

# Ex-ante and ex-post evaluation of the 1989 French welfare reform using a natural experiment : the 1908 social laws in Alsace-Moselle\*

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## Abstract

We use a combination of ex-ante and ex-post evaluation methods to evaluate a major welfare policy implemented in France in 1989. The policy granted an allowance (the Revenu Minimum d'Insertion, RMI, of up to 45% of the French full time minimum wage) to every individual above age 25 and below a threshold household income.

The ex-post evaluation relies on the specificity of the Eastern part of France. In Alsace-Moselle, since 1908 and during German occupancy, residents benefited from a very similar transfer system (called "Aide Sociale"). Our estimates, based on double and triple differences, show that the RMI policy was associated with: a 3% fall in employment (among unskilled workers 25-55 years old), leading to an estimated loss of 328 000 jobs; a decline in the job-access rate; and a 5-month increase in the average duration of unemployment. We find considerably larger disincentive effects for single parents. In a second step, we build and calibrate a matching model with endogenous job search effort, using the difference-in-differences estimates. It predicts that, if a 38% implicit tax rate had been maintained as in the 2007 reform (RSA), instead of a 100% implicit tax rate due to the RMI, the increase in unemployment would have been approximately half of its actual value, and the increase in the duration of unemployment would have been limited to only 2.5 months.

**Keywords:** welfare policies, difference-in-differences, labor supply, job search.

**JEL Classification:** J22.

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# 1 Introduction

Many European countries as well as some US states have experimented with giving direct cash transfers to the poorest families and individuals in society. These welfare policies are thought to be a straightforward way of alleviating poverty and, to some extent, the side effects of poverty, such as crime, underinvestment in education, and health problems.

However, these benefits may come at a cost. Such policies may cause disincentive effects with respect to employment and labor market participation. Transferring cash to poor households may discourage job search efforts and undermine work ethic. Answering these questions means understanding the negative income effect in labour supply curves, which several studies find evidence to support (see the comprehensive survey by Blundell and McCurdy 1999.)<sup>1</sup>.

In 1989, under the presidency of François Mitterrand, Michel Rocard's socialist government passed the RMI law (Revenu Minimum d'Insertion), which provided income support to all individuals above age 25 whose income fell below a certain threshold. The amount was initially 2000 French Francs (about 300 euros) for a single person, roughly 40% of the gross monthly minimum wage at the time (4,961.84 FF or about 800 euros), with additional benefits per dependent person in the household. Surprisingly, at the time of the 1989 reform and in subsequent years, few attempts have been made to evaluate the effects of the RMI on employment and unemployment. This may be explained by the lack of appropriate data, the absence of a convincing identification strategy, some theoretical shortcomings, and perhaps politics' disinterest in scientific arguments<sup>2</sup>.

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<sup>1</sup>During the 1980's, policies in many states and countries moved from welfare to workfare, where transfers are made conditional on working. Examples of workfare policies are either tax credits (such as the earned income tax credit (EITC) in the US or the WTC in the UK) or wage subsidies adding up to the net wage received by employers (such as the Self-Sufficiency project in Canada). The evaluation of these policies still amounts to knowledge of labor supply elasticities, but now the uncompensated labor supply elasticities with respect to wages must be estimated.

<sup>2</sup>Many studies had to overcome the lack of information about eligibility of potential RMI recipients and rely on proxies instead. The difficulty of obtaining a clear identification strategy is due to the fact that France is a centralized country where laws are implemented all over the territory: the design of appropriate control groups which could serve as counterfactuals, such as unaffected regions, is therefore difficult. The effects of major labor policies in France such as minimum wage changes, worktime reduction or payroll tax exemptions had to rely on creatively chosen control groups, for instance using variations in firm size, such as Crépon and Kramarz (2002) or Crépon et al. (2004). With regard to the lack of a fully-developed theory adapted to European labor markets, it is acknowledged that the measurement of disincentive effects of welfare policies traditionally relies on compensated and uncompensated elasticities of labor supply with respect to earnings, e.g. see Blundell and McCurdy (1999). However, in Continental Europe, and in France in particular, the existence of high rates of involuntary unemployment among the potential recipients implies that more complex models of labor supply are needed. Those models should take into account the existence of several labor market states, and in particular the existence of unemployment. Blundell and McCurdy (1999, pp 1686 to 1772) argued that the literature lacks a proper modelling of the process of job search and job matching.

In this paper, we attempt to overcome these many methodological difficulties in two ways. First, we show that regional variance can in fact be found in France. This variance comes not from the implementation of the RMI law, *but instead from the pre-1989 situation*. In particular, we make use of an interesting feature of French institutions: the Northeastern part of France (a region, Alsace, and a sub-region or “département”, Moselle) has had different institutions from the rest of the country since the end of the *XIX<sup>th</sup>* century. In particular, Alsace-Moselle has had a different social security system. This unique historical accident allows us to use a difference-in-differences framework to evaluate the reforms that were implemented differently in the rest of France. Alsace-Moselle can serve as a control group, while the rest of France can be used as the treatment group<sup>3</sup>.

Applying this strategy, based on double and triple difference estimates to control for different regional trends, we investigate the employment, unemployment and labor force participation effects of RMI, as well as the effects on job search and wages. We include a number of robustness checks and falsification exercises. We then calibrate key parameters of an extension of the three-state labor market model, such that the disincentive effects, according to the model and the difference-in-differences approach, are the same. Finally, we use the calibrated model to run a number of counterfactual policies, in particular the recent RSA reform. If that reform had been implemented counterfactually in 1989, our model suggests that the employment losses would have been reduced by 50 percent.

Our paper is organized as follows: In **Section 2**, we outline the RMI experiment in France, the regional implementation in Alsace-Moselle and additional local social policies, and briefly survey earlier policy evaluations of it. In **Section 3**, we describe the data and the empirical methodology. In **Section 4**, we provide the main employment and unemployment results and various additional robustness checks. In **Section 5**, we develop a job search model with social transfers and general equilibrium effects in order to replicate the various possible channels through which the RMI may affect employment and unemployment. We reach a number of predictions that fit the empirical findings. In **Section 6**, we then use the difference-in-differences results of Section 4 to calibrate our model, and we run a number of counterfactual experiments. **Section 7** concludes.

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<sup>3</sup>This identification strategy was successfully applied to the evaluation of another policy, the effects of the 35h workweek reform in 1998 in Chemin and Wasmer (2009).

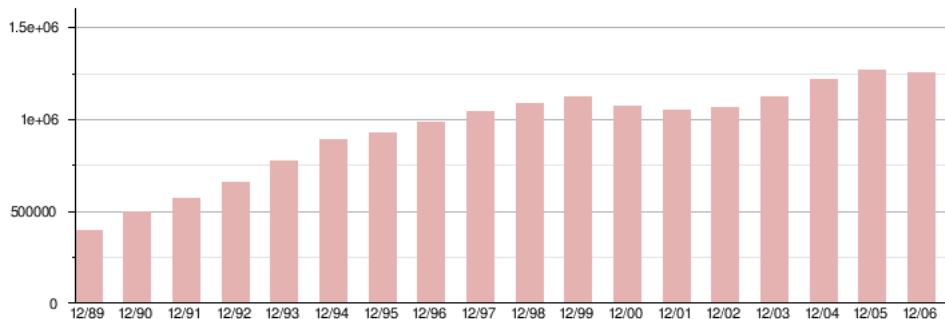


Figure 1: Beneficiaries of the RMI

## 2 Description of the policy and its regional implementation

### 2.1 The RMI: context and design

In the early 80's, after the second oil shock of 1979, France realized it was now permanently affected by mass unemployment and in particular long-term unemployment. Poverty rose and in 1985, an initiative called “Restaurant du Coeur” was launched by a famous humorist and actor (Coluche) to provide free food to families in the need. In French politics, the need of a better safety net became obvious. In 1989, the French Parliament voted in favor of the RMI (Revenu Minimum d’Insertion): any citizen above 25 years old, living in a household earning less than a given income threshold, became eligible for an allowance amounting to a large fraction of the minimum legal wage<sup>4</sup>. RMI recipients received 2000 French Francs (FF hereafter), that is 40% of the monthly full-time gross minimum wage at the time. The allowance was increased by 50% for a two-persons household and 30% for each additional dependent person. Almost all members of the Parliament (left and right) voted in favor of the law<sup>5</sup>. Figure 1 shows that take-up was gradual among beneficiaries, with approximately 1.25 million people benefiting from the RMI in 2006.

With the allowance came the requirement to sign an insertion contract (“Contrat d’Insertion”), which specified concrete steps taken by the beneficiary to find a job (counselling, training program, support from national employment agencies and local public administration). In defending the law on Oct. 4, 1989, Minister Claude Evin thus described the two objectives of the reform: solidarity (in France, at the time, 600 000 long-term unemployed had income less than 2000 FF and 400 000 of them were no longer

<sup>4</sup>Law n° 88-1088, December First 1988.

<sup>5</sup>Only three opposed and 24 abstained, out of 585 members of the Parliament.

covered by social security); and individual responsibility (the “Contrat d’Insertion” aimed at reinserting individuals into the labor market). The RMI policy was initially presented as a mix of welfare and workfare: the transfer would be made conditional on an objective of ‘insertion’ into employment and society, thanks to counselling, provision of incentives and housing allowance.

However, the insertion contract was not always enforced. In fact, only 60 percent of recipients signed (Zoyem, 2001). The President of the Parliament Commission in charge of the examination of the law, MP Jean-Michel Belorgey, even argued that it would be unthinkable to cut benefits to those unable to get a job, given that failure to find work may be due to “deficiencies of the public administration” in re-inserting recipients into the labor market.

Several academic works, including Gurgand and Margolis (2001, 2005), pointed out that the gains from activity may be small for many RMI recipients. This phenomenon is known as a poverty trap: that is, an implicit marginal tax rate of 100%, or even higher, for RMI recipients who obtain a job. In addition, jobs taken by RMI recipients were generally low-paying, on average 610 euros per month according to Rioux (2001). Piketty (1998) highlighted women’s high labor supply elasticities and the disincentive effects of policies such as RMI and family transfers. In an effort to mitigate this, partial reforms were implemented in 1998, 2000 and 2001 (Hagnéré and Trannoy, 2001) to raise the incentives to work. Despite the warnings, the RMI rapidly became the largest welfare program in France: in December 2007, the RMI was distributed to 1.16 million recipients, roughly the total number of unemployed workers.

Policy debates gradually came to the consensus that the “insertion component” of RMI had not succeeded, even though few explicitly recognized the disincentive effects. In theory, such effects should exist: the RMI was indeed a “differential allowance”. After a transition period, all income from activity led to an equivalent decrease in the amount of the allowance, leading to a 100% effective marginal tax rate. In some cases, the marginal hours worked would reduce the income of RMI recipients, given the cumulated loss of RMI and other social transfers. To limit the disincentive effects of this 100% implicit marginal tax rate of labor income, which in some cases would be even larger due to the loss of additional social transfers (free public transportation in some regions such as Ile de France, rebates of 10 euros on monthly telephone bills in France Telecom, and so on), the initial transition period during which RMI and labor incomes could be cumulated was then extended from 3 months to 12 months in the 2000’s. According to Hagnéré et Trannoy (2001), after 1998, the first three months of labor income would not be counted into the determination of the level of RMI, and the next 9 months would be counted with a rebate of 50%, leading to a smaller effective marginal tax rate during this transition period. Nevertheless, after the one year period, the marginal rate of taxation would increase again to 100%.

In 2007, another major reform led by Martin Hirsch (Haut Commissaire aux Solidarités Actives) took stock of this debate and introduced better incentives: for the marginal

hours worked, the new scheme (RSA, standing for Revenu de Solidarité Active) transformed each additional euro of labor income into 0.62 euro of additional net income, equivalent to a much lower 38% effective marginal tax rate. The RSA combined the RMI (*RSA socle*) and a complement, proportional to the additional labor income (*RSA chapeau*).

## 2.2 Alsace-Moselle : “aide sociale”

A system (“aide sociale”) similar to the RMI, at the city level, was already in place in Alsace Moselle. Since 1908, all municipalities in Alsace-Moselle were required to provide assistance to impoverished citizens<sup>6</sup>. For instance, in the main city in Alsace (Strasbourg), the allowance for a single eligible person amounts to 65% of the gross minimum wage (Kintz, 1989). It was also more generous than the RMI in that it concerned all individuals above 16 years old<sup>7</sup>.

After the introduction of the French RMI in 1989, municipalities in Alsace-Moselle may still provide an allowance to poor individuals, but this allowance reduces the RMI given by the state (Woehrling, 2002)<sup>8</sup>. Consequently, after 1989, cities in Alsace Moselle have a direct incentive to stop providing this “aide sociale”, as emphasized by Woehrling (2002). Poor individuals qualify for welfare payments in Alsace Moselle and the rest of France after 1989, but only in Alsace Moselle before 1989. This provides an opportunity for a difference-in-difference analysis before and after 1988, between Alsace Moselle and the rest of France, in order to evaluate the impact of the RMI.

Of course, one may argue that Alsace-Moselle is *different* due to the existence of other regional specificities. In Figure 2, Alsace-Moselle is represented by the three “départements” labeled 57, 68 and 67. They are in the top east corner of France, and happen to be the only to be ones with a border with Germany.

This has at least one undesirable consequence for the econometric identification: since the pattern of trade between Germany and France is not homogeneous on French

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<sup>6</sup>“Lois locales des 30 mai 1908 et du 8 novembre 1909”. [http://www.lexisnexis.com/fr/droit/search/runRemoteLink.do?bct=A&risb=21\\_T4090933869&homeCsi=303228&A=0.7883780303835484&urlEnc=ISO-8859-1&dpsi=0ARX&remotekey1=DOC-ID&remotekey2=685\\_EN\\_AL0\\_64685FASCICULEEN\\_1\\_PRO\\_018548&service=DOC-ID&origdpsi=0ARX&level=1&duRemote=true](http://www.lexisnexis.com/fr/droit/search/runRemoteLink.do?bct=A&risb=21_T4090933869&homeCsi=303228&A=0.7883780303835484&urlEnc=ISO-8859-1&dpsi=0ARX&remotekey1=DOC-ID&remotekey2=685_EN_AL0_64685FASCICULEEN_1_PRO_018548&service=DOC-ID&origdpsi=0ARX&level=1&duRemote=true). French central state never abolished the various local social laws including this specific one, and even recognized officially the Alsace-Moselle specificity in a law text in 1924. See Chemin and Wasmer (2009).

<sup>7</sup>According to Kintz (1989), in Strasbourg there are 13 000 persons covered by the subsidies for an amount of near 3 millions euros. In some other cities, e.g. Colmar, in-kind allowances are distributed to those in need. A decree-law from 1938 excluded foreigners. This disposition, according to Kintz (1989) is not really applied and in any event cannot legally be applied to European Union citizens. Kintz also argue that the system is much less known in the “département” of Moselle.

<sup>8</sup>The amount of RMI given is equal to a minimum revenue of approximately 450 euros minus income.



Figure 2: Map of France

territory, but instead depends on distance to the border as any gravity model predicts, it is quite likely that Alsace-Moselle is disproportionately affected by the German economic cycle when it differs from the French economic cycle. In such a case, any comparison of “before and after” in Alsace-Moselle and the rest of France will be contaminated by spillover effects. To solve this difficult issue, we will need to do several additional comparisons with unaffected groups in both Alsace-Moselle and the rest of France. These amount to falsification exercises or triple differences, combining the difference-in-differences results of the affected and unaffected.

### 2.3 Other local transfers

In the early discussion of the law, Claude Evin noted that some places in France had already implemented a type of social help. He gave the example of two départements (Ile-et-Vilaine, dept #35, in Brittany, and Territoire de Belfort, dept #90, next to Alsace) and cities (Besançon, in Doubs, dept #25, next to Territoire de Belfort ; Grenoble, in Isère, dept #38, in French Alps). Interestingly enough, neither he nor the Rapporteur of the project, Belorgey, mentioned Alsace and Moselle social laws, despite the evident importance of local social laws in the region. Kintz (1989) recalls that “local social aid is one of the less known sector of local laws in Alsace-Moselle and points out some errors or omissions about the local system in the early discussions at the French Parliament”.

## 2.4 A survey of the literature

A comprehensive survey of the RMI and the debate regarding its evolution during its first decade can be found in L'Horty and Parent (1999). In addition to the papers already cited in Section 2.1, the existing literature points to the strong disincentive effects of the RMI. Rioux (2001) finds that RMI recipients search for a job less than the unemployed not receiving benefits. Using case studies, Gurgand and Margolis (2001) find that gains from finding a job are low for RMI recipients. In particular, more than half of single mothers would see their income decrease if they were to take a job. Zoyem (2001) showed that 40% of RMI recipients never signed a “contrat d’insertion sociale ou professionnelle”, the contract specifying the path towards insertion. He also showed that the transition through those contracts for the other 60% only had marginal effects on job placement: he only found a significant effect on placement in subsidized jobs (local public services or local administrations) and insignificant effects on placement into temporary or permanent private sector jobs.

Terracol (2009), using data on the French part of the European Community Household Panel, managed to calculate the eligibility of recipients and found adverse effects of eligibility on finding a job in a duration model. Bargain and Doorley (2009), using a regression discontinuity approach based on age – childless adults below 25 are not eligible – also found strong effects on employment, a -7 to -10% employment effect for uneducated men. Overall, the literature shows disincentive effects, despite partial reforms to reduce poverty traps (Hagnéré and Trannoy, 2001)<sup>9</sup>.

## 3 Empirical methodology

Given the literature described above and simple theoretical reasoning, one may be willing to test whether the RMI has the following effects:

1. A decline in the search effort of job seekers, all the more when available jobs are part-time.
2. A decrease in employment due to a wage-push effect of the policy.
3. A rise in unemployment due to lower effort and lower job creation.
4. An increase in the number of unemployed coming from inactivity due to “labeling effects”. That is, non-searching workers claiming RMI benefits and falsely counted as unemployed.

To investigate these effects, we compare the more than 25 years old to the less than 25 years old (not affected by the RMI), in the rest of France compared to Alsace-Moselle,

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<sup>9</sup>In 1998 and 2001, the transitory period during which a cumul of labor earnings and social minima was allowed (initially 3 months) was extended. After 2000, the amount of the housing allowance was calculated without taking into account a part of the labor earnings below the RMI. Finally, the “Prime pour l’Emploi” (a moderate wage subsidy enacted through the tax system, with a negative income tax component) was introduced in 2001.



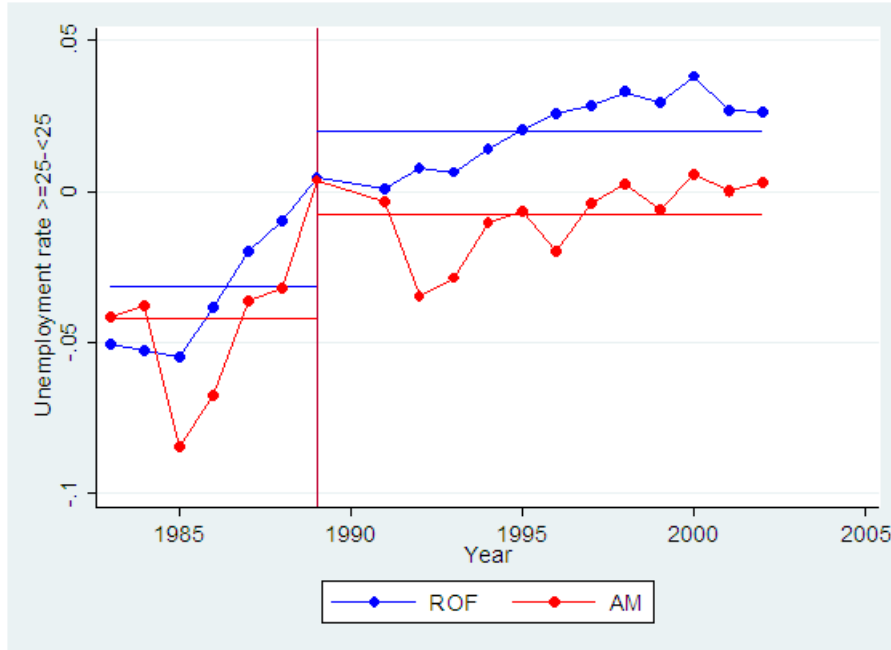


Figure 3: Unemployment rate differences between the 25 years old and the less than 25 years old, in the the Rest of France (ROF, in dark blue) and Alsace Moselle (AM, in light red)

before and after 1989. Figure 3 shows the evolution of the difference in unemployment rates between the more than 25 years old, and less than 25 years old.

The rest of France and Alsace-Moselle are on similar trends before 1989. However, starting in 1989, unemployment rates of the more than 25 years old increases more in the rest of France than in Alsace Moselle. Results are similar for employment rates in Figure 4.

The rest of France and Alsace Moselle are on similar trends prior to 1989. However, after 1989, employment rates for the 25 years old in Alsace Moselle are on average closer to those in the rest of France, pointing to negative effects of the RMI on employment.

To investigate the statistical significance of these results, we turn to regression analysis, and consider many variables: the transitions between labor market states, job search activity, wages and finally the evolution of employment rates, unemployment rates and non-participation. We compare the rest of France after 1989, relative to the rest of France before 1989, compared to the similar evolution in Alsace Moselle.

First, we focus on transitions from unemployment and out of the labor force (U and N) in year  $t - 1$  to employment in year  $t$ , for individuals who would be eligible to the RMI in year  $t$ , based on their status in year  $t - 1$ . More specifically, there are two conditions to determine eligibility to the RMI. The first condition stipulates that the

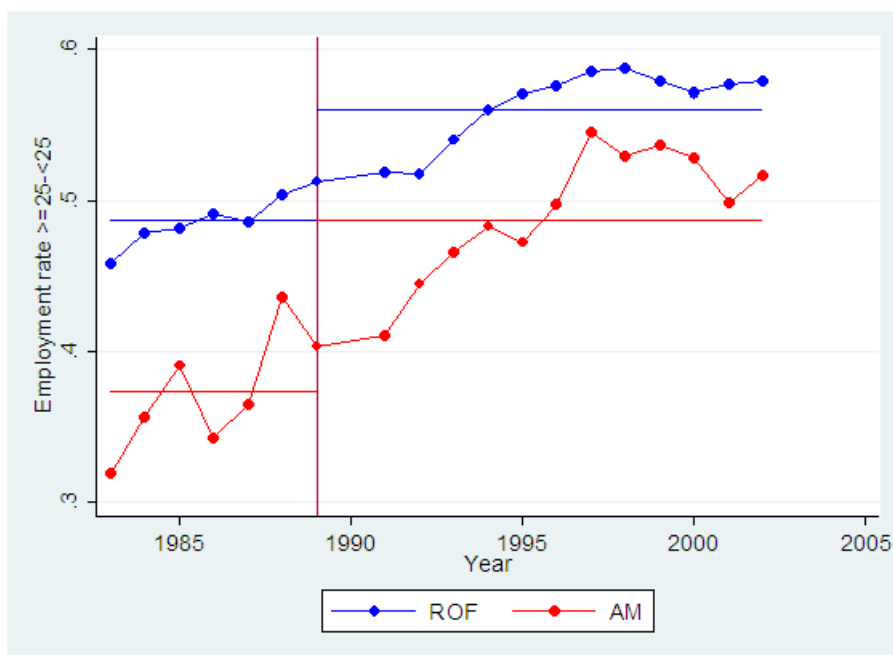


Figure 4: Employment rate differences between the 25 years old and the less than 25 years old, in the the Rest of France (ROF, in dark blue) and Alsace Moselle (AM, in light red)

individual must be more than 25 years old. The second condition states that quarterly total household income<sup>10</sup> must be inferior to a certain level<sup>11</sup>.

To obtain information on a certain individual the year before, we use the longitudinal nature of France's Labor Force Survey, the *Enquête Emploi*. This survey is collected every year in March. The random and representative sample is partly renewed every year: only a third of the households in the sample are surveyed again the next year, and overall each household is interviewed three times. In this paper, we keep all the individuals for which we have information the year before. This represents 1,539,167 such individuals between 1982 and 2002 (see Appendix Table 1 for descriptive statistics of this sample). Given our identification strategy, which is based on three "départements" representing a relatively small fraction of France, the Labor Force Survey represents the best possible data, because its size allows for a large enough control group.

We then focus on eligible, i.e. low income, households. In France, the duration of unemployment benefits was calculated on the basis of tenure in the previous job. In particular, in 1989, individuals are granted a proportion of their past income during 3, 15, or 30 months, if they have worked respectively 4, 8, or more than 12 months in their past job (Daniel, 1999). One can thus safely assume that an individual more than 24 years old, AND in a low-income household, AND who has been unemployed for more than 20 months **the year before** or is out of the labor force, is eligible for the RMI **a year after**, i.e. 12 months later, if he remains unemployed, as his unemployment insurance runs out.

The drawback of this strategy is that we only observe income in the previous year, and not in the previous quarter. Hence, the eligibility is subject to measurement error. An implication of this is that the effects we will estimate in the regression analysis are likely to be underestimating the true coefficients. We will therefore need to interpret our results as a possible lower bound of our estimates<sup>12</sup>.

In this sample, we find 44,663 individuals of more than 24 years old, AND in a low-income household, AND who have been unemployed for more than 20 months or out of the labor force **the year before**. Note that these individuals are eligible to the RMI

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<sup>10</sup>Total income includes income from all possible sources (wage, bonus, in-kind payments, unemployment insurance, "allocations familiales", "allocations logement", profit from firms or agricultural exploitation, pensions, real estate revenues, alimonies, unemployment insurance).

<sup>11</sup>The maximum RMI amount in 1989 is 2000FF/month for a single individual. It is re-evaluated by decree every year. We collected these decrees for every year after 1989. However, there was no RMI before 1989. To determine the maximum RMI amount that could have been obtained before 1988 (and thus a theoretical eligibility had the RMI been instituted), we deflate the 1988 maximum RMI amount by the Consumer Price Index. Indeed, L'Horty et al (1999) discuss the indexation of the RMI based on the consumer price index in France.

<sup>12</sup>In this sense, we follow the earlier papers such as Piketty (1998) who used the Labor Force Survey. We have less precise data than in Terracol (2009) who uses the French data of the European Community Panel with detailed information of monthly income. However, this panel only starts in 1994 and is not appropriate for our identification strategy, beyond the too limited sample size in Alsace-Moselle.

in year  $t$  only if  $t \geq 1989$  in the rest of France, as the RMI was enacted in 1989. In contrast, such individuals are eligible to the RMI for all years  $t$  in Alsace-Moselle, as the RMI is available in Alsace Moselle before (under the form of the “aide sociale”) and after 1989. In this paper, we compare the transitions back to employment of these eligible individuals before and after 1989, in the rest of France compared to Alsace-Moselle.

The disincentive effects of the RMI, if they exist, imply that individuals are less likely to get a job if they can benefit from the RMI. Thus, we should see fewer transitions back to employment for eligible individuals in the rest of France after 1989, relative to the rest of France before 1989. We should observe no differences in Alsace Moselle in the extent of these transitions before and after 1989, as the RMI is available to eligible individuals before and after. Thus, Alsace Moselle is an ideal control group for the rest of France. This forms the basis of a difference-in-differences analysis. Formally, we will perform regressions of the following form:

$$\Delta employment_{ijt} = \alpha_j + \beta_t + \gamma_1(Rest\_of\_France) * (After1989)_{ijt} + \theta X_{ijt} + u_{it} \quad (1)$$

where  $i$  corresponds to individual  $i$ ,  $j$  to department  $j$  and  $t$  to year  $t$ . The dependent variable  $\Delta employment_{ijt}$  is a dichotomous variable equal to 1 if the individual is working at time  $t$ , 0 otherwise. It may be interpreted as a transition from unemployment or inactivity (U and N) to employment, as we focus on individuals unemployed or out of the labor force at time  $t - 1$ .  $\alpha_j$  are department fixed effects (95), and  $\beta_t$  are year fixed effects (20).  $(Rest\_of\_France) * (After1989)_{ijt}$  is an interaction term between the two following dichotomous variables.  $Rest\_of\_France_j$  is a dichotomous variable that takes the value 1 if individual  $i$  resides in the rest of France, 0 otherwise.  $After1989_t$  is a dichotomous variable that takes the value 1 if individual  $i$  is interviewed after 1989, 0 otherwise. The coefficient of interest is  $\gamma_1$ , which measures the relative increase in transitions to employment for individuals in the rest of France after the reform. Additionally, 22 control variables (5 age dummies, sex, household size and 15 diploma dummies) are included in the analysis. Standard errors are clustered at the level of the department to account for serial correlation within department, the unit at which the reform is implemented (Moulton, 1990), that may arise in a difference-in-differences estimation (Bertrand et al, 2004).

## 4 Results

### 4.1 Preliminary investigation: double-difference results

Table 1 looks at the impact of the RMI on transitions, search effort, stocks, and wages, based on double difference. The next sub-section provides additional causal evidence based on triple differences. In column (1), the sample is restricted to individuals more

than 24 years old, AND in a low-income household, AND who have been unemployed for more than 20 months, or out of the labor force, in year  $t - 1$ ; in other words eligible to the RMI in year  $t$ . The coefficient  $\gamma_1$  of the variable “Rest of France\*After year 1989” reflects the effect of the RMI on the hazard rate into employment. This coefficient is large and negative: it is equal to -0.04, meaning that the probability of finding a job is 4 percentage points lower for an eligible individual in the rest of France after 1989, relative to a similar eligible individual in the rest of France before 1989, compared to the same evolution for eligible individuals in Alsace-Moselle before and after 1989. This result is statistically significant at the 1 percent level. This is suggestive of disincentive effects: individuals with access to the RMI are less likely to get back to work. This 4 percentage point decrease is a sizeable effect, considering that only 10 percent of such individuals get a job.

In column (2), the coefficient is also large and significantly negative on transitions from U to E. This could be due in part to a composition effect of the pool of the unemployed itself, which we term the “labeling effect”: individuals not searching, that is, theoretically out of the labor force, may have had an incentive to falsely declare themselves unemployed, either because they felt this would help obtain the RMI or because of a feeling of guilt with respect to the interviewers.

To investigate, at least in part, the existence of this phenomenon, we may look at transitions from N to U. In column (3), the sample is restricted to out of the labor force individuals, more than 24 years old, in a low-income household in year  $t - 1$ ; in other words eligible to the RMI in year  $t$ . The dependent variable is a dichotomous variable, equal to “1” if the individual is unemployed, “0” otherwise. The coefficient is positive but not significant, which points to a weak “labeling effect”. This change in the composition of the pool of the unemployed due to false declaration about job search activity and false labeling of Labor Force Statistics may therefore not be the main reason behind the lower hazard rate.

Column (4) looks at search effort of the unemployed workers. The dependent variable in column (4) is the change, from one year to the next, in a dichotomous variable, equal to “1” if the individual has placed an ad, or responded to an ad in a newspaper or on a notice-board<sup>13</sup>. The sample in column (4) is the long-term (more than 20 months) unemployed in a low income household a year before. Search effort decreases, but not significantly so.

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<sup>13</sup>There are generally two ways to search for a job. First, an individual may place an ad, or respond to an ad, in a newspaper or on a notice-board of the governmental organizations (ANPE). This option is chosen by 32 percent of the individuals looking for a job in France. Second, an individual may pursue a more proactive approach, by registering in a temporary work agency, contacting directly employers, or looking for a job through personal relationships. 99 percent of the individuals follow (or at least self-report that they follow) this option. Considering the low variability in the second option, we prefer to focus on the first option, i.e. placing or responding to an ad in a newspaper or on a notice-board. We find no effect of the RMI on the more proactive ways to search for a job.

Columns (5) and (6) look at the stocks of employed and unemployed. The sample is restricted to the unskilled workers (high school dropouts). In column (5), the dependent variable is a dichotomous variable, equal to “1” if the individual is employed, “0” otherwise. The probability of being employed decreases by 4 percentage points. This indicates strong disincentive effects on unskilled workers. Column (6) indicates that unemployment rises. Column (7) looks at wages, and finds no significant impact on wages.

Table 1 has presented evidence that the RMI is associated with quite strong disincentive effects. The results are based on simple difference-in-differences analysis between the rest of France and Alsace-Moselle, before and after 1989. The main assumption on which this analysis relies is the “common time effects” assumption: to interpret causally the difference-in-differences coefficient, one needs to assume that the treatment and control group are on the same time trend. In other words, the rest of France would have evolved the same way Alsace-Moselle did had the RMI not been implemented. This is certainly a strong assumption considering some inherent characteristics of Alsace Moselle, for example, its close proximity to Germany, which may have experienced an economic upturn over the same period.

## 4.2 Benchmark estimates: triple differences

We address this concern by performing triple differences. We use the individuals less than 25 years old, as a category knowingly not affected by the RMI. The RMI only applies to individuals above 25 years<sup>14</sup>, whereas “aide sociale” in Alsace Moselle applies to individuals of more than 16 years old. This means that individuals less than 24 years old a year before are not affected by the RMI in France, and are affected by the “aide sociale” in Alsace Moselle, before and after 1989. Using the less than 25 years old in a triple differences analysis is a strong test of the “common time effects” assumption. The “common time effects” assumption is replaced by a new, less demanding, one: that individuals below or above 25 years old are subject to the same relative trend in Alsace-Moselle with respect to the rest of France.

The sample in Table 2 includes individuals aged above and below 25 years old. We define “More than 25” as a dichotomous variable equal to “1” if the individuals is more than 25 years old, “0” otherwise. We then interact this dichotomous variable with all variables contained in the difference-in-differences analysis of equation (2), i.e.  $(Rest\_of\_France) * (After1989)_{ijt}$ , the department and year fixed effects. The coefficient of interest is now in front of  $(Rest\_of\_France) * (After1989) * (More\_than\_25)_{ijt}$ , a triple differences coefficient.

Column (1) shows that the probability to find a job is 7 percentage points lower

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<sup>14</sup>It also applies to individuals below 25 but with dependent children and an income level below the threshold. This very rarely happens in the data.

after the RMI was implemented in France. This is in contrast to the individuals less than 25 years old, who did not experience such a decrease. Columns (2) to (7) replicate the analysis performed in Table 1, but in a triple differences framework. Consistent with Table 1, Table 2 shows a negative impact on transitions from U to E (column (2)), no impact on transitions from N to U (the “labeling effect” in column (3)), a decrease in search effort (column (4)). The probability to be employed decreases (column (5)), while the probability to be unemployed increases (column (6)). No such effect is found on wages as indicated in column (7).

These effects are large in magnitude. For example, column (1) indicates a seven percentage point decrease in the probability of transitioning to employment from unemployment or from being out of the labor force. Appendix Table 1 shows that such individuals represent 5 percent of the unskilled population between 25 and 55 years old, or approximately 15 million people.<sup>15</sup> The RMI thus caused 52,500<sup>16</sup> people to remain unemployed or out of the labor force because of disincentive effects. Column (6) shows a 3 percentage point reduction in total employment. Considering that 73 percent of the total population is employed, this represents 328, 500 individuals<sup>17</sup>.

### 4.3 Heterogeneous effects

Table 3 looks at the impact of the RMI more specifically on part-time workers and on different household compositions.

Column (1) shows the full sample result (as in of column (1) of Table 2). Column (2) instead restricts the analysis to part-time workers. The dependent variable is a dichotomous variable, equal to “1” if the individual is employed part-time, “0” otherwise. The RMI has an effect on part-time work but not full-time work, as seen in column (3). This is expected since the disincentive effects are stronger for part-time work than for full-time work.

Column (4) to (7) restrict the sample to different household compositions (single persons, single parents, couples without children, couples with children). Column (5) indicates that the effect of the RMI is mostly felt by single parents, a fact consistent with the existing literature (e.g. Piketty 1998, Gurgand and Margolis 2001).

### 4.4 Other checks: robustness and falsification

The methodology is simple and transparent and can therefore be extended along several dimensions. For the sake of concision, we will place several additional tables in the

<sup>15</sup>Source: [http://www.insee.fr/fr/themes/tableau.asp?reg\\_id=0&ref\\_id=NATnon02150](http://www.insee.fr/fr/themes/tableau.asp?reg_id=0&ref_id=NATnon02150) Répartition de la population par sexe et âge au 1er janvier 2011. Insee, estimations de population (résultats provisoires arrêtés fin 2010).

<sup>16</sup> $7\% \cdot 5\% \cdot 15$  millions.

<sup>17</sup> $3\% \cdot 73 \cdot 15$  millions.

Appendix (Appendix Tables 2 to 4) and only briefly describe the results. First, we vary the duration of the unemployment spell to show that the results are not sensitive to the particular measure of eligibility used, or the focus on individuals having been unemployed for more than 18 and 22 months the year before. The results remain very similar (see results in Appendix Table 2). We also removed the 22 control variables (5 age dummies, sex, household size and 15 diploma dummies), with no change in the results: the results are not particularly sensitive to the particular set of control variables used.

A concern with this estimation is the long time frame used. We use the *Enquête Emploi* from 1982 to 2002. This long time span is advantageous because it gives a large sample size, but the drawback is the possibility that many other things could have happened in the rest of France compared to Alsace Moselle over this period. We thus restricted the sample from 1985 to 1995. Results are robust to this restricted sample.

We then perform a falsification exercise by looking at a period slightly before the enactment of the RMI, in column (6) of Appendix Table 2. For instance, we focus on the period 1984-1985, and look at the interaction term  $(Rest\_of\_France) * (After1985)_{ijt}$ . There was no RMI in France before or after 1985, while there was the “aide sociale” in Alsace-Moselle over the same period. Thus, we should see no significant difference-in-differences coefficient, as there has been no change in the rest of France over the period. Indeed, the difference-in-differences coefficient of this regression are not significantly different from zero. This indicates that the individuals considered, i.e. more than 24 years old, AND in a low-income household, AND with no household members earning unemployment insurance, AND who have been unemployed for more than 20 months, or are out of the labor force, in year  $t - 1$ , evolve in a same manner in the rest of France or in Alsace-Moselle, in a period preceding the enactment of the RMI.

We also remove in column (7) the départements of Ile-et-Vilaine (35), Doubs (25), Territoire de Belfort (90), and Isere (38) from the sample as some sort of “aide sociale” already existed in some of their municipalities, as explained in Section 2.3; and results do not change.

We finally present another triple differences analysis. Focusing on individuals that are more than 24 years old, AND unemployed for more than 20 months or out of the labor force, in year  $t - 1$ , but who live in a household whose members earn more than the maximum RMI amount, we obtain a group of individuals similar in many dimensions to the eligible individuals, but they are ineligible to the RMI in year  $t$ . In column (8) of Appendix Table 2, we find no impact on the transitions back to employment of these individuals, before and after 1989, in the rest of France compared to Alsace-Moselle. Column (9) performs a triple difference analysis using these two categories of individuals. We define “Long term-low income a year before”, as a dichotomous variable equal to “1” if the individuals is more than 24 years old, AND in a low-income household, AND with no household members earning unemployment insurance, AND who has been unemployed for more than 20 months or out of the labor force, in year  $t - 1$ , “0” if the



individual is more than 24 years old, AND in a high-income household, AND who has been unemployed for more than 20 months, or out of the labor force, in year  $t - 1$ . We interact this dichotomous variable with all variables contained in the difference-in-differences analysis, i.e.  $(Rest\_of\_France) * (After1989)_{ijt}$ , the department and year fixed effects. Column (9) shows that eligible individuals experience a 3 percentage point decline in their probability of returning to work due to the RMI.

## 4.5 Regression discontinuity design

Following Lemieux et al. (2008) in response to Fortin et al. (2004), we also perform a regression discontinuity design to estimate the impact of the RMI on employment. After 1989, in the rest of France, only individuals more than 25 years old were eligible to the minimum income. We use this sharp discontinuity to compare the employment probabilities of individuals just above 25 years old compared to those just below 25 years old. As opposed to the difference-in-differences estimator, we do not need to make assumptions about the comparability of the treated group to a control group that is temporally or geographically distinct (Lemieux et al., 2008). A regression discontinuity design controls for the changing macroeconomic environment. Conditional on the assumption that individuals do not manipulate their age to benefit from the minimum income, being more or less than 25 years old at the time of the survey is essentially random (Lee, 2008). Following Lemieux et al. (2008), we focus our analysis on high school dropouts<sup>18</sup>. We perform regressions of the following form:

$$employment_{ijt} = \alpha_j + \beta_t + \gamma_1(More\_than\_25)_{ijt} + \delta(age) + \theta X_{ijt} + u_{it} \quad (2)$$

where the dependent variable  $employment_{ijt}$  is a dichotomous variable equal to 1 if the individual is working at time  $t$ , 0 otherwise. The variable of interest is “More than 25”, a dichotomous variable equal to “1” if the individual is more than 25 year old, “0” otherwise. We also include a continuous function of age  $\delta(age)$  in the regression to capture the impact of age on employment. The intuition of the regression discontinuity design is that there is no reason to expect an abrupt change in employment probabilities at 25 years old, other than through the eligibility to the minimum income. The identification assumption is violated if people can “cheat” on their age. This problem is unlikely to occur since the true age can be easily verified by the authorities (Lemieux et al., 2008).

Results are reported in Appendix Table 3. In columns (1) to (3), the sample is restricted to individuals in the rest of France, after 1989, and in a 5-year window around the age of 25 years old (between 19 and 30 years old). Column (1) includes a cubic specification for age. An individual who just turns 25 experiences a 3 percentage points decrease in its probability to be working. This result is statistically significant at the 1 percent level.

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<sup>18</sup>85 percent of the beneficiaries of the minimum income are high-school dropouts.

Columns (2) and (3) show that the coefficient is the same when controlling for département fixed effects, and year fixed effects (column (2)), and for the sex of the individual, the household size, and education dummies (column (3)). Column (4) shows that the result is not sensitive to the choice of the 5 year window by expanding the window to 7 years around the age of 25 years. Column (5) is based on a local linear regression with the discontinuity based on age, and reports estimates of a significantly negative coefficient<sup>19</sup>.

Falsification exercises are presented in columns (6) to (8). Column (6) restricts the sample to high school dropouts, in the rest of France, before 1989, and in a 5-year window around the age of 25 years old (between 19 and 30 years old). There was no minimum income in the rest of France before 1989. Thus there should be no systematic difference between individuals just above or just below 25 years old. This is indeed what is found in column (6). Columns (7) to (8) performs the same analysis in Alsace-Moselle. The “aide sociale” in Alsace-Moselle operates a different cut-off rule: individuals have to be aged more than 16 years old to be eligible to “aide sociale”. Thus there should be no systematic differences in Alsace-Moselle between individuals just above or just below 25 years old, before or after 1989. This is indeed what is found in column (7) (after 1989), and in column (8) (Before 1989).

These regression discontinuity design estimates are similar to the difference-in-differences estimate found in previous sections. This reinforces the confidence one might have in these results.

## 4.6 Alternative explanations

The negative effect on employment could be due to the fact that the RMI would allow beneficiaries to be more demanding about the quality of the job they are looking for. It would thus take them longer to find such a job. If it is the case, then a negative employment effect in the short run might be balanced by a positive effect in the long run. We test this mechanism by looking at two measures of job requirements by job searchers.

The dependent variable in column (1) of Appendix Table 4 is a dichotomous variable, equal to "1" if the individual is looking for a permanent job, "0" if the individual is looking for a temporary job. No effect of the RMI is found on these different kinds of jobs, indicating that the mechanism cited above is not at play. The dependent variable in column (2) is a dichotomous variable, equal to "1" if the individual is demanding in his search, "0" otherwise. Being demanding is defined from a question on the nature of the job searched. Respondents indicate if they are searching for a full-time job exclusively

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<sup>19</sup>A bootstrap method was used to estimate the statistical significance of the estimate. 1,000 observations were selected at random, and used to estimate the RDD coefficient with local linear regressions. This was repeated 100 times. The coefficient is deemed significantly negative at x% if it is positive less than x% of the times.

(not part-time), a part-time job exclusively (not full-time), a full-time job but would accept a part-time job, a part-time job but would accept a full-time job. The first two answers correspond to a demanding job seeker, while the last two answers correspond to a more flexible job seeker. We found no impact of the RMI on the last two questions, therefore no impact on the proportion of flexible job seekers.

Finally, partial reforms were implemented between 1998 and 2001<sup>20</sup>. To quantify their impact, one may reproduce the Regression Discontinuity Design analysis performed in Appendix Table 3 to a period before and after 2000. Column (3) restricts the sample to individuals in the rest of France, after 1989, and before 2000, and in a 5-year window around the age of 25 years old (between 19 and 30 years old), while column (4) restricts the sample to individuals in the rest of France, after 2000. The RDD analysis finds no significant difference in the coefficients before and after 2000, pointing to the relative inefficacy of these partial reforms.

## 5 Model

In this section, we build a search and matching model based on a simplified version of Garibaldi and Wasmer (2004)<sup>21</sup>, which will be calibrated using the previous difference-in-differences results and then used to analyse counterfactual policies. We apply it to the segment of the labor force where individuals have low skills and earn the minimum wage.

### 5.1 Setup

Time is continuous, individuals and firms are risk-neutral and discount the future at rate  $r$ . Individuals consume their income and face some utility costs from working or searching for a job. Employed workers work  $h$  hours at the monthly minimum wage  $w$ , where  $h$  is not a choice variable for individuals but instead a parameter. This parameter is expressed as a fraction of a full-time job (39 hours per week at the time). The amount of RMI transfer to an individual working  $h$  hours is denoted by  $rmi(h)$ . The maximum amount of the transfer is for individuals who are not working:  $rmi(0) = \alpha w$  where  $\alpha$  is the ratio of the value of the RMI to the minimum wage  $w$ , approximately equal to 0.45.

Job search effort is denoted by  $e$  and job search effort of “inactive” workers is assumed to be zero. We assume that the cost of search effort is  $\psi(e)$ , and is an increasing and

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<sup>20</sup>As described in Section 2, the transitory period for a possible cumul of labor earnings and social minima was extended in 1998 and 2001. In 2000, the housing allowance was made partly unconditional to the RMI. An employment subsidy (Prime pour l’Emploi) was enacted in 2001.

<sup>21</sup>In the 2004 paper, the authors introduced participation decisions at the extensive margin in a search-matching model à la Pissarides (2000). In the current work, we use the benchmark structure of the model and introduce continuous job search effort.

convex function of effort. Similarly and to save notations, the disutility of working  $h$  hours is denoted by  $\psi(h)$ . The RMI recipients are supposed to be unemployed and actively searching, but are not eligible for unemployment insurance<sup>22</sup>.

Hence the flow utility of individuals in the three respective states E (employment), U (unemployment, ineligible for unemployment insurance, e.g. long-term unemployed and only covered by RMI) and N (not in the labor force) is as follows:

$$\begin{aligned} \text{E: } v_e &= hw + rmi(h) - \psi(h) \\ \text{U: } v_u &= rmi(0) - \psi(e) \\ \text{N: } v_n &= rmi(0) \end{aligned}$$

We will assume that the introduction of the RMI acts as an increase in  $\alpha$  from 0 to 0.45 leading to a rise in  $\nu_u$  by  $\alpha\underline{w}$ . We also start the analysis in assuming first that wages of the target RMI population would be close enough to the minimum wage to be considered as exogenous as well (the next sub-section will relax this assumption). Recall that the amount transferred by RMI led to a 100% marginal tax rate of hours worked. For all hours worked between 0 and 40% of a full-time job, the income  $hw + rmi(h)$  would therefore be constant with  $h$ . Only after 40% would the additional hour worked yield some additional income to individuals. Therefore, for a worker with positive hours,  $\nu_e$  will also rise but by less than  $\alpha\underline{w}$  as compared to the situation without RMI.

### 5.1.1 Optimal job search effort

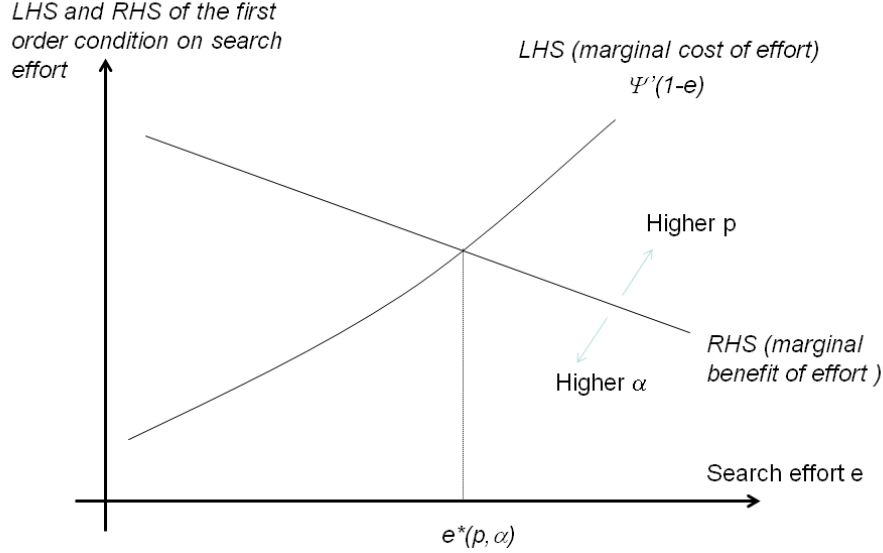
The Bellman equations of the model are as follows:

$$\begin{aligned} rE &= hw + rmi(h) - \psi(h) + s(U - E) + s_N(N - E) \\ rU &= rmi(0) - \psi(e) + (p \times e)(E - U) \\ rN &= rmi(0) + \lambda(U - N) \end{aligned}$$

where  $p$  is a parameter reflecting the aggregate state of the labor market and made endogenous later on,  $e$  is job search effort of the individual,  $s$  is the exogenous rate at which workers switch from employment to unemployment,  $s_N$  is the exogenous rate at which workers switch from employment to inactivity, and  $\lambda$  is the exogenous rate at

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<sup>22</sup>In Section 4.3 of Garibaldi and Wasmer, there is a distinction between covered and uncovered job seekers, and denoted by  $U^c$  and  $U^u$  the two categories. That model implied that job seekers may be uncovered if they came out of inactivity, but would be covered by the unemployment insurance if they came out of employment. That part of the model was therefore a 4-state model of the labor force. In our current work, we make a simplifying assumption: the employment spells of the RMI-eligible population are too short (temporary work) or represent too few hours (part-time jobs) to imply eligibility to unemployment insurance after job loss. Doing so, our model remains a three state model of the labor market and can be analyzed more simply.



which workers switch from inactivity to active job search. All flow parameters ( $s$ ,  $s_N$ ,  $\lambda$  and  $p$ ) are continuous time Poisson parameters.

Optimal job search effort is given by a first order condition:

$$\begin{aligned} \frac{dU}{de} = 0 &\Leftrightarrow \\ \psi'(e) &= p(E - U) \end{aligned} \quad (3)$$

stating that the marginal cost of effort  $\psi'(e)$  equals at the optimal choice the marginal return on effort, that is a marginal gain in probability  $p$  to get a job times the capital gain  $E - U$  from getting the job.

Straightforward calculations lead to the value of  $E - U$  as a function of parameters (see Appendix for an exact calculation). We can then derive the value of optimal effort as a function of parameters as in the next Figure.

### 5.1.2 Demand side

The firm side is classical. Firms observe the optimal search effort of workers and create vacancies so as to exhaust profit opportunities. Denote by  $c$  the cost of posting a vacancy and  $q$  the rate at which firms recruit workers, and finally  $y$  the hourly productivity. We

have :

$$\begin{aligned} rV &= -c + q(J - V) \\ rJ &= yh - wh + (s + s_N)(V - J) \end{aligned}$$

where  $V$  is the value of a job vacancy and  $J$  is the value of a filled job. Free-entry implies that

$$\begin{aligned} V &= 0 \\ \implies J &= c/q = \frac{yh - wh}{r + s + s_N} \end{aligned}$$

### 5.1.3 Equilibrium

Finally, both  $p$  and  $q$  are made consistent through the existence of an aggregate matching function  $M(\bar{e}N_U, N_V)$  where  $N_U$  is the number of unemployed,  $\bar{e}$  is the average job search effort in the population of the unemployed, and  $N_V$  is the number of posted vacancies. We assume a constant return to scale function. Hence we have, introducing  $\theta = \frac{N_V}{\bar{e}N_U}$ , the following transition rates:

$$\begin{aligned} p &= \frac{M(\bar{e}N_U, N_V)}{\bar{e}N_U} = M(1, \theta) = p(\theta) \\ q &= \frac{M(\bar{e}N_U, N_V)}{N_V} = M(1/\theta, 1) = q(\theta) \end{aligned}$$

with  $p'(\theta) > 0$  and  $q'(\theta) < 0$ .

This delivers the equilibrium value of  $\theta$ , since there is a unique  $\theta^*$  function of the parameters  $y, w, c, r, s$  and  $s_N$  such that

$$\frac{c}{q(\theta^*)} = \frac{yh - wh}{r + s + s_N}$$

Plugging into the optimal search effort condition determined by equation (3), we obtain the optimal search effort  $e^*(\alpha, p(\theta^*))$ . The equilibrium of the labor market is therefore described by the couple  $(\theta^*, e^*)$ .

**Proposition 1** *Labor market tightness does not depend on  $\alpha$ , the level of RMI as compared to the minimum wage. The RMI has an impact only through a reduction in job search effort  $e^*$ , with  $\frac{\partial e^*}{\partial \alpha} < 0$ .*

Firms react to RMI through the search effort: the value of  $\theta^*$  is independent of  $\alpha$ , but the total number of vacancies is equal to  $N_V = e^* \times \theta^*$  and thus reacts to the RMI.

In a symmetric equilibrium where every unemployed individual searches the same amount, we have the following stock-flow conditions :

$$\begin{aligned}\frac{dN_U}{dt} = 0 &= \lambda N_N + s(1 - N_N - N_U) - e^* p(\theta^*) N_U \\ \frac{dN_N}{dt} = 0 &= -\lambda N_N + s_N(1 - N_N - N_U)\end{aligned}$$

where  $1 - N_N - N_U$  is the total number of jobs created by firms. The last equation implies that

$$N_U = 1 - N_N \left(1 + \frac{\lambda}{s_N}\right)$$

while the first one implies

$$\lambda N_N \left(1 + \frac{s}{s_N}\right) = e^* p(\theta^*) N_U$$

Combining the two, we have

$$N_U = \frac{1}{1 + \frac{e^* p(\theta^*)}{\lambda} \frac{s_N + \lambda}{s_N + s}}$$

The number of unemployed workers decreases with  $\theta^*$  and with job search effort and increases with  $s$ .

**Proposition 2** *Denote by  $e_0^*$  the value of job search effort when  $\alpha = 0$  (no RMI), and by  $e^*(\alpha)$  the post-RMI value as calculated above. The causal impact of RMI on unemployment is given by*

$$\Lambda = \frac{1}{1 + \frac{e^*(\alpha) p(\theta^*)}{\lambda} \frac{s_N + \lambda}{s_N + s}} - \frac{1}{1 + \frac{e_0^* p(\theta^*)}{\lambda} \frac{s_N + \lambda}{s_N + s}}$$

**Corollary 3** *The rate of unemployment is*

$$u = N_U/(1 - N_N) = \frac{1}{1 + \frac{e^*(\alpha)p}{s+s_N}}$$

*which increases with the outflows from employment ( $s$  and  $s_N$ ), decreases with job search effort  $e^*$  and with the rate of job creation by firms  $p(\theta^*)$ .*

## 5.2 Extensions

### 5.2.1 Endogenous wage

Let us now assume that wages are not fixed but partly reflect the workers' outside options. To simplify, we assume a static bargaining rule, such that

$$wh = \beta yh + (1 - \beta)w^R$$

where  $w^R$  is the monthly wage that equalizes the utility  $\nu^U$  and  $\nu^E$ , namely

$$w^R = rmi(0) - rmi(h) + \psi(h) - \psi(e)$$

Given that  $rmi(0) - rmi(h)$  is greater than 0 for all hours worked, the introduction of the RMI must raise wages in the economy for all eligible workers except when  $\beta$  is equal to one.

### 5.2.2 Job search

A second extension is to allow individuals to direct their search towards either part-time or full-time jobs. Indeed, many of the RMI recipients were not able to immediately obtain a full time job and had to accept, at least for some time, part-time jobs where the disincentive effects of RMI were likely to be large. Therefore, we may want to modify the model to allow for this possibility. Relaxing first the labor demand side, we can decompose the search effort into two components,  $e = e_F + e_P$  where the subscript F, P reflect the effort spent into full-time or part-time. Similarly let  $p_F$  and  $p_P$  be the job finding rate of part-time and full-time jobs. Finally, let  $E(P)$  and  $E(F)$  be the value of part-time and full time employment. We have

$$rU = rmi(0) - \psi(e_F + e_P) + (p_F \times e_F)(E_F - U) + (p_P \times e_P)(E_P - U).$$



The first order condition for effort appears to be similar to that of the undirected search version of the model. Optimal job search effort is given by a first order condition:

$$\frac{dU}{de_K} = 0, K = F, P \Leftrightarrow \psi'(e_F + e_P) = p_F(E_F - U) = p_P(E_P - U) \quad (4)$$

stating that the marginal cost of effort  $\psi'(e)$  at the optimal choice is equal to the marginal return on effort, which is the marginal gain in probability  $p_K$  of getting a job of type  $K = F, P$  times the capital gain  $E_K - U$  from getting the job.

On the employer side, the free-entry condition still holds but we need to redefine the concept of job market tightness: let  $\theta_K = \frac{N_{V,K}}{\bar{e}_K N_U}$  be the tightness for the market of jobs of type  $K=F, P$ . We now have:

$$p_K = \frac{M(\bar{e}_K N_U, N_{V,K})}{\bar{e}_K N_U} = M(1, \theta_K) = p(\theta_K)$$

$$q_K = \frac{M(\bar{e}_K N_U, N_{V,K})}{N_{V,K}} = M(1/\theta_K, 1) = q(\theta_K)$$

and finally, the free-entry condition writes :

$$\frac{c}{q(\theta_K^*)} = \frac{yh_K - wh_K}{r + s + s_N}$$

where subscripts  $K = F, P$  apply to the number of job vacancies  $N_{V,K}$ , hours  $h_K$  and recruiting rate  $q_K$ .

## 6 Calibration and decomposition of the effects

The model is now used, in its benchmark version, to calibrate the French economy prior to the RMI reform. One key parameter of interest is the elasticity of effort in the cost function, since this elasticity determines the magnitude of disincentive effects and has further consequences on the elasticity of employment and labor supply to wages.

Our strategy is as follows: we will estimate the coefficients of the model to fit several targets, including the average level of unemployment and of labor market participation *prior to the reform*, and the difference-in-difference estimate of the economy *post-RMI*, which identifies the causal effect. With this methodology, we obtain the value of the disutility of additional effort. Finally, using the full-parametrized model, we are able to run a number of counterfactual experiments. In particular, we examine what employment effects would have been obtained in 1989 if the 2007 RSA reform (which increased

the incentives to work when compared with the RMI alone) had been implemented right away, in place of the RMI.

The calibration specifically targets a group of unskilled workers over the period 1982-1988, chosen among those most likely to be paid around the minimum wage level and to potentially be eligible for the RMI. The target group is chosen among the 25-55 year old population, so as to remove transitions between higher education and activity or between activity and retirement. We also select those having an education level below "Baccalauréat", that is the equivalent of high school dropouts. Summary statistics of this population group are displayed in Appendix Table 1.

We see that 81 percent of them are either employed or unemployed. Those with a job have on average a wage equal to 124% of the minimum wage<sup>23</sup>. The fraction of the unemployed population amounts to 10 percent of the labor force. The six transitions between the three different labor market states E, U and N are displayed in the bottom of the table. The high school dropouts represent 63% of the 25-55 year old. The statistics are reported in Table Appendix 1.

## 6.1 Preliminary : extending to more flows

Before doing so, we first extend the model, in order to account for all observed transitions between labor market states. In particular, we let workers flow between unemployment and inactivity, thus adding one more transition rate to the previous model. This leads to a new asset value for unemployment, as follows :

$$rU = \alpha \underline{w} - \psi(e) + (p \times e)(E - U) + \lambda_{un}(N - U)$$

and the following modified stock-flow equations:

$$\begin{aligned} \frac{dN_U}{dt} = 0 &= \lambda N_N + s(1 - N_N - N_U) - (e^* p(\theta^*) + \lambda_{un})N_U \\ \frac{dN_N}{dt} = 0 &= -\lambda N_N + s_N(1 - N_N - N_U) + \lambda_{un}N_U \end{aligned}$$

Second, and following Garibaldi and Wasmer's (2005) calibration of US labor market dynamics, we argue that the direct flows between inactivity and employment are mis-measurement, due to the inability of yearly surveys to properly identify infra-yearly transitions. Someone observed in time  $t - 1$  in state  $N$  and in time  $t$  in state  $E$  must have actually transited through "active search" before getting a job. Therefore, if we denote by

$$\eta_{ij}, i, j = E, U, N$$

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<sup>23</sup>For each individual, we calculated the hourly wage. It was then compared to the minimum wage (SMIC) in that year. The average of this ratio is 1.24.

the 6 quarterly empirical transition rates between the three labor market states, we can identified the five transition rates of the model as, respectively:

$$\left\{ \begin{array}{l} s = \eta_{EU} \\ s_N = \eta_{EN} \\ \lambda un = \eta_{UN} \\ \lambda = \eta_{NU} + \eta_{NE} \\ p(\theta)e^* = \eta_{UE} + \eta_{NE} \end{array} \right. \quad (5)$$

We also compute transition rates between the six states. Since these flow rates are on a yearly basis and may reflect partly infra-yearly transition, we build a transition matrix  $A^Y$  as :

$$A^Y = \begin{pmatrix} 1 - \eta_{eu}^Y - \eta_{en}^Y & \eta_{eu}^Y & \eta_{en}^Y \\ \eta_{ue}^Y & 1 - \eta_{ue}^Y - \eta_{un}^Y & \eta_{un}^Y \\ \eta_{me}^Y & \eta_{mu}^Y & 1 - \eta_{ue}^Y - \eta_{un}^Y \end{pmatrix}$$

and the quarterly transition matrix  $A^Q$  is obtained as the unique real 4<sup>th</sup> root of  $A^Y$  so that

$$A^Y = (A^Q)^4$$

We obtain the following values for the estimated quarterly matrix:

$$A^Q = \begin{pmatrix} 1 - \eta_{eu}^Q - \eta_{en}^Q & \eta_{eu}^Q & \eta_{en}^Q \\ \eta_{ue}^Q & 1 - \eta_{ue}^Q - \eta_{un}^Q & \eta_{un}^Q \\ \eta_{me}^Q & \eta_{mu}^Q & 1 - \eta_{ue}^Q - \eta_{un}^Q \end{pmatrix} = \begin{pmatrix} 0.9865 & 0.0091 & 0.0044 \\ 0.0922 & 0.8745 & 0.0333 \\ 0.0192 & 0.0084 & 0.9724 \end{pmatrix}$$

We assume that all flows between inactivity and employment transit though a minimum period of unemployment, and therefore, compute  $\lambda_{nu}$  as  $\eta_{me}^Q + \eta_{mu}^Q = 0.0192 + 0.0084 = 0.0333$  and  $pe^*$  as  $\eta_{ne}^Q + \eta_{ue}^Q = 0.0192 + 0.0922 = 0.1114$ . With the calculated flow values without direct flows between inactivity and employment, the ergodic rate of unemployment is equal to 10.82 percent of the labor force.

## 6.2 Calibration methodology and parameters

We will proceed as follows: the hourly productivity  $y$  is equal to 1 and the hourly wage is equal to 0.66 of the hourly productivity in the exogenous wage calibration; the quarterly interest rate is 1%; as a normalization, the search cost parameter is equal to labor productivity, and labor market tightness will adjust freely; the effort function is assumed to be iso-elastic with parameters  $\psi(e) = A_\psi e^{\eta_\psi}$ ; the parameter  $A_\psi$  is set to unity; the matching function is assumed to be  $A_M N_U^{0.5} V^{0.5}$ ; the value of the RMI for a non-employed worker is 0.45 times the full-time wage; the value of the RMI for a worker employed  $h$  hours is  $\max(0.45 * w - h * w; 0)$ , which reflects the poverty trap mentioned above.

Hours are set to the average working hours in the sample, 31.5 hours ( $h=31.5/39=0.8077$  of full-time.)

The difference-in-differences estimates of previous section (Table 2, columns 1) indicates a decrease in the job finding rate by 7 percentage points a year (divide by 4 for the quarterly values) due to the causal effect of the RMI. We then let the code search for the values of parameters  $A_M, \eta_\psi$  such that the model matches the value of unemployment before the reform (10.3 in the absence of the RMI); a -10/4 quarterly decrease in the job finding rate after the implementation of the RMI.<sup>24</sup>

### 6.3 Calibration results

We find the following values of the parameters and endogenous variables, as reported in Table 4. Columns (1) and (2) report the results obtained from the same program, which jointly determines the parameter values and endogenous variables before and after the introduction of the RMI. Column (3) reports the results of another program, the RSA program. The RSA program is a 2007 reform of the RMI which keeps the base component: RSA at zero hours was equal to the value of the RMI at zero hours. But the RSA at a positive number hours provided additional income for hours worked such that the marginal tax rate for the working individual would be 38% and not 100%:  $RSA(h) = \max(rmi(0) - h \times w \times 0.38, 0)$ , while  $RMI(h) = \max(rmi(0) - h \times w, 0)$ .

The first set of rows provides the values of the parameters: the number of hours as a fraction of a full-time, the total wage and the various transfers,  $rmi(0)$  and  $rmi(h)$ . For the average worker, the amount of hours worked is such that the RMI yields no further transfer. Under a different policy scenario with  $h = 0.5$ , this is not the case. In contrast, the value of the RSA amounted to 0.094, arguably a sizeable fraction of the earnings.

The second set of rows in the table reports the calibrated parameters of interest. In particular, the elasticity of effort in the cost function is large (8.9). This will lead to the disincentive effects described above. The third set of rows reports the effect of the RMI on the main variables. Effort goes down with the RMI, as does employment and the hazard rate of employment. In contrast, the RSA leads to higher effort relative to the RMI and mitigates the reduction in employment. We find that the RMI leads to an

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<sup>24</sup>More precisely, the code has to solve for three asset values of employment, unemployment and inactivity (v1-3), the value of  $\theta$  and  $e$  before the reform (v4-5),  $A_M, \eta_\psi$  (v6-7), the number of employed workers, of unemployed workers and of non-participants before the reform (v8-10), and the same endogenous variables after the reform : three asset values of employment, unemployment and inactivity (v11-13), the value of  $\theta$  and  $e$  after the reform (v14-15), and the number of employed workers, of unemployed workers and of non-participants after the reform (v16-18). The code is perfectly identified since we have three Bellman equations, one free-entry condition and one optimal effort condition, 2 equations for the steady-state stock of employment and unemployment and a third one for participation (1-the sum of the two previous ones) : this leads to a total of 8 equations multiplied by two, before and after the reform, that is 16), to which we add a target for unemployment before the reform (10.3) and a target for the reduction in the job hazard rate from Table 2, column 1 (-0.07/4), a total of 18 equations.

increase in unemployment of  $12.58-10.82=1.76$  percentage points, while the RSA only increased unemployment by 0.86 percentage points compared to the level in absence of social transfers. In short, the increase from the RSA is only half of what it was with the RMI.

The last set of rows provides additional calculations. The RMI leads to an increase in the duration of unemployment by 5 months on average (2.66- 2.24 years) as compared to 2.5 months with the RSA (2.32 - 2.24 years). The last rows in the Table represent various calculations related to the incentives to work. The row 'net gain from employment' calculates the monetary gain from working in the absence of a transfer. It is 0.385 of productivity, or 58% of a full-time wage (dividing 0.385 by 0.66). Taking into account the transfers brought by the RMI, one can see that the net gain is much lower with the RMI: it amounts to only 8.8% of productivity. However, the RSA provides additional monetary gains, thus the gains of working increase significantly to approximately 18.2% of productivity. The last two rows calculate the value of being unemployed and out of the labor force. Both the RMI and the RSA led to an increase in the well-being of inactive and unemployed agents. The gap between the two values for unemployment and inactivity was large before the RMI (about 6 units), and fell to 1.4 units after the RMI and about 3 units under the RSA.

## 6.4 Additional calibration results

Table 5 follows the same structure, under different scenarios. Columns (1-3) replicate the analysis of Table 4, under the assumption that the marginal worker in the model does not obtain a job with the average number of hours (31.5) but under the alternative assumption that this marginal workers obtains a part-time job with  $h = 0.5$ . Qualitatively, the results of Table 4 are the same but the magnitude of the gains obtained for the RSA are considerably larger than for the RMI. For instance, the rise in unemployment obtained here is still an increase by 1.76 percentage points, but the RSA limits the rise to only 0.34 p.p.; that is 22% of the previous increase. The rise in the duration of unemployment under the RMI is still 5 months on average; but the RSA only increases the duration of unemployment by one month.

Columns (4-6) and (7-9) use a different target group (single parents) for the calibration. We first estimate from the Labour Force Surveys the matrix of yearly flows across the three labor market states and, as previously, obtain a quarterly matrix and do some transformation to account for infra-quarterly transition between inactivity and employment through unemployment. We also change the number of hours worked to 28.8 (corresponding to the summary statistics obtained for this group), that is a ratio  $h = 28.8/39 = 0.74$ . Finally, we raise the value of the fixed part of the RMI (or the RSA) to account for the change in the composition of the household: a second person in the household leads to +50%, and a third person to +30%. The percentage change we apply is therefore 80%, which is a conservative measure since the average number of

children of single parents is 2.87 in the sample. Unsurprisingly, the results are large and the RMI has important disincentive effects for this category of workers, while the RSA leads to practically no change in the employment outcome. In columns (7) to (9), to isolate the effect of the additional income from RMI/RSA implied by the new household composition from the effect of the different elasticity of labor supply and the underlying flows parameters, we run a counterfactual exercise in which we keep all values of the parameters except that of the RMI/RSA, which is kept to the value of a single adult with no children. The impact of the RMI relative to the RSA is still different; although this is less notable than in columns (4) to (6).

## 7 Conclusion

Our paper uses an interesting natural experiment to obtain difference-in-differences estimates of the impact of French welfare reform. We find strong disincentive effects of the RMI. Using the difference-in-differences estimates, we then calibrate a model and assess the effect of a major policy reform in 2007, the RSA, which provides additional income to those who work without affecting the unemployed. We find that the disincentive effects are drastically reduced.

Our results are a first step toward integrating ex-post estimations of public policies into ex-ante structural approaches, a fruitful research direction proposed by Attanazio et al. (2003, 2009) and Todd and Wolpin (2009). This literature was developed to address a common criticism of ex-ante policy evaluations: that structural coefficients of interest may have changed after the reform due to general equilibrium effects. In part, our modelling strategy is immune to this critique. The estimates presented in our calibrations deal precisely with general equilibrium effects since our model allows for the free entry of firms. To account for general equilibrium effects, we calibrate our model using a difference-in-differences approach at the national level.

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**Table 1: Impact of the RMI on transitions and stocks**  
(sample restricted to the 25-55 years old)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	(U+N) to E 1 if E, 0 otherwise	U to E 1 if E, 0 otherwise	N to U 1 if U, 0 otherwise	Search effort Long term U Low income hh a year before	E 1 if E, 0 otherwise Unskilled (High school dropouts)	U 1 if U, 0 otherwise	Wage Wage
Sample	Long term U or N Low income hh a year before	Long term U Low income hh a year before	N Low income hh a year before	Search effort Long term U Low income hh a year before	1 if E, 0 otherwise Unskilled (High school dropouts)	1 if U, 0 otherwise	Wage
Rest of France*After year 1989	-0.04 (8.41)***	-0.12 (4.88)***	0.009 (1.24)	-0.09 (1.62)	-0.04 (5.50)***	0.02 (1.96)*	133.57 (0.73)
Departement fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations i	44663	6074	34978	6074	493795	493795	371444
R-squared	0.03	0.05	0.03	0.02	0.15	0.02	0.04

OLS regressions. Robust t statistics in parentheses, clustered at the level of departement. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The sample is restricted to those 25-55 years old. The dependent variable in column (1) is a dichotomous variable, equal to "1" if the individual is working, "0" otherwise. The sample in columns (1) is restricted to the long-term (more than 20 months) unemployed in a low income household a year before. These individuals are eligible for the RMI in the current year of observation if they remain unemployed. The explanatory variable of interest is "Rest Of France\*After year 1989", the interaction between a dichotomous variable equal to "1" if the individual resides in the Rest of France, "0" if he resides in Alsace-Moselle, and a second dichotomous variable equal to "1" if the observation is after the year 1989, "0" otherwise. The control variables in all columns include five age dummies, the sex of the individual, the household size, and 15 education dummies. 95 departement fixed effects, and year fixed effects are also included in all columns. Columns (1), (2) and (3) look at transitions from (U+N) to E, U to E, and N to U. The dependent variable in column (4) is the change, from one year to the next, in a dichotomous variable, equal to "1" if the individual has placed an ad or responded to an ad in a newspaper or on a notice-board. The sample in column (4) is the long-term (more than 20 months) unemployed in a low income household a year before. Columns (5) and (6) look at the stocks of employed and unemployed. The dependent variable in column (7) is the wage. In columns (5), (6), and (7), the sample is restricted to the unskilled workers (high school dropouts).

Table 2: Triple differences with the less than 25 years old

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable	(U+N) to E	U to E	N to U	Search	E	U	Wage
Sample	1 if E, 0 otherwise	1 if E, 0 otherwise	1 if U, 0 otherwise	Search effort	1 if E, 0 otherwise	1 if U, 0 otherwise	Wage
	Long term U or N	Long term U	N	Long term U	Unskilled (High school dropouts)		
	Low income hh	Low income hh	Low income hh	Low income hh			
	a year before	a year before	a year before	a year before			
Rest Of France*After 1989*More than 25	-0.07 (2.48)**	-0.20 (4.17)***	-0.083 (0.60)	-0.18 (4.23)***	-0.03 (2.46)**	0.06 (3.77)***	-81.80 (0.28)
Rest of France*After year 1989	0.03 (1.07)	0.09 (1.92)*	0.092 (0.63)	0.09 (1.79)*	-0.01 (1.39)	-0.04 (4.21)***	215.54 (1.16)
Departement fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Departement fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49734	9674	36276	9674	606210	606210	412672
R-squared	0.06	0.09	0.05	0.03	0.26	0.04	0.04

OLS regressions. Robust t statistics in parentheses, clustered at the level of departement. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The dependent variables are the same as in Table 1: transition from unemployment or out of the labor force to employment in column (1), transition from unemployment to employment in column (2), transition from out of the labor force to unemployment in column (3), Search effort in column (4), employment in column (5), unemployment in column (6), and wage in column (7). "Rest Of France\*After year 1989" is an interaction between a dichotomous variable equal to "1" if the individual resides in the Rest of France, "0" if he resides in Alsace-Moselle, and a second dichotomous variable equal to "1" if the observation is after the year 1989, "0" otherwise. The coefficient of interest is "Rest Of France\*After year 1989 \*More than 25", an interaction term between three dichotomous variables, with "More than 25" a dichotomous variable taking the value "1" if the individual is more than 25 years old, "0" otherwise. In all columns, 95 interaction terms between department fixed effects and the dichotomous variable "More than 25" are included, as well as 20 interaction terms between year fixed effects and the dichotomous variable "More than 25". The control variables in all columns include five age dummies, the sex of the individual, the household size, and 15 education dummies.

**Table 3: heterogeneous effects across demographics categories**

Dependent variable: transition (U+N) to E: "1" if employed, "0" otherwise, restricted to the sample of Long term (20 months) U or N-Low income hh a year before

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Baseline	Part time	Full time	Single persons	Single parents	Couples without children	Couples with children	
Rest Of France*After 1989*More than 25	-0.07 (2.48)**	-0.10 (4.22)***	0.01 (0.59)	-0.25 (0.97)	-0.22 (3.18)***	0.15 (0.46)	-0.06 (1.00)
Rest of France*After year 1989	0.03 (1.07)	0.08 (3.35)***	-0.04 (1.97)*	0.23 (0.88)	0.15 (1.84)*	-0.22 (0.69)	0.03 (0.67)
Departement fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Departement fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49734	46683	46329	4717	8017	9666	25356
R-squared	0.06	0.03	0.07	0.19	0.09	0.09	0.07

OLS regressions. Robust t statistics in parentheses, clustered at the level of departement. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The dependent variable in all columns is a dichotomous variable, equal to "1" if the individual is working, "0" otherwise. As in column (1) of Table (1), the sample in column (1) is restricted to the long-term (more than 20 months) unemployed in a low income household a year before. In column (2), the dependent variable is a dichotomous variable, equal to "1" if the individual is working part-time, "0" otherwise. In column (3), the dependent variable is a dichotomous variable, equal to "1" if the individual is working full-time, "0" otherwise. Column (4) to (7) restrict the sample to different household composition (single persons, single parents, couples without children, couples with children). The control variables include five age dummies, the sex of the individual, the household size, 15 education dummies, 95 departement fixed effects, and 20 year fixed effects.

Table 4: Benchmark calibration and counter-factual policy exercise: 25-55 low skill sample

	(1)	(2)	(3)
	Initial calibration		Counterfactual
<b>Policy variables</b>			
Social transfer at 0 hours	No RMI	RMI	RSA
Social transfer at $h$ hours	0	0.297	0.297
Monthly wage (fraction of productivity)	0	0	0.094
Hours worked $h$ for employed workers (fraction of full-time)	0.533	0.533	0.533
	0.81	0.81	0.81
<b>Targets for the calibration</b>			
Unemployment rate	10.82	N	
Reduction in job finding rate due to RMI	N	-0.0125	
<b>Parameters found by the code</b>			
Scale parameter $A_M$ in the matching function	0.1122		
Elasticity of effort in the cost of effort $\eta_\psi$	8.90		
<b>Other parameters</b>			
Scale parameter $A_\psi$ in the cost function	1		
Elasticity of the matching function $\eta_M$	0.5		
<b>Main endogenous variables</b>			
Effort level	0.723	0.613	0.668
Unemployment rate	10.82	12.58	11.68
Hazard rate from unemployment to employment	0.111	0.094	0.102
<b>Derived endogenous variables</b>			
Average duration of unemployment (years)	2.24	2.66	2.45
Number of employed workers (fraction of total population)	0.700	0.676	0.688
Number of inactive workers (fraction of total population)	0.215	0.226	0.221
Gain from employment 1: $\Delta(wh - C(h))$	0.385	0.385	0.479
Gain from employment 2: $\Delta(wh - C(h))$ -transfers at zero hours	0.385	0.088	0.182
Gain from employment 3: $\Delta(wh - C(h))$ -transfers at zero hours + $C(e)$	0.327	0.075	0.156
Present discounted value of being unemployed	24.6	35.0	41.1
Present discounted value of being out of the labor force	18.0	33.6	38.0
<p>Column 1 is the result of the calibration for France in the period 1982-1988 (prior the RMI); column 2 is the result of the calibration after the RMI; column 3 is the fictional calibrated economy 1982-1988 if the RSA been implemented in 1989. % RSA/RMI is the variation in variable <math>x</math> from column 1 to 3 divided by the variation from column 1 to 2 (RMI)</p>			

**Table 5: Additional calibrations and counter-factual policy exercises**

	Different hours: part-time		Single parents		Counterfactual Single parents				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Initial calibration	Counterfact.	Initial calibration	Counterfact.	Initial calibration	Counterfact.	Initial calibration	Counterfact.	Counterfact.
<b>Policy variables</b>	No RMI	RMI	RSA	No RMI	RMI	RSA	No RMI	RMI	RSA
Social transfer at 0 hours	0	0.297	0.297	0	0.535	0.535	0	0.297	0.297
Social transfer at $h$ hours	0	0	0.176	0	0.047	0.349	0	0	0.112
Monthly wage (fraction of productivity)	0.33	0.33	0.33	0.487	0.487	0.487	0.487	0.487	0.487
Hours worked $h$ for employed workers (fraction of full-time)	0.5	0.5	0.5	0.739	0.739	0.739	0.739	0.739	0.739
<b>Targets for the calibration</b>									
Unemployment rate	10.82	N	N	14.50	N	N	14.50	N	N
Reduction in job finding rate due to RMI	N	-0.0125	N	N	-0.055	N	N	-0.055	N
<b>Parameters found by the code</b>									
Scale parameter $A_M$ in the matching function	0.1407			0.0951			0.118		
Elasticity of effort in the cost of effort $\eta_\psi$	13.78			72.14			5.50		
<b>Other parameters</b>									
Scale parameter $A_\psi$ in the cost function	1			1			1		
Elasticity of the matching function $\eta_M$	0.5			0.5			0.5		
<b>Main endogenous variables</b>									
Effort level	0.778	0.656	0.751	0.934	0.338	0.927	0.609	0.220	0.504
Unemployment rate	10.82	12.58	11.16	14.50	0.319	14.58	14.50	0.319	0.170
Hazard rate from unemployment to employment	0.111	0.094	0.108	0.086	0.031	0.085	0.086	0.031	0.071
<b>Derived endogenous variables</b>									
Average duration of unemployment (years)	2.24	2.66	2.32	2.90	8.01	2.92	2.90	8.01	3.50
Number of employed workers (fraction of total population)	0.700	0.676	0.695	0.750	0.543	0.748	0.750	0.543	0.718
Number of inactive workers (fraction of total population)	0.215	0.226	0.217	0.123	0.202	0.124	0.123	0.202	0.136
Gain from employment 1: $\Delta(wh - C(h))$	0.330	0.330	0.502	0.487	0.535	0.837	0.299	0.299	0.411
Gain from employment 2: $\Delta(wh - C(h))$ -transfers at zero hours	0.384	0.033	0.205	0.487	0	0.302	0.299	0.002	0.114
Gain from employment 3: $\Delta(wh - C(h))$ -transfers at zero hours + $C(e)$	0.299	0.030	0.185	0.480	0	0.298	0.233	0.002	0.090
Present discounted value of being unemployed	21.3	31.7	42.8	32.8	53.5	73.7	18.9	29.7	36.4
Present discounted value of being out of the labor force	15.7	31.2	39.3	26.2	53.5	70.0	15.1	29.8	35.1

Column 1 is the result of the calibration for France in the period 1982-1988 (prior the RMI); column 2 is the result of the calibration after the RMI; column 3 is the fictional calibrated economy 1982-1988 if the RSA had been implemented in 1989. Columns 4 to 6 is the result of the calibration for single parents. Columns 7 to 9 is the result of the counterfactual calibration for single parents under the RMI/RSA value of single adults.

Appendix Table 1: Descriptive Statistics of Enquête Emploi 1982-2002

	Alsace-Moselle			Rest of France		
	Mean	SD	Obs.	Mean	SD	Obs.
Proportion of unskilled, 25 to 55 years old:						
Long-term (>20 months) U or N, in a low-income household	0.05	0.22	41632	0.1	0.2248077	749689
Transition from category above last year to employment	0.09	0.29	2092	0.11	0.32	40025
Search effort of Long-term (>20 months) U in a low-income household	0.03	0.19	2092	0.04	0.21	40025
Employed	0.72	0.45	27494	0.73	0.44	474983
Unemployed	0.06	0.23	27494	0.08	0.28	474983
Wage (French Francs)	6820.95	6447.76	16655	6719.82	15915.87	277457
Employed (part-time)	0.10	0.30	27494	0.10	0.30	474983
Employed (full-time)	0.62	0.48	27494	0.64	0.48	474983
Single persons	0.06	0.23	27494	0.06	0.24	474975
Single parents	0.06	0.23	27494	0.06	0.25	474975
Couples without children	0.16	0.37	27494	0.17	0.38	474975
Couples with children	0.70	0.46	27494	0.68	0.47	474975
<b>Control Variables:</b>						
age: 25-39 years	0.45	0.50	27494	0.43	0.50	474975
age: 40-49 years	0.35	0.48	27494	0.36	0.48	474975
age: 50-55 years	0.20	0.40	27494	0.21	0.41	474975
Male	0.50	0.50	27494	0.50	0.50	474983
Highest degree completed: secondary technical degree (CAP, BEP)	0.40	0.49	27123	0.31	0.46	467929
Highest degree completed: general secondary degree (BEPC)	0.07	0.26	27123	0.12	0.33	467929
Highest degree completed: general primary degree (CEP)	0.19	0.40	27123	0.23	0.42	467929
Highest degree completed: no degree	0.34	0.47	27123	0.34	0.47	467929
Household size (number)	3.57	1.49	27494	3.51	1.47	474975
Transitions France before, age 25-55, unskilled						
Transition	Full sample	Single person	Single parent			
EU	0.0293755	0.0379295	0.0430226			
EN	0.0183352	0.0084784	0.0088252			
UE	0.302179	0.2743363	0.2507463			
UN	0.1073773	0.0752212	0.0895522			
NE	0.0762672	0.0271739	0.0553936			
NU	0.0275926	0.0434783	0.090379			

**Appendix Table 2: Robustness checks and various falsification exercises**

Dependent variable: transition (U+N) to E: "1" if employed, "0" otherwise, restricted to the sample of Long term (20 months) U or N-Low income hh a year before

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Baseline	18 months U	22 months U	No controls	1984-1985	1985-1995	1984-1985	Rest of France without dep 35, 25, 90, 38	Long term U HIGH income hh a year before	DDD
Rest Of France*After 1989*More than 25	-0.07 (2.48)**	-0.07 (2.56)**	-0.07 (2.48)**	-0.06 (1.82)*	-0.06 (1.79)*	0.14 (1.56)	-0.07 (2.51)**		
Rest of France*After year 1989	0.03 (1.07)	0.03 (1.24)	0.03 (1.06)	0.02 (0.72)	0.02 (0.55)	-0.36 (4.26)***	0.03 (1.07)	-0.01 (1.29)	-0.01 (1.32)
Rest Of France*After 1985*More than 25									
Rest of France*After year 1985									
Rest Of France*After 1989									
*Long term-Low income a year before									-0.03 (4.22)***
Departement fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	no	Yes	Yes	Yes	Yes	Yes
Year fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Departement fixed effects interacted with "More than 25"	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49734	50005	49426	50280	25764	2808	47939	76825	121488
R-squared	0.06	0.06	0.06	0.04	0.08	0.15	0.06	0.03	0.03

OLS regressions. Robust t statistics in parentheses, clustered at the level of departement. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The dependent variable in all columns is a dichotomous variable, equal to "1" if the individual is working, "0" otherwise. As in column (1) of Table (1), the sample in column (1) is restricted to the long-term (more than 20 months) unemployed in a low income household a year before. Column (2) excludes from the treatment group the four following departments: 35, 25, 90, 38. In column (3), the dependent variable is a dichotomous variable, equal to "1" if the individual is working full-time, "0" otherwise. In column (4), the dependent variable is a dichotomous variable, equal to "1" if the individual is working full-time, "0" otherwise. The sample in column (5) includes long term (more than 20 months) unemployed individuals living in a HIGH income household a year before. As the household income is superior to the RMI eligibility requirement, these individuals are not eligible a year after if they remain unemployed. Column (6) is a triple differences analysis. The coefficient of interest is Rest Of France\*After year 1989 \*Long term-Low income a year before", an interaction term between three dichotomous variable, with "Long term-Low income a year before", a dichotomous variable taking the value "1" if the individual is a long term (more than 20 months) in a low income household a year before). The control variables include five age dummies, the sex of the individual, the household size, 15 education dummies, 95 departement fixed effects, and 20 year fixed effects.



**Appendix Table 3: Regression discontinuity design estimates**  
**Dependent variable: 1 if working, 0 otherwise**  
**(Sample restricted to High School drop-outs)**

Method	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Area	Cubic specification		Rest of France		Local linear regressions		Falsification exercises	
Time Period	5 years		After 1989		7 years		Rest of France	
Age interval	5 years		7 years		5 years		Before 1989	
More than 25 dummy	5 years		7 years		5 years		After 1989	
Age	5 years		7 years		5 years		Before 1989	
Age square	5 years		7 years		5 years		Before 1989	
Age Cube	5 years		7 years		5 years		Before 1989	
More than 25 dummy	-0.03 (2.91)***	-0.03 (3.04)***	-0.03 (3.04)***	-0.07 (8.74)***	<b>-0.07*</b>	-0.01 (0.83)	-0.02 (1.10)	-0.04 (1.90)
Age	1.01 (8.54)***	0.97 (8.46)***	0.97 (8.46)***	-0.17 (6.03)***		4.06 (6.20)***	1.59 (2.80)	1.25 (1.72)
Age square	-0.03 (6.45)***	-0.03 (6.32)***	-0.03 (6.32)***	0.01 (10.78)***		-0.16 (5.89)***	-0.06 (2.34)	-0.05 (1.56)
Age Cube	0.00 (4.87)***	0.00 (4.69)***	0.00 (4.69)***	-0.00 (13.51)***		0.00 (5.63)***	0.00 (1.97)	0.00 (1.43)
Departement fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	98083	98083	98083	176453		36805	5731	3419
R-squared	0.18	0.20	0.26	0.40		0.15	0.23	0.15

OLS regressions. Robust t statistics in parentheses, clustered at the level of departement. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The dependent variable in all columns is a dichotomous variable, equal to "1" if the individual is working, "0" otherwise. The sample in all columns is restricted to High School dropouts. Columns (1) to (3) further restrict the sample to individuals in the rest of France, after 1989, and in a 5-year window around the age of 25 years old (between 19 and 30 years old). The variable of interest is "More than 25 dummy", a dichotomous variable equal to "1" if the individual is more than 25 year old, "0" otherwise. This is the regression discontinuity design coefficient. Age, age squared, and age are also included. Column (2) includes departement fixed effects, and year fixed effects. Column (3) includes control variables (the sex of the individual, the household size, and education dummies). Column (4) expands the window to 7 years around the age of 25 years. Column (5) uses local linear regressions to estimate the regression discontinuity design coefficient. A bootstrap method was used to estimate the statistical significance of the estimate. 1,000 observations were selected at random, and used to estimate the RDD coefficient with local linear regressions. This was repeated 100 times. The coefficient is deemed significantly negative at x% if it is positive less than x% of the times. Falsification exercises are presented in columns (6) to (8). Column (6) restricts the sample to High School dropouts, in the rest of France, before 1989, and in a 5-year window around the age of 25 years old (between 19 and 30 years old). Column (7) to (8) restricts the sample to High School dropouts, in a 5-year window around the age of 25 years old (between 19 and 30 years old), in Alsace-Moselle, after 1989 (column (7)), and before 1989 (column (8)).

Appendix Table 4: Alternative explanations

	(1)	(2)	(3)	(4)
Dependent variable	Search: permanent job	Search: demanding	1 if E, 0 otherwise	
Sample	Long term U or N	Low income hh	After 1989, Before 2000	After 2000
	a year before			
Rest Of France*After 1989*More than 25	-0.04 (0.88)	-0.07 (1.43)		
Rest of France*After year 1989	0.07 (1.72)*	0.07 (0.98)		
More than 25 dummy			-0.03 (2.87)***	-0.04 (1.80)*
Age			0.86 (6.66)***	1.60 (7.28)***
Age square			-0.03 (4.73)***	-0.06 (6.18)***
Age Cube			0.00 (3.26)***	0.00 (5.35)***
Department fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Year fixed effects interacted with "More than 25"	Yes	Yes		
Department fixed effects interacted with "More than 25"	Yes	Yes		
Observations	5914	5919	81020	17063
R-squared	0.06	0.07	0.20	0.18

OLS regressions. Robust t statistics in parentheses, clustered at the level of department. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. The sample is restricted to the 25-55 years old. The dependent variable in column (1) is a dichotomous variable, equal to "1" if the individual is looking for a permanent job, "0" if the individual is looking for a temporary job. The sample in columns (1) and (2) is restricted to the long-term (more than 20 months) unemployed in a low income household a year before. These individuals are eligible for the RMI in the current year of observation if they remain unemployed. The dependent variable in column (2) is a dichotomous variable, equal to "1" if the individual is demanding in his search, "0" otherwise. Being demanding is defined by a question on the nature of the job searched. Respondents indicate if they are searching for a full-time job exclusively (not part-time), a part-time job exclusively (not full-time), a full-time job but would accept a part-time job, a part-time job but would accept a full-time job. The first two answers correspond to a demanding searcher, while the last two answers correspond to a more flexible searcher. The dependent variable in columns (3) and (4) is a dichotomous variable, equal to "1" if the individual is working, "0" otherwise. The sample in these columns is restricted to High School dropouts. Column (3) further restricts the sample to individuals in the rest of France, after 1989, and before 2000, and in a 5-year window around the age of 25 years old (between 19 and 30 years old). The variable of interest is "More than 25 dummy", a dichotomous variable equal to "1" if the individual is more than 25 year old, "0" otherwise. This is the regression discontinuity design coefficient. Age, age squared, age cubed are also included. Column (4) restricts the sample to individuals in the rest of France, after 2000. The control variables in all columns include five age dummies, the sex of the individual, the household size, and 15 education dummies. 95 department fixed effects, and year fixed effects are also included in all columns.

# Model Appendix

## Bellman equations with full information

Starting from

$$\begin{aligned} rE &= \nu_e + s(U - E) + s_N(N - E) \\ rU &= \nu_u + (p \times e)(E - U) \\ rN &= \lambda(U - N) \end{aligned}$$

with

$$\begin{aligned} \nu_e &= hw + rmi(h) - \psi(h) \\ \nu_u &= rmi(0) - \psi(e) \end{aligned}$$

we take the difference between the first and the second equation and between the first and the third, we obtain:

$$\begin{aligned} (r + s + ep)(E - U) &= \nu_e - \nu_u + s_N(N - E) \\ (r + s_N + \lambda)(E - N) &= \nu_e + (s - \lambda)(U - E) \end{aligned}$$

Inserting  $E - N$  of the second equation into the first one, we have further:

$$\begin{aligned} (r + s + ep)(E - U) &= \nu_e - \nu_u \\ &+ \frac{s_N}{r + s_N + \lambda} [-\nu_e + (s - \lambda)(E - U)] \end{aligned}$$

or

$$E - U = \frac{\frac{r+\lambda}{r+s_N+\lambda}\nu_e - \nu_u}{r + s + ep + \frac{s_N}{r+s_N+\lambda}(\lambda - s)} \quad (6)$$

Hence, the smaller the gap in income between employment and unemployment, the lower the gap in asset values. In particular, the move from a situation where  $rmi(h) \equiv 0$  for all hours to a situation where it is positive and decreasing in hours lead to a reduction in the difference between  $E$  and  $U$ .

**Proof of Proposition 1, second part on  $e^*$ .**

Going back to the first order condition we have, replacing the value of  $(E - U)$  by that of equation (6):

$$\psi'(e) = p \frac{\frac{r+\lambda}{r+s_N+\lambda}\nu_e - \nu_u}{r + s + ep + \frac{s_N}{r+s_N+\lambda}(\lambda - s)} \quad (7)$$

The left-hand side is the marginal utility of leisure, it is thus increasing in effort  $e$ . The right hand side is a decreasing function of  $e$ , moreover decreasing when  $rmi(\cdot)$  is positive. Hence the proof of the second part of Proposition 1: there is a unique value of effort  $e^*$  satisfying 7 and a shift in  $\alpha$  reduces search effort. See also Figure 5.1.1.

## Stock-flow equations with full information

Using the value of  $N_U$  from the text, we can also compute  $N_N$ . We have

$$\begin{aligned} N_U &= \frac{1}{1 + A} \\ N_N &= \frac{s_N}{\lambda + s_N} \frac{A}{1 + A} \end{aligned}$$

where

$$A = \frac{e^* p \lambda + s_N}{\lambda s + s_N}$$

Hence, the active population is

$$1 - N_N = \frac{\lambda + s_N \frac{1}{1+A}}{\lambda + s_N}$$

and the rate of unemployment is

$$u = \frac{N_U}{1 - N_N} = \frac{1}{1 + \frac{e^* p(\theta^*)}{s + s_N}}$$

## Six-flows ergodic unemployment rate

The ergodic unemployment rate is

$$dU/dt = E \cdot \eta_{eu} + N \cdot \eta_{nu} - U \cdot (\eta_{ue} + \eta_{un}) \quad (8)$$

$$dE/dt = N \cdot \eta_{ne} + U \cdot \eta_{ue} - E \cdot (\eta_{eu} + \eta_{en}) \quad (9)$$

$$dN/dt = E \cdot \eta_{en} + U \cdot \eta_{un} - N \cdot (\eta_{ne} + \eta_{nu}) \quad (10)$$

The stationary rate of unemployment is reached when  $E$ ,  $N$  and  $U$  are constant: this is the rate of unemployment corresponding to the ergodic distribution of workers in the three states.

**Definition 4** *The ergodic rate of unemployment is given by:*

$$u^* = \frac{\eta_{eu} \cdot \eta_{ne} + \eta_{eu} \cdot \eta_{nu} + \eta_{en} \cdot \eta_{nu}}{\eta_{eu} \cdot \eta_{ne} + \eta_{eu} \cdot \eta_{nu} + \eta_{en} \cdot \eta_{nu} + \eta_{ue} \cdot \eta_{ne} + \eta_{ue} \cdot \eta_{nu} + \eta_{ne} \cdot \eta_{un}} \quad (11)$$