Document de travail

EVALUATING THE IMPACT OF THE FRENCH TAX CREDIT PROGRAMME:

A DIFFERENCE IN DIFFERENCE MODEL

N° 2004-07
January 2006

This version dated January 2006 replaces the earlier version written in June 2004, which is available on request from the author

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Résumé

The French Tax Credit programme was created in 2001. This is the first study that attempts to evaluate the impact of the measure on employment outcomes using non-experimental evaluation methods. The data for the analysis are drawn from the French labour force surveys of 1999 to 2002. The rotating structure of this survey enables us to apply panel data methods to the estimation of the model. We conclude that the programme has an insignificant impact on the employment rate of French women. We do, however, find some evidence of a negative and weakly significant impact for married women.

Theme : labour market policies evaluation
Keywords : labour supply; difference-in-difference.
Classification JEL : C34, I38, J21

1. Introduction

The French tax credit programme, "la Prime Pour l'Emploi", was launched by the Jospin government in spring 2001. This is the first time ever that a tax credit programme has been put into force in France. The American Earned Income Tax Credit was created much earlier in 1975, and the British tax credit dates back to at least 1988.

Tax credits belong to the group of the so-called "in-work" benefits, payable to low-earnings workers. One of their aims is to increase work incentives for the low-skilled by raising income from work relative to unemployment income. There is a huge literature reviewing and evaluating the impact of this type of measures on employment outcomes in Anglo-saxon countries (see, for example, Blundell, 2005, and Blundell and Hoynes, 2003). The main conclusions from these studies are that tax credits have little employment effects with the notable exception of American lone parents for whom the EITC is normally found to have increased the incentives to work. On the other hand, adverse negative effects of the programme on the employment rates of married women[1] have been reported for the case of the EITC (Eissa and Hoynes, 2004).

Like the EITC and the WFTC, the French tax credit is conditional on total household resources. Individuals with some important sources of non-work income or with a high-income partner are excluded from the program. The threshold level of total income for eligibility varies roughly between 24 and 30 thousand euros for dual-earners households, depending on the presence and the number of dependent children. Half of French households filing a tax form fall below the income threshold for eligibility to the tax credit[2]. On the other hand, contrarily to the Anglo-Saxon programmes, the French tax credit is not targeted at working "parents". Childless individuals are entitled to the measure and, further to this, additions for dependent children are not very tangible, being equal to 30 euros per year and per dependent child[3].

According to government sources, over eight millions of French taxpayers were paid a tax credit in year 2001, for a total disbursement of over one thousand millions of euros. This

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[1] Here one should actually talk about married "mothers" rather than "women", as the EITC is conditional on being at work and having dependent children. This was also the case for the British Working Family Tax Credit until the 2004 reform which has made the credit available also to childless workers.

[2] The earnings thresholds and the total household income bound for eligibility to the tax credit were modified only slightly by later reforms, therefore not affecting much these conclusions.

[3] Lone parents are entitled to yearly additions of 60 euros for the first child and 30 euros for each other one. These children's additions have remained unchanged under later reforms, the claim being that other policy measures take care of the (additional) financial needs of (working) parents in France.

means that about one every three French workers were paid a tax credit, for an average amount of 150 euros per household[4], which corresponds to roughly 1% of the minimum wage in the same year. This profile contrasts with records of over one million recipients of the Working Family Tax Credit in the UK, for an average yearly expenditure of over 2500 euros per household, and nearly 20 millions recipients of the EITC in the USA, with an average expenditure of almost 700 euros per household.

The French tax credits are the largest for workers earning approximately the minimum wage. Payments are phased out for individuals earning between the minimum wage and roughly 1.4 of the minimum wage. This explains the large number of recipients and it is, indeed, not surprising given that the distribution of wages in France is very compressed around the minimum wage.

This is the first study that makes an attempt to evaluate the impact of the French programme on employment using non-experimental evaluation methods. Earlier French studies were all based on simulations models, built on data drawn before the policy was implemented, as reviewed in Stancanelli and Sterdyniak (2004). According to the earlier findings, the employment effects of the tax credit, were small, if any at all, amounting to at most a few thousands new jobs, for women in the age range 25-49, according to the most reliable estimations.

We focus here on the employment effects of the policy for women[5], disregarding differential incentives on the supply of hours of work for individuals in the phase in or the phase out of the programme, given that the choice of working hours is known to be rigid and mostly determined by employers in the French labour market (see, for example, Bourguignon and Magnac, 1990). An overwhelming number of French workers report not to have any control of their working hours, according to different surveys.

According to theoretical a priori, tax credits should increase the employment rate of eligible persons, by raising income from work relative to unemployment income. They may, however, reduce the incentives to work for married women, were their husbands to be

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[4] The amounts paid by the tax credit were increased at various instances from the socialists as well as from the later liberal governments that have made the tax credit one of their "flag" programmes. Here we discuss the amounts paid according to the first version of the programme which is the one we do evaluate. It should, however, be noticed that the increases only concerned recipients in the phase in, with the remarkable exception of the first reform that made up for an "error" in programme design, which was tapering out at a very fast rate income in the phase out. Notwithstanding the increases to the credit payable under the various reforms the amounts paid remain, by large, smaller than those paid by the EITC and the WFTC.

[5] French women are generally found to be more responsive than men to policy incentives (see, for example, Piketty, 1998; Bourguignon and Magnac, 1990).

eligible. As we are looking at the first year the policy was implemented[6], one might further argue that the announcement of the policy may strengthen its effects[7] (positive for all, but possibly negative for married women). On the other hand, payments made by the tax offices, on the basis of tax declarations relating to earnings from work and total income one year earlier, make the tax credit less tangible and may, therefore, reduce policy responses relative to other measures administered, for example, by the welfare offices.

Here, two different approaches are followed to specifying the "treatment" effect, where "treatment" is defined as (potential) eligibility to the policy measure, as standard in the evaluation literature. Under the first approximation, the treatment group is composed of women potentially eligible to the policy, on the basis of their estimated earnings and household income. The control group includes women with own earnings just above the threshold level for eligibility and women that fail to meet eligibility conditions because of their husband's income. A somewhat similar approach has been taken in a number of studies in the evaluation literature, that estimated the impact of minimum wage increases on employment by defining the control group as those workers with earnings just above the minimum wage (see, for example, Stewart, 2004 and 2005).

The alternative approach identifies the policy impact for married women by comparing them to cohabiting women, who are not allowed to file joint tax forms with their partner in France. Under this framework, married women are defined as the "treatment" group and cohabiting women as the "control" group[8]. This is comparable to the strategy followed by Eissa and Hoynes (2004), who define couples with children as the EITC treatment group and childless couples as the control group, given that the policy is targeted at working households with children.

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[6] The tax credit was actually paid for the first time in the September 2001 to eligible individuals, on the basis of their 2001 tax declarations, made in March 2001 and relating to earnings and income in year 2000. Given that the policy was only announced in February 2001, and that the French LFS were run in March of every year, we take the first "policy year" to be 2002. One cannot possibly assume that March 2001 (ie data drawn from the French LFS of year 2001) is a policy year, as the tax credit had just been voted at the time the survey was carried out.

[7] Blundel et al. (2004) evaluating the impact of a new UK programme for young unemployed, find important "programme introduction effects". According to their estimates, the impact of the policy was much larger in the first quarter after being introduced than in successive quarters.

[8] Here, one could actually re-inverse the conclusions, by defining cohabiting women as the treatment group and married women as the control group, given that the model aims at identifying the impact of the tax credit on employment, by exploiting the fact that cohabiting women cannot file joint tax forms and are, consequently, entitled to the tax credit independently from the situation of their partner.

We use data from the French Labour Force Surveys of years 1999 to 2002[9] to estimate our evaluation model. The rotating structure of this survey enables us to estimate an (unbalanced) panel data model of the employment probability, in addition to pooled cross-sections dichotomous probability models.

On the basis of our estimation results, we conclude that the tax credit has no significant impact on the employment rate of French women. We do, however, find some evidence of a negative and weakly significant effect for married women. In particular, according to our estimates, the marginal effect of the policy on the employment rates of married women would lie between 0.5% and 1.3%, suggesting a destruction of 20 to 50 thousands jobs in 2002.

The structure of the paper is the following. The next section spells out more in detail the workings of the French tax credit programme and provides some background information on the French labour market. In Section 3, the estimation model is laid out. The specification of the treatment and control groups is the object of Section 4. The data and the selection of the sample for analysis are described in Section 5. Descriptive sample statistics are given in Section 6. The results of estimation are presented in Section 7. The last section concludes the paper.

2. The French tax credit and the local labour market

The French tax credit programme, called "Prime Pour l'Emploi", which means namely "a premium to work", was launched by the socialist government, headed by the Prime Minister Jospin, in Spring 2001. This measure belongs to the family of so called "in-work benefits" that have been adopted in a number of OECD countries starting from the seventies, with two main objectives. The first is to fight the increasing poverty rates of low-skilled workers, redistributing income towards the "working poor". The second is to reduce "unemployment traps" -that occur when the household income from work is not much larger than the income received when unemployed- and, by doing so, to increase the incentives to work. In most countries, in-work benefits have been targeted at workers from households with dependent children, as for them the risk of poverty is among the highest and unemployment traps are

[9] As from year 2003 the design of the French labour force surveys was changed dramatically. Starting from 2003, the survey is run four times a year; a new questionnaire has been written; and half of the interviews (the second and the third) are done by telephone, rather than by person at the house of the respondent. According to the French national statistical offices (INSEE, 2003), the new LFS surveys are not comparable to the earlier annual surveys. In particular, information on respondents' employment status can not be compared, which makes it unfeasible for us to extend the analysis to 2003 and later policy years.

often the more severe. When in-work benefits are administered by the tax offices, rather than by the social security administration, they are also called "tax credits".

The American Earned Income Tax Credit is perhaps the most well-known in-work benefit system world-wide. There is a huge economic literature evaluating its impact on poverty and employment, as well the advantages and disadvantages of administering the benefits via the tax offices. In-work benefits are in force since a long time also in the United Kingdom and Australia. A number of OECD countries like, for example, the Netherlands has at some stage considered whether to introduce them (see Nelissen et al, 2005, and Nelissen and Van Soest, 2003, for a simulation of the impact of in-work benefits on employment in the Dutch labour market).

The French tax credit was actually introduced to compensate the low-end of the distribution of tax payers for tax reductions granted to the wealthier households. Within the "family" of OECD in-work benefits, it stands out as a "hybrid" measure as it attempts to achieve a number of different objectives, such as, for example, discouraging small-hours part-time jobs and rewarding full-time "minimum wage" workers. Individuals with very little earnings over the year or working few hours in low-paid jobs are not eligible to the tax credit. The tapering off of benefits is such that benefits are the largest at about the minimum wage level and decrease thereafter.

Alike other in work-benefits schemes in OECD countries, the benefits paid increase with the number of dependent children for eligible workers and more so for lone parents in-work, but "children additions" are extremely small. An eligible lone parent is entitled to a 60 euros yearly addition for the first child and to 30 euros extra for each other child. The children addition for married parents is equal to 30 euros per dependent child, while the addition for a dependent spouse is 78 euros per year. Childless workers are also entitled to the tax-credit.

The French scheme is, to our knowledge, the only one that is payable to the individual rather than the household, in spite of being means-tested on total household income[10], which implies that in some households both husband and wife may receive a tax credit, if they both satisfy the eligibility conditions.

Eligibility conditions to the French tax credit can be spelled out as follows (see Table1):

1. Having worked at least part of the (fiscal) year and having earned more than roughly 0.3 of the minimum wage (about 3200 euros) and less than about 1.4 of the minimum wage

[10] Individualisation of the tax credit could not be completely independent from the income of the other partner, as filing joint tax declarations is compulsory for married couples in France.

(almost 15000 euro), on a yearly base[11]. The upper earnings bound is shifted up to almost twice the minimum wage (almost 23000 euros) for those with a dependent spouse or with a spouse earning less than 0.3 of the minimum wage.

2. Reporting total taxable household income below roughly 12000 euros[12], for single people, and approximately 24000 euros, for married couples. This total income bound is increased by over 3000 euros for each dependent child[13].

The reason for setting the lowest earnings bound was to discourage small hours part-time jobs. However, few French workers fall below the lowest earnings bound for eligibility: roughly less than 3 per cent of female workers, according to the LFS[14]. But almost 60% of working women have earnings below the upper earnings bound, which is not surprising given the compressed shape of the earning distribution at around the minimum wage in France and the fact that French women's earnings are still well below those of men[15]. The income bound is not much more binding as roughly half of French households filing a tax declaration fall below the income bound.

One is then not surprised to find out from official tax statistics that over eight million French households were paid a tax credit in 2001, that is to say one every three workers.

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[11] Full-time equivalent (taxable) earnings are computed for individuals having worked part-time and/or only part of the year, to determine the upper bound for earnings. This scaling is not applied to the lower earnings bound, which is computed on the basis of actual yearly (taxable) earnings.

[12] Here, one could be misled into thinking that the earnings bound for single people is never binding as it appears at first sight to be larger than the income bound for eligibility, but this is not actually true as these bounds are defined in terms of "taxable" earnings and "taxable" income, and the rate at which total income is taxed is much lower than that for earnings from work, in the French tax system. As an approximation, roughly 72% of total income would be subject to income taxes against almost 100% of income from work.

[13] The earnings and total income bounds have been slightly increased every tax year. For the purposes of our analysis, the bounds announced in year 2001 are relevant, and were, therefore given above. The policy year we consider is 2002. The relevant LFS survey was carried out in March 2002. At that time, individuals knew the eligibility bounds announced in 2001, but they did not know yet the bounds for 2002. In practice, given the time disconnection between the decision to work and the payment of the tax credit, the actual rules determining the payment of tax credits for the individuals in our sample, will be those fixed in 2003, as individuals file their tax declarations in March of each year. However, the relevant tax parameters for the purposes of our analysis are clearly those announced in 2001, as these were the only one known to individuals at the time of carrying out the 2002 LFS survey.

[14] We take here as a reference the raw weighted mean number of women earning less than 0.3 of the minimum wage in the years before the policy was introduced, knowing that the LFS only surveys earnings at one snapshot point in time, so that we are bound to underestimate this statistic. Moreover, LFS earnings information is self-reported, and, therefore, subject to reporting and recall error. Discarding from the sample, individuals that report to earn less than (half) the official minimum wage on a hourly base, one is left with almost no observations falling below the lower earnings bound for eligibility to the tax credit, which is what actually happens in our estimation sample. This is more so as we replace observed earnings with predicted earnings to determine eligibility to the tax credit for all women in our sample, on the one hand, to make up for unobserved earnings of women out of work and, on the other hand, to control for possible endogeneity of earnings.

[15] Roughly 20% below on the basis of raw differences.

The large coverage of the credit contrasts with its small importance. The amounts paid (see Table 2) were equal in 2001 to 4,4% of reported (full-time equivalent) earnings for salaries between 0,3 times the minimum wage and the minimum wage and decreased for earnings between the minimum wage and approximately 1,4 times the minimum wage (the phase out). Payments are, therefore, the largest for full-time workers earning the minimum wage[16].

In 2001, the total public expenditure on tax credit payments was of over one thousand millions of euros, equal to an average amount of 150 euros per year per household, representing roughly 1% of the minimum wage at that time. This profile contrasts with records of over one million recipients of the Working Family Tax Credit in the UK, for an average yearly expenditure of over 2500 euros per household, and nearly 20 millions recipients of the EITC in the USA, with an average expenditure of almost 700 euros per household.

However, the employment effects of tax credit programmes are not just a function of the amounts paid. For example, the UK measure has been found to be less effective than the USA one. According to Blundell and Hoynes (2003), the differences in employment outcomes of the EITC and the WFTC can be at least partly explained by the interactions with other tax benefits schemes (unemployment benefits for households with dependent children being much more generous in the UK than in the USA, for example) as well as by the general economic context (the booming economy in the USA in the mid nineties). When times are good, employment effects of in-work benefits may be larger as the larger jobs offer may allow individuals to really trade-off between working or not, on the basis of the expected gains from work. When (structural) unemployment is high, in-work benefits may play less of a role.

Let us then take a look at the French labour market. French GDP growth rate declined in the policy year 2002 (see Figure a, in the Appendix, for a picture of French GDP over the last twelve years), but this seems to have had little impact on the upward trend in the employment rates of (married) women, while men's employment fell in 2002. The employment rates of French (married) women are trended up over time and they appear to be less sensitive to the economic cycle than the employment rates of French men (see Figure 1). The earlier economic recession of 1993 seems to have had a larger impact on employment trends than the more recent one. On the other hand, if one looks at trends in the average and median wages

[16] Later reforms increased these from 4.4% to 4.6% of earnings.

over the same period of time, it is possible to detect some spikes in the average wage at recession years (see Figure 2), which is presumably due to a larger proportion of low-wage workers leaving the labour market during bad years. But median female wages seem to be less affected from the cycle than those of men.

Generally speaking, overall wage growth was moderate in the 2000s, partly because of the working time reductions that were negotiated against salary moderation for the firms concerned, partly because of the economic downturn, so that relatively small increases in income from work due to the tax credit might have been quite tangible. Looking at employment rates of women by marital status, one can see that married women's employment lags far below that of single women, so that it might actually be desirable to target employment policies at married women. This makes it even more relevant for policy purposes to test whether the introduction of the tax credit may have had a discouraging impact on married women's employment rates. For example, there is some evidence that parental leave programmes created in the nineties have had a negative impact on the employment rates of French low-skilled women (see, for example, Piketty, 1998).

3. The evaluation model

We apply a difference in differences approach to estimate the employment effects of the French tax credit programme. Using non experimental data, the impact of the programme is measured by the difference between the employment probability of individuals potentially eligible for the policy (the treatment group) and that of not eligible ones (the control group), before and after the policy change. There is nowadays a vast literature that applies this counterfactual method to the evaluation of labour market programmes.

The validity of this non-experimental policy evaluation method rests, however, on a number of (strong) hypotheses. The first is that the employment probability of the control group is not affected by the policy change. In our case, we assume that individuals with earnings and income just above the programme eligibility thresholds do not or cannot modify their labour market behaviour to participate in the programme.

The second important assumption is that the difference between the employment probabilities of the two groups is time invariant, i.e; that the employment probabilities of the two groups are not affected differently by the business cycle or other institutional changes that may have taken place during the same period. In this respect, in France at about the same time when the tax credit was introduced, some other policies changes occurred that might

have stimulated employment of the low-skilled. These included the possibility of continuing to receive housing benefits as well as social security benefits while taking up work for the previously unemployed. Further to this, some small and medium size enterprises joined in the "35 hours" working-week agreement during that time, as the 35 hours reform was fragmented over time. And some measures to reduce employers' social security contributions rates on low-skilled people were implemented in the 2000s. However, none of these programmes were administered by the tax administration. They all treated married and cohabiting women alike, unlike the tax credit. Furthermore, the earnings and income conditions determining eligibility to the tax credit programme apply to all workers and not just to the segment of the labour market which were previously unemployed and receiving welfare (social security assistance) benefits. The "35 hours" working-week applies only to workers of the enterprises concerned. The employers' contributions reductions on the low-skilled were timed somewhat differently than the tax credit measure. It follows that our approach should enable us to disentangle the impact of the introduction of the tax credit from that of other policy changes.

Finally, for the difference-in-differences approach to be meaningful, the assigned control group should be as close as possible to the treatment group, without however being eligible for the programme. Given that ineligible women have higher earnings than the eligible ones, it is difficult to draw a control group that is very close to the treatment group. We dealt with this issue, by including in the control group married women that fail eligibility because of their husband's income, and also by adopting an alternative approach where treatment is completely independent from earnings (see Section 4 for more details).

We focus here on the impact of the tax credit programme on the employment rate of women. Let us define E as a binary variable taking value one if individuals are employed, and zero if they are not[17]. Our estimating model is a dichotomous probability model of the employment probability:

$$1)\ \Pr(E_{it}=1\mid x_{it})=G(z_{it}'\beta+\alpha PPE_{it}+\upsilon y1999_{it}+\delta y2001_{it}+\psi y2002_{it}+\gamma PPE_{it}y2002_{it})$$
$$t=1,...,T$$

[17] Here we have chosen to look at the employment probability. Alternatively, one could have focused on the participation probability like Eissa and Williamson Hoynes (1999) do. We feel that drawing the line between unemployment and other out-of-work states is not clear-cut, especially as different "definitions' of unemployment are available in the French LFS for the period of time that we look at.

where z are individual characteristics, *PPE* is a dichotomus variable taking value one for individuals potentially eligible to the policy programme, y1999, *y2001* and *y2002* are year dummies, the interaction variable *PPE* times year 2002 measures the policy impact, and ϑ summarizes the vector of parameters to be estimated. The additional regressors included in the vector z control for individual characteristics, family composition, and local labour market conditions (see the data section for more details). For the purposes of our difference-in-differences model, the years 1999 to 2001 are used as control years. In 1999 and 2000 the introduction of the tax credit had not been announced yet. The year 2001 serves also a reference year for our analysis, as the LFS survey was carried out in March 2001 and the policy measure was implemented in Spring 2001. The year 2002 is the treatment or "policy" year. The underlying model is:

$$2) E_{it}^{*} = x_{it}'\beta + \alpha PPE_{it} + \upsilon y1999_{it} + \delta y2001_{it} + \psi y2002_{it}\gamma + PPE_{it}y2002_{it} + \varepsilon_{it}$$

and if the error term is normally distributed, G(·) in equation (1) is equal to a standard cumulative normal distribution under a probit specification:

$$3) G(x) = \Phi(x) = \int_{-\infty}^{x} \phi(v)dv, \qquad \phi(x) = (2\pi)^{-1/2}\exp(-x^2/2),$$

If the error term follows a logit specification, G(·) in equation (1) is a standard cumulative logit distribution: $G(x) = \Lambda(x) = \exp(x)/[1+\exp(x)]$.

The corresponding log-likelihood is:

$$4) l_i(\vartheta) = E_i \log\left[G(\cdot)\right] + (1-E_i)\log\left[1-G(\cdot)\right]$$

If we assume additionally unobserved individual effects, c_i, the model becomes:

$$5) \Pr(E_{it}=1 \mid x_i, c_i) = \Pr(E_{it}=1 \mid x_{it}, c_i) =$$
$$G(z_{it}'\beta + \alpha PPE_{it} + \upsilon y1999_{it} + \delta y2001_{it} + \psi y2002_{it} + \gamma PPE_{it}y2002_{it}, c_i)$$
$$t = 1,...,T$$

Under our preferred specification, the c_i are unobserved cluster effects[18], to allow for correlation of the observations over time and :

[18] This model is called a "population average" panel data model in STATA, taking perhaps somewhat misleading from the biological literature where such models with clustered observations were implemented first. The advantage of this specification of the random error model is that it is very flexible and, in particular, it allows for specifying robust standard errors.

$$6)\ \Pr(E_{ig}=1\mid x_i,c_i)=$$
$$\Lambda(z_{ig}'\beta+\alpha PPE_{ig}+\upsilon y1999_{it}+\delta y2001_{ig}+\psi y2002_{ig}+\gamma PPE_{ig}y2002_{ig},c_i)\cdot$$
$$g=1,...,G$$

Models (1) and (6) are estimated by using robust standard errors, to account for the possibility of serial dependence. Some authors have highlighted the importance of accounting for possible serial correlation in the context of difference-in-differences models (see, for example, Bertrand et al., 2001). Serial correlation may seriously bias the standard errors of the model, though it appears to be more of a problem in the case of long-time series data (see also Kezdi, 2002). In our model, serial correlation may arise due to correlation of the explanatory variables over time. This may especially be the case for the binary treatment variable determining eligibility to the programme. Serial correlation may also come about from highly positively correlated values of the dependent variable over time. To control for possible serial correlation, robust standard errors are specified using the Huber/White/sandwich estimator.

4. The specification of the treatment and control groups

To implement the model we construct next, the treatment and control groups. We follow here two different approaches. Under the first, more "conventional", the treatment is determined on the basis of the rules that determine eligibility to the tax credit, while the control group is constructed "ad hoc", using similar information. A similar approach has been adopted, for example, in a number of studies that estimated the impact of minimum wage increases on employment, where the control group was made up of workers with earnings just above the minimum wage (see, for example, Stewart, 2004 and 2005).

Under the second one, to identify possible differential effects for married women than for unmarried ones, we define the "treatment" as being married and the "control" as living together. Women unmarried but living together cannot file joint tax declarations[19] and should not, therefore, respond to the negative incentives found in some of the EITC literature for

[19] Only those cohabiting couples that have signed a "pacs" ("*pacte civil de solidarité*"), i.e; signed an official contract of living together at the local city council, are allowed to file joint tax forms, and this only after three years have elapsed since their "pacs" was signed. This means that in our dataset, only those cohabiting couples that had signed a pacs in 1999 (and were surveyed) could have opted for making a joint tax declaration. Now "pacsing" is only possible in France since 1999 and in that year 72631 "pacs" were signed, some of which may have been contracted by homosexual couples, which are not under study here. Even ignoring this last caveat, and assuming that all couples "pacsed" opted for making joint tax declarations, which seems quite unlikely, and that further all of these were surveyed, which would also be quite rare, one would conclude that at most 3.5% of the cohabiting couples in our sample could have made a joint tax declaration in 2002. This should, therefore, hopefully not matter for the means of our analysis.

married women (see, for example, Eissa and Williamson Hoynes, 2004). Under this assumption, we assume that the difference in employment probabilities of married and cohabiting women in the policy year(s) relative to earlier years, is due to the introduction of the tax credit. This resembles somewhat the approach taken by Eissa and Willliamson-Hoynes (2004) that, in one of their specifications, defined couples with children as the treatment group and childless couples as the control group -as the EITC is targeted at working households with children.

To follow the first approach, where the treatment and control groups are made up on the basis of eligibility rules, we start off by predicting earnings for women out of work. Given that entitlement to the tax credit is conditional on the level of income from work, and that earnings are bound to be endogenous in a model of the employment probability, we replace actual earnings with predicted earnings for all women in our sample[20]. Therefore, we use predicted (hourly) earnings to determine eligibility. To this end, we estimate a Heckman selection model of wages for year 2000[21], by specifying hourly wages, w_i, and participation, p_i, as follows:

$$7)\ \ln w_i = x_i\beta + u_{1i}$$
$$8)\ p_i = m_i\delta + u_{2i}$$
$$u_1 \sim N(0,\sigma), u_2 \sim N(0,1), corr(u_1, u_2) = \rho$$

Under this set up, the log-likelihood for observation i is:

$$9) l_i = \begin{cases} \ln\Phi\left(\dfrac{m_i\delta + \ln w_i - x_i\beta)\rho/\sigma}{\sqrt{1-\rho^2}}\right) - \dfrac{1}{2}\left(\dfrac{\ln w_i - x_i\beta}{\sigma}\right)^2 - \ln(\sqrt{2\pi\sigma}) & w_i observed \\ \ln\Phi(-m_i\delta) & w_i notobserved \end{cases}$$

and $\lambda=\rho\sigma$.

Women that reported working on more than one job are excluded from the wage model, as well as those with missing working hours. The regressors of the wage equation include a polynomial in age, a quadratic in experience, education level dummies, and a dummy for residing in the region of Paris, as salaries tend to be higher there, following the cost of living. The explanatory variables of the employment participation equation are the same as those

[20] Actually, this turns out to be the same approach taken, after all, by Eissa and Williamson Hoynes (2004) that were dealing with similar issues.

[21] We opted for estimating the wage model using data drawn earlier that the introduction of the tax credit, to avoid any possible endogeneity of wages, programme participation and employment outcomes.

included in the wage equation plus variables relating to marital status, presence and age of children, and nationality. The results of estimation are reported in Table B, in the Appendix to the paper. Hourly earnings are found to increase significantly with higher education levels. They increase significantly with experience but at a decreasing rate and they are non-linear in age. Salaries in the region of Paris appear to be significantly higher on average than salaries in other livelihoods. The estimated lambda is statistically significant and positive suggesting that selection is an issue here.

To define the treatment group, for which *PPE* is equal to one, we apply to our data the programme earnings and total-household-income thresholds, as defined by the tax credit rules announced in year 2001 (see Table 1 for more details). The employment status (and earnings) of the partner, if any, are assumed to be unaffected by the policy measure[22]. Total income is set up equal to women's predicted earnings from work plus the income of their husband, for married women (see next section for more information on this and other data issues).

To be eligible to the tax credit, women must have earnings above the lower eligibility threshold (roughly 0.3 of the minimum wage)[23] and below the upper threshold (around 1.4 of the minimum wage). The upper earnings threshold is larger for married women with a non-employed husband or a husband earning less than the lower earnings bound. While the lower threshold relates to actual (taxable) yearly earnings, the upper threshold is defined relative to full-time equivalent yearly (taxable) earnings. It follows that actual (taxable) yearly earnings must be adjusted to control for actual hours of work, for individuals working part-time and/or only part of the tax year to calculate whether individuals meet the upper-earnings threshold condition for eligibility[24].

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[22] This is a reasonable assumption, at least as a starting point, and especially within the context of French society, where the male chauvinist model is still widespread. To give an idea, less than one per cent of parental leave takers are fathers and even the take up rate of paternal leave, which is shorter and with an earnings compensation rate equal to 100%, is far below 100% and much lower than in other European countries.

[23] In the LFS, less than 3% of women have earnings below the lower earnings threshold. This percentage falls dramatically when observations reporting wages below (half) the minimum wage are discarded from the sample (see the data section for more details). In particular, there are no observations below the minimum earnings threshold for eligibility to the tax credit in our sample, once we replaced actual earnings with predicted ones.

[24] For this purpose, yearly earnings (W) are set equal to hourly earnings (w) time "annualized" working hours (52*h) scaled by the "equivalent full-time earnings factor", which is equal to 1820 (35*52) over annualized hours. All this comes to the following expression:

$$W_i = w_i * (h * 52) * 1820 / (h * 52) = w_i * 1820 = w_i * 35 * 52 .$$

It follows that for part-time workers actual hours of work cancel out and if one is ready to assume that full-time workers work for 35 hours per week, which is not a shocking assumption given that, first of all, many firms have introduced a 35 hours working week, and, secondly, that hours of work do not really matter so much for full-timers, as they are not really paid by the hour, then hours do not matter any longer in our evaluation model. We can therefore reason in terms of (predicted) hourly earnings to determine eligibility to the tax credit. With just

In addition to passing the earnings test, to be eligible individuals must also have total taxable income falling below the income bound. This last varies with the number of children, for all, and with the employment status and earnings of the husband, for married women (see Table 1).

The control group is made up "ad hoc" including:

a) women with earnings just above the upper earnings threshold for eligibility, and earning at most half the minimum wage more than the upper earnings threshold that applies to their case;

b) and married women that fail eligibility because of their husband's earnings.

To be more precise, if we define:

- "SMIC" ("salaire minimum d'insertion") as the level of the minimum wage in 2001;
- "WUi" as the upper earnings threshold that applies to the ith woman in the sample[25];
- and Yi as the total household income bound that applies to the ith woman in the sample[26];

we include in the control group:

a) women earning more than "WUi" and less than "1/2 SMIC + WUi";
b) married women earning less than "WUi" but with a husband's income such that total household income is larger than Yi.

Some sensitivity analysis is carried out by setting a looser bound for group a above, by including in the control group women with earnings up to the upper earnings threshold that applies to their case plus the minimum wage, i.e; earning more than "WUi" and less than "WUi" + "SMIC". Group b stays the same as above. The treatment group is not affected either.

Next, we split up the sample for estimation according to women's marital status, to test for a differential impact of the policy on women with different situations. We distinguish single women –including never married, divorced and widowed women- from married women and cohabiting ones. Given the relatively short time period covered and the bounds

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one caveat for the lower earnings threshold which is independent from hours of work. But in the case of our sample, there are no observations falling below this threshold (see footnote 24).

[25] The upper earnings threshold varies between married and unmarried women (see Table 1).

[26] The total-household-income bound for eligibility varies with the number of children, marital status, and employment status and earnings of the husband.

set on age (see Section 5 below on data construction), marital status is quite stable for women in our sample[27] (see Figure C in the Appendix for an overview of trends in marriage rates for French women of all ages).

The other approach we take to defining the treatment and control groups, focuses on the employment impact of the tax credit for married women by defining the "treated" as married women and the "untreated" as cohabiting women. Cohabiting women will be eligible for the tax credit irrespective of their partner's income. This strategy should enable us to test for the impact of the conditioning on total household resources -as one of the eligibility requirements of the tax credit- on the employment choices of married women.

Descriptive statistics of the treatment and control groups under the two approaches, are given in section 6, after having described the data and the selection of the sample for analysis in Section 5 below.

5. The data and the selection of the sample for analysis

The sample for analysis is drawn from the French Labour Force Surveys of years 1999 to 2002. This survey has a rotating sample structure which enables one to construct an (unbalanced) longitudinal panel sample. Around 60,000 households are interviewed each year in March, with a third of the sample being replaced each year[28], which means that individuals are kept in the survey for at most three years.

For our analysis, we select from each survey year a sample of women that are either household heads ("personne de reference du ménage") or spouse of the head[29]. Additionally, we select only observations that were aged over 16 years and less than 52 years at the time of each survey[30]. Until age 16, school is compulsory in France. Special labour market

[27] About 97-98 per cent of married women (that stay on in the sample), remain married over three year's intervals and 94 per cent of single women do not change their status. Cohabiting women tend to change status more often: 76-78 per cent continues to be so over three-year periods.

[28] The structure of this annual survey has been changed dramatically as from year 2003. Interviews now take place every quarter; the survey questionnaire has been heavily revised; and two out of four interviews take place by telephone rather than at the home of the respondent. According to the National Statistical offices the data are not comparable to those drawn from earlier surveys (see INSEE, 2003).

[29] This implies, in particular, that we drop young women still living at home with their parents, that may be more difficult to follow from one year to the next.

[30] We apply this age selection criterion to both husbands (and cohabiting men) and wives, to ensure that there are no interactions with other labour market policies that may affect individual behaviour, as having ones' husband entering early retirement may affect a woman's labour market behaviour.

programmes apply to individuals aged 55 and over[31], who are, for example, exempted from searching for a job while receiving unemployment benefits, and protected from dismissal, if in-work (by the so called "Delalande" law which obliges employers to pay extra-compensation money for the dismissal of older workers).

Self-employed women were dropped from the sample as their earnings were not surveyed by the LFS of 1999-2002. Moreover, self-employed income is typically more likely to be affected by (mis-)reporting errors than income from dependent work. In addition to this, only women reporting to be either employed or unemployed, on a broad range of criteria[32], or housewives were kept in the sample. Full-time students and trainees as well as retired women were discarded from the sample. Along the same lines, women with a self-employed husband, or a retired husband or an employed husband that did not report earnings from work were also dropped from the sample, to enable us to apply the total household income conditions for eligibility to the tax credit[33].

Other studies of French labour supply eliminate from the sample for analysis also women that are public sector employees, as most of them[34] have a special social security status - for example, they have special pension and retirement arrangements- which goes together with a long-term employment contract, so that they enjoy a lower probability of leaving or loosing their job than other comparable individuals in the private sector. Here, we keep these women in the sample for a number of reasons. First of all, we cannot exclude that some transitions from non-participation, unemployment or other employment statuses to the status of public employee will take place. For this reason, we also want to include public workers in our sample and account for their wages in the wage regression to predict earnings for non-employed people. Secondly, women tend to be over-represented among public sector

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[31] We set the limit at 52, rather than 55, as we do not want to have in our panel data model people that will be 55 and over in the policy year.

[32] In addition to the ILO definition of unemployment, the survey also includes subjective questions on the individual occupation, covering employment, unemployment and house-work, among other things.

[33] The LFS 1999-2002 only asked for income of dependent workers or unemployed persons. Pensions and other income sources were not surveyed. Roughly nine per cent (1800) of married women in our (final) sample were dropped because of missing information on their husbands' earnings from work. An alternative possibility would have been to predict earnings for employed (salaried) husbands but that would have added to the noise around the boundaries of the treatment and the control group.

[34] Notice, however, that a considerable number of people are hired in the public sector, at all levels, with a "short-term" contract. There is actually no statutory limit to renewals and to total contract duration of "short-term" contracts in the French public sector. However, one cannot assume that all "short-term contracts" are equivalent to "long-term" contracts as an increasing number of them do actually end, partly as a result of labour shedding and restructuring, partly because of the growing number of employment promotion programs, and partly because of the changes in the ruling political party.

employees and them being the focus of our analysis, throwing public employees away we may end up with a non-representative selected sample of women.

Some women in the sample report hourly earnings below the minimum wage. Cross-checking observations with unusually low earnings against an indicator of unreliable survey responses provided in the survey, we could not find any correlation between the two. We could not find any evidence that women reporting less than the hourly minimum wage were misreporting their wages. Moreover, in France, in jobs like babysitting, workers may happen to earn less than the hourly minimum wage. The standard contract for these household employees distinguishes between "active" and "passive" hours of work, where "active" hours of work amount to 2/3 of the actual working time and they are the ones actually paid for by the employers. For these reasons, we have resolved to draw the line at half the hourly minimum wage and drop those observations earning less than this from our sample[35].

Finally, we drop women that have more than one job, which represent about 2.5% of the (final) sample (about 600 observations), in each of the years considered. On the one hand, only earnings and hours of work in the "main job" are surveyed and, on other hand, it would be difficult to predict (total) earnings for these women.

Having selected according to the criteria above the sample for analysis, we end up with roughly 24-25,000 women for each year considered. Women are next matched to their partners, if any, and all observations are pooled over the four-year period considered, from year 1999 to year 2002. The rotating structure of the sample allows us to construct an unbalanced panel. Over four thousands women[36], selected according to the criteria above, stay in the sample for periods of three years (from 1999 to 2001 or from 2000 to 2002) and between eleven and twelve thousands stay on for two-year intervals.

As far as variables construction goes, the following comments are in order. The wage information available in the survey relates to usual monthly wages, net of (after) employee payroll taxes but gross of (before) employee income taxes. Information on wage bonuses is collected in a separate question. We add wage bonuses to women's monthly wages to compute the total monthly wage. Information on usual weekly working hours is used to compute the hourly wage.

Total income is constructed as the sum of the income of the two partners. To determine eligibility to the tax credit, total income is computed setting women's earnings equal to their

[35] In any case, we replace actual earnings with predicted ones for all observations, including these ones, so actual earnings only enter the estimation of predicted earnings in the model.

[36] Over eight thousands in total, for the two three-year periods.

predicted earnings. The income of the husband is added to the total income variable to determine eligibility to the tax credit. Husbands' income includes earnings from work or unemployment benefits when available. Other sources of income are not taken into consideration here, as they were not collected by the survey. No information is available on non-wage income except for unemployment benefits[37]. We assume that income from property or interests on savings are on average negligible. This does not seem as a too strong an assumption given that we restrict attention to low-paid workers. Taxable income is computed by applying a standard approximation[38].

Education level dummies are increasing in educational level, the basis being the highest education level, equivalent to a university degree. Experience is computed by subtracting age at the end of formal schooling from current age.

To account for local labour market conditions, we have constructed a series of dummies for the region of residence, with base "Ile-de-France", the region of Paris. The other regional areas are as defined by the survey: « Bourgogne » ; « Champagne » and « Ardenne » ; « Haute Normandie » ; « Basse Normandie » ; « Picardie » ; « Centre » ; « Calais » ; « Lorraine » ; « Alsace » ; « Franche-Comte » ; « Loire » ; « Bretagne » ; « Poitou-Charentes » ; « Aquitanie » ; « Midi" and "Pyrenées" ; "Limousin" ; "Rhones-Alpes" ; "Auvergnes" ; "Languedoc" and "Roussillon" ; "Provence", "Cote d'Azur" and "Corse".

The area of residence dummies account additionally for the size of the agglomeration where individuals reside:

a) small cities include rural neighbourhoods or urban neighbourhoods with less than 20,000 inhabitants;

b) large cities are those with more than 200,000 inhabitants;

c) Paris stands on its own as the largest urban agglomeration in France;

The base for these dummies are medium size cities with a population of 20,0000 to 200,000 inhabitants. Given that "Paris" accounts for a large share of the population of "Ile-de-France", we only enter "Ile-de-France" in our regressions.

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[37] Information on unemployment income from the LFS is not generally considered to be very good. However, only a small number (between 4 and 6 per cent) of the husbands in our sample are unemployed in each of the years considered. Moreover, earnings conditions matter more than total household income, as over half of French households filing tax forms passes the total income test for eligibility to the tax credit, but only one every three workers gets it.

[38] This is done by multiplying pre-tax income by a factor of 0.72, which takes into account various provisions concerning both what part of total income is taxed and at which rate.

6. Descriptive analysis of the data: the treatment and control groups

Descriptive statistics of the full data sample selected according to the criteria listed in Section 5 above, are given in Table 3, for year 2002, and for the pooled data, covering years 1999 to 2002. Descriptive statistics of the treatment and control groups, under the two approaches described in Section 4 above, are given, respectively, in Table 4 and Table 5, for the pooled data. One should keep in mind, to avoid any confusion, that the models based on the treatment and control groups given in Table 4, are also estimated separately for women with different marital status, in addition, of course, to being estimated for the full sample.

From Table 3, one can see that sample characteristics are pretty stable over time, as the descriptives for year 2002 are almost identical to those for the 4-year sample –and the same applies to the other years (see also Table C in the Appendix). Around fifty per cent of women in the sample are married, at any time; twenty-five per cent are living together and the remaining twenty-five per cent are single[39].

About 70% of women in our sample were potentially eligible for the tax credit at any time, according to our estimations. Using sample weights, this would correspond to a little less than eight million women in year 2002. Now, according to government estimates about eight millions and two hundreds households were paid a tax credit in year 2001. Here we do not estimate who does actually get the tax credit, but rather who would be entitled for it, if she were to work. Therefore, it is reasonable that the number of potentially eligible people encompasses that of actual recipients. In particular, about 68% of women in the control group were actually employed in year 2002. The sample percentage of women belonging to the control group is 15%, in each of the years considered.

From Table 4, it emerges that women in the control group enjoy a higher education level than those in the treatment group, as anticipated. It is then not surprising to find out that they also have much higher employment rates. It also turns out that they are more likely to live in the region of Paris, suggesting some geographical segregation of (female) labour by skill level. The proportion of single and cohabiting women in the control group is lower than that in the treatment group. This is probably due to the fact that we imposed rule b in addition to rule a when constructing the control group (see Section 4 for more details), ie. we included in the control group married women that failed eligibility only because of their husbands' income. The characteristics of the treatment and control groups are fairly stable over time

[39] "Single" women include here those that are never married, divorced or widowed.

(see Table D in the Appendix, where the same statistics as in Table 4 are shown for the treatment and control groups in year 2002).

The treatment and control groups described in Table 4, were further split up according to their marital status into the following groups: married women; unmarried women; further distinguished between single and cohabiting women. Descriptive statistics for married women subgroups (given in Table E in the Appendix to the paper) suggest about the same patterns as those shown in Table 4.

Table 5 provides descriptive statistics of the treatment and control groups, constructed following the approach whereby married women are considered as the treatment group and cohabiting women constitute the control group. Under this framework, we do not rely on the eligibility rules for the construction of the treatment and the control group (see Section 4). The two groups compare now fairly well in terms of education levels and area of residence. Women living together with a (male) partner but not formally married tend, however, to be younger and with a smaller number of children than married women. They are also more likely to be of French nationality than married women are.

7. Results of estimation

Results of estimation of the employment probability models specified in Section 3 are given, respectively, in Tables 6 and Table 8, for the two different control and treatment groups. Only the "γ" estimates are shown. Full results of estimation for the logit with clustered observations and all covariates of Table 6, our preferred specification, are given in Table A, in the Appendix to the paper. In Table 7, some sensitivity analysis was carried out, relative to the models of Table 6, by choosing a larger control group (see end of Section 4 for information).

We estimated logit and probit models on pooled data for the four years and a random effects logit, with clustered observations. All these specifications allow for robust standard errors (see Section 3 for more details).

The estimations were first carried out without controlling for covariates, only including treatment and year dummies, in addition to the interaction of treatment and the policy year, the "γ" estimate. Next, covariates were included. These are a quadratic in age, education level dummies, number and age of children, a dummy for French nationality and a number of indicators of the area of residence (see Table A in the Appendix).

Looking first at Table 6, we find some evidence of a significantly negative impact of programme participation for married women, if covariates are not controlled for. Including all covariates makes this negative effect less significant, only at the 10% level. The negative marginal effect is equal to 0.013, according to estimates from the panel logit model, suggesting that the tax credit would reduce employment of married women by 1.3%. This would correspond to a reduction of a little less than 50000 jobs.

In the pooled logit and probit with covariates of Table 6, a weakly significant positive effect shows up for cohabiting women. This becomes, however, not significant once unobserved heterogeneity is allowed for in the panel data model. The "γ" coefficient for single women is never significant and negative most of the time.

In Table 7, where the control group is larger in size –and less comparable to the treatment group, as we have included women with higher earnings (see Table F in the Appendix for descriptives of sample characteristics) the "γ" estimates are less significant than in Table 6, as one would have expected. A negative and statistically significant coefficient still shows up for married women, if covariates are not controlled for. When adding controls, the estimates become significant only at the ten per cent level, in the pooled logit and probit models, but not significant in the panel data model. There is some evidence of a positive and (strongly) significant, at the 5% level, coefficient for unmarried women altogether, in all the models but the panel data ones, suggesting (confirming) that controlling for unobserved heterogeneity makes this estimate not significant.

Results of estimation of the model where the treatment group are married women "tout court" and the control group are cohabiting ones (see Section 4 for more details, and Table 5 for descriptive statistics) are given in Table 8. Here we find no significant impact of the programme in the pooled logit and probit models without covariates. A negative and weakly significant (at the 10% level) impact of the tax credit on employment shows up in the panel logit without covariates. This effect becomes statistically significant at the 5% level when covariates are introduced, in the same model. The estimated marginal effect is now half the size of that in the model without covariates, passing from about 1% to 0.5%, which suggests that the tax credit has reduced employment of married women by about 20000 jobs in year 2002. The "γ" estimate is negative and weakly significant, at the 10% level, also in the pooled logit and probit models with covariates, giving slightly larger marginal effects, as reasonable, given that these estimates are less precise than in the panel data model.

To sum up, according to the different models estimated, one can conclude in favour of a non-significant impact of the tax credit on the employment rate of French women. There is,

however, some evidence of a negative and weakly significant employment effect of the programme for married women. This would amount, according to our estimates, to an employment reduction of twenty to fifty thousands jobs for married women in the policy year.

8. Conclusions

This paper provides an estimate of the impact of the French tax credit, "la Prime Pour l'Emploi", on the employment rate of low-earnings women. It represents the first evaluation study based on data posterior to the programme implementation. It is also the first one to apply non-experimental evaluation methods.

Like similar in-work benefits programmes, the French tax credit is expected to increase the incentives to work for non-employed persons. However, it may decrease incentives to work for (married) secondary-earners, as found in the American EITC literature.

We test here for the employment effects of the policy on women by applying a standard non-experimental evaluation method, a "difference-in-differences" approach. Different treatment and control groups are defined to test for the robustness of our estimates of the policy effect. In particular, one of specifications adopted is based on the eligibility rules, to set the boundaries for the control and the treatment group. The other one identifies the policy impact for married women, by defining married women as the treatment group and cohabiting women as the control group. It turns out that under the latter approach, the two groups compare fairly well.

The survey data used for the empirical analysis are drawn from the French Labour Force Surveys of years 2000 to 2002. The rotating structure of the survey enables us to apply panel data methods to the estimation of the model. We also estimate pooled logit and probit of the employment probability to get more insights into the policy effects.

On the basis of the results of estimation, we conclude in favour of a non-significant impact of the tax credit on the employment rate of French women. We find, however, some evidence of a negative and weakly significant employment effect of the programme for married women. This would amount, according to our estimates, to an employment reduction of twenty to fifty thousands jobs for married women in the policy year.

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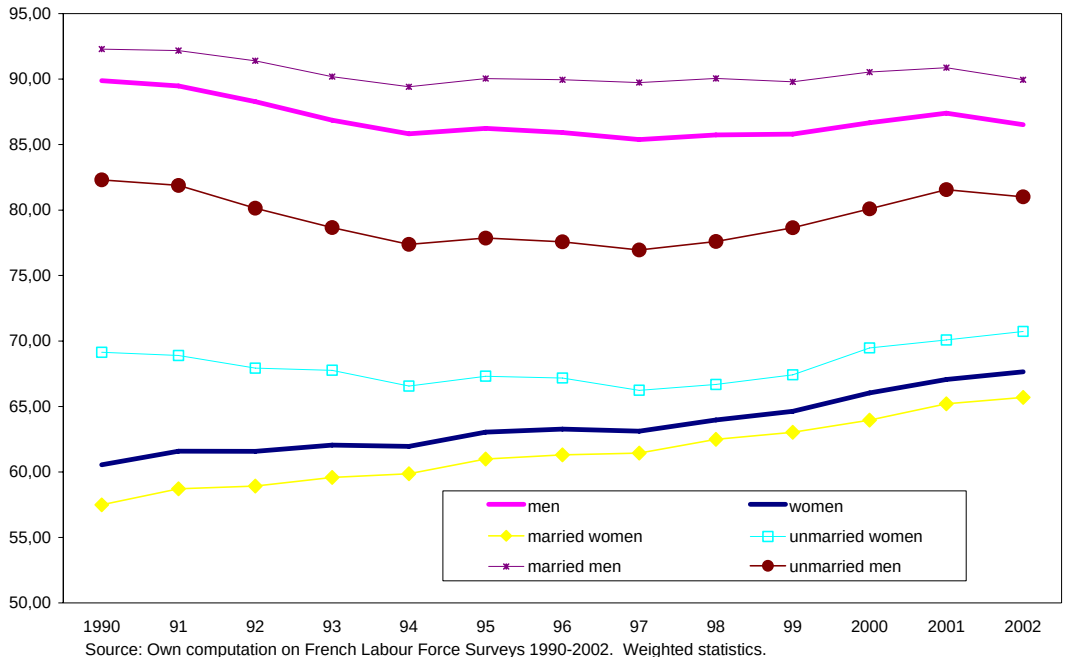
Figure 1. Employment rates by gender and marital status



Source: Own computation on French Labour Force Surveys 1990-2002. Weighted statistics.

Figure 2. Mean and median wages by gender (deflated with CPI base 1995)

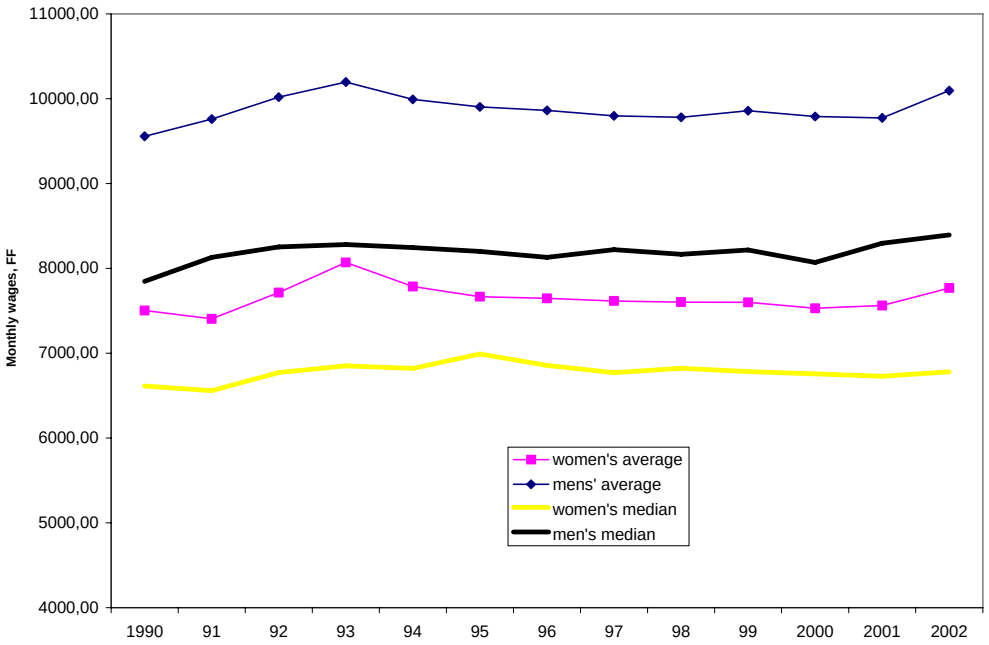


Table 1. Earnings and income thresholds for eligibility to the tax credit, in euros, 2001 rules.

	Earnings thresholds		*Income threshold(*)*
	Lower	Upper	
Single women	3187	14872	11772#
Married women (a)	3187	14872	23544

These thresholds relate, respectively, to annual taxable individual earnings and total taxable household income.
Notice that overall tax rules are such that total income is taxed at a lower rate than earnings from work, which implies that the (taxable) income threshold for single is not necessarily below the earnings from work.
(*) The income threshold is increased by 3253 euros for each dependent child.
(a)The upper earnings threshold is equal to 22654 euros for married women whose husband is out of work or earns less than the lower earnings threshold.

Table 2. Amounts of tax credit payable, 2001 rules.

Earnings from work, per year, euros		*Tax credit, per year, euros*
Lower bound	Upper bound	
0	3187	0%
3187	10623*	4,4% * earnings
10623*	14872*	(14872-earnings)*5,5% (#)

(*)These are defined in terms of full-time equivalent earnings.
This percentage was changed to 11% as from 2002 and applied to the 2002 earnings but it is not obvious that respondents to the March 2002 LFS would be already aware of this and, moreover, they would not have had time to adapt their behaviour to this change.

Table 3 ***Descriptive statistics of the full sample***

	Year 2002		**4 years sample**	
Variable name	mean	SD	mean	SD
Age	36.65	8.18	36.71	8.19
Experience	17.65	9.48	17.79	9.47
Education 1, CEP	0 .23	0.42	0.24	0.43
Education 2, BEPC	0.08	0.27	0 .08	0.27
Education 3, BEP-CAP	0.26	0.44	0.26	0.44
Education 4, BAC	0.16	0.37	0.16	0.37
Education 5, BAC + 2	0.15	0.36	0.15	0.35
Married	0.49	0.50	0.50	0.50
Cohabitant	0.25	0.43	0.25	0.43
Single	0.26	0.44	0.25	0.43
Children number	1.32	1.18	1.33	1.19
Any child of age <3 years	0.15	0.36	0.15	0.35
Paris	0.15	0.36	0.15	0.36
small city	0.41	0.49	0.42	0.49
large city	0.22	0.41	0.21	0.41
Ile de France	0.18	0.38	0.18	0.38
French nationality	0.91	0.28	0.92	0.28
Employed	0.71	0.45	0.71	0.45
Hourly salary obs.,FF	53.91	36.31	51.36	30.95
Hourly pred., FF	45.18	13.18	44,84	12.34
Husband's employed*	0.92	0.27	0.92	0.27
Husband's income*, FF	11413.11	5937.21	9845.09	5314.94
Observations no.	*23530*		*96798*	

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.

Table 4 ***Descriptive statistics of treatment and control groups, constructed using eligibility rules***

	Treatment group		Control group	
Variable name	Mean	SD	mean	SD
Age	36.62	8.01	38.21	7.43
Experience	18.65	9.38		
Education 1, CEP	0.31	0.46	0.03	0.18
Education 2, BEPC	0.10	0.30	0.03	0.17
Education 3, BEP-CAP	0.32	0.47	0.10	0.31
Education 4, BAC	0.17	0.37	0.13	0.34
Education 5, BAC + 2	0.08	0.27	0.37	0.48
Married	0.55	0.50	0.61	0.49
Cohabitant	0.17	0.38	0.21	0.41
Single	0.28	0.45	0.18	0.39
Children number	1.47	1.18	1.11	1.10
Any child of age <3 years	0.16	0.37	0.14	0.34
Paris	0.11	0.32	0.27	0.44
small city	0.45	0.50	0.33	0.47
large city	0.21	0.41	0.22	0.41
Ile de France	0.13	0.34	0.30	0.46
French nationality	0.91	0.29	0.94	0.24
Employed	0.66	0.47	0.82	0.39
Ln hourly salary obs.,FF	3.76	0.30	4.11	2.97
Ln hourly salary pred.FF	3.65	0.18	4.02	0.20
Husband's employed*	0.90	0.31	0.99	0.11
Husband's income*, FF	8674.61	3591.18	13753.81	7261.72
Observations number	*69352*		*14061*	

Note: These statistics are computed over the 4 years period.

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis. The women's hourly salary, both observed and predicted, is given in logarithms.

Table 5 ***Descriptive statistics of treatment and control groups: married women versus living together***

	Married women		**Cohabiting women**	
Variable name	Mean	SD	mean	SD
Age	38.27	7.29	32.43	7.28
Experience	19.66	8.60	13.06	8.90
Education 1, CEP	0.26	0.44	0.20	0.40
Education 2, BEPC	0.09	0.28	0.07	0.26
Education 3, BEP-CAP	0.28	0.45	0.26	0.44
Education 4, BAC	0.15	0.36	0.18	0.39
Education 5, BAC + 2	0.14	0.34	0.16	0.37
Children number	1.77	1.15	0.96	1.06
Any child of age <3 years	0.17	0.37	0.21	0.41
Paris	0.14	0.34	0.14	0.35
small city	0.47	0.50	0.44	0.50
large city	0.20	0.40	0.20	0.40
Ile de France	0.16	0.37	0.17	0.37
French nationality	0.89	0.32	0.96	0.19
Employed	0.67	0.47	0.72	0.45
Ln hourly salary obs.,FF	3.87	0.38	3.81	0.35
Ln hourly salary pred.FF	3.77	0.26	3.70	0.27
Husband's employed*	0.93	0.26	0.90	0.30
Husband's income*, FF	10493.72	8586.88	8519.48	4346.69
Observations number	*48502*		*23812*	

Note: These statistics are computed over the 4 years period.

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.

Table 6 ***Results of estimation : treatment based on eligibility rules***

	Estimates of the impact of the tax credit γ				
	All	***Married***	***Unmarried***	***Singles***	***Cohabiting***
No covariates					
Logit , pooled data					
coefficient l	-0.181	-0.182	-0.284	-0.045	-0.146
standard error	0.075	0.069	0.108	0.166	0.148
marginal effect	-0.016**	-0.016**	-0.020**	-0.023	0.011
Probit, pooled data					
coefficient	-0.097	-0.100	-0.146	-0.022	-0.067
standard error	0.032	0.040	0.057	0.084	0.081
marginal effect	-0.034**	-0.037**	-0.50**	-0.007	-0.025
Panel logit clusters					
Coefficient	-0.089	-0.067	-0.160	0.005	-0.095
standard error	0.039	0.046	0.080	0.118	0.117
marginal effect	-0.008**	-0.005	-0.016**	0.018	-0.012
With covariates					
Logit, pooled data					
coefficient	-0.011	-0.151	0.244	-0.087	0.293
standard error	0.063	0.073	0.123	0.169	0.168
marginal effect	-0.016	-0.016**	0.020**	-0.023	0.011*
Probit, pooled data					
Coefficient	-0.001	-0.080	0.143	-0.045	0.197
standard error	0.035	0.042	0.065	0.086	0.093
marginal effect	-0.000	-0.029*	0.045**	-0.013	0.069**
Panel logit clusters					
coefficient	-0.027	-0.089	0.110	-0.063	0.135
standard error	0.047	0.053	0.104	0.134	0.143
marginal effect	-0.015	-0.013*	0.021	0.022	0.011
Observations	*83413*	*46621*	*36792*	*21849*	*14943*

Note: All models are estimated specifying robust standard errors.
Marginal effects are computed as the difference between the (average) predicted probability of employment, with γ set equal to zero, and the same with γ set equal to one.
The covariates included are a quadratic in age, the five education level dummies, the number of children, a dummy for the presence of young children aged less than three years, a dummy for living in the region of Paris, dummies accounting for the population size of the city of residence, a dummy for French nationality, treatment and year dummies.
Descriptives of the treatment and control group are given in Table 4.
(**) indicates statistical significance at 5% level; (*) at 10% level.

Table 7 ***Sensitivity analysis : treatment based on eligibility rules***

	Estimates of the impact of the tax credit γ				
	All	***Married***	***Unmarried***	***Singles***	***Cohabiting***
No covariates					
Logit , pooled data					
coefficient l	-0.126	-0.146	-0.210	0.070	-0.107
standard error	0.054	0.065	0.098	0.148	0.136
marginal effect	-0.023**	-0.021**	-0.028**	0.029	-0.025
Probit, pooled data					
coefficient	-0.066	-0.080	-0.106	0.036	-0.045
standard error	0.030	0.037	0.052	0.075	0.075
marginal effect	-0.023**	-0.029**	-0.036**	0.011	0.016
Panel logit clusters					
Coefficient	-0.011	-0.151	-0.120	0.080	-0.082
standard error	0.063	0.073	0.072	0.105	0.104
marginal effect	-0.016	-0.016**	-0.023	0.024	-0.024
With covariates					
Logit, pooled data					
coefficient	0.035	-0.129	0.307	0.032	0.290
standard error	0.058	0.069	0.112	0.151	0.154
marginal effect	0.023	-0.021*	0.028**	0.029	0.025*
Probit, pooled data					
Coefficient	0.026	-0.068*	0.185	0.020	0.202
standard error	0.032	0.039	0.059	0.078	0.085
marginal effect	0.009	-0.024*	0.056**	0.006	0.070**
Panel logit clusters					
coefficient	0.005	-0.071	0.152	0.028	0.145
standard error	0.043	0.049	0.091	0.118	0.126
marginal effect	0.021	-0.017	0.028	0.028	0.024
Observations	*86158*	*47919*	*38239*	*22500*	*15739*

Note: Here the control group includes women earning up to the minimum wage more than the upper earnings threshold, whose earnings fall, therefore between, UWi and UWi+SMIC (see Section 4 at the bottom, for more details).
All models are estimated specifying robust standard errors.
Marginal effects are computed as the difference between the (average) predicted probability of employment, with γ set equal to zero, and the same with γ set equal to one.
The covariates included are a quadratic in age, the five education level dummies, the number of children, a dummy for the presence of young children aged less than three years, a dummy for living in the region of Paris, dummies accounting for the population size of the city of residence, a dummy for French nationality, treatment and year dummies.
Descriptives of the treatment and control groups are given in Table F in the Appendix to the paper.
(**) indicates statistical significance at 5% level; (*) at 10% level.

Table 8 ***Results of estimation : treatment based on marital status in the policy year***

	Estimates of the impact of the tax credit γ		
	coefficient	standard error	marginal effect
No covariates			
Logit , pooled data	-0.033	0.041	-0.002
Probit, pooled data	-0.019	0.024	-0.007
Panel logit clusters	-0.209	0.125	-0.010*
With covariates			
Logit, pooled data	-0.082	0.044	-0.002*
Probit, pooled data	-0.047	0.026	-0.016*
Panel logit clusters	-0.073	0.035	-0.005**
Observations	*72311*		

Note: All models are estimated specifying robust standard errors.
The covariates included are a quadratic in age, the five education level dummies, the number of children, a dummy for the presence of young children aged less than three years, a dummy for living in the region of Paris, dummies accounting for the population size of the city of residence, a dummy for French nationality, treatment (marital status) and year dummies.
Descriptives of the treatment and control group are given in Table 5.
(**) indicates statistical significance at 5% level; (*) at 10% level.

Appendix

Table A ***Results of estimation of the panel logit model, with clusters, of Table 7 (see equation 6 in the paper)***

	All		Married	
	Coefficient	St. error	Coefficient	St. error
Eligible to the tax credit	0.256**	0.033	0.429**	0.045
Eligible in 2002	**-0.027**	**0.047**	**-0.089***	**0.053**
1999	-0.075**	0.015	-0.066**	0.019
2001	0.013	0.015	0.020	0.019
2002	0.062	0.046	0.132**	0.051
Age	0.259**	0.011	0.350**	0.018
Age squared	-0.003**	0.0001	-0.004**	0.0002
education 1, CEP	-1.733**	0.053	-1.857**	0.074
education 2, BEPC	-1.135**	0.057	-1.332**	0.080
education 3, BEP-CAP	-0.951**	0.051	-1.133**	0.080
education 4, BAC	-0.586**	0.053	-0.815**	0.072
education 5, BAC + 2	0.055**	0.054	-0.124**	0.069
Any child of age <3 years	-0.568**	0.022	-0.515**	0.029
child number	-0.472**	0.010	-0.474**	0.013
French nationality	0.699**	0.035	0.763**	0.043
region of Paris	0.537**	0.033	0.502**	0.043
small city	0.137**	0.024	0.214**	0.033
large city	-0.019	0.029	0.028	0.039
Constant	-3.776**	0.209	-5.637**	0.343
Observations no.	*83413*		*46621*	
Clusters no.	*54767*		*30005*	
Wald Test (χ2, 18)	*8754.98*		*4495.30*	

Note: the model estimated is a panel logit with clustered observations and robust standard errors. The treatment coefficient was already reported in Table 6. Here we give results of estimation for all covariates included in the model.
(**) indicates statistical significance at 5% level; (*) at 10% level.

Table B ***Results of estimation of the wage model The dependent variable is the logarithm of the hourly wage.***

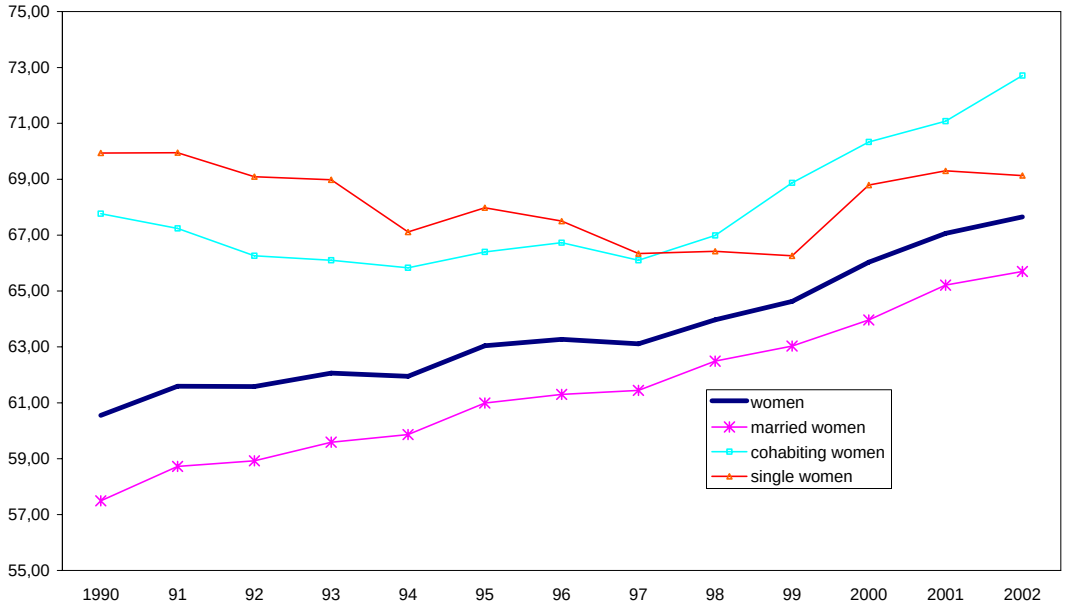
The dependent variable of the selection equation is the probability of employment

	Wage equation		**Probit of participation**	
Variable name	coefficient	SE	coefficient	SE
Age	0.037**	0.017	0.049	0.063
age squared	-0.0006	0.0005	0.0007	0.002
age cube	0.000008**	0.000004	-0.00002	0.00002
experience	0.009**	0.002	0.0009	0.007
experience squared	-0.0006**	0.00005	0.0002	0.0002
education CEP	-0.665**	0.00005	-1.131**	0.050
education BEPC	-0.527**	0.013	-0.705**	0.052
education BEP-CAP	-0.490**	0.011	-0.593**	0.045
education BAC	-0.355**	0.010	-0.333**	0.043
education BAC + 2	-0.165**	0.009	0.042	0 .044
region of Paris	0.138**	0.006	0.205**	0.026
Constant	3.143**	0.204	-0.458	0.732
married			-0.014	0.022
cohabitant			-0.048*	0.025
any child of age <3 years			-0.413**	0.025
Children's number			-0.217**	0.009
French nationality			0.227**	0.030
Lambda			0.229**	0.007
Observations	22731			
Censored obs.	7298			

Note: This model is estimated on data drawn from the full sample selected for year 2000, for which descriptives are given in Table C below.

Figure a. French GDP growth rate (base 1995)

Figure b. Womens' employment rates by marital status.



Source: Own computation on French Labour Force Surveys 1990-2002. Weighted statistics.

Figure C . Trends in marriage rates

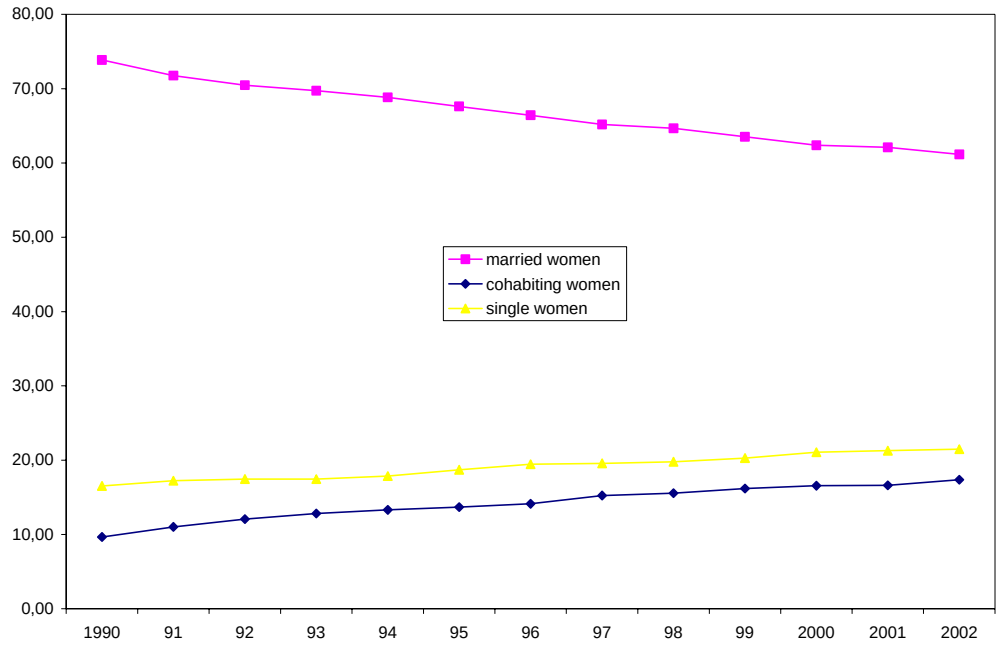


Table C ***Descriptive statistics of the full sample***

	Year 2000		**Year 2002**	
Variable name	mean	SD	mean	SD
Age	36.77	8.22	36.65	8.18
Experience	18.00	9.51	17.65	9.48
Education 1, CEP	0.25	0.43	0 .23	0.42
Education 2, BEPC	0.08	0.28	0.08	0.27
Education 3, BEP-CAP	0.27	0.44	0.26	0.44
Education 4, BAC	0.16	0.36	0.16	0.37
Education 5, BAC + 2	0.14	0 .35	0.15	0.36
Married	0.50	0.50	0.49	0.50
Cohabitant	0.24	0.43	0.25	0.43
Single	0.26	0.44	0.26	0.44
Children number	1.33	1.20	1.32	1.18
Any child of age <3 years	1.14	0.35	0.15	0.36
Paris	0.15	0.36	0.15	0.36
small city	0.41	0.49	0.41	0.49
large city	0.21	0.41	0.22	0.41
Ile de France	0.17	0.38	0.91	0.28
French nationality	0.92	0.28	0.18	0.38
Employed	0.70	0.46	0.71	0.45
Hourly salary obs.,FF	50.71	28.26	53.91	36.31
Hourly salary pred., FF	44.00	12.87	45.17	13.18
Husband's employed*	0.92	0.27	0.92	0.27
Husband's income*, FF	10798.29	7668.44	11413.11	5937.21
Observations no.	*24683*		*23532*	

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.

Table D ***Descriptive statistics of the treatment and control groups, on the basis of eligibility rules, year 2002***

	Treatment		Control	
Variable name	mean	SD	mean	SD
Age	36.52	8.00	38.36	7.32
Experience	18.32	9.33	16.53	9.07
Education 1, CEP	0.28	0.45	0.19	0.14
Education 2, BEPC	0.10	0.31	0.02	0.13
Education 3, BEP-CAP	0.32	0.47	0.06	0.24
Education 4, BAC	0.18	0.38	0.12	0.32
Education 5, BAC + 2	0.09	0.28	0.39	0.49
Married	0.53	0.50	0.65	0.48
Cohabitant	0.20	0.40	0.15	0.36
Single	0.27	0.45	0.20	0.40
Children number	1.46	1.15	1.07	1.15
Any child of age <3 years	0.18	0.38	0.12	0.32
Paris	0.11	0.31	0.27	0.44
small city	0.47	0.50	0.33	0.47
large city	0.21	0.40	0.22	0.41
Ile de France	0.13	0.34	0.30	0.46
French nationality	0.91	0.28	0.93	0.25
Employed	0.68	0.47	0.84	0.36
Ln hourly salary obs.,FF	3.80	0.32	4.16	0.39
Ln hourly salary pred FF	3.66	0.16	4.06	0.16
Husband's employed*	0.90	0.30	0.99	0.11
Husband's income*, FF	9281.78	4436.55	14347.53	7527.26
Observations no.	*16892*		*3203*	

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.

Table E ***Descriptive statistics of treatment and control groups, married women: eligibility rules***

	Treatment group		Control group	
Variable name	Mean	SD	mean	SD
Age	37.66	7.28	39.75	6.89
Experience	19.87	8.63	18.50	8 .73
Education 1, CEP	0.32	0.46	0.02	0.18
Education 2, BEPC	0.11	0.31	0.03	0.17
Education 3, BEP-CAP	0.33	0.47	0.09	0.28
Education 4, BAC	0.16	0.37	0.14	0.34
Education 5, BAC + 2	0.07	0.26	0.44	0.50
Children number	1.80	1.13	1.52	1.10
Any child of age <3 years	0.17	0.38	0.15	0.36
Paris	0.10	0.30	0.22	0.42
small city	0.51	0.50	0.37	0.48
large city	0.19	0.39	0.23	0.42
Ile de France	0.13	0.33	0.26	0.44
French nationality	0.89	0.32	0.93	0.26
Employed	0.64	0.48	0.79	0.41
Ln hourly salary obs.,FF	3.76	0.30	4.15	0.37
Ln hourly salary pred.FF	3.60	0.16	4.05	0.20
Husband's employed*	0.91	0.28	1.00	0.28
Husband's income*, FF	8925.88	3551.39	15085.28	7474.27
Observations number	*38062*		*8559*	

Note: These statistics are computed over the 4 years period.

(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.

Table F ***Descriptive statistics of the treatment and control groups, on the basis of eligibility rules, year 2002: a larger control group.***

	Treatment		Control	
Variable name	mean	SD	mean	SD
Age	36.52	8.00	39.26	7.32
Experience	18.32	9.33	17.16	8.81
Education 1, CEP	0.28	0.45	0.17	0.13
Education 2, BEPC	0.10	0.31	0.015	0.12
Education 3, BEP-CAP	0.32	0.47	0.05	0.23
Education 4, BAC	0.18	0.38	0.10	0.30
Education 5, BAC + 2	0.09	0.28	0.36	0.48
Married	0.53	0.50	0.64	0.48
Cohabitant	0.20	0.40	0.15	0.36
Single	0.27	0.45	0.21	0.41
Children number	1.46	1.15	1.10	1.16
Any child of age <3 years	0.18	0.38	0.11	0.31
Paris	0.11	0.31	0.30	0.46
small city	0.47	0.50	0.31	0.46
large city	0.21	0.40	0.22	0.41
Ile de France	0.13	0.34	0.33	0.47
French nationality	0.91	0.28	0.93	0.25
Employed	0.68	0.47	0.84	0.36
Ln hourly salary obs.,FF	3.80	0.32	4.18	0.39
Ln hourly salary pred FF	3.66	0.16	4.10	0.16
Husband's employed*	0.90	0.30	0.99	0.11
Husband's income*, FF	9281.78	4436.55	14347.53	7527.26
Observations no.	*16892*		*3798*	

Note: Here the control group includes women earning up to the minimum wage more than the upper earnings threshold, whose earnings fall, therefore between, UWi and UWi+SMIC (see Section 4 at the bottom, for more details).
(*) The mean of partner's employment status is computed only for married and cohabiting women. The salary of the husband is averaged over positive values only and computed on a monthly basis.