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## ABSTRACT

### **The Detaxation of Overtime Hours: Lessons from the French Experiment<sup>\*</sup>**

In October 2007 France introduced an exemption on the income tax and social security contributions that applied to wages received for hours worked overtime. The goal of the policy was to increase the number of hours worked. This article shows that this reform has had no significant impact on hours worked. Conversely, it has had a positive impact on the overtime hours declared by highly qualified wage-earners, who have opportunities to manipulate the overtime hours they declare in order to optimize their tax situation, since the hours they work are difficult to verify.

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# 1 Introduction

In France, since 1 October 2007, remuneration paid for hours worked overtime has been exempt from income tax and a substantial portion of social security contributions. This detaxation was an essential plank of the economic policy introduced after the presidential elections of May 2007. For France's new president, detaxation of overtime hours offered numerous advantages. In valorizing work, it sounded the death knell of the Malthusian culture symbolized by the 35-hour work week, the impact of which on employment was open to legitimate doubt.<sup>1</sup> It did not directly challenge the 35-hour legal work week, to which many French people remain attached. In short, the tax exemption on overtime hours looked like the ideal instrument for injecting dynamism into the French economy by giving an incentive to "work more to earn more."

In recent years, other countries have adopted similar reforms. Since 1996 Austria exempts the extra rate paid for overtime from income tax, with a maximum of 10 hours per month. In Belgium taxes and social security contributions on the extra overtime rate have been reduced since 2005.<sup>2</sup> Italy introduced a similar measure in 2008, but suspended it at the close of that year in the face of rising unemployment. Finally, Luxembourg has had in place exemptions from tax and social security payments for hours of paid work beyond the legal limit since the start of 2008.<sup>3</sup> While none of these countries has undertaken a reform as far-reaching as that of France, the view that detaxation of overtime hours is an effective means of increasing the number of hours worked appears to have convinced a significant number of policymakers in Europe.

Economic analysis puts the matter in a different perspective: it stresses the fact that if taxation is to be efficient, it must define a tax base that the authorities can easily verify.<sup>4</sup> Now in most cases, it is hard for a third party to verify the number of hours worked when employers and employees have a shared interest in not revealing it. And that is indeed the case with the

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<sup>1</sup>Patrick Artus, Pierre Cahuc and André Zylberberg (2007), Matthieu Chemin and Etienne Wasmer (2009).

<sup>2</sup>In Belgium there has been a reduction of fiscal costs on the first 65 overtime hours per calendar year since 1 July 2005. This ceiling was raised to the first 100 hours for the year 2009, and since 1 January 2010 it is set at 130 hours. The advantage for the employee consists of a tax reduction, and for the employer in reduced social contributions on the extra rate for overtime hours. Hence an important difference between the French and Belgian mechanisms is that the compulsory rate of tax deduction on overtime hours is at least as high as that on normal hours in Belgium, since the tax exemption applies only to the extra overtime rate, whereas in France it is the total remuneration for overtime hours, not just the extra rate, to which the exemption applies.

<sup>3</sup>In Luxembourg, from 1 January 2008 the base rate of remuneration for overtime hours (apart from the extra) was no longer subject to income tax (except for the extra overtime rate). Since 1 January 2009 the entire remuneration for overtime hours is exempt from tax, and an exemption for social security contributions has been introduced, but only up to a limit of an overtime extra rate of 40%.

<sup>4</sup>Especially since the works of James Mirrlees (1971) and Agnar Sandmo (1981). For a recent overview of this topic, see the article by Henrik Jacobsen Kleven, Claus Thustrup Kreiner, and Emmanuel Saez (2009).

tax exemption on overtime hours: employers and wage-earners have an interest in declaring overtime hours in order to benefit from the tax cut. Hence it is far from obvious that detaxation of overtime hours, costly in any case,<sup>5</sup> leads directly to an increase in hours worked.<sup>6</sup>

The graph in figure 1 displays the evolution of the average weekly number of paid overtime hours for the period 2003-2009.<sup>7</sup> We see that paid overtime hours are more numerous after the introduction of the reform in 2007 than before. The level of paid overtime hours rose in 2007 and has remained relatively high since, while the economy was entering a deep recession.<sup>8</sup>

The increase in paid overtime hours beginning in 2007 observed on graph 1 is not necessarily linked to the reform.<sup>9</sup> It might result from a more intensive utilization of overtime hours by firms that were avoiding hiring in anticipation of the onset of recession. Moreover, even if the increase in overtime hours is indeed linked to the reform, it is possible that it did not entail a rise in hours actually worked. This scenario is plausible to the extent that a significant percentage of overtime hours worked is not explicitly remunerated.<sup>10</sup> Prior to October 2007, employees whose labor

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<sup>5</sup>The official cost for 2008 is estimated at 4.4 billion euros, which represents around 40% of the total budget of the French state for employment. <http://www.vie-publique.fr/actualite/alaune/loi-faveur-heures-supplementaires-quel-bilan.html>

<sup>6</sup>The IMF report on France dated 19 November 2007 underlines this danger: “While the aim of reducing workweek restrictions, providing enterprises with greater flexibility and lowering marginal wage costs, is laudable, the exemption of taxation on overtime entails considerable windfall effects (effets d’aubaine), is operationally complex in order to avoid likely fraud, and benefits insiders. Given its cost in terms of lost revenue, its effect in increasing working hours, which is subject to uncertainty, will have to be monitored carefully. The measure is overall a second-best response to the original distortion of the mandatory workweek reduction. It is emblematic of the pernicious nexus between rigid labor market institutions and the budget that, after having spent considerable sums to implement the 35-hour workweek, additional public money is now being diverted to circumvent it.” <https://www.imf.org/external/np/ms/2007/111907.htm>.

<sup>7</sup>We utilize the ongoing *Enquête Emploi* (Labor Force Survey), which seeks information from persons throughout the year, and which began in January 2003. Before that date, the *Enquête Emploi* was based on interrogations which took place during the month of March every year. The data on overtime hours are not perfectly homogeneous over the span 2003-2009, since persons who had not changed jobs since the previous interrogation were only asked about their hours exceeding the the maximum during the first two interrogations (each person is queried once per trimester for 6 consecutive trimesters). Since the fourth trimester of 2006, questions about the number of overtime hours are asked at every interrogation. We have systematically verified that our results, derived from data covering the whole period 2003T1-2009T3, retain their validity for the sub-period 2006T4-2009T3.

<sup>8</sup>This increase in paid overtime hours might result from changed behavior in compiling tax declarations, prompted by the introduction of detaxation. In fact, surveys carried out on firms have revealed that a significant percentage of firms in which the work week habitually exceeded 35 hours did not declare overtime hours prior to October 2007. This proportion may have shrunk after October 2007 (Chagny et al., 2010). The *Enquête Emploi* does not allow us to detect a significant growth of overtime hours linked to this type of behavior. We can ascertain it by studying the evolution of the declarations of paid overtime hours of persons who declare they work 39 hours both before and after October 2007. On average, persons who work 39 hours declare 0.09 paid overtime hours per week (with a standard deviation equal to .02) before October 2007 and 0.12 hours from October 2007 on (with a standard deviation equal to 0.01). The p-value linked to the null hypothesis of an equality of overtime hours before and after October 2007 is equal to 20%.

<sup>9</sup>Other statistical sources confirm this increase in paid overtime hours in 2007 (Chagny, Gonzales, and Zilberman, 2010).

<sup>10</sup>The under-declaration of overtime hours is a phenomenon observed in other countries. Shulamit Kahn and

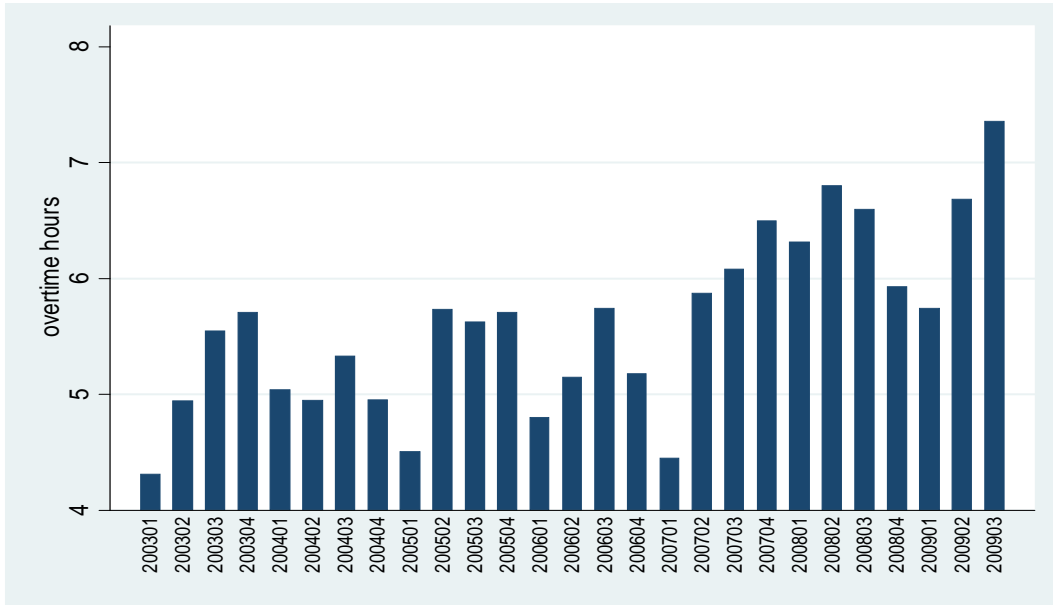


Figure 1: Average number per quarter of paid overtime hours per full-time employee. Non-agricultural for-profit sector. Source: *Enquête Emploi*.

contract stipulated a weekly duration of 35 hours were working 37 hours on average and were declaring only 0.4 paid overtime hours per week.<sup>11</sup> If the regulations governing hours worked had been rigorously respected, there ought to have been 2 paid hours per week.<sup>12</sup> Moreover, if the regulations had been followed to the letter, the correlation between the paid overtime hours and the hours worked by employees whose labor contract stipulates a work week of 35 hours ought to be close to 1. Before October 2007, however, it came to 0.39.<sup>13</sup> In substance, paid overtime hours and length of time worked frequently vary independently, and it is not at

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Carlos Mallo (2007) have estimated, for the United States, a model where employers and employees may have a shared interest in not declaring overtime hours to the authorities because of the costs associated with entering overtime hours in the accounts, and with the interpretation of the legal rules. The under-declaration of overtime hours in Germany is documented by Thomas Bauer and Klaus Zimmerman (1999). David Bell and Robert Hart (1999) highlight a significant volume of unpaid overtime hours in the United Kingdom.

<sup>11</sup>Here we take into consideration employees in the commercial non-agriculture sector whose labor contract stipulates a work week of 35 hours and who do not declare overtime hours offset by compensating rest time. The period assessed is 2003T1-2007T3, in other words before the introduction of the reform.

<sup>12</sup>This does not necessarily mean that these hours are not paid. The monthly wage may include such hours as a result of an agreement between employee and employer not stipulated in the labor contract. Such hours may also be remunerated in the form of a performance bonus, despite such a bonus being forbidden and subject to judicial sanction.

<sup>13</sup>Again, we consider employees in the commercial non-agriculture sector whose labor contract stipulates a work week of 35 hours and who do not declare overtime hours offset by compensating rest time. The period assessed is 2003T1-2007T3, in other words before the introduction of the reform.

all obvious that an increase in paid overtime hours has direct repercussions on the duration of work.

In order to evaluate the impact of the detaxation, we compare the evolution of the paid overtime hours and the hours worked of two groups of individuals, one of which is affected by the reform and the other not. The treatment group is composed of employees who reside and work in France. The untreated group is composed of employees who reside in France but work abroad, in regions adjoining the French border. These transborder workers (*travailleurs frontaliers*, literally "border workers") did not benefit from the detaxation of overtime hours. Hence the overtime hours and hours worked of French employees who work in regions near those of the transborder workers ought to rise relative to those of the transborder workers, from the fourth quarter of 2007 on, if the reform really did have the effects anticipated and if other events did not modify the relative hours of the two groups of employees. In order to ensure the pertinence of the results obtained, we take into account the differences in economic situation between countries, the evolution of regulatory frameworks on both sides of the borders, as well as the differences between the two groups of employees studied.

Ultimately, we find that the overtime hours of employees working in France rose, relative to those of the transborder employees, starting in the fourth quarter of 2007. This rise in overtime hours applies solely to highly-qualified employees, who have many ways to manipulate the overtime hours they declare in order to achieve tax optimization, because the length of time they work is particularly difficult to check on. Conversely, we detect no difference in the evolution of hours worked, whatever category of employee is considered. These results suggest that the upshot of the detaxation of overtime hours has essentially been tax optimization, with no real impact on the length of time worked. These results are confirmed by comparison of the evolution of the duration of work by employees in very small firms and that of independent workers who have not been directly affected by the detaxation of overtime hours.

This article is organized as follows: Section 2 reviews the content of the regulations governing length of time worked, and that of the reform of October 2007, which introduced detaxation of overtime hours. Section 3 is devoted to a theoretical discussion of the consequences of detaxation of overtime hours. We start by presenting a model which shows that detaxation of overtime hours does increase the length of time worked if the hours are perfectly verifiable, since the enhanced remuneration of overtime hours induced by the detaxation incentivates employees to work more.

This is the objective of the reform. Yet, when the hours are totally unverifiable, detaxation of overtime hours leads to a *diminution* of the length of time worked, for it is possible to increase one's income by declaring fictive hours; this increase in income incentivates employees to work fewer hours if leisure is a normal good, a generally accepted hypothesis. Thus, in the intermediate case, pertinent from an empirical viewpoint, in which hours are imperfectly verifiable by the authorities, detaxation of overtime hours should have an ambiguous impact on length of time worked. Section 4 describes the evolution of the declared overtime hours and the hours worked of employees for the period 2003-2009, in order to highlight the specificity of this evolution in October 2007. Section 5 compares the evolution of the overtime hours and length of time worked of individuals affected, and ones not affected, by the detaxation of overtime hours. Some concluding observations are offered in section 6.

## **2 The regulation of the duration of work, and the detaxation of overtime hours**

### **2.1 Regulation of the duration of work before October 2007**

Since 1 January 2000, France has lived with the 35-hour regime imposed by the Aubry laws,<sup>14</sup> as opposed to 39 hours previously. But the regulations governing time spent at work go far beyond the specification of the legal limit on work time. They comprise numerous mechanisms which form a complex ensemble of constraints and limits on the length of time effectively worked. Two of these are particularly important. They concern overtime hours, and the annual lump sum of days.

By definition, every hour of work performed beyond the legal limit of 35 hours per week is an overtime hour. Until 1 October 2007, it entitled the worker to an increase in his or her remuneration varying between minimums of 10% to 50% of the normal hourly wage, according to the size of the firm (10% minimum in firms with at most 20 employees, 25% minimum beyond that), the sectoral agreements in place (which might dictate more favorable rates), and the number of hours effected (a minimum increase of 50% once past the threshold of 8 overtime hours per week). But working time could also be reckoned on an annual rather than a weekly basis. By agreements in place at the level of sector, firm, or establishment, certain employees fall under a "modulated" regime in which the duration of work may vary over all or part of the

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<sup>14</sup>The date 1 January 2000 applied to firms with 20 employees or more; for the others, the 35-hour rule was imposed starting on 1 January 2002 (art. L.3121-10 of the labor code).



year, but may not exceed 1607 hours. Within this framework, hours worked in excess of this ceiling are considered overtime hours.

A range of mechanisms restricts the use of overtime hours. In the first place, the legislation provides for maximum durations of work: 10 hours per day (8 hours for night work, and 12 hours maximum under a collective agreement), and 48 hours per week (without exceeding 44 hours on average over a period of 12 consecutive weeks). In essence, overtime hours are limited by rules based on the idea that there will be more jobs if every employed person works fewer hours. The principal mechanism is the annual quota, the volume of which is fixed at 220 hours by decree, but which can be modified (downward only) by a collective sectoral agreement, and also by an agreement at the firm or establishment level under certain conditions. The employer is required, in principle, to inform the inspector of labor, and to obtain his permission on a case by case basis, to have overtime hours performed in excess of the quota. Overtime hours also create an entitlement to a complex system of rest time which, in substance, provides for extra holidays as a function of overtime hours effected: on one hand, if a sectoral agreement provides for it, remuneration for overtime hours may be replaced by a compensatory rest period of equivalent length (and in this case the overtime hours do not count toward the annual quota); on the other, once the quota is exceeded, obligatory compensation is triggered in the form of a rest period equalling 50% of the duration of the hours effected in firms of 20 employees or less, and 100% in firms with more than 20 employees once the quota is exceeded (and 50% above the threshold of 41 hours or more).

Faced with such constraints, many employers prefer to pay "premiums" or "bonuses," which are often remuneration for undeclared overtime hours. Labor ministry investigations regularly reveal that the quantity of overtime hours really being worked is unknown.

Besides, in 2007, certain employees were governed by the arrangement specifying an annual lump sum of days. These were managers, or non-managerial employees who enjoyed real autonomy in how they managed their time. In this case a collective agreement covering a sector, a firm, or an establishment determined the number of days worked. Absent such an agreement, the upper limit of the lump sum is set by default at 218 days per year.

## **2.2 The detaxation of overtime hours introduced in October 2007**

Thus, in essence, the regulation of working time in 2007 was characterized by a legal duration of 35 hours per week, and by stringent limits on the utilization of overtime hours. The law "to promote work, employment, and purchasing power" (*travail, emploi, pouvoir d'achat*, hence "the TEPA law," or "the fiscal package law") adopted on 1 August 2007 marked the first change in the regulation of working time. The TEPA law abolishes none of the regulatory and administrative mechanisms limiting the use of overtime hours. All it does is alter their cost, from 1 October 2007 on. In the first place, the TEPA law renders the rate of extra remuneration for overtime hours uniform, setting it at 25% whatever the size of the firm (absent extended sectoral collective agreements, or ones at the firm level, providing for a different rate). This uniformization entailed an increase in the cost of an overtime hour for many firms with fewer than 21 employees, for which the rate of extra pay for overtime had previously been 10%. To offset this extra cost, flat-rate reductions in the social security contributions paid by employers on overtime hours were introduced: 1.5 euros per hour in firms with at most 20 employees, 0.5 euros for the rest. Next, the overtime hours performed by a private-sector or public-sector employee were exempted from income tax and wage-based social security contributions (up to a limit of 21.5% of the gross wage). The TEPA law was clearly intended to make the utilization of overtime hours attractive, especially for employees.

## **3 The consequences of detaxation: some theoretical remarks**

Prior to the TEPA law, the constraints that limited overtime hours led many employers to reward overtime work with premiums. With the tax burden on overtime removed, they have an interest in abandoning this practice and paying for overtime hours, since that is a way to pay less tax. Detaxation of overtime hours may then lead to an increase in hours declared, with no change in the length of time effectively worked. More generally, employers and employees in principle have a shared interest in paying and receiving as much remuneration as possible in the form of overtime hours, without necessarily increasing the length of time worked. Opportunities to do so are many, since it is very hard for the fiscal authorities to check on how much time was really worked when employee and employer concert their declaration of an amount. This is the Achilles' heel of detaxation of overtime hours. Let us begin by reviewing several of these opportunities, and then their implications for the impact of detaxation of overtime hours.

### 3.1 Tax optimization

To treat premiums—rewards for good results—as compensation for overtime hours is to skirt legality. Top-performing employees may indeed be doing work at home, or thinking about their tasks while in transit. Equally, it is possible to reckon time spent on breaks or in transit as overtime hours. Besides, nothing prevents firms from remunerating overtime hours by increasing the rate of extra pay for overtime while reducing pay for normal hours. An individual may thus have a monthly wage that remains unchanged, but of which a smaller portion is subject to tax. The growth of such practices, extremely difficult for the authorities to check on, may transform detaxation of overtime hours into a veritable manna for firms and employees.

The studies available suggest that this manna may be exploited assiduously. A number of them show that employees and firms rebalance the various components of overall remuneration in response to the legal and fiscal environment. In the United States, the Fair Labor Standards Act (FLSA) passed in 1938, instituted a legal weekly duration of 40 hours, and raised the rate of extra pay for overtime hours to 50% once past that legal threshold (a total rate of remuneration called "time and a half" in the vernacular). But this law did not immediately come into force everywhere. Retail commerce in particular was exempt from it for a long time, whereas the wholesale trade felt the impact immediately. Since these two sectors have similar characteristics, it is possible to bring out the consequences of the overtime increase by comparing their performance during the period when the rate of increase was different for each, a task undertaken by Dora Costa (2000). She finds that employers reacted to the introduction of the FLSA by reducing the wage paid for normal hours, but without totally nullifying the extra cost of overtime hours. In the southern states, where the clauses bearing on the minimum wage were more stringent for employers than in the northern states, the average wage clearly rose more in the wake of the FLSA than in the northern states, and the dip in hours worked was greater. Dora Costa also finds that the introduction of the FLSA had little effect on the overall volume of employment.

A contribution by Stephen Trejo (2003) uses a closely-related methodology, exploiting the differences in the application of the FLSA according to sector between 1970 and 1989. Over that period, the number of employees covered by the FLSA, and who therefore had to be paid 50% more for each hour worked beyond the legal weekly duration of 40 hours, rose considerably in 5 sectors, including transportation and retail commerce. Trejo's statistical analysis finds no

significant effect, either on the percentage of workers putting in overtime hours, or on the overall volume of overtime hours. He explains this result by the decrease in the wage for normal hours, which offset the increase in the cost of overtime hours.

The studies by Costa and Trejo clearly illustrate the fact that employers and employees focus on the overall "package," in which the things that count are the sum total of hours worked and the remuneration received. That is why increases in the rate of extra pay for overtime hours are neutralized and have no effect when there is no minimum wage to prevent the reduction of the hourly wage. That is also why employers and employees may alter the various components of the labor contract so as to obtain fiscal advantages: company-supplied automobiles, restaurant cheques and other advantages in kind are forms of remuneration utilized when they are advantageous in fiscal terms. These advantages lead to lower wages, but they are mutually beneficial, since they constitute a way to reduce the total tax take drawn from employer and employee. Tax law restrains their use in order to limit abuse. Conversely, detaxation of overtime hours opens up wide possibilities of tax optimization that are costly for the public finances.

Now, the impact of detaxation of overtime hours on hours effectively worked depends in large part on the verifiability of overtime hours, as we shall now show.

### **3.2 Detaxation of overtime hours and length of time worked**

To show that the verifiability of hours worked does affect the impact of detaxation of overtime hours on the length of time worked, we consider a labor market with workers of heterogeneous productivity. The productivity of a worker is measured by the parameter  $\theta > 0$ , the distribution of which is not degenerated in a single point of mass. A worker of productivity  $\theta$  produces a quantity  $\theta f(H)$ ,  $f(0) = 0$ ,  $f' > 0$ ,  $f'' < 0$ , when he works for duration  $H$ . The workers have identical preferences represented by a utility function  $U(C, L)$ , quasi-concave and strictly increasing in relation to its two arguments: consumption  $C$  and leisure  $L$ , equal to total disposable time,  $L_0$ , reduced by the duration worked ( $L = L_0 - H$ ).

The detaxation of overtime hours introduced in France allows the payment of lower taxes on overtime hours than on normal hours. This amounts to subsidizing overtime hours. In order to lighten our presentation, we assume that the rate of taxation on normal hours is null, and we denote by  $s_e$  the rate of the subsidy on overtime hours flowing to employees, and by  $s_f$  the

rate of the subsidy on overtime hours flowing to employers. We are therefore situated within a framework of partial equilibrium, which leaves out the impact of how the subsidies on overtime hours are financed. The legal rate of extra pay for overtime hours, paid by the employer to the employee, is denoted  $p$ .

We consider a labor market where competing firms offer contracts stipulating an hourly wage and a length of time to be worked. At labor market equilibrium, the contracts maximize the utility of employees under the constraint of null profit for firms. The allocation thus obtained is a Pareto optimum.

It will be helpful to take two diametrically opposed cases in turn: in the first, overtime hours are perfectly verifiable by the authorities, in the second totally unverifiable. The second case is the one habitually envisaged in the literature treating optimal taxation, in the wake of the seminal contribution of Mirrlees (1971): the overall remuneration received by the employee is assumed to be verifiable, but the number of hours worked is not. In this framework, productivity  $\theta$  is private information held by the firm and the employee and cannot be verified by third parties.

### 3.2.1 Verifiable hours worked

We assume that hours worked are verifiable by the authorities. Denoting the legal duration of work by  $\bar{H}$  and the hourly wage by  $w$ , the labor cost has the expression

$$wH + (pw - s_f) \max(H - \bar{H}, 0).$$

Assuming for the sake of simplicity that their wage is the sole source of income for the workers, consumption is equal to the total wage received by the employee, augmented by the subsidy on overtime hours:

$$wH + (pw + s_e) \max(H - \bar{H}, 0).$$

For each type of worker  $\theta$ , the duration of work and the equilibrium wage maximize utility under the null profit constraint which is written

$$\theta f(H) = wH + (pw - s_f) \max(H - \bar{H}, 0).$$

Using the last two relations, it is apparent that the consumption of an employee of productivity  $\theta$  may be written:

$$\theta f(H) + (s_e + s_f) \max(H - \bar{H}, 0).$$

In consequence, the equilibrium duration of work for workers of productivity  $\theta$  maximises

$$U [\theta f(H) + (s_e + s_f) \max(H - \bar{H}, 0), L_0 - H].$$

It is immediately clear that the consumption and the duration of work of each employee are independent of the rate of extra pay for overtime hours. We are back to the results highlighted by Costa (2000) and by Trejo (2003). Conversely, the remuneration and the length of time worked are dependent on the subsidy for overtime hours.

The solution of the program of maximization of hours is well-known. When the duration of work in the absence of subsidy is less than or equal to the legal duration, the subsidy may incentivate employees to work more. When the length of time worked in the absence of subsidy is greater than or equal to the legal duration, the subsidy has an ambiguous impact on the length of time worked: it causes an income effect which may, in theory, dominate the substitution effect, but in practice this income effect is weak to the extent that the volume of overtime hours is itself generally weak in relation to total volume of hours worked. In consequence, it is likely that the substitution effect dominates and that overall the subsidy has a positive impact on hours worked.

Hence, when overtime hours are verifiable, detaxation of overtime hours is likely to have a positive impact on hours worked.

This result is obtained on the assumption of a perfectly flexible wage—something that is not always the case, especially in France, where more than 10% of wage-earners are paid at minimum wage and where collective bargaining plays a large part, especially at the lower end of the wage spectrum. In this framework, the presence of a wage floor may limit the impact of detaxation of overtime hours on hours worked, if it leads to a reduction in the hourly wage declared to the authorities. The authorities can know the hourly wage since, by hypothesis, they observe the total remuneration of the employee (equal to  $\theta F(H) + s_f \max(H - \bar{H}, 0)$ ). Calculation of the hourly equilibrium wage

$$w = \begin{cases} \frac{\theta F(H) + s_f (H - \bar{H})}{(1+p)H} & \text{if } H > \bar{H} \\ \frac{\theta F(H)}{H} & \text{otherwise} \end{cases}$$

shows that an increase in the subsidies  $s_e$  or  $s_f$  may indeed lead to a lowering of the hourly wage. For example, the hourly wage falls with  $s_f$  and  $s_e$  when  $s_f \rightarrow 0$  if the subsidy for overtime hours increases the duration of work. The presence of the wage floor then imposes a limit on the rise in the length of time worked that would flow from the detaxation of overtime hours if the

hourly wage were perfectly flexible. Thus, at minimum wage level, the impact of the detaxation on the length of time worked may be very slight if the subsidy allocated to firms is weak, as it is in France.

### 3.2.2 Unverifiable hours worked

We revert to the case where the hourly wage is perfectly flexible, and we now assume that the overall remuneration of the worker is verifiable, but that the quantity of hours worked is not. To maximize the subsidy they receive, employees and employers then have an interest in stating the highest possible number of overtime hours compatible with the maximum authorized duration of work, or with a ceiling duration, beyond which fictive overtime hours could be detected by the authorities. If we denote  $H_{\max} \geq \bar{H}$  this maximum duration, the null profit condition entails that the consumption of a wage-earner of type  $\theta$  is equal to

$$\theta f(H) + (s_e + s_f)(H_{\max} - \bar{H}).$$

Consequently, the equilibrium duration of work for workers of productivity  $\theta$  maximizes

$$U [\theta f(H) + (s_e + s_f)(H_{\max} - \bar{H}), L_0 - H].$$

It is immediately apparent that an increase in the subsidy for overtime hours is equivalent to an increase in non-wage income, the impact of which on the length of time worked is negative if leisure is a normal good, which is generally the case.

Hence, when overtime hours are unverifiable, detaxation of overtime hours has a negative impact on hours worked.

This result, obtained when the hourly wage is perfectly flexible, remains valid in the presence of a floor under the hourly wage. Nonetheless, the presence of an hourly wage floor may impose a supplementary limit on the length of time worked that can be declared to the authorities, since they, knowing the total remuneration, can verify that the declared length of time worked does indeed correspond to an hourly wage higher than the authorized floor.<sup>15</sup> So the presence of a wage floor limits the opportunities for tax optimization when hours worked are unverifiable. At the limit, for employees paid the minimum legal or conventional wage, there is no margin

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<sup>15</sup>The overall remuneration without subsidy is equal to the productivity of labor; if the hours effectively worked do not vary, but hours declared increase, the hourly wage declared—i.e. calculable by the authorities—must be adjusted downward.

for maneuver to reduce the hourly wage, and detaxation of overtime hours gives rise to no optimization.

On the whole, these lines of reasoning show that the impact of the detaxation of overtime hours on the effective length of time worked depends largely on the verifiability of time worked, which varies with categories of workers, and also on the degree of wage rigidity, which generally varies with wage level.

## 4 The evolution of the length of time worked and overtime hours

### 4.1 The data

We use the Labor Force Survey (*Enquête Emploi*) carried out by INSEE. Each quarter, around 70,000 persons (residing in 45,000 residences) are queried, which represents a sampling rate of residences of around 1/600th. This survey is ongoing. Every person (older than 15) in each residence selected is queried once per quarter for six consecutive quarters.

The *Enquête Emploi* is the sole coherent source currently available for analyzing the impact of the detaxation of overtime hours. For one thing, it tracks the duration of time worked continuously since 2003. For another, the queries regarding the length of time worked are very detailed.<sup>16</sup> Overtime hours effected during the week preceding each interview are declared at interview, and the distinction is made between those that are remunerated and those that are compensated by rest days; total hours worked are also recorded, and information is supplied about all kinds of holidays or absences that might have affected the volume; many characteristics of the wage-earner (age, family situation, region, education, job held, type of labor contract, payment of premiums, etc.) and of the firm for which he or she works are also included in the survey (especially the size of the firm and the sector in which it is active).<sup>17</sup>

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<sup>16</sup>They are presented in appendix A.

<sup>17</sup>Other administrative sources issuing from administrative declarations or surveys of heads of firms include information on overtime hours since the fourth trimester 2007. Examples include the annual declarations of company data (DADS), or the recapitulatory statement of social security contributions (BRC) filled out by firms monthly or trimestrially when social security contributions are paid. These two sources have been compiled starting with the fourth trimester of 2007 in order to follow in detail the paid overtime hours (for the DADS) or to deduct the reduction of social security contributions to which firms and employs are entitled on overtime hours starting on that date (for the BRC). But however reliable they may be, they contain no information on periods prior to October 2007, and therefore cannot serve as a basis for the evaluation of the mechanism introduced by the TEPA law.

As for surveys of firms, such as the Acemo (*Activité et conditions d'emploi de la main d'oeuvre*) and Ecmoss (*Coût de la main d'oeuvre et la structure des salaires*, available from 2005 on for overtime hours) they constitute the instrument for tracking overtime hours until 2007. However, the information only covers firms of 10 employees or more (around 80% of the non-agriculture for profit sector). Now, the recent measurements of overtime hours have



We have selected individuals having a full time paid job in the non-agricultural for-profit sector, with a maximum work duration of 72 hours per week, whose work schedules have not been interrupted by a strike, by time off for training, by illness, by a period of partial unemployment, a business closure, or maternity.

We have eliminated employees who work under the lump-sum-of-days regime, as most managers do. For this category, it is not so much the weekly duration of work that is sensitive to detaxation as it is the total number of days worked during the year. We have likewise eliminated persons working under a modulation agreement, or one of annualized working time, for whom the length of time worked may temporarily exceed the legal duration without triggering overtime hours. Finally, we have excluded the unemployed and the retired (who may sometimes have had some paid activity during the reference week of the survey), interns, and persons with contracts supported in the context of some employment policy, as well as salaried executives, seasonal workers, and those working for individual employers whose schedules fall under very specific constraints.

Paid overtime hours are on average effected by men to a greater extent than by women, by employees under 50 more than by seniors, and more often among laborers and the intermediate professions than among managers and white-collar employees (see appendix B). Among persons who declare their wage level, it is especially in the vicinity of the median wage (equalling around 1.6 times the minimum wage) that the weekly averages of overtime hours are highest.

## 4.2 The rupture of October 2007

In order to detect the existence of an possible rupture in the evolution of the duration of work and overtime hours in October 2007, we begin by analyzing the values of these variables before and after that date for individuals working in France. This analysis enables us to show that paid overtime hours increased significantly starting in October 2007, whereas the volume of hours worked has remained unchanged.

Table 1 presents the evolution of the average of paid overtime hours, and hours worked, in

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demonstrated that recourse to them evolves with the size of the firm, which makes it difficult to infer the behavior of very small firms. Moreover, these surveys tend to be affected by under-declaration, especially on the part of firms resorting to overtime hours with great regularity. Such firms have had a strong incentive to declare their hours when surveyed starting in October 2007, so as not to reveal any discrepancy with the statements of social security contributions which permit them to benefit from detaxation. On these matters, see the Report to Parliament on the putting into effect of article 1 of the law of 21 August 2007 to promote work, employment, and purchasing power relative to the exemptions from charges on overtime hours (<http://www.ladocumentationfrancaise.fr/rapports-publics/094000050/index.shtml>).

October 2007 for persons queried before and after that date. The period covered thus runs from July 2006 to December 2008 (persons are queried a maximum of 6 times, once each quarter).

The first column in table 1 reports the average weekly duration of work and the average number of paid overtime hours before October 2007, for the ensemble of employees working full-time. The second column presents the values of these two variables after October 2007. The third column presents the difference between these two variables. Thus, the first line of the third column shows that there is an increase of the order of 0.06 overtime hours per week. The fourth column, which gives the p-value, shows that this increase is statistically significant at the threshold of 1%. This is a substantial augmentation, inasmuch as the number of weekly overtime hours was on average 0.40 hours per employee before October 2007. Paid overtime hours thus increased by more than 10% starting in October 2007. Conversely, the second line of the third column of table 1 indicates that the evolution of hours worked presents no rupture in October 2007, for there is no statistically significant increase in hours worked. Thus, on average, the whole population of employees declare significantly more overtime hours starting in October 2007, but do not work significantly longer durations starting on that date.<sup>18</sup> This observation is nevertheless very summary, concerning as it does the ensemble of employees.

Scrutiny of the evolution of the duration of work and overtime hours for different categories of employee makes it possible to refine this observation. The third column of table 2 shows that the overtime hours of managers, technicians, and the intellectual or artistic professions, and of employees paid more than 1.3 times the minimum wage (called SMIC in France), increase significantly, whereas those of laborers and employees remunerated at less than 1.3 times the minimum wage do not increase. There is, moreover, no augmentation of the length of time worked. These evolutions conform to the predictions of the theoretical model presented in the previous section. Opportunities to declare fictive hours are indeed more widely available when the duration of work is harder to verify. And it is harder to check on the hours worked by employees who enjoy greater autonomy in the scheduling of their work. This is generally the situation of managers, technicians, and those employed in the intellectual and artistic professions. Unlike managers, technicians, and the intellectual and artistic professions, laborers generally have a more closely regulated duration of work, which a third party can more easily check up on. Hence their opportunities for tax optimization are fewer. To sum up, table 2 shows that

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<sup>18</sup>Appendix C shows that this phenomenon does not derive from a substitution between paid overtime hours and overtime hours triggering the right to compensatory rest.

paid overtime hours have increased significantly for the categories of employee whose duration of work is difficult to verify and whose wages are relatively flexible, whereas it has not grown significantly for laborers and low-wage workers whose duration of work is more easily verifiable, and whose wages are more often constrained by the legal minimum, and collective agreements.

In order to describe the evolution of overtime hours and the duration of work with greater precision, it is helpful to distinguish between employees declaring overtime hours after October 2007 and those not declaring such hours. The previous analysis in fact includes individuals who never perform overtime hours, or who no longer do so after the reform for various reasons. It is also enlightening to look at the difference between the duration declared to the authorities (equal to the sum of the legal duration plus the overtime hours), and the duration worked, represented by the *Deviation* variable. An increase in the *Deviation* variable corresponds to an augmentation of overtime hours greater than the augmentation of hours really worked.<sup>19</sup> In the presence of tax optimization, this difference should grow.

The first lines of table 3 report the overtime hours, the hours worked, and the *Deviation* variable for employees declaring paid overtime hours after 1 October 2007. These employees declare more overtime hours after October 2007 than before. Their length of time worked is also higher after October 2007. The gap between the duration declared to the authorities and the duration worked, declared in the survey, widens significantly, on the order of 0.3 hours per week.

The following lines of table 3 show that the widening of the gap between hours declared to the authorities and duration worked is more marked for employees who declare more overtime hours after 1 October 2007 than before that date. We see that their length of time worked does increase starting in October 2007, but not as much as their number of overtime hours does. The gap between the duration declared to the authorities and the duration worked widens by 0.7 hours per week. This widening looks quite substantial when it is compared to the average of weekly overtime hours, equal to 0.4.

The following lines of table 3 indicate that there is no significant variation in the difference between duration declared and duration worked for employees who do not declare any overtime hours after 1 October 2007. The same is true of employees who do not declare any more overtime

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<sup>19</sup>The *Deviation* variable, equal to the difference between the legal duration augmented by overtime hours on one hand, and the duration of work declared to the survey (which we call duration worked) on the other, is generally negative. An increase in the *Deviation* variable thus generally corresponds to a diminution of its absolute value.

hours from October 2007 on than they did before that date.

On the whole, table 3 shows that the widening of the gap between hours declared to the authorities and hours worked was greater for persons who declared more overtime hours after October 2007 than before.

Table 4 details the results presented in table 3 for different categories of employees. The third column of table 4 shows that the difference between hours declared to the authorities and hours worked by managers, technicians, and intellectual and artistic professions who have declared more overtime hours since 1 October 2007 has increased considerably from that date on. Almost half the increase in their overtime hours declared is not matched by any increase in their length of time worked! Table 4 shows, on the other hand, that there is no widening of the gap between the duration declared to the authorities and the duration worked for laborers who have declared more overtime hours starting in October 2007. We obtain the same result concerning low-wage employees (less than 1.3 times the minimum wage), for whom the opportunities for optimization are, in the same way as for laborers, probably limited.

Taken as a whole, these descriptive elements suggest that the detaxation of overtime hours may have incentivized a significant degree of fiscal optimization, notably on the part of qualified employees, whose duration of work is hard to check up on. In these circumstances, the theoretical model developed in the previous section shows that the detaxation of overtime hours has an ambiguous impact on the length of time worked. We shall now examine the impact of the detaxation of overtime hours by comparing the behaviors of individuals affected by this reform with that of individuals who are in comparable situations, but who have not been affected by this reform.

## **5 The impact of the reform**

To pinpoint the impact of the detaxation of overtime hours, we compare the evolution of the paid overtime hours and the hours worked for two groups of individuals, one of which is affected by the reform and the other not. Our first strategy for pinpointing the impact of the reform consists of a comparison between transborder employees, those who reside in France but work abroad in bordering regions, and employees who reside and work in France. We start by discussing this strategy, and then go on to present the results.

In the next stage, we compare the evolution of the duration of work of independent workers

who do not employ anyone and thus are not affected by detaxation, with that of employees who work in very small firms.

## 5.1 Transborder employees and employees working in France

### 5.1.1 Identifying the impact of detaxation

Unlike employees who live and work in France, transborder workers have not benefited from the detaxation of overtime hours.<sup>20</sup> So the overtime hours and the hours worked of French employees ought to rise relative to those of transborder workers, beginning in the fourth quarter of 2007, if the reform really did have the effects anticipated, and if other events have not altered the relative hours of the two groups of employees.

A range of events might affect the paid overtime hours and the hours worked of the two groups, independently of the detaxation of overtime hours.

*i)* The transborder workers might differ from those who work in France. These differences might have to do not just with observable characteristics, like educational level, age, or family situation,<sup>21</sup> but also with non-observable ones like motivation to work or personal ambition. Such differences can lead to different reactions to the economic situation, and diverging evolutions in the duration of work and overtime hours. The *Enquête Emploi*, which collects information on every individual for six consecutive quarters, allows us to take into account the heterogeneity of observable and non-observable characteristics, constant over time, among transborder workers

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<sup>20</sup>The detaxation of overtime hours effectively concerns a portion of social security contributions, and income tax. Employees working in a neighboring country pay their social security contributions there (European Community regulation no. 1408/71, dated 14 June 1971), and thus do not benefit from the reduction in social security contributions on overtime hours, which represents over three quarters of the total amount of the exemption. Hence the detaxation of overtime hours always entails a more significant reduction of compulsory withholdings for employees working in France than for transborder workers. As for the income tax, it is paid in France if the employee has the fiscal status of *travailleur frontalier* (transborder worker), meaning he or she resides not far from the border and returns home sufficiently often (with the exception of persons working in Luxembourg or in the canton of Geneva). Transborder workers who do pay their income tax in France only received confirmation that they could benefit from the detaxation of overtime hours at the end of 2009, because of a juridical indeterminacy (no explicit mention of transborder workers in the law on the detaxation of overtime hours, the absence of any directive defining the duration of work, without which it was impossible to say when the hours worked by transborder workers became overtime hours), which was cleared up in a circular of January 2010 (Bulletin officiel des Impôts no. 7, 14 January 2010). This circular states that the benefit of the detaxation applies to transborder workers beginning on 1 October 2007. The overtime hours eligible for exemption from income tax are hours of work performed beyond the legal duration of work set by the legislation on the duration of work in the country where the employee holds his or her job, or, in the case of a country that does not fix any legal length of time worked, beyond the duration provided for by a convention or a professional or interprofessional agreement. That said, if the convention or professional or interprofessional agreement sets a duration of work below 35 hours, only the hours effected past the 35-hour threshold are exempt.

<sup>21</sup>These characteristics are presented in table 14.

and workers in France, by estimating the impact of the reform with regressions that include fixed individual effects.

*ii)* The economic situation might be different in France and in neighboring countries. To take this phenomenon into account, we integrate variables measuring the situation in each country and we compare the hours of transborder workers with those of employees working in departments (administrative-territorial units) of France adjacent to the French border, in order to compare employees working in homogeneous geographic zones.

*iii)* Fiscal reforms might influence the overtime hours and the hours worked in the bordering countries. Such reforms might have an impact on the length of time worked of persons residing in France who work abroad. This might be the case when social security contributions, systematically paid in the country where the job is held, are modified. This might also be the case for persons working in Luxembourg or in the canton of Geneva, for in these cases taxes are paid in the country where the job is held. We have verified that no reform introduced in a neighboring country has led to a reduction in obligatory withholdings on hours of work in excess of the legal or conventional duration of work as significant as in France.

*iv)* The composition of the two groups of workers might evolve over time, especially in a period of recession. The *Enquête Emploi* allows us to resolve this problem, since it collects information on every individual during six consecutive quarters. It is therefore possible to compare the evolution of the duration of work and overtime hours for the same ensemble of workers before and after the reform, thus neutralizing any bias due to an eventual alteration of the composition of the groups. In order to ensure that variations in the length of time worked and overtime hours do not arise from job changes, we limit ourselves to a sample of individuals who kept the same job.<sup>22</sup>

The evaluation of the impact of the detaxation of overtime hours is realized through estimating the equation

$$Y_{ict} = b_0 + b_1(D_t \times F_i) + b_2D_t + b_3X_{ct} + \nu_i + \varepsilon_{it} \quad (1)$$

where  $Y_{ict}$  designates the duration of work or the paid overtime hours of individual  $i$  employed in country  $c$  on date  $t$ .  $D_t$  is a dummy variable equal to zero before 1 October 2007 and to one subsequently.  $F_i$  is a dummy variable equal to one for wage-earners employed in France and

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<sup>22</sup>This choice also excludes individuals who change jobs across countries, which could potentially impact the evaluation of the reform. However, in our sample only 6 individuals changed the country where they work over the corresponding period.

to zero for transborder workers.  $X_{ct}$  is a variable representing the quarterly economic situation, measured, according to the specifications, by the business climate or by the share of exports of goods and services in the GDP of country  $c$  at date  $t$  (quarterly indicators of the OECD).  $\nu_i$  is a fixed individual effect and  $\varepsilon_{it}$  is a random factor of null average.

The coefficient  $b_1$  measures the difference in variation after-before October 2007 between the hours of work (or the overtime hours) of wage-earners employed in France and transborder workers. In the context presented above, the coefficient  $b_1$  measures the impact of the detaxation of overtime hours on the duration of work or on overtime hours.

### 5.1.2 Results

Figure 2 shows that the difference between the hours of weekly work of wage-earners working in France and transborder workers presents no tendency either upward or downward. This figure also shows that the hours worked of employees working in France seem not to have increased, relative to those of transborder workers, beginning in October 2007. This observation is confirmed by table 5, which presents the variation, between before and after 1 October 2007, in the difference between the duration of work and the overtime hours of employees working in France and the same difference in the case of transborder workers (coefficient  $b_1$  of equation (1)). Table 5 distinguishes two regions in order to assure the greatest possible homogeneity of economic situations, compatible with the availability of data.<sup>23</sup> The "North" region is composed of the border zones of Belgium, Luxembourg, and Germany. The "North-East" region is composed of Luxembourg, Germany, and Switzerland. The first two columns are dedicated to the North region, and the four following ones to the North-East region. The first column presents the results for the North region without taking into account differences of economic situation between regions. The second column takes into account differences in economic situation represented by the share of exports in the GDP of each bordering country. Columns (3) and (4) present the results of similar estimations for the North-East region, as well as columns (5) and (6) for both regions taken together.<sup>24</sup> We see that controlling for the economic situation yields no significant change to any result in all that follows, which suggests that the geographic zone concerned is

<sup>23</sup>For this reason, we have eliminated Italy and Spain, which comprise an insufficient number of observations.

<sup>24</sup>These results, as well as the following, remain qualitatively the same when we exclude individuals who have only been queried once before or after the reform. Hence, they are unlikely to stem from potential measurement errors.

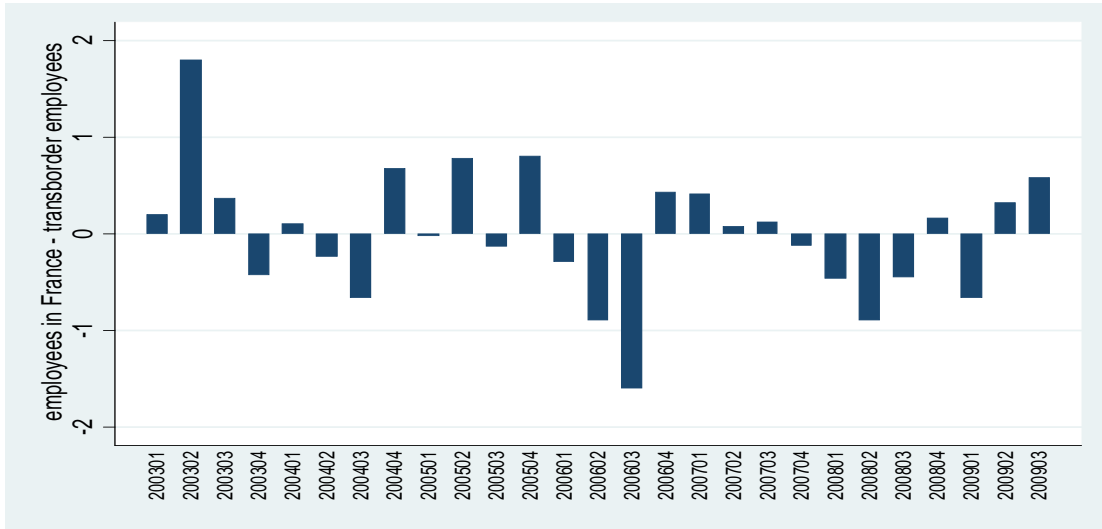


Figure 2: Difference centered on 0 between the weekly work duration of employees working in France and transborder employees. Source: *Enquête Emploi*.

subject to the same economic situation.<sup>25</sup>

As a whole, table 5 shows that there is no significant difference in the evolution of the durations of work of employees working in France and trans-border employees. Conversely, the number of overtime hours declared by the employees residing in France increases, relative to that of transborder employees, for certain specifications. In particular, overtime hours increase significantly for the most pertinent specifications, which take account of the economic situation and which concern wage-earners who keep the same job before and after October 2007. These results are coherent with those of the previous section: after 1 October 2007, overtime hours have a tendency to increase, but the length of time worked remains unchanged.

In order to better discern the extent of the results obtained in table 5, table 6 presents the results of specifications identical to those of table 5, but bearing on wage-earners whose duration of work is a priori difficult to verify. We have selected employees in teaching and the scientific professions, media professions, arts and entertainment, administrative and commercial managers of firms, engineers and technical personnel of firms. On the whole, table 6 indicates that the detaxation of overtime hours has led to growth in the overtime hours of categories of employees whose duration of work is hard to verify, without having had any impact on their hours worked.

<sup>25</sup>We have also taken the economic situation into account with annual dummies or with the business climate (trimestrial OECD indicator), without the results being affected.



The number of overtime hours increases more for these employees, around 0.8 to 0.9 hours as opposed to 0.5 to 0.6 for the group as a whole. In addition, it is striking to note that for this category of employees, the paid overtime hours of those working in France grew relative to those of the transborder employees, whereas their hours worked did not increase in absolute terms relative to those of the transborder employees. The signs of the coefficients associated to the hours worked of the employees in France are in fact all negative, although not significant.

The contrast between the behavior of employees whose hours are hard to verify and that of those whose hours are easier to verify emerges more convincingly in examining table 7. This table presents the results of estimations identical to those of the two previous tables, but focusing this time on laborers and wage-earning tradesmen. We see that the overtime hours, like the duration of work, do not increase for the employees in this category working in France relative to those of the transborder employees after October 2007. Here too, these results are coherent with those of the previous section.<sup>26</sup>

In sum, comparison of the evolution of the length of time worked of wage-earners employed in France and that of transborder workers indicates that the detaxation of overtime hours has had no significant effect on length of time worked. This result holds good for all categories of employee, whatever their socio-professional category or their wage level. Conversely, detaxation of overtime hours has increased the number of overtime hours declared by relatively qualified employees, whose duration of work is particularly hard to verify.

## **5.2 Employees of very small firms and independent workers**

### **5.2.1 An alternative strategy of identification**

In order to ensure the robustness of the foregoing results concerning the impact of detaxation on length of time worked, we apply the same method as before, but we now select a different group of individuals who have not been directly affected by the reform. The detaxation of overtime hours does affect all wage-earners. Independent workers who do not employ a wage-earner are, however, not affected by detaxation. If the detaxation of overtime hours has really had an impact on the duration of work of employees, we ought to observe a rupture in the difference of duration of work of employees and independents starting in October 2007.

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<sup>26</sup>Because of the large number of missing observations in the wage declarations, we are unable to conduct these estimations on the reduced sample of transborder workers for wages below 1.3 SMIC, on one hand, and above this marker on the other, as we did in the previous section.

Comparison of the evolution of the duration of work<sup>27</sup> between these two groups does not necessarily make it possible to identify a causal impact of detaxation on the duration of work. Several different factors might affect the hours worked of these two groups, independently of the detaxation of overtime hours.

1) For one thing, the independents might have individual characteristics and specific working conditions that cause them to react differently to the economic situation than employees do. In order to limit these differences, we compare independents not employing a wage-earner with wage-earners in firms having just one employee.<sup>28</sup> Moreover, we study separately two families of trades within which economic conditions are more homogeneous: first, independent tradesmen and wage-earning laborers in the trades, and second, retailers and retail employees.<sup>29</sup> We thus verify that the length of time worked has not varied differently between employees and independents within these two families since 2003. Finally, we continue to take account of the heterogeneity of observable and non-observable characteristics, which do not change over time, between independents and employees by including fixed individual effects.

ii) As in the case of the transborder workers, the composition of the two groups might evolve over time. A reform occurring in 2008, which created the easily accessible and fiscally advantageous status of auto-entrepreneur (self-entrepreneur) might have facilitated the transition from the status of wage-earner to that of independent. To take account of these changes, we confine ourselves to individuals who change neither their status nor their job during the period, while following the same ensemble of workers before and after the reform.

iii) Other reforms might have influenced the durations of work of the two groups independently. We have identified none of sufficient importance for the period preceding and following the reform of 2007, the fiscal regime having been globally stable over the whole of the period.

iv) Finally, by reducing the labor cost of wage-earners, the detaxation of overtime hours might give them an advantage over independents. In consequence, the detaxation of overtime hours might reduce the duration of work of the independents, who might lose market share to wage-earners. This effect can only be slight, inasmuch as the detaxation of overtime hours has only a slight effect on the cost of labor. Still, this does create a risk of over-estimating the

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<sup>27</sup>Overtime hours evidently cannot be compared between these two groups, since the independents do not declare any.

<sup>28</sup>Some characteristics of these independents and employees are presented in tables 15 to 17.

<sup>29</sup>We compare the evolution of the duration of work in occupations for whom the data are sufficiently abundant. Other occupations, like the liberal professions or the health professions, cannot be studied because of the lack of a sufficient number of observations in our sample, either among employees or among independents.

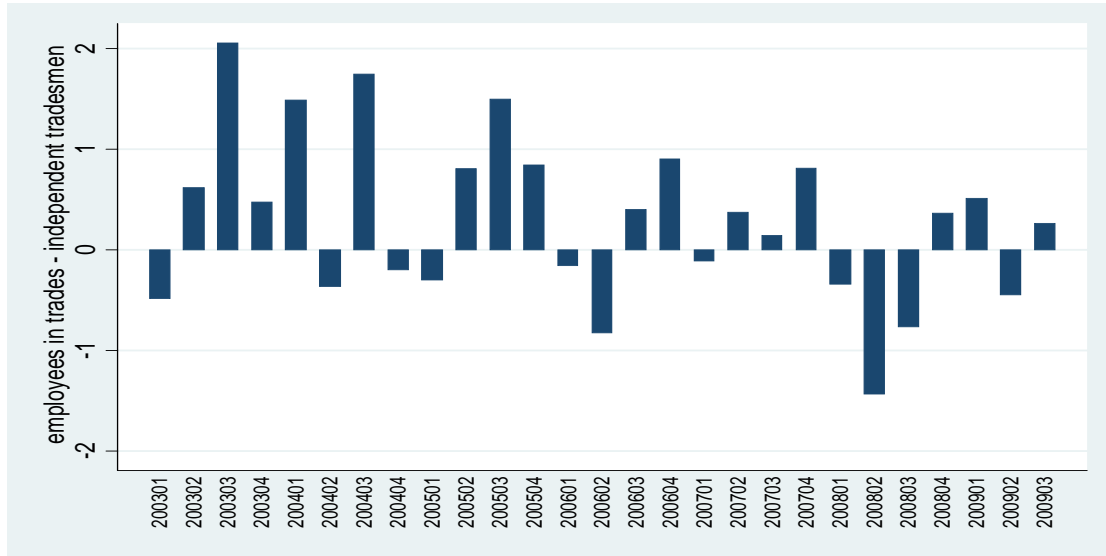


Figure 3: Difference centered on 0 between the weekly work duration of employees and independent workers. Laborers employed in the trades working in firms with a single employee, and independent tradesmen with no employees. Source: *Enquête Emploi*.

impact of detaxation on the length of time worked.

The impact of the reform is evaluated by estimating an equation similar to equation (1) for hours worked.

### 5.2.2 Results

Figure 3 shows that the difference between the duration of work of independent tradesmen without employees, and laborers in the trades who work in firms with a single employee, remains stable over the whole of the period. The graph reveals no increase in the relative duration of work of the employees beginning in the fourth quarter of 2007. The same holds good for independent retailers without employees, and retail employees who are the sole employee in their firm (Figure 4).

Table 8 confirms these results. It presents the value of coefficient  $b_1$  of equation (1) and its standard deviation for different families of employees. The first column concerns the ensemble of employees in very small firms, and independents not employing a wage-earner. For these two groups, there is no significant difference in the evolution of the duration of work before and after the reform of 2007. This result is confirmed by comparison with groups who work in the trades

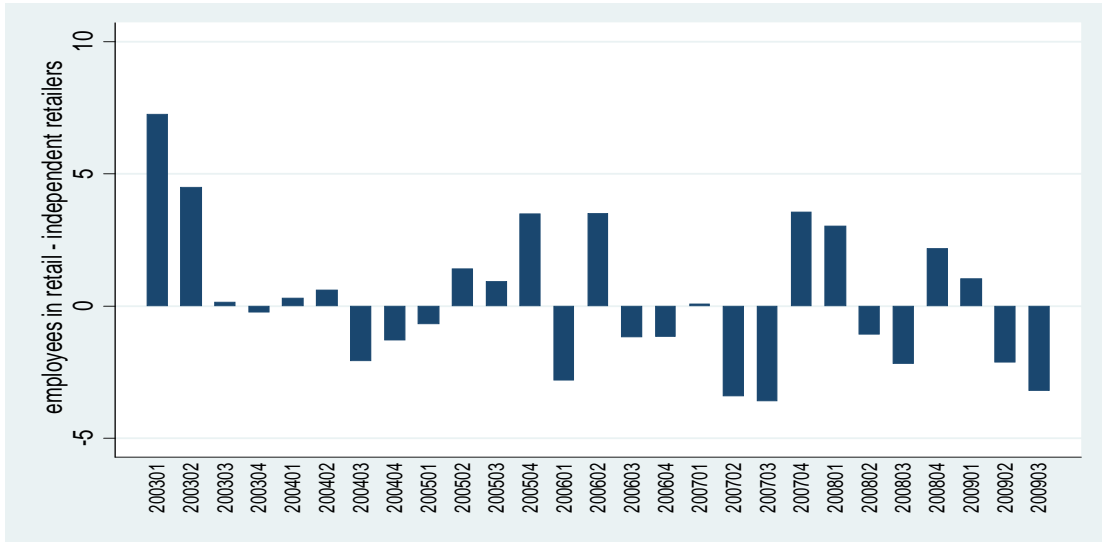


Figure 4: Difference centered on 0 between the weekly work duration of employees and independent workers. Retail employees working in firms with a single employee and independent retailers with no employees. Source: *Enquête Emploi*.

sector and the retail sector. The second column concerns the trades sector. The third column concerns retail. In these two sectors, there is no significant difference in the evolution of the duration of work as between employees and independents.

Finally, these results confirm the absence of effect of the reform of October 2007 on the duration of work obtained previously by comparing employees working in France and those working abroad. The detaxation of overtime hours has had no detectable impact on the length of time worked.

## 6 Conclusion

The detaxation of overtime hours introduced in October 2007 was intended to allow individuals in France to work more so as to earn more. The evaluation conducted in this article indicates that the detaxation of overtime hours has not, in fact, had any significant impact on hours worked. Conversely, it has indeed had a positive impact on paid overtime hours which create an entitlement to tax reductions. Thus, the detaxation of overtime hours appears not to have fully met its aim: while the wage-earners concerned have indeed benefited from a spike in their remuneration thanks to detaxation, that has not, on average, come about through working more.

Detaxation is a measure costly for the public purse, without any ascertained impact on hours worked.

This evaluation has focused on the impact of the measure on hours. Other dimensions could be explored, for example employment, or employee motivation. The fact that hours worked do not increase after October 2007 suggests, however, that the measure must have had a very limited effect on employment.

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	Before	After	After–Before	p-value	N
	(1)	(2)	(3)	(4)	(5)
Overtime hours	.422 (.015)	.488 (.017)	.065 (.019)	.0040	29 659
Hours worked	38.61 (.040)	38.67 (.040)	.062 (.057)	.2703	29 659

Table 1: Weekly number of overtime hours and of hours worked by all full-time employees of the non-agricultural for-profit sector. Average value for individuals interrogated before and after October 2007. (1) Before October 2007. (2) After October 2007. (3) Difference. (4) p-value. Null hypothesis: after-before difference equal to zero. (5) Number of observations. Standard deviation in parentheses.

	Before	After	After–Before	p-value	N
	(1)	(2)	(3)	(4)	(5)
Managers, technicians, and the intellectual or artistic professions					
Overtime hours	.250 (.019)	.341 (.025)	.091 (.032)	.0037	9 860
Hours worked	40.21 (.084)	40.32 (.081)	.108 (.117)	.3531	9 860
Employees paid more than 1.3 times the minimum wage					
Overtime hours	.450 (.021)	.545 (.024)	.095 (.032)	.0027	17 267
Hours worked	39.58 (.059)	39.58 (.058)	.001 (.083)	.9866	17 267
Laborers					
Overtime hours	.530 (.025)	.584 (.028)	.055 (0.38)	.1458	11 199
Hours worked	37.61 (.046)	37.63 (.047)	.027 (.065)	.6770	11 199
Employees paid less than 1.3 times the minimum wage					
Overtime hours	.393 (.023)	.407 (.023)	.015 (.032)	.6459	11 604
Hours worked	37.26 (.045)	37.27 (.046)	.006 (.064)	.9236	11 604

Table 2: Weekly number of overtime hours and of hours worked by full-time employees of the non-agricultural for-profit sector. Average value for individuals interrogated before and after October 2007. (1) Before October 2007. (2) After October 2007. (3) Difference. (4) p-value. Null hypothesis: after-before difference equal to zero. (5) Number of observations. Standard deviation in parentheses.



	Before (1)	After (2)	After–Before (3)	p-value (4)	N (5)
Employees declaring paid overtime hours after 1 October 2007					
Overtime hours	1.719 (.081)	2.993 (.087)	1.274 (.118)	.0000	4 278
Hours worked	39.64 (.126)	40.62 (.108)	.975 (.166)	.0000	4 278
Deviation	–2.927 (.111)	–2.627 (.080)	.300 (.137)	.0284	4 278
Employees declaring more paid overtime hours after 1 October 2007 than before					
Overtime hours	.904 (.063)	3.053 (.102)	2.148 (.120)	.0000	3 339
Hours worked	39.12 (.139)	40.54 (.127)	1.424 (.188)	.0000	3 339
Deviation	–3.211 (.129)	–2.488 (.091)	.724 (.157)	.0000	3 339
Employees not declaring paid overtime hours after 1 October 2007					
Overtime hours	.237 (012)	.000 –	–.237 (012)	.0000	25 381
Hours worked	38.46 (.042)	38.29 (.042)	–.169 (.059)	.0044	25 381
Deviation	–3.220 (.041)	–3.288 (.042)	–.068 (.058)	.2437	25 381
Employees not declaring more paid overtime hours after 1 October 2007 than before					
Overtime hours	.370 (.015)	.116 (.008)	–.253 (.017)	.0000	26 320
Hours worked	38.55 (.040)	38.39 (.041)	–.153 (.059)	.0091	26 320
Deviation	–3.181 (.040)	–3.281 (.041)	–.100 (.057)	.0787	26 320

Table 3: Weekly number of overtime hours and of hours worked by full-time employees of the non-agricultural for-profit sector. Average value for individuals interrogated before and after October 2007. (1) Before October 2007. (2) After October 2007. (3) Difference. (4) p-value. Null hypothesis: after-before difference equal to zero. (5) Number of observations. The variable Deviation is the difference between the duration declared to the authorities (equal to the sum of the legal duration plus the overtime hours), and the duration worked. Standard deviation in parentheses.

	Before	After	After–Before	p-value	N
	(1)	(2)	(3)	(4)	(5)
Managers, technicians, and the intellectual or artistic professions					
Overtime hours	1.301 (.133)	2.687 (.171)	1.387 (.216)	.0000	1 047
Hours worked	40.43 (.295)	41.15 (.223)	.726 (.370)	.0501	1 047
Deviation	–4.127 (.286)	–3.466 (.186)	.661 (.341)	.0531	1 047
Laborers					
Overtime hours	1.552 (.098)	2.896 (.114)	1.344 (.151)	.0000	2 048
Hours worked	38.84 (.144)	40.03 (.137)	1.186 (.198)	.0000	2 048
Deviation	–2.289 (.114)	–2.131 (.094)	.158 (.148)	.2866	2 048
Employees paid less than 1.3 times the minimum wage					
Overtime hours	1.517 (.121)	2.492 (.118)	.975 (.213)	.0000	1 696
Hours worked	38.46 (.155)	39.44 (.146)	.976 (.213)	.0000	1 696
Deviation	–1.944 (.131)	–1.945 (.102)	.002 (.166)	.9923	1 696

Table 4: Weekly number of overtime hours and of hours worked by full-time employees of the non-agricultural for-profit sector. Average value for individuals interrogated before and after October 2007 who have declared overtime hours after October 2007. (1) Before October 2007. (2) After October 2007. (3) Difference. (4) p-value. Null hypothesis: after-before difference equal to zero. (5) Number of observations. The variable Deviation is the difference between the duration declared to the authorities (equal to the sum of the legal duration plus the overtime hours), and the duration worked. Standard deviation in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
Overtime hours	.641** (.299)	.618** (.298)	.552** (.263)	.506** (.264)	.488** (.243)	.446* (.243)
Hours worked	.550 (.458)	.535 (.457)	.032 (.389)	.003 (.390)	.136 (.355)	.108 (.356)
Economic situation	No	Yes	No	Yes	No	Yes
Number of observations	3 698	3 698	3 101	3 101	4 881	4 881
incl. treatment	3 191	3 191	2460	2460	4 146	4 146
incl. control	507	507	641	641	735	735

Table 5: Impact of the detaxation of overtime hours. Control group of transborder employees. (1) For employees of the North (Belgium, Luxembourg, Germany) without taking into account differences of economic situations. (2) For employees of the North (Belgium, Luxembourg, Germany) taking into account differences of economic situations. (3) For employees of the North-East (Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (4) For employees of the North-East (Luxembourg, Germany, Switzerland) taking into account differences of economic situations. (5) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (6) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) taking into account differences of economic situations. Regressions with individual fixed effects. Economic situation: share of exports in GDP. Robust standard deviations in parentheses. \* significant at 10 percent, \*\* significant at 5 percent, \*\*\* significant at 1 percent.

	(1)	(2)	(3)	(4)	(5)	(6)
Overtime hours	.975** (.489)	.966** (.494)	.809** (.411)	.757* (.416)	.804** (.393)	.758* (.397)
Hours worked	-.105 (1.197)	-.110 (1.193)	-.520 (.736)	-.567 (.742)	-.161 (.670)	-.187 (.675)
Economic situation	No	Yes	No	Yes	No	Yes
Number of observations	1 128	1 128	903	903	1 474	1 474
incl. treatment	994	994	674	674	1 233	1 233
incl. control	134	134	229	229	241	241

Table 6: Impact of the detaxation of overtime hours for employees in teaching and the scientific professions, media professions, arts and entertainment, administrative and commercial managers of firms, engineers and technical personnel of firms. Control group of transborder employees in similar positions. (1) For employees of the North (Belgium, Luxembourg, Germany) without taking into account differences of economic situations. (2) For employees of the North (Belgium, Luxembourg, Germany) taking into account differences of economic situations. (3) For employees of the North-East (Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (4) For employees of the North-Eas (Luxembourg, Germany, Switzerland) taking into account differences of economic situations. (5) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (6) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) taking into account differences of economic situations. Regressions with individual fixed effects. Economic situation: share of exports in GDP. Robust standard deviations in parentheses. \* significant at 10 percent, \*\* significant at 5 percent, \*\*\* significant at 1 percent.

	(1)	(2)	(3)	(4)	(5)	(6)
Overtime hours	.480 (.450)	.467 (.447)	.377 (.402)	.326 (.402)	.231 (.361)	.186 (.361)
Hours worked	.590 (.485)	.579 (.486)	.394 (.456)	.350 (.459)	.225 (.401)	.186 (.403)
Economic situation	No	Yes	No	Yes	No	Yes
Number of observations	1 636	1 636	1 437	1 437	2 177	2 177
incl. treatment	1 334	1 334	1 113	1 113	1 781	1 781
incl. control	302	302	324	324	396	396

Table 7: Impact of the detaxation of overtime hours for laborers and wage-earning tradesmen. Control group of transborder employees in similar positions. (1) For employees of the North (Belgium, Luxembourg, Germany) without taking into account differences of economic situations. (2) For employees of the North (Belgium, Luxembourg, Germany) taking into account differences of economic situations. (3) For employees of the North-East (Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (4) For employees of the North-Eas (Luxembourg, Germany, Switzerland) taking into account differences of economic situations. (5) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) without taking into account differences of economic situations. (6) For employees of the North and North-East (Belgium, Luxembourg, Germany, Switzerland) taking into account differences of economic situations. Regressions with individual fixed effects. Economic situation: share of exports in GDP. Robust standard deviations in parentheses. \* significant at 10 percent, \*\* significant at 5 percent, \*\*\* significant at 1 percent.

	(1)	(2)	(3)
Hours worked	-.065 (.329)	.011 (.489)	-.244 (.865)
Number of observations	1 607	977	630
incl. employees	351	288	63
incl. independent	1256	689	567

Table 8: Impact of the detaxation of overtime hours on hours worked. Control group of independents. (1) For all employees (trades and retail sectors). (2) For employees in the trades sector. (3) For employees in the retail sector. Regressions with individual fixed effects. Robust standard deviations in parentheses. \* significant at 10 percent, \*\* significant at 5 percent, \*\*\* significant at 1 percent.

## APPENDIX

### A Questions relating to the duration of work in the *Enquête Emploi*

Persons interrogated in the *Enquête Emploi* who have worked during the reference week must describe their professional activity. After questions about holidays that may have been taken during this period, the following questions relating to the duration of work are asked:

**Question B46 a. (variable EMPHSC)**

"Have you effected overtime (or complementary) hours, paid or not?"

**Question B46 b. (variable EMPHNNH)**

"How many overtime (or complementary) hours?"

**Question B46 c. (variable EMPHRE)**

"Of these overtime (or complementary) hours, how many are or will be remunerated?"

**Question B46 d. (if the overtime hours were not all remunerated) (variable EMPHRC)**

"And how many have created or will create an entitlement to compensatory rest?"

**Question B47 a. (variable EMPAFF)**

"Was your schedule affected by the following causes? (several possible answers)"

1. Partial unemployment, bad weather (Or: bad weather)
2. Time spent on training
3. Strike, labor conflict
4. No, by none of the above factors

**Question B47 b. (variable EMPAFC)**

"How many hours or days of partial unemployment or bad weather?"

**Question B47 c. (variable EMPAFA)**

"How many hours or days of training?"

**Question B47 d. (variable EMPAFG)**

"How many hours or days of strike or labor conflict?"

**Question B48 a. (variable EMPNBH)**

"During the week Monday to Sunday (dates), how many hours did you put in at your principal job? (Not counting ordinary hours or days off, or exceptional ones, or legal holidays, bridges, make-up time, personal unpaid time off, partial unemployment, training, strike, labor conflict)."

## B Statistics on hours worked and overtime hours

### B.1 By gender

	(1)	(2)	(3)	(4)
Men	40.17 (6.45)	.55 (2.20)	.22 (.136)	52.07 (10.12)
Women	38.31 (4.85)	.25 (1.38)	.21 (1.24)	49.28 (10.34)
Total	39.60 (6.06)	.45 (1.98)	.22 (1.32)	51.32 (10.26)
Number of observations	235 593	144 707	134 133	34 367

Table 9: Average number of hours over the week according to net wage (1) Total hours effected by the employees. (2) Paid overtime hours by employees. (3) Overtime hours creating entitlement to compensatory rest by employees. (4) Total hours effected by independents. Non-agricultural for-profit sector, for persons working full time. Standard deviations in parentheses.

### B.2 By age

	(1)	(2)	(3)	(4)
15 - 29	38.52 (5.00)	.51 (2.04)	.23 (1.34)	48.99 (9.68)
30 - 39	39.87 (6.13)	.48 (2.06)	.24 (1.35)	51.25 (10.34)
40 - 49	39.97 (6.36)	.45 (2.02)	.23 (1.38)	51.77 (10.38)
50 - 59	40.11 (6.63)	.29 (1.62)	.16 (1.12)	51.58 (10.09)
60 +	40.89 (7.33)	.27 (1.33)	.10 (.94)	50.41 (10.33)
Number of observations	235 591	144 705	134 131	34 367

Table 10: Average number of hours over the week according to net wage (1) Total hours effected by the employees. (2) Paid overtime hours by employees. (3) Overtime hours creating entitlement to compensatory rest by employees. (4) Total hours effected by independents. Non-agricultural for-profit sector, for persons working full time. Standard deviations in parentheses.



### B.3 By socio-professional category

	(1)	(2)	(3)	(4)
Tradesmen, retailers	47.99 (9.80)	.22 (1.43)	.29 (1.76)	51.59 (10.35)
Managers and higher intellectual professions	44.86 (7.53)	.17 (1.36)	.23 (1.54)	51.24 (9.81)
Intermediate professions	39.87 (6.02)	.38 (1.80)	.28 (1.52)	49.26 (9.97)
White-collar employees	37.55 (4.27)	.28 (1.59)	.20 (1.17)	48.68 (10.23)
Laborers	38.24 (4.66)	.66 (2.34)	.18 (1.18)	48.50 (9.63)
Number of observations	235 558	144 698	134 131	34 367

Table 11: Average number of hours over the week according to net wage. Non-agricultural for-profit sector, for persons working full time. (1) Total hours effected by the employees. (2) Paid overtime hours by employees. (3) Overtime hours creating entitlement to compensatory rest by employees. (4) Total hours effected by independents. Standard deviations in parentheses.

### B.4 By level of net wage

	(1)	(2)	(3)
Less than 1,1 Smic	37.22 (4.04)	.33 (1.66)	.18 (1.18)
Between 1,1 and 1,3 Smic	38.83 (4.09)	.44 (1.82)	.27 (1.82)
Between 1,3 and 1,5 Smic	38.74 (5.04)	.51 (2.05)	.21 (1.24)
Between 1,5 and 1,7 Smic	38.35 (5.28)	.55 (2.21)	.22 (1.31)
Between 1,7 and 2 Smic	40.21 (5.81)	.52 (2.16)	.24 (1.35)
Between 2 and 2,3 Smic	41.59 (6.67)	.49 (2.24)	.27 (1.43)
Between 2,3 and 2,6 Smic	42.86 (7.10)	.51 (2.42)	.27 (1.49)
Between 2,6 and 3 Smic	44.38 (7.52)	.45 (2.35)	.23 (1.41)
Between 3 and 3,5 Smic	45.78 (7.53)	.23 (1.62)	.23 (1.48)
More than 3,5 Smic	48.43 (8.17)	.21 (1.61)	.22 (1.39)
Total	39.70 (6.11)	.45 (1.98)	.18 (1.25)
Number of observations	235 593	144 707	134 133

Table 12: Average number of hours over the week according to net wage. (1) Total hours effected by the employees. (2) Paid overtime hours by employees. (3) Overtime hours creating entitlement to compensatory rest by employees. Non-agricultural for-profit sector, for persons working full time. Standard deviations in parentheses. Individuals are queried on their wage only twice over six quarters. This table is based on the assumption that the wage remains constant between two interrogations.

## C Evolution of overtime hours creating entitlement to compensatory rest

Table 13 shows that the only significant change in the number of overtime hours creating entitlement to compensatory rest from October 2007 on is observed for the ensemble of employees in the non-agricultural for-profit sector. Nonetheless, there is not significant change for employees who declare paid overtime hours. This means that the increase in paid overtime hours observed beginning in October 2007 has not been matched by a diminution in the number of overtime hours creating entitlement to compensatory rest. We also observe an absence of significant change for overtime hours creating entitlement to compensatory rest for laborers, engineers, managers, teachers, scientists, arts and entertainment professionals.

	Before (1)	After (2)	After- Before (3)	p-value (4)	N (5)
All employees					
Compensated overtime hours	.234 (.012)	.200 (.011)	-.034 (.016)	.0286	27 461
Employees declaring overtime hours after 1 October 2007					
Compensated overtime hours	.580 (.062)	.485 (.050)	-.095 (.080)	.2362	2 601
Employees declaring more overtime hours after 1 October 2007 than before that date					
Compensated overtime hours	.558 (.065)	.445 (.057)	-.103 (.087)	.2351	2 203
Engineers, managers, teachers, scientists, arts and entertainment professionals					
Compensated overtime hours	.284 (.023)	.245 (.020)	-.040 (.031)	.2013	9 387
Laborers					
Compensated overtime hours	.180 (.016)	.151 (.015)	-.029 (.022)	.1877	10 057

Table 13: Number of paid overtime hours for full-time employees in the for-profit non-agriculture sector. Average value for individuals interrogated before and after October 2007. (1) Before October 2007. (2) After October 2007. (3) Difference. (4) p-value. Null hypothesis: Before-After difference equal to zero. (5) Number of observations. Standard deviations in parenthesis.

## D Statistics on transborder employees

	Transborder employees	Employees working in France
Male	75.2%	68.7%
Age	39.00 (0.18)	36.95 (0.08)
Education	13.09 (0.05)	13.02 (0.02)
Number of children	0.76 (0.02)	0.76 (0.01)
Hours worked	41.91 (0.08)	38.63 (0.03)
Overtime hours	0.46 (0.04)	0.56 (0.02)
Number of observations	3,283	20,742

Table 14: Characteristics of transborder employees and employees working in France. Education: number of years of education. Number of children: number of children below 18 year-old in the household. Weekly number of overtime hours and hours worked. Non-agricultural for-profit sector, for persons working full time. Standard errors in parentheses.

## E Statistics on independent workers

	Employees	Independents
Male	66.2%	72.1%
Age	37.09 (0.16)	43.42 (0.17)
Education	13.47 (.05)	13.44 (0.05)
Number of children	0.79 (0.01)	0.90 (0.02)
Hours worked	39.80 (0.094)	50.77 (0.17)
Number of observations	4,786	3,859

Table 15: Characteristics of independents and employees in craft industry and retail. Education: number of years of education. Number of children: number of children below 18 year-old in the household. Weekly number of hours worked. Non-agricultural for-profit sector, for persons working full time. Standard errors in parentheses.

	Employees	Independents
Male	94.5%	81.8%
Age	33.47 (.35)	42.92 (0.26)
Education	11.81 (.09)	12.55 (.07)
Number of children	0.90 (.03)	0.94 (.03)
Hours worked	38.36 (.16)	50.38 (.24)
Number of observations	1, 109	1, 730

Table 16: Characteristics of independents and employees in craft industry. Education: number of years of education. Number of children: number of children below 18 year-old in the household. Weekly number of hours worked. Non-agricultural for-profit sector, for persons working full time. Standard errors in parentheses.

	Employees	Independents
Male	32.52%	59.81%
Age	35.92 (0.70)	44.16 (0.27)
Education	13.27 (0.16)	13.35 (0.08)
Number of children	0.69 (0.06)	0.83 (0.03)
Hours worked	39.08 (0.38)	51.49 (0.28)
Number of observations	326	1, 493

Table 17: Characteristics of independents and employees in the retail sector. Education: number of years of education. Number of children: number of children below 18 year-old in the household. Weekly number of hours worked. Non-agricultural for-profit sector, for persons working full time. Standard errors in parentheses.