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MATTHIEU BUNEL, FABRICE GILLES, YANNICK L'HORTY

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The effect of social security payroll tax reductions on employment and wages: an evaluation of the 2003 French reform

Matthieu Bunel,
matthieu.bunel@utbm.fr
Université de technologie de Belfort Montbéliard (Utbm), CEE and TEPP (FR CNRS n°3126).

Fabrice Gilles,
fabrice.gilles@univ-lille1.fr
Université de Lille 1, EQUIPPE and CEE.

Yannick L'Horty
Yannick.lhorty@cee-recherche.fr
Université d'Evry- EPEE, CEE and TEPP (FR CNRS n°3126).

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Abstract

The French Fillon reform of 17 January 2003 unified the schemes of payroll tax reductions for firms that had adopted the 35-hour work week and those that had not. This reform had very different effects depending on the category of firms concerned: the payroll tax reductions was considerably greater for the firms that had remained on 39 hours than for the others, particularly for wages situated at around 1.3 times the minimum wage). This article examines in detail the nature of the reform and its effects on wages and labour costs, before presenting an evaluation of its impact on employment, using a balanced panel of firms with more than 5 employees drawn from a matching between several administrative data sources for the period 2002-2005.

In both categories of firm, we find elasticities of employment with respect to labour costs that are significant and of the expected signs: a rise of 1% in average labour costs reduces employment by 0.25%. As the majority of 39-hour firms received greater reductions, the Fillon reform allowed them to raise their level of employment. For the 35-hour firms, on the contrary, the reverse situation prevailed: the reform led to a fall in employment. Ultimately, the Fillon reform has had no clear effect on aggregate employment, measured either in job numbers or full-time equivalents. It has, however, contributed to a rise in average wages, for both categories of firms.

Keywords: public policy evaluation, payroll tax cuts, labour cost, semi-parametric estimations

JEL Code: C14 – J3 – J38

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In order to tackle unemployment, payroll tax reduction targeted on low wages have been implemented in many countries, especially in Continental Europe countries where a minimum wage coexists with high employer-paid payroll taxes. These cuts have been experienced since July 1993 in France and in Belgium and since 1994 in the Netherlands with the SPAK policy (*Specifieke Afdrachtskorting Lage Lonen*). Through many reforms since 1993, the French policy has been extended to more and more workers far away from the mandatory minimum wage within a fast-growing budget. Since the last 2003-2005 reform which has been implemented when Mr François Fillon was France's Minister of Labor, the tax cut affects merely two thirds of the labor force and costs 25 billions euros per year, which represents 1.3 percent of GDP. With the Fillon reform, this payroll tax reduction has become the masterpiece of the employment policy in France with the largest budget among European Countries policies dedicated to that type of policy and also the largest budget among French programs for employment.

The Fillon reform merged two previous payroll tax reduction. The first one was the low wage tax cut (LWTC) implemented by Mr Balladur and Mr Juppé between 1993 and 1998. The second one was the working time reduction tax cut (WTRTC) experienced by Mr Jospin and Mrs Aubry since 1998 within the context of the 35 hours work week policy. The Fillon reform has kept the linear profile of the LWTC and the starting point of the WTRTC, *i.e.* the 26 percentage points tax cut at the minimum wage. The main originality was to introduce a new threshold of 160 percent of the minimum wage for the end of the tax reduction. It is important to notice that a high minimum wage increase has been concomitant with the Fillon reform. However, this rise was lower for 35 hour-firms than for the others.

This article proposes an evaluation of the effects of this reform on employment and wages by using a matching of administrative data, allowing us to verify the amounts by which firms actually benefited from reduced social security contributions. We start by describing the nature and timetable of the shock on the amount of payroll taxes paid by firms, showing how the unification of reduction measures has had very different effects depending on the category of firms. We then present the data used for our evaluation, which are indicators at the level of each establishment. This provides us with information about the amount and nature of the reductions from which firms actually benefit, whereas all previous studies have simply ascribed scales. These data allow us to make a certain number of original observations about the changes in the situation of firms. After presenting these observations, we evaluate the effects of the reform using a balanced panel of more than 90,000 firms with 5 or more employees.

We compare the levels of several variables of interest before and after the Fillon reform, and within two groups of firms. The first one adopted the 35-hour work week and benefited from WTRTC that have been introduced by laws Aubry 1 and 2. The second one had retained a 39-hour work week and benefited from the LWTC. For each group of firms, we examine the way in which a stronger reduction in payroll tax between 2002 and 2005 influenced the total labour costs and size of the workforce, total or unskilled. The aim is to evaluate the impact of the Fillon reform on employment (total or unskilled), wages and labour costs, in firms that had adopted the 35-hour work week and in firms that had stayed with the 39-hour work week.

A new evaluation is necessary

A large number of applied studies have investigated *a posteriori* the effects of a national payroll tax reduction (PTR) scales. According to these studies, there is no clear relation between changes in contributions and changes in wages, employment and unemployment. We shall briefly describe the methodologies used and the results obtained by these different generations of articles.

The first generation of studies was based on time series (Brittain, 1971; Vroman, 1974a; Beach and Balfour, 1983; Kugler and Kugler, 2008) or international comparisons (Vroman, 1974b; Bell and Nickell, 1997). These first works obtained heterogeneous results on the effects of a modification in PTR on employment. These results have been largely challenged in recent years because of their high dependence on bias due to omitted variables. Indeed, at the macroeconomic level, these unobserved variables can affect the rates of contributions observed and at the same time wages and employment, thereby biasing the estimated coefficients.

To surmount this problem, a second generation of works drew on microeconomic data. Using this approach, based on US panel data from the PSID for the period 1968 - 1974, Hamermesh (1979) showed that a rise in PTR influences wages and employment at the same time. A 1% rise in PTR was accompanied on average by a 0.3% drop in wages, the remainder being absorbed by a fall in employment.

Adopting a similar methodology, Gruber (1997) studied the overall influence of the privatisation of the Social Security system in Chile, introduced in 1981 and resulting in a substantial cut in PTR. Using data on manufacturing firms for the period 1979 - 1986, he obtained the result that only wages were positively affected by this shock. The effect on employment remained non-significant.

Using French data, Kramarz and Philippon (2001), and Crépon and Desplatz (2001) analysed the impact of the LWTC during the 1990s linked to the Juppé reform of 1995. Based on data from the French Labour Force Survey for the period 1990 - 1998, Kramarz and Philippon (2001) analysed the probability of losing their job for two groups of employees: those directly affected by the change in labour costs, and those not directly affected, but who are closest to the first group in the wage distribution. With the help of difference-in-differences estimators, they obtained the result that a 1% rise in labour costs leads to a 1.5% increase in the probability of losing one's job. With LWTC, the fall in labour costs in the neighbourhood of the minimum wage has a positive effect on employment. Crépon and Desplatz (2001) used matched employee-employer data for the period 1994 - 1997 drawn from Bénéfices réels normaux (BRN) and Déclarations annuelles de données sociales (DADS) to analyse the effects of the LWTC reforms of 1995 and 1996. With the help of parametric and non-parametric estimators, they concluded that there was a strong rise in employment following the reform (about 600,000 jobs).

A last generation of studies used time series at the industry level (Jamet, 2005; Gafsi, L'Horty and Mihoubi, 2005). The main advantage of this approach is that it takes into account effects of volume and inter-industry substitution. These studies found an impact on employment which is substantially lower than that identified by Crépon and Desplatz (2001), particularly for low wages workers.

These estimations on French datas all concern measures in force up until 1998, representing budgets of the order of 5 billion euros. Today, those budgets have more than tripled. Consequently, not only are the results of applied econometric studies inconsistent with each

other, but they have also been left behind by the rising costs of these measures. Hence, a new evaluation of the impact of SSC reductions on employment and wages has become necessary, because this policy has been by far and away the leading employment policy in France over more than a decade, in terms of both the budget committed to it and the number of employees concerned.

If we investigate the reasons for the lack of evaluation of French schemes for reduced SSC, then one main cause emerges, by a process of elimination. Fundamentally, it is neither the unavailability nor the inaccessibility of data, neither the will of researchers nor that of the economic administration, in the broadest sense of the term, that are to blame. In reality, all these factors, and many others that might be named, only play a marginal role. The principal cause resides in the way these measures have been implemented. Since 1993, we have witnessed no less than eight major reforms of SSC reduction schemes, in other words an average lifespan of 18 months. In short, the endemic instability of these measures constitutes the main obstacle to their evaluation by means of modern econometric techniques. Over the last fifteen years, the trial-and-error search for an ideal formula for reductions in SSC, combined with the massive rise in the cost of the budgets devoted to this policy, have made it very difficult in practice to carry out an economic evaluation of it.

Legal framework

Evaluating the effects of a public policy presupposes a precise and careful definition of the shock of which we wish to study the consequences. This means that we must determine not only the content of the reform, but also the degree of its actual application in firms and over time. That is the purpose of this section, in which we set out to describe precisely the nature and chronology of the shock, in order to verify whether the unification of reduction measures has had significantly different effects on different categories of firms.

A multiple reform

It is often complex to simplify a tax system. The “Law n°2003-47 of 17 January 2003 relating to wages, working time and the development of employment”, known as the Fillon reform, simultaneously affected several components of labour costs. The minimum wage was raised in an exceptional way, the amount and structure of the payroll tax underwent large-scale change, and the laws governing overtime quota were profoundly modified.

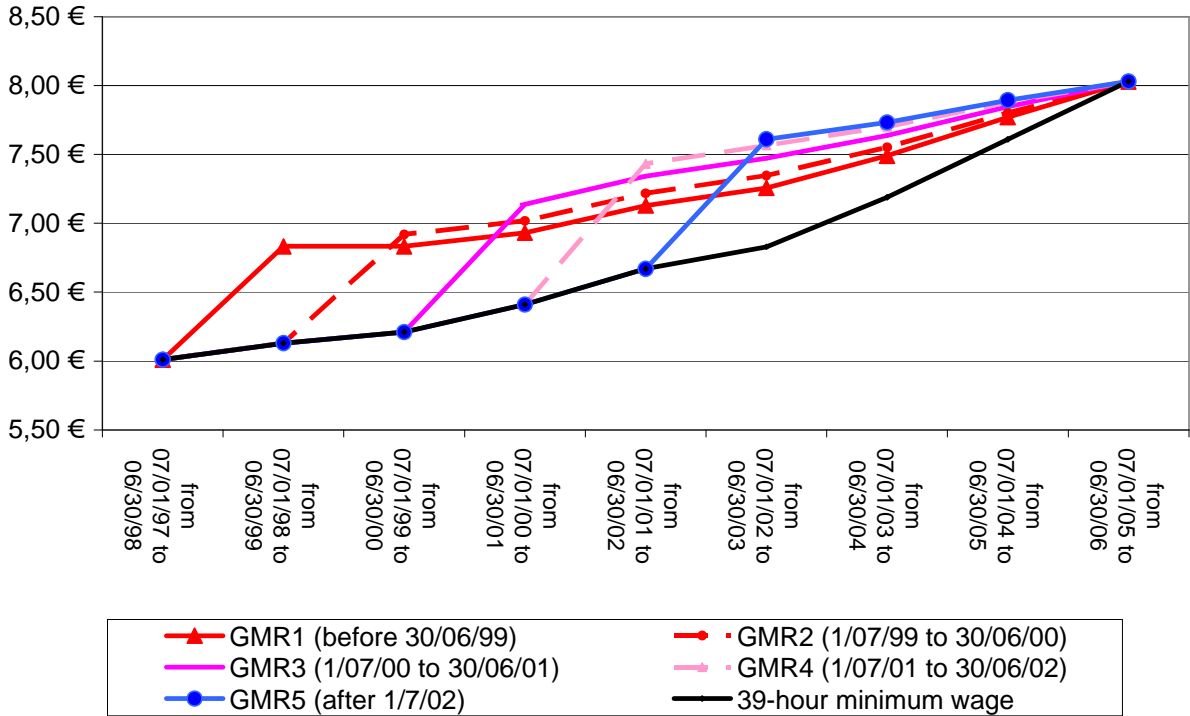
Firstly, the period 2003-2005 saw the harmonisation of six coexisting minimum wages: the five monthly wage guarantees (GMR – *garanties mensuelles de rémunération*) with the level of the 39-hour-minimum wage. The French minimum wage introduced in 1970, includes the basic wage, fringe benefits, and all other payments having the *de facto* character of a premium. The level of the hourly level of the minimum wage is revised every year on July 1st according to inflation, half of any increase in hourly blue collar wage levels and possible government extra boosts. When the 35-hour work week was introduced in January 2000, one of the principles enshrined in the legislation was a guarantee of the purchasing power of employees earning the minimum wage and benefiting from the working time reduction (WTR). The payment of these employees was determined on the basis of their monthly wage before WTR. So the GMR corresponds to the hourly minimum wage at the time of adoption of the 35-hour work week multiplied by 169 hours. Employees working a 35-hour work week therefore automatically earned a higher hourly wage than the hourly minimum wage for the 39-hour work week. The five “generations” of GMR applied to employees moving to the 35-hour work week before July 1st 1999, 2000, 2001, 2002 and 2003.

These GMR are reviewed on the basis of inflation and half of any increase in *monthly* blue collar wage levels. Thus, before the Fillon reform, the GMR rose less than the hourly 39-hour minimum wage. The aims of the Fillon reform was to get the latter and the different GMRs to converge upwards over three years.

As Graph 1 illustrates, over the period 2001-2005, the hourly minimum wage rose by 20.4% in current euros, whereas the different GMR rose by between 8.0% and 12.6%. Consequently, the increase in labour costs generated by the rise in the hourly minimum wage and the GMR was higher for those firms that had retained the 39-hour work week.

Graph 1

Evolution in the 39-hour minimum wage and GMRs from 1999 to 2005



Source: Legifrance

Different trajectories for different firms

Over and above the unification of minimum wages, the main purpose of the reform was to harmonise the situations of firms and employees with regard to PTR schemes and minimum pay levels in view of the planned abolition of GMR. After enactment of the Aubry laws of 1998 and 2000, which introduced the 35-hour work week, two measures of PTR co-existed. Firms remaining on 39 hours continued to benefit from the LWTC (*Ristourne sur les bas salaires*) implemented by the Balladur reform of 1993 and the Juppé reform of 1996. Firms adopting the 35-hour work week enjoyed a more generous system of reduction, to compensate for the extra costs linked to the reduction in working hours the WTRTC. For these firms, we can distinguish between two main families of incentives to reduce working time: the measures known as “Aubry 1” and “Aubry 2”, differentiated by the date of entry, the total and the scale of aids.

Firms that had anticipated the legal change to 35 hours, by reducing the effective working hours of their employees by at least 10% and increasing their workforce by at least 6%,

benefited from a lump aid per employee and per year that varied between 1,300 € and 752 €, depending on the date of the change to the 35-hour work week. In addition, this aid could be cumulated during five years with the LWTC measures up until 2000, then with Aubry 2 from 2000 to 2003, and finally with the Fillon measure from 2003 until July 2004. After this date, firms had to choose between the Fillon reductions and the Aubry 1 reductions.

In order to unify all these different devices, the PTR were merged to produce a single, hybrid mechanism that has been in force ever since. Over this period, labour costs have therefore evolved as a function of three main factors: the increase in the minimum wage and the monthly wage guarantee established with the laws on the reduction in working hours; the spread of the increase in these minima over all wages (on this point, see Koubi and Lhommeau, 2006); the PTR reform. Other measures have been added to these changes, encouraging the use of overtime or modifying the regulation of part-time work.

The PTR reform was imposed on all firms. However, the difference in scale was much more distinct in firms benefiting from the LWTC, which represented 18.2 % at the level of the 39 hour minimum wage and decreased linearly to zero at 1.3 times the minimum wage. In three successive stages, starting in July 2003, the amount of the reduction was increased to 26 % and the range was extended up to 1.6 times the minimum wage (Graph 2-A). The rise in reductions was therefore clearly more pronounced in these firms, for all wage levels. This relative advantage given to firms retaining the 39-hour work week was intended to offset the rise in the gross hourly 39 hour minimum wage. In firms benefiting from Aubry 2, the reform only marginally modified the amount of reductions for low wages, but cut reductions for medium and high wages (Graph 2-C). The replacement of a convex scale by a linear scale meant that there was no change at the level of the minimum wage, a reduction in contributions up to about 1.6 times the minimum wage and an increase of about 2 percent above this wage level. For firms benefiting from Aubry 1, who had hitherto received the most aid at all wage levels, the harmonisation of scales resulted in lower reductions at all wage levels and especially for the highest levels, because of the disappearance of flat-rate aids (Graph 2-B).

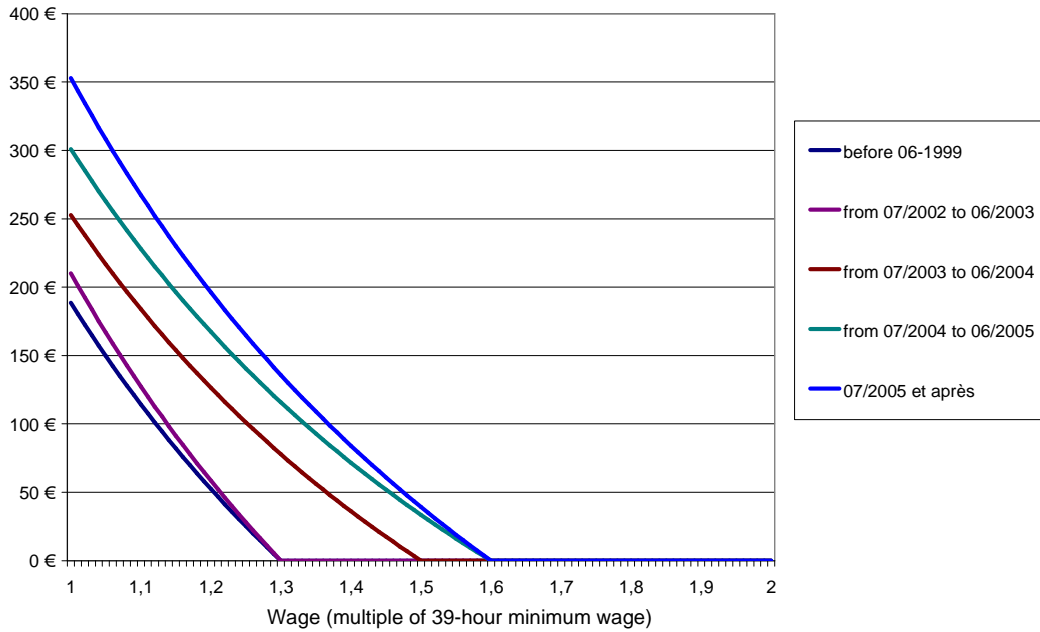
Progressive implementation

One particular difficulty in the evaluation lies in the timetable of implementation of the reform. All these concomitant modifications in labour cost components were implemented progressively. Over two years, from July 2003 to July 2005, a large number of successive reorganisations were carried out with the aim of harmonising wages and payroll tax contributions. For the firms that had retained the 39-hour work week, the new measure was adopted in three stages (July 2003, July 2004 and July 2005). For the firms that had adopted the 35-hour work week, the transition took place in four stages (July 2003, July 2004, January 2005 and July 2005). The different provisional scales for the different initial situations (LWTC, Aubry 1-WTRTC and Aubry 2-WTRTC) are shown in Graphs 2A, 2B and 2C.

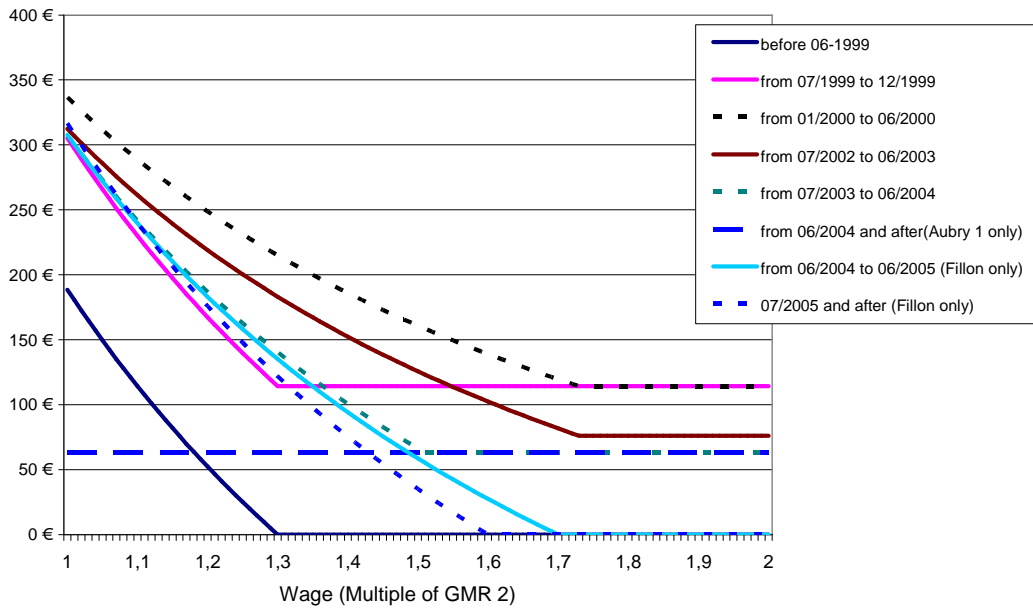
Graph 2

Amount of monthly reductions per employee

2-A. For firms remaining on 39 hours (LWTC followed by “Fillon other employers”)



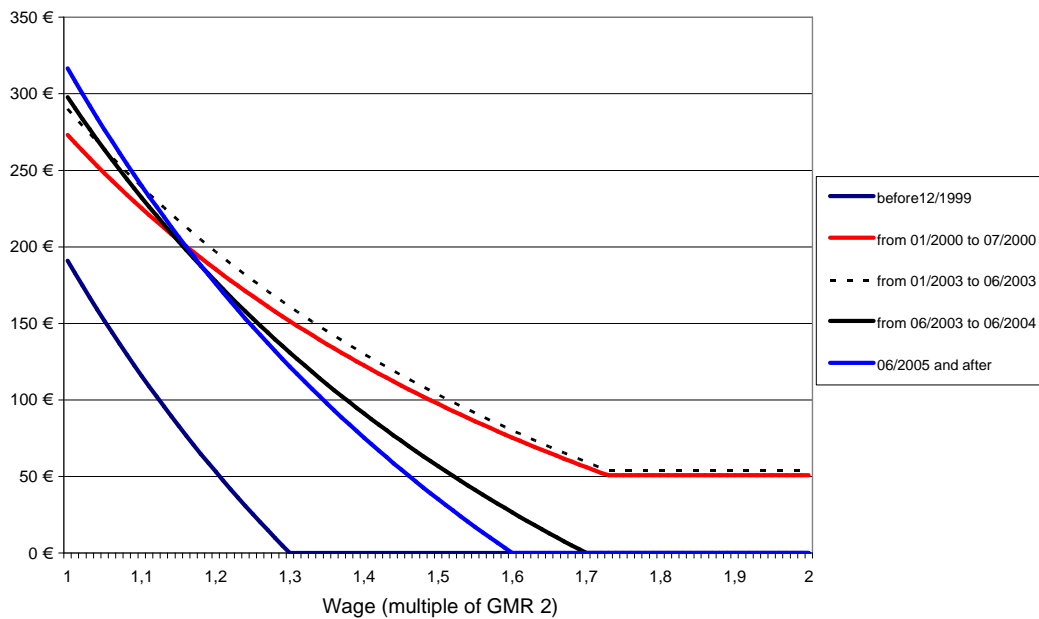
2-B. For firms adopting the 35-hour work week with Aubry 1-WTRTC (cumulative with LWTC, Aubry 2-WTRTC and Fillon-Aubry 2)



Source: Legifrance

Note: This graph is based on the assumption that firms benefit from the highest level of reductions (i.e. 1372 euros the first year)

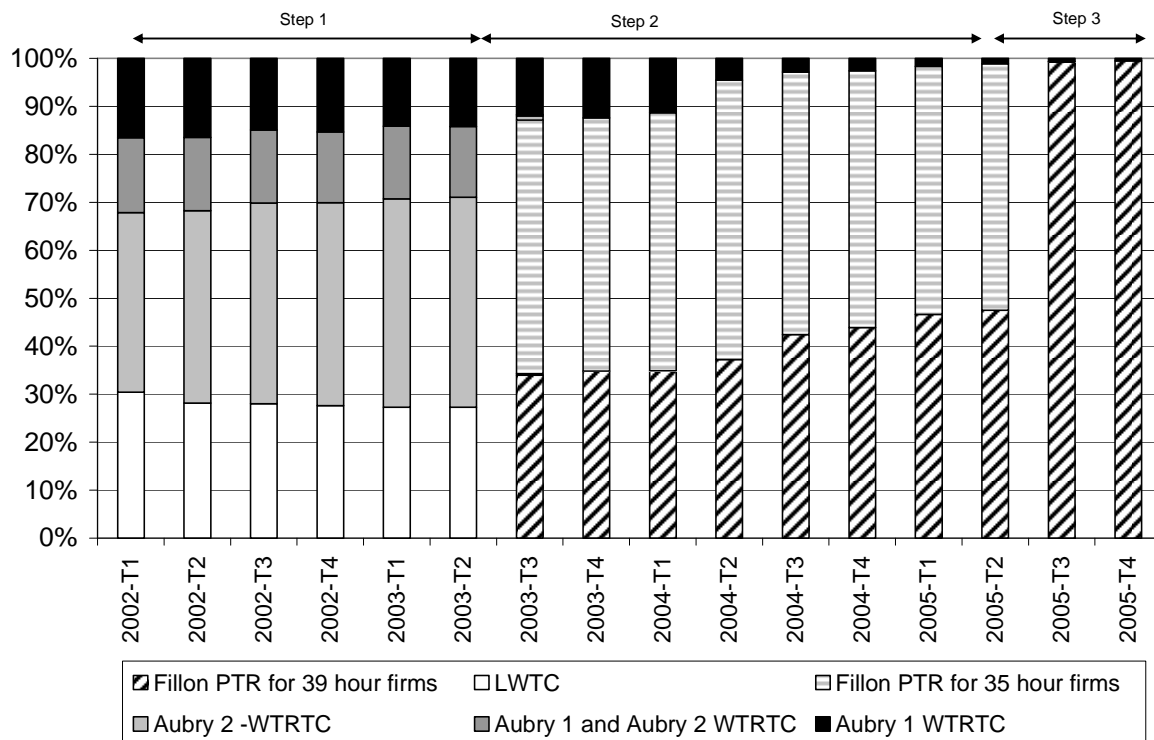
2-C. For firms adopting the 35-hour work week with Aubry 2-WTRTC



Source: Legifrance

Graph 3 shows the distribution of the weight of reductions over the different PTR schemes for each year. From 2002 to 2003, LWTC coexisted firstly with Aubry 1-WTRTC and then with Aubry 2-WTRTC. From 2002, the weight of these two measures reached 70% and overtook mostly LWTC. Transitory regimes appeared from 2003 until 2005, before being replaced by the definitive mechanism.

Graph 3
Evolution in the respective weights of LWTC, Aubry 1 and Aubry 2 WTRTC and Fillon PTR



Sources: Acoess-Urssaf (2005) – calculations by the authors

Overall, these changes have resulted in a redistribution of the PTR between firms, with less given to firms on 35 hours and more to those on 39 hours. However, within these two categories of firms, the strength of the positive or negative shock varied according to the workforce structure, in terms of wages and skills. Within both categories of firm, the amount of the reductions varied greatly from one firm to another.

First results

As the shock of the Fillon reform is asymmetrical in terms of both wage brackets and firms, it is useful to take this double asymmetry into account in the analysis. This calls for the use of specific data, which must allow us to describe wage distributions by firm, while at the same time recording the regime of reduction and its evolution over time.

The data

In particular, it is necessary to know the number of employees in each wage brackets (defined as a multiple of the French minimum wage). To compute these information and various others indicators characterising the establishments, we have drawn on Insee data from an exhaustive administrative files called DADS (*Déclarations Annuelles de Données Sociales* – Annual Declarations of Social Data). We also need information about the nature of the PTR in every firm. For this, we have used Acooss files (*Agence Centrale des Organismes de Sécurité Sociale* – Central Agency of Social Security Organisations). The AROME, ORME and SEQUOIA databases allow to identify different categories of establishments that benefited from PTR over the period 1999 - 2005. This chiefly concerns the low wage rebate, aids associated with the first Aubry law on the reduction of working time and the second Aubry law on the adoption of the 35-hour work week, and the two sections of the Fillon reform of 2003 – that affecting firms on 35 hours and that affecting other establishments. These aggregate data at the level of each establishment comprise the wage bill, workforce numbers, PTR, the number of employees concerned by these reductions and the payroll taxes due by establishments affiliated to the general social security regime.

After matching of the Insee and Acooss-Urssaf databases, we obtain an original dataset describing the evolution for each wage brackets (defined as a multiple of the French minimum wage) the type of aids obtained, the number of employees concerned and the total amount of PTR from which the establishment benefits. The matched database is composed of 130,000 establishments (92,000 firms) employing 3 million employees in full-time equivalents (FTE) (table 1).

Table 1. Database size, second half of 2004

	Nb of establishments	Nb of employees (FTE)
Initial Acooss and/or Dads database	1.8 million establishments (1.4 million firms)	14 million employees
Initial Acooss and Dads database of establishments with at least one employee (1)	688,000 establishments	9.2 million employees
Base (1) panel from 2002 to 2005 (2)	384,000 establishments	5.9 million employees
Final database drawn from base (2) for firms with more than 5 employees, matched with SUSE files and excluding extreme values	130,000 establishments (92,000 firms)	3,0 million employees

Source: AROME, ORME and SEQUOIA (Acooss-Urssaf) databases, DADS (Insee).

The field finally used in the econometric analysis is a balanced panel of private non-farm business and semi-public firms for the period 2001 to 2005². It corresponds to firms with more than 5 employees present simultaneously in Acoess and Insee files and for which the main activity of the establishment (APET) is always recorded, excluding temporary agency workers, apprentices, trainees and home workers³ (gross workforce numbers registered on 31 December). Public establishments (identified by a SIRET number starting with 1 or 2) have been excluded from the sample, as have the establishments of firms with no right to PTR under the Fillon reform: France Telecom, Orange, La Poste, RFF, EDF, GDF, ADP, SNCF, Banque de France, RATP, SEITA. Firms benefiting simultaneously from two types of aid or discontinuously, holding firms, domestic service firms, temporary employment agencies and public firms have all been excluded. Firms belonging to the Hotels Cafés Restaurants (HCR) industry have also been excluded, because they received a specific aid during this period. Finally, firms in which the growth rate of employment, production and labour costs are characterised by extreme values⁴, and those in which the average gross hourly wage is lower than the minimum wage have also been excluded. All these manipulations lead us to exclude 20,000 of the 150,000 establishments initially present in the sample (Table 1).

Four categories of establishments

As the measures of PTR were not always exclusive, establishments may have benefited from several in succession. The large majority of establishments in our sample - four out of five - have benefited from at least one measure of PTR. The 20% who have not benefited from any measure of reduction are establishments that are present in the DADS (Insee) files and not present in the ORME (Acoess-Urssaf) files, but which are not excluded from the general field of reductions⁵. Note that this category tends to overstate the number of “unaided” firms, because it includes some firms that have received aid but are incorrectly identified during the matching of the Acoess and Insee files (fictitious or erroneous SIRET numbers). Among the establishments that have received at least one aid, four categories can be identified:

- Establishments benefitting from the LWTC until 2003 and then from the Fillon PTR. They represent more than 65% of establishments aided (and 40% of employees) and form the first category (LWTC-Fillon PTR).
- Establishments benefitting from the low wage rebate, the Aubry 2 WTRTC and then the specific Fillon measure in 2003. They constitute 20% of establishments aided (and 33% of employees).
- Establishments that benefited from Aubry 1 and Aubry 2 WTRTC and then the Fillon PTR. These “Aubry 1” establishments represent slightly less than 10% of establishments aided (16% of employees).

² The data for 2001 are used to construct lagged values for our indicators.

³ In the rest of this study, we shall use the distribution of employees by wage brackets (defined as a multiple of the French minimum wage). This information is difficult to obtain for very small firms, which is why we have chosen the threshold of 5 employees.

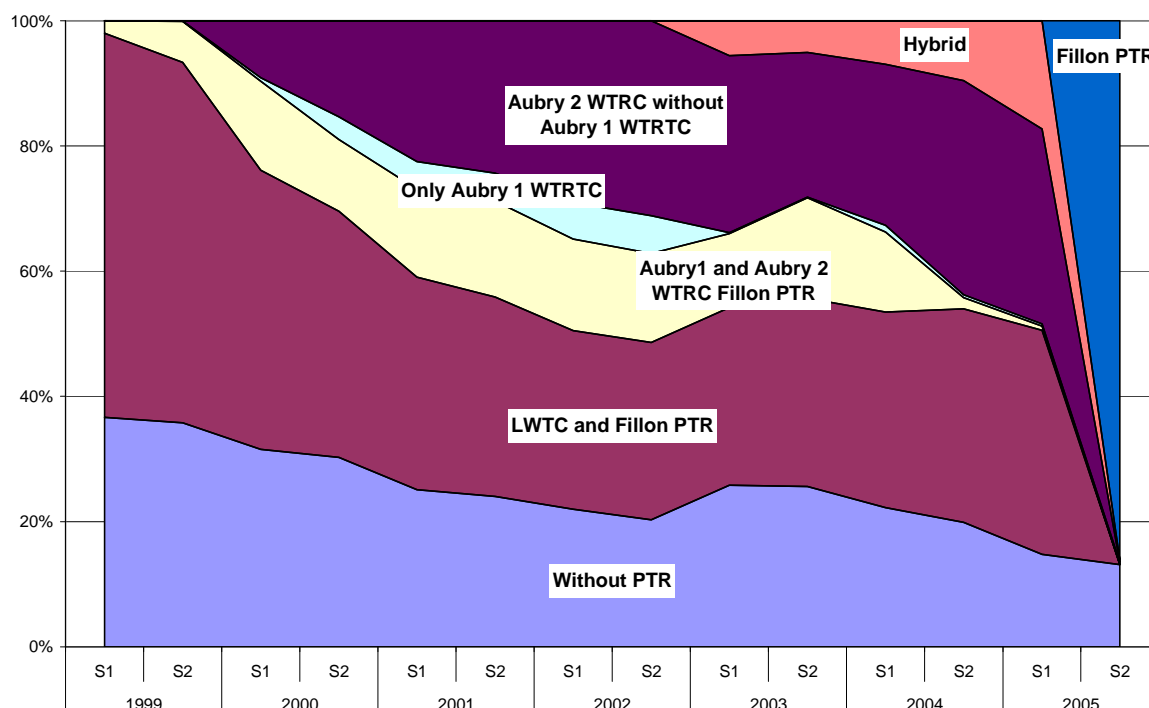
⁴ We thereby exclude all observations for which the values of the variables in question do not lie between -60% and +250%.

⁵ The Fillon payroll tax cuts concern employers of the private sector affiliated to the regime of unemployment insurance for employees in the general regime, the agricultural regime and the regimes of miners, sailors and notary. Certain employers in the parapublic sector are also covered for employees whose jobs are eligible for unemployment benefit (e.g. private-public firms, large national firms). On the contrary, private employers, the State, local authorities and public administrative bodies are excluded.

- hybrid establishments, which belong simultaneously to these different categories, which have changed from one category to the other over the course of time, or which have received specific aids (extra PTR for a cut of more than 15% in working hours and for the road haulage industry). These establishments constitute a more marginal category.

Graph 4 shows the evolution of the distribution of employees in these different categories of establishments for all firms (this graph is based on data from the initial database, not the balanced panel).

Graph 4. Distribution of employees in different categories of establishment



Source: AROME, ORME and SEQUOIA databases (Acoess-Urssaf), DADS (Insee).

Field: Firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 1999 - 2005.

Table 2 presents the characteristics of firms according to these different categories, for firms present throughout the period 2001 - 2005. On average, the LWTC-Fillon PTR firms have a smaller workforce than those benefitting from measures associated with the WTRTC (18 employees compared to 24 for “Aubry1 and Aubry2 WTRTC” firms and 45 for “Aubry2 WTRTC” firms). Firms on 35 hours are thus more likely to employ more than 50 employees, (about 9% for Aubry1 and Aubry2 WTRTC, and 16% for Aubry2 WTRTC, compared to 5% for LWTC-Fillon PTR). They are also more unlikely to be very small firms (less than 10 employees). In addition, firms that have adopted the 35-hour work week are more likely to come from the trade or finance industries. Conversely, firms keeping the 39-hour work week are more likely to be in the capital goods industry, building or transport. Lastly, firms on 39 hours are more likely to be located in the Ile-de-France or Rhône-Alpes regions. The categories of firms in our sample also differ in the composition of their workforce. Compared to the firms that remained on 39 hours, those that adopted the 35-hour work week employ a larger proportion of unskilled and a lower proportion of skilled labour.

Table 2. **Characteristics of firms present in the data base for 2002**

	Aubry1+Aubry2+Fillon	Aubry2+Fillon	Hybrid	RBS+Fillon
Workforce characteristics				
Average size	23.71	44.89	36.14	18.25
]5-10[	55.92%	41.31%	46.87	54.65%
[10-20[	19.65%	21.30%	20.31%	25.74%
[20-50[	15.57%	21.15%	19.12%	14.51%
[50-200[	7.47%	12.37%	10.68%	4.44%
[200 and more	1.39%	3.87%	3.02%	0.67%
% of unskilled employees	26.0%	21.8%	18.6%	18.7%
% of skilled employees	42.9%	40.5%	41.4%	48.2%
% of highly skilled employees	31.1%	37.7%	40.0%	33.1%
% of part-time employees	17.7%	15.6%	14.6%	13.0%
% of women	37.1%	33.5%	33.0%	28.4%
Branches of industry				
Food industry	4.4%	3.5%	3.8%	4.5%
Consumer goods and car industry	4.4%	4.2%	6.3%	4.1%
Capital goods industry	3.2%	4.9%	5.8%	5.7%
Intermediate goods and energy	6.9%	11.6%	11.9%	10.5%
Building	10.7%	8.4%	9.5%	20.7%
Trade	44.6%	34.3%	29.7%	29.8%
Transport	3.4%	4.2%	4.7%	7.5%
Financial, real estate and business services	7.6%	16.9%	7.8%	3.3%
Other services	14.8%	12.0%	20.6%	13.9%
Wages and working hours				
Average gross hourly wage	13.83 €	16.57 €	16.60 €	15.25 €
% of employees paid [0.8; 1.1[minimum wage	21.9%	9.4%	11.7%	13.9%
% of employees paid [1.1 ; 1.3[minimum wage	19.1%	14.0%	12.3%	17.9%
% of employees paid [1.3 ; 1.6[minimum wage	20.0%	20.4%	17.9%	21.4%
% of employees paid [1.6 minimum wage and more	34.0%	51.7%	54.4%	44.8%
Average annual number of hours	1620.84	1680.37	1694.82	1744.37
Geographical location				
Ile-de-France	8.4%	15.93%	22.38%	18.02%
Rhône-Alpes	8.96%	11.53%	10.79%	12.77%
Provence-Alpes-Côte d'Azur	8.14%	7.23%	7.46%	6.57%
Other regions	74.5%	65.31%	59.37%	62.64%
Number of observations	39 154	57 532	37 968	148 924

Source: AROME, ORME and SEQUOIA databases (AcoSS-Urssaf), DADS (Insee).

Field: balanced panel of establishments with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR over the period 2001-2005.

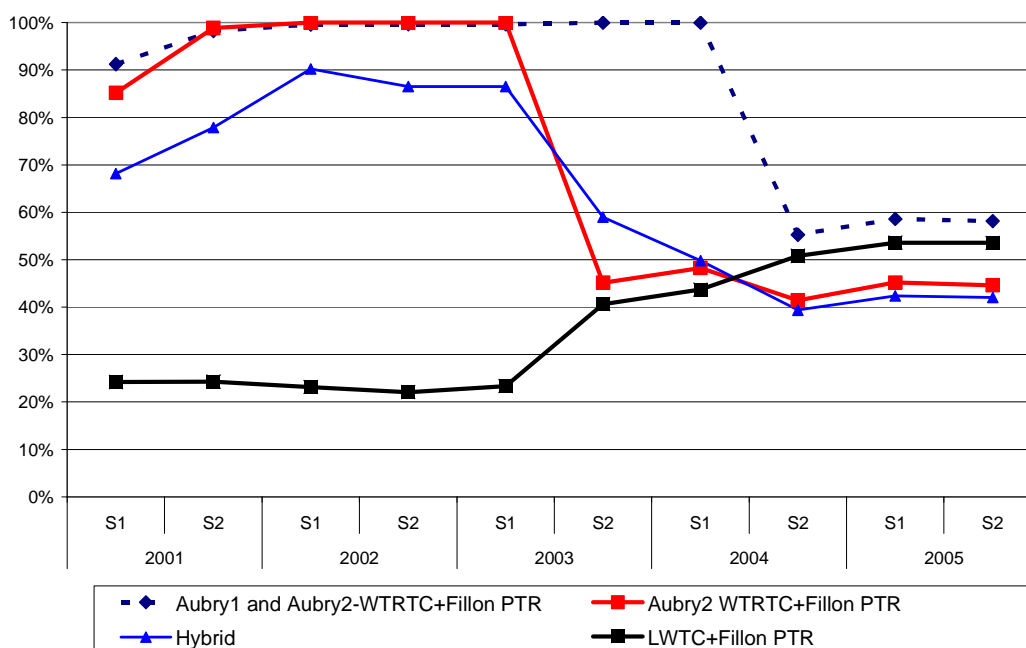
On average, firms on 35 hours employed a higher proportion of workers on low wages (less than 1.3 minimum wage) than the others. This result is principally due to the firms that adopted the 35-hour work week with the help of Aubry 1 WTRTC. The gross hourly wage is lower in these firms than it is in those that changed to the 35-hour work week without

incentives or in those that remained on 39 hours. Lastly, and not surprisingly, the number of annual hours worked per employee is lower in 35-hour firms than it is in 39-hour firms. It is also lower in firms that moved to 35 hours in the context of Aubry 1 than it is in the others⁶. It is also likely that all these categories of establishments also differ in their characteristics of work organisation and technology, as several applied studies on the transition to the 35-hour work week have shown (notably Bunel [2005] and Gilles [2006]).

Clear differences in employment evolution between the different categories of establishment

For each category of establishment, Graph 5 shows the evolution in the proportion of employees for whom their employer firm receives PTR⁷. In the framework of Aubry 1 and Aubry 2, firms were granted PTR for all their employees. In the case of the LWTC, only the lowest wages, below 1.3 minimum wage, were concerned, represented some 20 % of employees. With the Fillon reform, the proportion of employees concerned converged to about 50 %. It therefore fell in firms on 35 hours and rose in those on 39 hours, as can be seen in Graph 5. It can also be observed that at the end of this period, the proportion of employees concerned was higher in LWTC firms than in Aubry 2 firms, reflecting a higher proportion of employees being paid less than 1.6 minimum wage in LWTC firms (see Table 2). Employment evolution in what we call “hybrid” establishments was comparable to that observed in Aubry 2 firms.

Graph 5. Evolution of the proportion of employees benefitting from PTR



Source: AROME, ORME and SEQUOIA databases (Acoess-Urssaf), DADS (Insee).

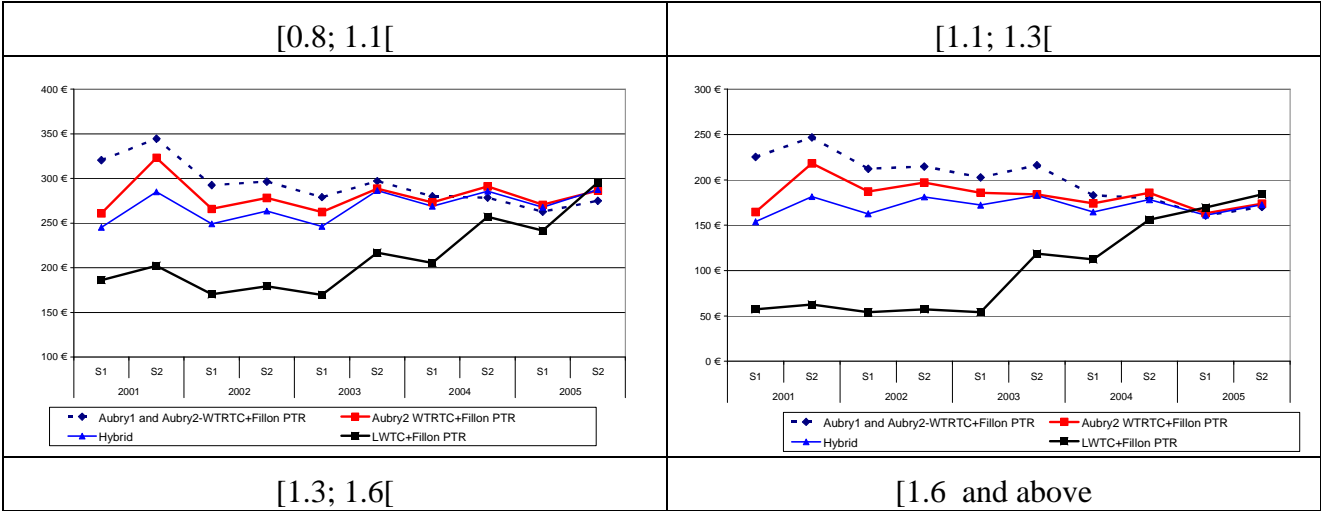
Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 - 2005.

⁶ Firms that wanted to move to the 35-hour work week with the benefit of Aubry 1 aids were obliged to implement a 10% reduction in effective working time, unlike other firms.

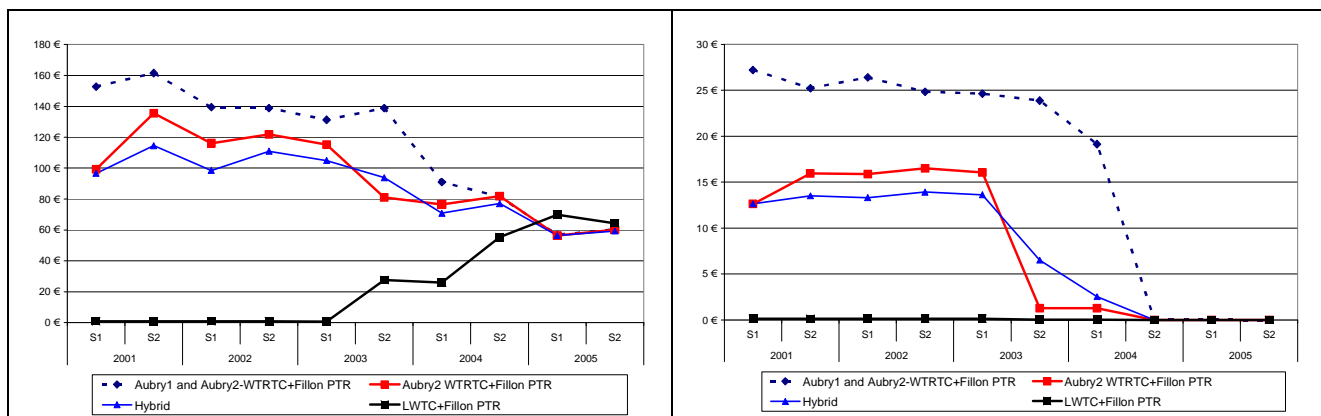
⁷ These are gross workforce figures, not full-time equivalents: an establishment that transforms a full-time job into two part-time jobs increases the number of employees concerned by measure involving PTR.

Graph 6 shows the evolution in the amount of the reduction per employee concerned for each wage brackets (defined as a multiple of the French minimum wage)⁸. It is relevant to distinguish different wage brackets because the aids are regressive with regard to wage. This is indeed what we can observe in the Graph 6, where, for all categories of establishment, the amount of aid is all the higher when the wages are low. Remember that the Fillon reform sets out to harmonise heterogeneous situations, with the result that firms which had adopted the 35-hour work week did not receive the same treatment as the others. Given the sliding scales of reductions, the difference is small at the level of the minimum wage but substantial around the level of 1.3 minimum wage and for high wages. We have therefore defined four wage brackets in the graph, expressed as proportions of the hourly minimum wage: employees who earn an hourly wage close to the minimum wage, those whose wages lie between 1.1 and 1.3 times the minimum wage, those between 1.3 and 1.6 minimum wage, and those whose hourly wage is above 1.6 minimum wage. Before the Fillon reform, the average amount of aid was higher in establishments benefitting from the Aubry measures than it was in firms receiving LWTR, for all wage levels. With the Fillon reform, these differing amounts converged towards one sole level, resulting in a cut in the average amount of aid for establishments on 35 hours (Aubry 1 and Aubry 2 WTRTC) and a rise in the amount of reductions for LWTR establishments. This convergence is visible at all wage levels, varying in intensity from one wage bracket to another.

Graph 6. Amount of PTR per employee concerned for different wage brackets



⁸ Note that the amount of the PTR for each employee is not calculated using Acoess information about these employees (EFFREC variable). The use of this variable produces abnormally low estimations of reductions (for example, less than 50 € for 39 hour firms before 2002). The numbers of employees affected by payroll tax subsidies has therefore been recalculated using Dads data.

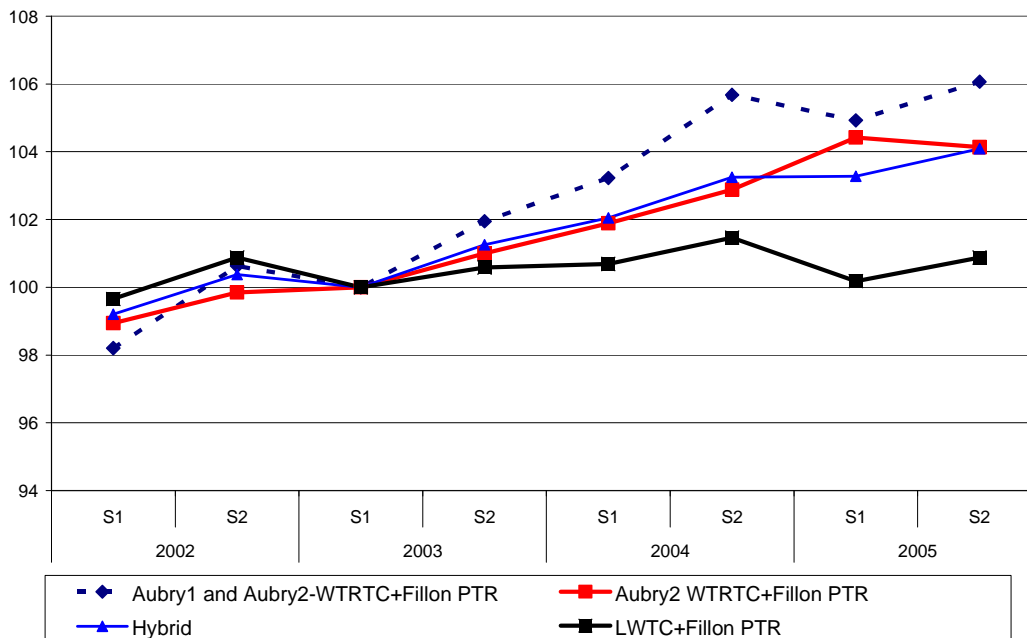


Source: AROME, ORME and SEQUOIA databases (Acoiss-Urssaf), DADS (Insee).

Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 - 2005.

Labour costs, calculated per employee and taking PTR into account, are affected by the Fillon reform. They rise more slowly in firms staying on 39 hours than in those changing to 35 hours. In this respect, Graph 7 is most illustrative. Before implementation of the Fillon reform, between the first halves of 2002 and 2003, the evolution in labour costs per full-time equivalent employee was the same for all categories of firms. Since the first half of 2003, on the other hand, labour costs per employee have increased by 4% to 6% for firms on 35 hours, while they have only risen by an average of 1% in firms on 39 hours.

Graph 7. Labour costs per full-time equivalent employee



Source: AROME, ORME and SEQUOIA databases (Acoiss-Urssaf), DADS (Insee).

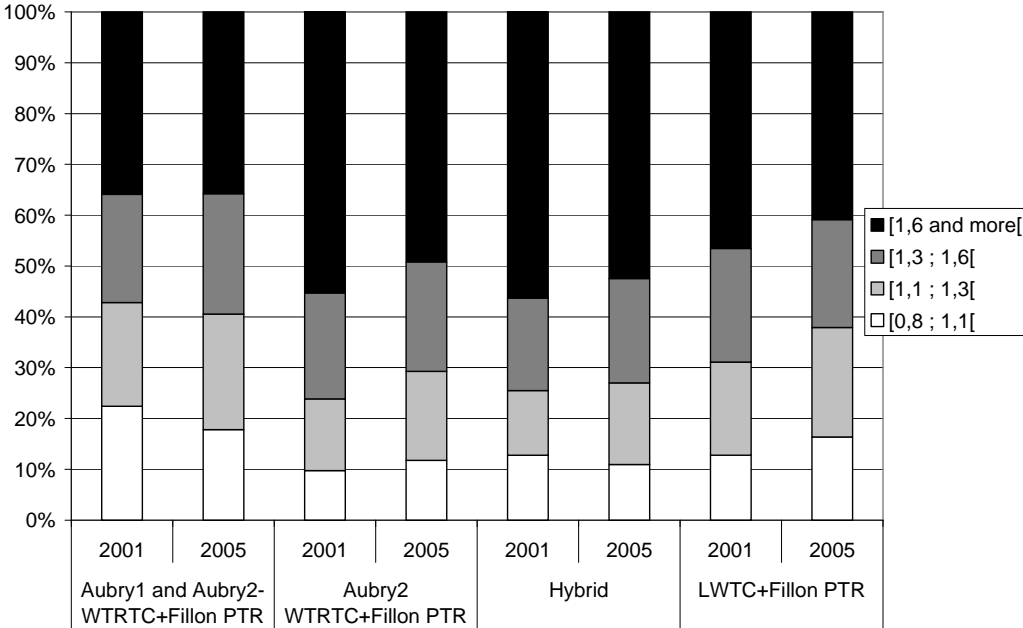
Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 - 2005.

Note: base index = 100 for first half of 2003.

Graph 8 represents the wage structure in wage brackets (defined as a multiple of the French minimum wage) in the different categories of establishment in 2001 and in 2005, from which we can deduce its evolution. Overall, the structure has remained stable for firms receiving Aubry 1 aids, with just a slight fall in low-wage employees. Establishments on 39 hours, on the other hand, experienced a strong rise in the proportion of low-wage employees earning up to 1.3 minimum wage, corresponding to the wage bracket in which PTR were highest in the Fillon reform. Establishments receiving Aubry 2 aids also saw a rise in low-wage employees, but on a smaller scale, and above all a strong fall in the share of high wage earners, above 1.6 minimum wage, for which the Fillon reform abolished previous PTR.

The evolution in the level of employment for each category of establishment is presented in Graph 9. It can be seen that employment rose regularly in RBS establishments, by a total of just over 4% between 2001 and the end of 2005, while it fell during the period of the Fillon reform in establishments receiving Aubry 1 and/or Aubry 2 aids. The evolution in hybrid establishments was comparable to that of Aubry 2 establishments. This employment evolution appears to go in the right direction, given the nature of the payroll tax shocks experienced by the two categories of firms (a rise in the average value of reductions for firms on 39 hours and a fall for firms on 35 hours) and given the evolution in labour costs (see Graph 7). However, this observation needs to be confirmed by econometric analysis to take into account the fact that this employment evolution could be explained by factors other than PTR (see the following section).

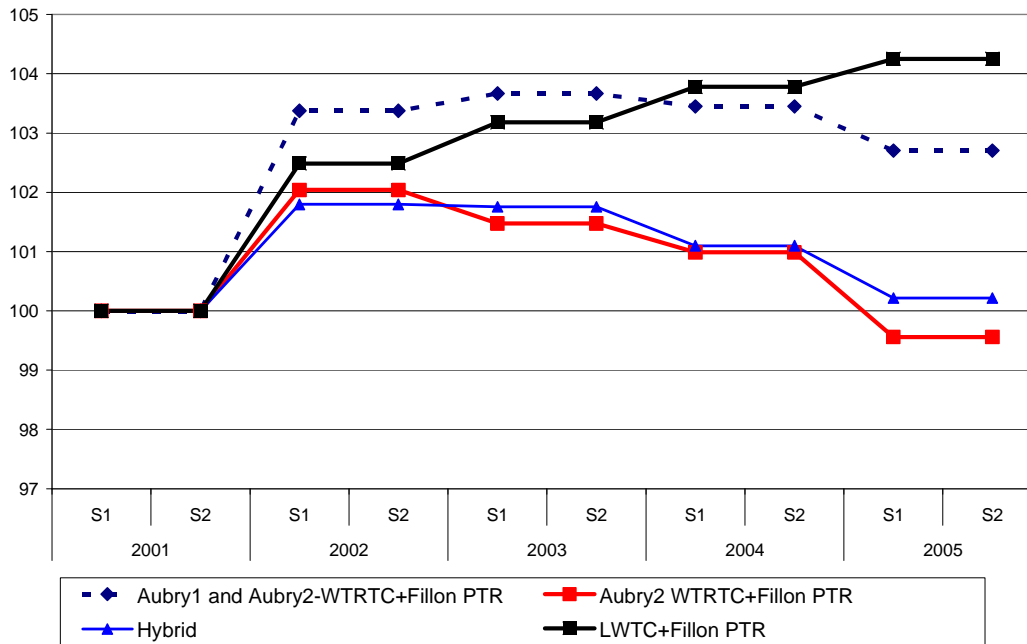
Graph 8. Evolution in the proportion of employees per wage bracket



Source: AROME, ORME and SEQUOIA databases (Acoiss-Urssaf), DADS (Insee).

Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 - 2005.

Graph 9. Employment evolution by category of establishment



Source: AROME, ORME and SEQUOIA databases (Acos-Urssaf), DADS (Insee).

Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 - 2005.

The effects on labour costs, wages and employment

The results given above are essentially descriptive. If we wish to go further, we must use econometrics to evaluate the effects of the Fillon reform, *ceteris paribus*. For this purpose, we shall now focus on two main categories of firms. The first is composed of 35 hour firms benefited of the WTRTC (Aubry 1 and/or Aubry 1 aids) and obtained Fillon PTR after 2003. The second comprises 39 hour firms which received before 2003 LWTR and received “Fillon PTR” after. For each group of firms, we study the impact on labour costs, hourly wages, the overall employment level and that of unskilled workers, of a variation in the “apparent tax cuts ratio” (ATCR) – the ratio between the amount of PTR received and the labour cost – between the second half of 2002 and the first half of 2005.

To carry out this evaluation, only the firms of which all the establishments were present simultaneously in the different files were retained. The final sample is a balanced panel of more than 90,000 firms. The field we have chosen is firms with five or more employees⁹ (gross numbers registered on 31 December), present in the sample over the period 2001 to 2005 and receiving “Fillon PTR” continuously over the period 2003 to 2004 (AROME, ORME and SEQUOIA databases from Acos). The “hybrid” type firms described in the previous section are excluded from the analysis.

A contrasting evolution in the amount of reductions between the two groups of firms

The amount of PTR for an employee earning the minimum wage was about 300 € in the first half of 2005, for both categories of firm. Likewise, in 2005, the average reduction per

⁹ In the rest of this study, we shall be using the distribution of employees by wage bracket (multiples of the Smic) for our analysis. As this information is difficult to obtain for very small firms, we have chosen a threshold of 5 employees.

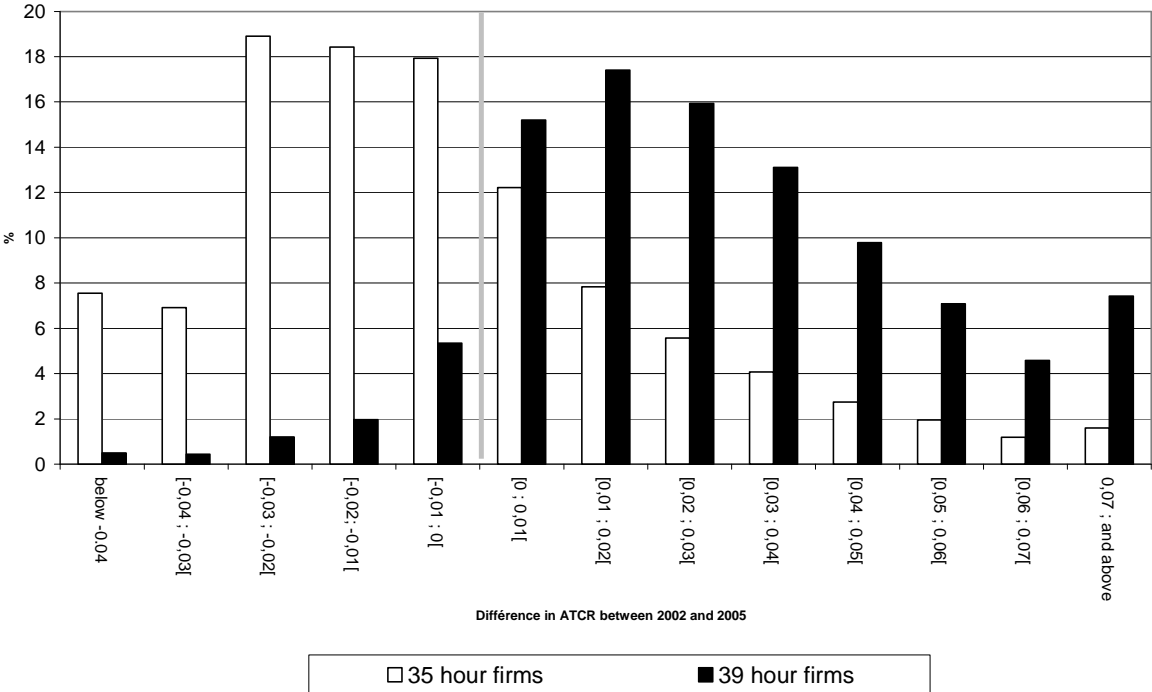
employee benefitting from PTR, i.e. earning between 1 and 1.6 minimum wage, was also very similar for both categories of firms (around 150 € per month).

In 2002, on the contrary, 39 hour firms received a payroll tax subsidies of 180 € for each employee earning the minimum wage, compared to 280 € for the 35 hour firms. However, the average reduction per employee concerned was higher for the first group of firms than it was for the other (by about 20 €). This is because although, before 2003, all the employees in 35 hour firms benefited from reductions, the reductions for employees earning more than 1.7 times the minimum wage were small (about 50 €).

To take this change of field into account, we have chosen to use the “apparent tax cuts ratio” (ATCR) – the ratio between PTR and the wage base. The latter rose by 2.1 points for 39 hour firms, whereas it fell by 0.9 points for 35 hour firms. This difference in evolution is due to the narrowing of the field of PTR (abolition of reductions for employees earning more than 1.7 minimum wage) and the low increase in reduction rates granted to 35 hour firms, while 39 hour firms have benefited simultaneously from a widening of the field of eligibility and an increase in rates of reduction.

Overall, then, firms remaining on 39 hours have benefited more from the reform than those on 35 hours. Within each category, however, the reform has had very heterogeneous effects on the evolution of the level of PTR. Nearly 90% of the 39 hour firms saw an increase in their ATCR, compared to 37% of the 35 hour firms. Moreover, among the firms in the former group, 58% were greatly advantaged by the modification in reduction scales, because their ATCR increased by more than 0.02 points (Graph 10). Among the firms in the second group, 33% suffered a fall in ATCR of at least 0.02 points.

Graph 10. Evolution in the ATCR between 2002 and 2005: comparison 35 hour firms and 39 hour firms



Source: AROME, ORME and SEQUOIA databases (Acoiss-Urssaf), DADS (Insee).

Field: balanced panel of 92,939 firms with 5 or more employees in the private non-farm business and semi-public sectors excluding HCR for the period 2001 to 2005.

Econometric methods

The variations in the ATCR are due to both the change in legal tax cuts rates and to variations in employment or in salary mass. To get an unbiased effect of the Fillon reform, we compute a « virtual apparent tax cuts ratio » (VATCR). In fact, we follow Crépon and Desplatz (2001) who calculate a « virtual » labour cost for every workers in 1997. This methodology allows them to estimate the impact of the LWTC reform, independently of any change in wages that was observed between 1994 and 1997.

In our paper, to get a VATCR for 2005, we make use of the Fillon tax cuts scales from January 2005 and we apply them to gross wages that are measured in June 2002. We do this for eight level of wages¹⁰. Hence, we get variations in the social security payroll tax rates, had wages and employment been kept unchanged between 2002 and 2005. In particular, the only variables that are supposed to affect the average labour cost are: (i) the level of variables that are observed in 2002 (average wage level in the firm ; average wage within the wage brackets; employment level and composition; for the firm: having adopted or not the 35-hour work week); (ii) the changes induced by the Fillon reform (changes in tax cuts scales; increase in the minimum wage or in the GMR).

Consequently, our goal is to explain employment variation using the variation in the VATCR, as well as usual control variables (for instance: firm size, industries, geographical location, value added growth rate). The variation in VATCR at the firm level is subject to different measurement errors linked to the nature of the data and its processing. To limit the influence of these errors, we have chosen as a treatment variable the position of firms with regard to the distribution of this variation, distinguishing between different classes, rather than the value of the variation in the reduction ratio.

To test the impact, *ceteris paribus*, on the variables of interest in the different sub-populations of a relative variation in average labour costs, we use three econometric methods: the ordinary least squares method (OLS), the quantile regression method (QR), and propensity score matching (PSM). We shall now briefly present the characteristics of these methods.

The OLS method estimates the average effect of the treatment consistently and without bias if it is exogenous. The model is written in the following form:

$$\Delta \ln Y_i = X_i\beta + T_i\gamma + u_i$$

where $\Delta \ln Y_i$ represents the growth rate of the dependent variable (employment, average labour costs and hourly wages), X_i a vector of exogenous variables that explain $\Delta \ln Y_i$ (industries, geographical location, value added growth rate, *etc.*) T_i the treatment variable (the amount of VATCR) and u_i a residual.

In addition to the OLS method, the quantile regression, first developed by Koenker and Bassett (1978), allows to measure the effect of dependent variables on the estimated variable at different points of its distribution, and not just the mean, as is the case for the linear model estimated by OLS. This method, now widely used (Koenker and Hallock, 2001), is based on the following minimisation programme:

¹⁰ These wage brackets are defined as a multiple of the French minimum wage and are the following: workers whose wage lies between 0.8 and 1.1 times the minimum wage; between 1.1 and 1.2 times the minimum wage; between 1.2 and 1.3 times the minimum wage; between 1.3 and 1.4 times the minimum wage; between 1.4 and 1.5 times the minimum wage; between 1.5 and 1.6 times the minimum wage; between 1.6 and 1.7 times the minimum wage; workers whose wage is larger than 1.7 times the minimum wage. Details about the building of the ATCR and about the estimation results are found in (BUNEL *et al.*, 2009).

$$\min \left(\sum_{i: \Delta \ln Y_i \geq X_i \beta_\theta + T_i \gamma_\theta} \theta |\Delta \ln Y_i - X_i \beta_\theta - T_i \gamma_\theta| + \sum_{i: \Delta \ln Y_i < X_i \beta_\theta + T_i \gamma_\theta} (1 - \theta) |\Delta \ln Y_i - X_i \beta_\theta - T_i \gamma_\theta| \right)$$

where θ represents the quantile considered. The estimated parameters β_θ and γ_θ can vary according to the quantile in question. In our case, the main attraction of this approach is that it allows us to control for the homogeneity of the impact of a variation in wage costs generated by the Fillon reform (2003) over the whole distribution of variables of interest. Moreover, it allows us to assume residuals not to be normally distributed.

Finally, to relax also the hypothesis of linearity between the dependent variable and the independent variables imposed by the above two methods, we use the method of semiparametric propensity score matching. For each firm, only the situation corresponding to the real evolution in labour costs can be observed. The interest of PSM estimation is that we can compare this situation with another one that would have resulted from a different evolution in labour costs. For this purpose, we use the kernel matching method developed by Heckman, Ichimura and Todd (1998). It is based on the construction, for each firm treated (*e.g.* having benefited from a greater increase in PTR), of a counterfactual firm corresponding to a weighted mean of all the firms in the control (or reference) group (*e.g.* of firms having benefited from a smaller increase in PTR). The weighting used is determined by the distance between the score obtained by a firm (*i.e.* the probability that the firm has been granted greater reductions, depending on its characteristics) and the score of each firm in the control group. Initially, the Heckman, Ichimura and Todd estimator (1998) studied the effect of a dichotomous treatment. However, it is possible to extend it to cover multiple treatments (Lechner, 1999; Brodaty *et al.*, 2000; Frölich, 2004).

Let $C_{T=k}^{kl}$ denote the causal effect being sought, corresponding to the difference in a performance indicator Y when a firm has benefited from a variation k in the apparent tax cuts ratio as compared to a variation l , with $k > l$.

$$C_{T=k}^{kl} \equiv E(\Delta \ln Y_{ik} | T_i = k) - E(\Delta \ln Y_{il} | T_i = k)$$

As in all matching models, the problem comes from the fact that $E(Y_{il} | T_i = k)$ is not observable. The estimated causal effect, used to get around this problem, is written as follows:

$$\hat{C}_{T=k}^{kl} \equiv \frac{1}{N_k} \sum_{i \in T_k} \left[\Delta \ln Y_i - \sum_{j \in T_k} \frac{K[(\hat{p}_i^{kl} - \hat{p}_j^{kl})/h_j]}{\sum_{j \in T_k} K[(\hat{p}_i^{kl} - \hat{p}_j^{kl})/h_j]} \Delta \ln Y_j \right]$$

N_k corresponds to the number of firms benefiting from a variation k in labour costs, and T_k is the set comprising these firms. $K[\cdot]$ denotes a kernel function and h_j a smoothing parameter, fixed at 0.06. The probabilities \hat{p}_i^{kl} are deduced from probabilities estimated using an ordered probit model that allows us to calculate $\Pr(T = k | X_i)$ and $\Pr(T = l | X_i)$. We obtain:

$$\hat{p}_i^{kl} = \frac{\Pr(T = k | X_i)}{\Pr(T = k | X_i) + \Pr(T = l | X_i)}$$

Note that these estimators are calculated on the common support, in other words on that part of the treated and control firms which are comparable, *i.e.* on that part of the two propensity score densities that is common to both the treated group and the control group. Lastly,

standard errors and confidence intervals are computed through bootstrapping replicating fifty samples with replacement.

These three econometrics methods are used to estimate the effects of a variation in the « virtual apparent tax cuts ratio » on employment and on others variables of interest. In order to present in a very simple way our estimation results, we have computed the elasticities dividing the estimated impact on the interest variable by the labor cost variation induced by the Fillon reform, as it was previously describe.

Results of the estimations

Tables 3 to 6 present the elasticities of employment and wages with respect to the average wage cost that we have estimated for firms on 35 hours and then for firms on 39 hours. Following an increase of 1 % in labour costs, these elasticities indicate the effects, in percent, on employment (measured in gross numbers and full time equivalence) and wages. Significant results are printed in bold type. The elasticities are often significant and always have the expected sign. A rise of 1 % in average costs reduces employment by about 0.25 %.

Overall, the results are not very sensitive to the method of estimation. Propensity score matching (PSM) gives qualitatively comparable results to the parametric approach (OLS). The results from quantile regression (QR) suggest that the estimation of elasticities obtained by OLS is higher at the lower end of the distribution for firms on 39 hours.

Now let us look at the results in more detail. To begin with, we consider the group of firms on 35 hours as a whole, before describing the effects more precisely, by observing what happens within this group according to the size of the shock experienced. We then repeat the procedure for the group of firms on 39 hours.

Firms on 35 hours

Overall, in the firms on 35 hours, the elasticities of employment with respect to average labour costs are more often significant when employment is measured in full-time equivalents. The effects are less noticeable when they are measured in terms of gross workforce numbers, according to the results shown in Table 3.

Table 3. Estimation of the elasticity of variables of interest with respect to changes in average labour costs for firms on 35 hours

	OLS	Quantile regressions		
		25%	50%	75%
Gross employment	-0.0585(ns) [-0.2439; 0.12695]	-0.0964(ns) [-0.2956; 0.10285]	-0.0852(ns) [-0.2346; 0.06419]	0.0469(ns) [-0.1582; 0.25196]
Full-time equivalent employment	-0.2776*** [-0.4601; -0.0950]	-0.1301(ns) [-0.3667; 0.1065]	-0.1125(ns) [-0.2864; 0.0614]	-0.2532** [-0.4735; -0.0328]
Gross hourly wage	-0.0051(ns) [-0.0998; 0.0895]	0.148*** [0.0435; 0.2526]	0.0479(ns) [-0.0463; 0.1421]	-0.1486*** [-0.2598; -0.0373]

Source: AROME, ORME and SEQUOIA databases (Acos), DADS and SUSE (Insee).

Field: Panel of 92,939 firms with 5 or more employees for the period 2002 to 2005 in private non-farm business and semi-public sectors.

Notes: *** significant at the level of 1%; ** significant at the level of 5%; (ns) non significant. The values between square brackets correspond to the limits of the confidence interval at 95%.

Moreover, as most of the firms on 35 hours have experienced an increase in average labour costs with the introduction of the Fillon reform, the negative sensibility of full-time equivalent employment to the shock (-0.28) indicates that one of the reasons for the fall in the volume of

hours worked is the increased use of temporary and part-time employment in these firms between 2002 and 2005. This effect can be ascribed to the higher end of the employment distribution (-0.25 for the third quartile).

This was to be expected, insofar as the firms on 35 hours have suffered a fall in PTR on high wages (1.7 Minimum wage and above) with the Fillon reform. Table 4 shows that the negative effect on gross employment in 35 hour firms was confined to those firms that had experienced a strong rise in average labour costs (between 2% and 3%). As we have already pointed out, this impact derives mainly from firms employing high-wage workers: Note that in firms experiencing a rise in average labour costs of 2% to 3%, the share of employees earning 1.7 minimum wage and more was more than 44%.

Table 4. Estimation of the elasticity of variables of interest for different values of average wage cost increases

		OLS	Nearest Neighbour	Kernel
Gross employment				
Variation in average labour costs	Below +0.5%	-0.1188(ns) [-0.3336; 0.0960]	-0.1824(ns) [-0.4889; 0.1240]	-0.1564(ns) [-0.361; 0.048]
	[+0.5%;+1%[	0.0049(ns) [-0.2483; 0.2582]	-0.3778** [-0.7480; -0.0076]	-0.2833(ns) [-0.592; 0.025]
	[+1%; +2%[	-0.0947(ns) [-0.3921; 0.2027]	-0.3954(ns) [-0.8605; 0.0696]	-0.5536*** [-0.786; -0.321]
	[+2%;+3%[	-0.6163** [-1.1469; -0.0858]	-1.3510*** [-2.0478; -0.6542]	-1.2799*** [-1.837; -0.722]
	Above +3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
	Full-time equivalent employment			
Variation in average labour costs	Below +0.5%	-0.3608*** [-0.5972; -0.1495]	-0.3749*** [-0.7139; -0.0621]	-0.4553*** [-0.743; -0.200]
	[+0.5%;+1%[	-0.3855*** [-0.6640; -0.1388]	-0.7243*** [-1.1399; -0.3686]	-0.6298*** [-0.913; -0.399]
	[+1%; +2%[	-0.5905*** [-0.9288; -0.3134]	-0.7827*** [-1.3074; -0.3392]	-0.8610*** [-1.148; -0.664]
	[+2%;+3%[	-1.5702*** [-2.3093; -1.1467]	-2.2469*** [-3.2544; -1.6910]	-2.1744*** [-3.018; -1.768]
	Above +3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
	Gross hourly wage			
Variation in average labour costs	Below +0.5%	-0.1110(ns) [-0.2231; 0.0010]	-0.0782 (ns) [-0.2314; 0.0751]	-0.1303(ns) [-0.335 0.074]
	[+0.5%;+1%[	0.0058(ns) [-0.1321; 0.1437]	-0.1259 (ns) [-0.3111; 0.0592]	-0.0630(ns) [-0.186 0.060]
	[+1%; +2%[	0.6412*** [0.4805; 0.8019]	0.5141*** [0.2816; 0.7466]	0.5932*** [0.438; 0.748]
	[+2%;+3%[	0.7320*** [0.4495; 1.0144]	0.3555 (ns) [-0.0626; 0.7736]	0.4977*** [0.219; 0.776]
	Above +3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>

Source: AROME, ORME and SEQUOIA databases (Acos), DADS and SUSE (Insee).

Field: Panel of 92,939 firms with 5 or more employees for the period 2002 to 2005 in private non-farm business and semi-public sectors.

Notes: *** significant at the level of 1%; ** significant at the level of 5%; (ns) non significant.

The values between square brackets correspond to the limits of the confidence interval at 95%.

The sensitivity of employment to average labour costs appears to increase in absolute terms with the size of the shock: it is lower in firms where labour costs have increased less

(sensitivity of -0.45 to -0.36 for a variation lower than +0.5%; on the contrary, sensitivity of -2.25 to -1.57 for a variation of +2% to +3%).

Effects on wages are less significant. The significant elasticities tend to be positive. The rise in labour costs therefore appears to have gone together with a rise in gross wages. This movement of wages in firms on 35 hours is mainly associated with firms in which the increase in average labour costs generated by the Fillon shock was the highest (+1% to +3%).

Firms on 39 hours

For the firms that kept the 39-hour work week, Table 5 highlights two main results. Firstly, the elasticities of gross and full-time equivalent employment with respect to average labour costs are indeed negative (-0.22 and -0.31). As firms on 39 hours experienced a fall in average labour costs with the introduction of the Fillon reform, employment grew, both in total hours worked and in the number of employees. The strongest growth in employment (in employees or hours worked) took place in those firms that had received the highest increases in PTR (variation in average labour costs of between -3% and -2%).

Table 5. Estimation of the elasticity of variables of interest with respect to changes in average labour costs for firms on 39 hours

	OLS	Quantile regressions		
		25%	50%	75%
Gross employment	-0.2234*** [-0.3414; -0.1054]	-0.2303*** [-0.3554; -0.1052]	-0.1512*** [-0.2439; -0.0585]	-0.1424** [-0.2740; -0.0107]
Full-time equivalent employment	-0.3133*** [-0.4252; -0.2015]	-0.3828*** [-0.5181; -0.2476]	-0.1260*** [-0.2259; -0.0261]	-0.1680*** [-0.2980; -0.0379]
Gross hourly wage	-0.4484*** [-0.5082; -0.3885]	-0.6480*** [-0.7124; -0.5836]	-0.2774*** [-0.3340; -0.2208]	-0.1171*** [-0.1889; -0.0453]

Source: AROME, ORME and SEQUOIA databases (Acos), DADS and SUSE (Insee).

Field: Panel of 92,939 firms with 5 or more employees for the period 2002 to 2005 in private non-farm business and semi-public sectors.

Notes: *** significant at the level of 1%; ** significant at the level of 5%; (ns) non significant.

The values between square brackets correspond to the limits of the confidence interval at 95%.

Secondly, implementation of the Fillon law of 2003 had a knock-on effect on wages, as it had for firms on 35 hours. Here, the elasticity of wages with respect to labour costs is negative (about -0.44) and labour costs have fallen overall, meaning that the Fillon reform has indeed brought about a rise in wages. These firms employed a high proportion of employees earning between 1.2 and 1.7 minimum wage, no doubt influenced during this period by the spread effects of successive increases in the hourly minimum wage.

Net effect on employment

Broadly speaking, the effect of the Fillon reform on employment has been very weak, or even slightly negative. Firms on 39 hours have benefited from it, on the whole, as they have seen average labour costs fall thanks to the PTR and despite the rise in the minimum wage. The effect of the Fillon reform on these firms has been positive. The firms on 35 hours, on the other hand, have experienced a rise in average labour costs, mainly related to the loss of PTR for employees earning over 1.7 minimum wage, with the end of the Aubry 1 WTRTC measures, and the increase in monthly wage guarantees (for firms employing 20 or more people). This rise in labour costs led to a slight fall in employment.

Table 6. Estimation of the elasticity of variables of interest with respect to changes in average labour costs for firms on 39 hours, for different values of average wage cost increases

		OLS	Nearest Neighbour	Kernel
Gross employment				
Variation in average labour costs	Above +0.05%	-0.2929*** [-0.4349; -0.1509]	-0.2323** [-0.4275; -0.0372]	-0.2655*** [-0.4282; -0.1029]
	[-0.03%; +0.05%[	-0.1968** [-0.3828; -0.0109]	0.3671** [0.0313; 0.7029]	0.1958(ns) [-0.0441; 0.4357]
	[-1%; -0.03%[	-0.2835*** [-0.4814; -0.0857]	0.2923(ns) [-0.0514; 0.6361]	0.1462(ns) [-0.1403; 0.4326]
	[-2%; -1%[	-0.2418** [-0.4819; -0.0018]	0.0769(ns) [-0.3000; 0.4538]	0.1154(ns) [-0.1861; 0.4169]
	[-3%; -2%[	-0.4630** [-0.8677; -0.0583]	-0.3086(ns) [-0.9136; 0.2963]	-0.1852(ns) [-0.5481; 0.1778]
	Below -3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Full-time equivalent employment				
Variation in average labour costs	Above +0.05%	-0.3275*** [-0.4637; -0.1913]	-0.2489*** [-0.4441; -0.0538]	-0.2489*** [-0.3790; -0.1188]
	[-0.03%; +0.05%[	-0.0819(ns) [-0.2635; 0.0996]	-0.0245(ns) [-0.3603; 0.3113]	0.0734(ns) [-0.2144; 0.3613]
	[-1%; -0.03%[	-0.3057*** [-0.4974; -0.1140]	-0.2046(ns) [-0.5484; 0.1391]	-0.1754(ns) [-0.4046; 0.0538]
	[-2%; -1%[	-0.2740** [-0.5061; -0.0420]	-0.3846** [-0.7615; -0.0077]	-0.1923(ns) [-0.4938; 0.1092]
	[-3%; -2%[	-0.3974** [-0.7861; -0.0087]	-0.5556** [-1.1605; -0.005]	-0.3086(ns) [-0.7926; 0.1753]
	Below -3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
Gross hourly wage				
Variation in average labour costs	Above +0.05%	-0.3371*** [-0.4107; -0.2635]	-0.2323*** [-0.3299; -0.1348]	-0.2489*** [-0.3368; -0.1611]
	[-0.03%; +0.05%[	-0.8979*** [-1.0025; -0.7932]	-0.9545*** [-1.1464; -0.7627]	-1.0280*** [-1.2342; -0.8217]
	[-1%; -0.03%[	-0.9315*** [-1.0375; -0.8255]	-1.1108*** [-1.2827; -0.9390]	-1.0816*** [-1.2821; -0.8811]
	[-2%; -1%[	-0.8388*** [-0.9619; -0.7157]	-0.9230*** [-1.0737; -0.7722]	-0.9999*** [-1.1808; -0.8190]
	[-3%; -2%[	-0.7947*** [-0.9952; -0.5942]	-0.9259*** [-1.1679; -0.6840]	-0.9259*** [-1.2284; -0.6235]
	Below -3%	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>

Source: AROME, ORME and SEQUOIA databases (Acooss), DADS and SUSE (Insee).

Field: Panel of 92,939 firms with 5 or more employees for the period 2002 to 2005 in private non-farm business and semi-public sectors.

Notes: *** significant at the level of 1%; ** significant at the level of 5%; (ns) non significant.

The values between square brackets correspond to the limits of the confidence interval at 95%.

We can attempt to specify the order of magnitude of these effects. For 39 hours firms, the overall effect on gross employment depends on the average change in average labour costs (-1.017%) and on the elasticity obtained in Table 5 (-0.2234). This gives us an effect of the order of 0.24%, or about 3,000 jobs. Even if we extrapolate this result to the whole active population, in other words the 15 million employees in the private non farm sector of which 46% work in firms on 39 hours, we only obtain an effect on employment of about 15,500 jobs created or saved by the Fillon reform. We can carry out a similar calculation for full-time

equivalent employment. In this case, the impact on employment is slightly stronger, of the order of 4,300 jobs in the sample and 21,500 jobs in the whole population.

For 35 hours firms, the average change in labour costs was +1.71% (weighted by workforce numbers). Given that the elasticity for full-time equivalent jobs is -0.278, the overall effect is negative. It is of the order of -0.48%, or the loss of about 7,700 jobs. Extrapolating to the whole population (54% of the 15 million employees in the market sector were employed by firms on 35 hours), we obtain an effect of 39,000 jobs destroyed.

So the overall effect of the Fillon reform, on 35-hour and 39-hour firms taken together, appears to have been very weak, or even negative. This is an aggregate result for large groups of firms, and it is not incompatible with the possibility that the reform has had a significant impact for certain firms in a few particular sectors of activity.

It should be noted that this article adopts an approach of micro-econometric evaluation along the lines of Crépon and Desplatz (2001), and is not based on any closed macroeconomic system. Our evaluation does not take into account either volume effects or effects of inter-industry substitution. Moreover, this study does not specify the impact of the Fillon reform by level of qualifications and wages. Further studies could usefully control for these different dimensions.

Conclusions

The reform introduced with the Fillon law of 17 January 2003 aimed to unify the different pre-existing schemes of payroll tax subsidies on low wages. It has had very different effects depending on the type of firms concerned. The harmonisation of the different schemes produced a much more pronounced reduction in payroll taxes for firms that had not changed to the 35-hour work week than for those that had, particularly for employees earning around 1.3 minimum wage. This observation is still verified when we consider the concomitant rise in the minimum wage, even with varied hypotheses about the spread of this rise along the wage distribution. Compared to the pre-existing reduction schemes, the Fillon harmonisation represented a fall in labour costs targeted slightly below the median wage and more pronounced in firms that had not signed an agreement to move to the 35-hour work week.

In this article, we use a balanced panel of firms over the period 2002-2005. This period starts just before the introduction of the reform, namely 2002, and finishes with the completion of the reform, in 2005. We have started in 2002 to avoid interruptions in the DADS chain of processing. The sample has been restricted to a balanced panel because it is difficult to distinguish between the real creation and closure of establishments and entries and exits from administrative files. To measure the distribution of employees in each firm, we have limited the sample to firms with five or more employees.

After presenting the nature of the shock and the data used, we distinguish between establishments according to the intensity of variations in payroll taxes during the reform. Through an econometric evaluation, we show that the level of employment grew more in those firms that gained the most from increased PTR. Overall, on the one hand, as the majority of 39-hour firms benefited from increased reductions, the Fillon reform led to relative growth in their level of employment. For 35-hour firms, on the other hand, the opposite situation can be observed. For these firms, the reform led to a relative fall in employment. Ultimately, because of this effect of redistribution of employment over firms, the Fillon reform had no clear effect on aggregate employment, whether measured in gross numbers or full-time equivalents.

Overall, labour costs decreased, but with notable differences between the two type of firm. For those on 39 hours, the Fillon reform resulted in a fall in labour costs, partly offset by a rise in hourly wages. For firms on 35 hours, on the contrary, the Fillon reform had no significant effect on labour costs. Hourly wages tended to fall because of the increase in working hours, and this fall offset the rise in labour costs generated by the loss of some of the PTR previously enjoyed by these firms.

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