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▶ **To cite this version:**

Fabrice Gilles, Yannick L'Horty, Ferhat Mihoubi, Xi Yang. Evaluating the impact of firm tax credits. Results from the French natural experiment CICE. 2018. halshs-01878945

HAL Id: halshs-01878945
https://shs.hal.science/halshs-01878945

Preprint submitted on 21 Sep 2018

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TEPP WORKING PAPER

N° 2018 - 05

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FABRICE GILLES, YANNICK L'HORTY, FERHAT MIHOUBI, XI YANG

www.tepp.eu

TEPP - Institute for Labor Studies and Public Policies
TEPP - Travail, Emploi et Politiques Publiques - FR CNRS 3435

ISSN 2110-5472

Evaluating the impact of firm tax credits. Results from the French natural experiment CICE*

Fabrice Gilles†, Yannick L'Horty‡, Ferhat Mihoubi§, Xi Yang**

First draft: May 2017

This draft: January 2018

Abstract

The most important economic policy measure of the François Hollande presidency in France is the Firm Tax Credit for Competitiveness and Employment (CICE). Representing an annual amount of more than 20 billion euros, *i.e.* almost two GDP percentage points, the tax credit rate amounts to 6% of the payroll of all companies in 2014, for all wages that are equal to or less than to 2.5 minimum wages. To identify the effects of this measure, we use a treatment intensity approach, by comparing firms that benefit most to those that benefit less from the CICE. We also control for a large set of predetermined variables, and instrument the apparent CICE rate by its simulated value before its implementation. Estimates are based on a balanced sample of more than 130,000 companies with five employees or more between 2009 and 2014. We found that the CICE has a positive but small effect on employment, payroll, and company margins, a negative effect on average salaries, but no effect on investment or productivity.

Keywords: treatment effect models, labour demand, tax and subsidies, public policy.

JEL Codes: C21, H25, J23, J38.

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* This study has received financial support through a grant from France Stratégie (the French Center for Studies and Prospective Strategy). For their helpful comments, we would like to thank Philippe Askénazy, Rozenn Desplatz, Antoine Naboulet, Sébastien Roux, and Alain Trannoy, as well as participants in the thematic AFSE French Treasury and TEPP conferences where a previous version of this paper was presented. As usual, the authors remain responsible for the mistakes and inaccuracies presented in this paper.

† Fabrice GILLES, Université Lille 1, LEM-CNRS (UMR 9221) and TEPP-CNRS (FR 3435), fabrice.gilles@univ-lille1.fr .

‡ Yannick L'HORTY, Université Paris-Est, ERUDITE (EA 437), UPEC, UPEM, and TEPP-CNRS (FR 3435), yannick.lhorty@u-pem.fr .

§ Ferhat MIHOUBI, Université Paris-Est, ERUDITE (EA 437), UPEC, UPEM, and TEPP-CNRS (FR 3435), ferhat.mihoubi@u-pec.fr .

** Xi YANG, Université Paris-Ouest Nanterre La Défense, ECONOMIX (UMR 7235), xi.yang@u-paris10.fr .

I. Introduction

The French firm tax credit for competitiveness and employment (CICE, *Crédit d'Impôt pour la Compétitivité et l'Emploi*) is the most important employment measure of President Francois Hollande's five-year term with regards to total amount as well as the number of employees and the number of companies concerned. It is a far-reaching measure, with a real cost of nearly 20 billion euros since 2014, *i.e.* nearly two GDP percentage points. As a rule, this massive general assistance can be used unconditionally. Firms have been given the freedom to choose among all possible ways to use this tax credit.

The economic consequences of a firm tax credit that is both massive and mainly unconditional such as the CICE are difficult to establish. The CICE is a major corporate tax cut which results, from an accounting standpoint, in increased profit margins. This markup shock may have modified transaction levels, relative prices in some markets, and the allocation of production factors in directions that cannot be established *a priori*. It involves multiple economic mechanisms at the firm level, as well as at the sectoral and macroeconomic levels, according to a general equilibrium framework. From a strictly theoretical point of view, given the variety of these mechanisms, the impact of this kind of measure is therefore largely undetermined. According to the principle of taxation impact, there is little connection between the taxable base of a compulsory levy and its actual consequences: the company that receives the credit is not necessarily the one that ultimately benefits from it.

Ex ante evaluations of the CICE are based on a great number of assumptions about these different mechanisms, which limit their credibility. They lead to mixed results. The first quantification carried out before the measure was even implemented predicted 150,000 jobs created within five years (Plane, 2012). Another quantification on the basis of a macro-simulation in 16 branches of activity led to an inter-sectoral effect of 120,000 jobs created or preserved (Ducoudré *et al.*, 2015). Hagneré and Legendre (2016) using micro-simulation model with firm level data predicted 261,000 jobs created or preserved. According to these *ex ante* evaluations, the cost per job created or preserved would be between 65,000 and over 140,000 Euros. On average, these three evaluations considered that the CICE might well create (or preserve) nearly 180,000 jobs.

An *ex post* evaluation relies on fewer assumptions. The originality of the present article stems from its carrying out this type of evaluation based on a broad set of exhaustive micro-databases of various companies. We draw upon administrative sources made available by *Acoss-Urssaf* (the French Central Agency of Social Security Organizations, DGFIP (French Treasury Agency) and *Insee* (French national statistical agency). These accounting and tax data[6] cover 2009 to 2014.

This article evaluates the effects of the CICE on the basis of a balanced sample[7] of more than 130,000 companies with five or more employees, during the 2009 to 2014 period. The aim is to measure the effects of the CICE on two sets of variables, *i.e.* employment and wages, as well as on economic activity.

6 In addition to the endorsement of the *comité du secret statistique* (French committee on statistical confidentiality) and of data producing services, authorizations had to be obtained to merge these data with tax sources before they could be accessed within the framework of the Centre d'Accès Sécurisé à Distance (French secure remote access center).

7 We therefore limit the analysis to the effects of the CICE on perennial companies. It is clear that the CICE can also produce effects on the survival of companies, which may in turn have consequences on employment, wages, and competitiveness. These effects, through business demography, are therefore outside our field of observation, which is limited to the intensive margin.

II. The policy

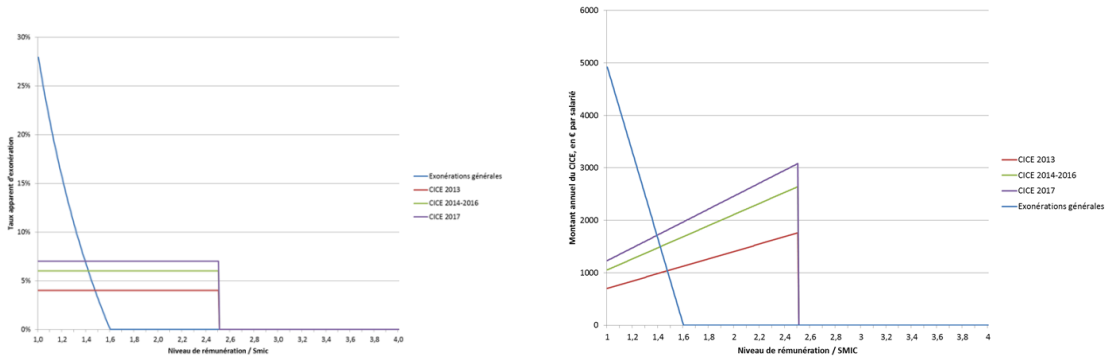
As a result of the deterioration of corporate margins and the need to restore their competitiveness, as established in the report by Louis Gallois (2012), the CICE has been in force in France from January 1, 2013. This is a general measure benefiting all companies employing at least one employee and not belonging to the area of public administration. The amount of the tax reduction is calculated by applying a uniform rate on all gross wages equivalent to or less than 2.5 minimum wages (Smic), *i.e.* well above the 1.6 Smic threshold that applies to general exemptions from social security contributions (graphic 1). The reduction rate was initially 4% in 2013, before being increased to 6% from 2014, which corresponds to a maximum cost of more than €2,500 per employee per year.[8] The total amount of the tax credit differs according to the company, depending on the distribution of the salaries they pay. This is a far reaching measure, with a real cost of 11.2 billion euros in 2013, according to the monitoring committee report, *i.e.* a half GDP percentage point.[9] This amount is expected to reach €18.4 billion in 2014 according to the CICE monitoring committee. It will be raised to nearly 25 billion in 2017, *i.e.* more than two GDP percentage points. The measure is comparable in its scope to the general exemptions from social security contributions, with which it should merge by 2018, within the framework of the *pacte de responsabilité* (responsibility pact).

The scale of the CICE is particular. The assistance is uniform for all wages under the maximum limit of 2.5 Smic. It is therefore shaped like a staircase in a salary-exemption rate chart, with a very marked threshold effect around 2.5 Smic. Salaried workers paid above the threshold, corresponding to a gross monthly salary of a little over 3,500 euros, are not concerned by the measure. In 2016, a salary increase of 1 euro for an employee paid close to the threshold resulted in a loss of more than 2,500 euros in assistance for the employer. This is a general measure benefiting all companies employing at least one employee not belonging to the area of public administration. The total amount of the tax credit differs depending on the company, according to the distribution of the wages they pay. This scale is very different from the social security exemption scale, which is much more concentrated at the bottom of the wage distribution scale (chart).

8 According to the presidential announcements of the end of June 2016, the CICE should be increased to 7% in 2017, for an additional budgetary cost of approximately 4 billion euros, resulting in a total amount of approximately 25 billion euros, *i.e.* almost half of the amount of corporate income tax collected annually. It should subsequently be transformed into permanent relief from social security contributions as part of the stability pact. "*I want to realize the CICE's complete potential, which is now fully understood and appreciated by companies, in particular SMEs and VSEs, and which has quick effects on employment, investment, and purchasing power*," declared French President François Hollande to Journal *les Echos*, on June 29, 2016.

9 Companies located in French overseas departments benefit from a scale increased by 7.5% in 2013 and subsequently by 9%.

Figure 1. The scale of the CICE tax credit as a percentage of salary.



This massive and general assistance is not very focused with regard to its use. According to article 244 (C) of the General Tax Code, which defines the CICE, its focus is extremely wide-ranging. The objective is for companies to fund "*improvement of their competitiveness, including through investment, research, innovation, training, recruitment, exploring new markets, ecological and energy transition, and reconstituting their working capital."* Companies have been given the freedom to choose among all these targets. No conditions of use or controls have been imposed on them. The only restrictions are that the tax credit cannot *"finance an increase in the share of profits distributed, or increase the remuneration of persons exercising management functions in the company"*.

Once the cost is covered, companies are free to use the CICE for whatever purpose they see fit, without any follow-up mechanism determining the use that is actually made of it by the companies. The chronicle of how it is spent is complex and variable depending on the company. In 2013, the only companies that actually benefited from the CICE, as of that year, were those that used the pre-financing mechanism. These companies collected, as of 2013, non-negligible amounts which may have changed their economic behavior. In addition, those that did not spend it all could modify their economic behavior by taking this future collection into account. These factors complicate the evaluation.

III. Data and descriptive analysis

To complete this study, we have had access to a fully exhaustive set of administrative sources and survey data, which not only help identify the amount of the CICE credited to each company but also the multiple outcome and control variables enabling a proper evaluation. We first present the data sources before describing the restrictions we had to impose when they were matched in order to put together the sample used in our estimates.

Data sources

Several comprehensive administrative databases have been used to build our workhorse dataset.
First we need precise information about the amount of tax credit at the firm level. The French Fiscal administration (*Dgfip*) provides the MVC dataset containing each year the amount of *CICE* tax credit. In order to get information on wage bill subject to the CICE (below 2.5 times the minimum wage) we use the BRC database, provided by *Acoss-Urssaf* (French central agency of social security organization). It collects wages and related social contributions reported by French employers. This dataset contains also information about employment.
Second, DADS (Annual Declaration on Social Data) is a comprehensive administrative database (a matched employers-employees database), produced by *Insee* (French National Statistical Agency). It provides information on employment, working hours, wages and their decomposition by socio-professional categories, gender, age, labor contract.

Third, the fiscal database, FARE is produced by Dgfip and Insee, collecting all firms' fiscal declarations. It provides information on firms' account indicators: gross sales, added value, gross operating, net results, profit margin, economic return rate, investment productivity and dividends.

Building the dataset

First, this dataset combines information from the three datasets (DADS, BRC and FARE).
The DADS dataset is available since 2009 and FARE since 2008. Our sample ranges from 2009 to 2014. It allows us to have enough information characterizing firms prior the introduction of the CICE tax credits in 2013.

Second, only firms subject to corporate taxes can benefit from CICE. Firms from the public sector and non-profit organizations have been dropped from our dataset.
Small firms benefit from special and simplified fiscal regimes. As a consequence, they are less likely concerned with the corporate tax regime. We thus do not consider firms employing fewer than 5 workers.
Firms belonging to the farming sector are affiliated to another Social Security Organization (*Msa*) and do not to appear in the *Acoss* file. As a consequence, very few firms from the farming sector appear in our dataset and we have ruled out firms from the farming sector.
The financial and insurance sector is under represented in the FARE database and the variables measuring their activity are quite different from those of the other sectors. This sector has also been discarded from our dataset.
Until 2014, a dispute opposed temporary works firms and their clients concerning a possible handover of the CICE. During 2013 and in the beginning of 2014, there is no clear evidences concerning the way the temporary work firms have used the tax credit (handover of tax credit to the clients of not). For this reason, the temporary works firms have not been include in our framework.

Third, to consider only reliable information at the firm level, we have applied several consistency filters.
With regards to the theoretical upper bounds of tax credits rates, we do not consider firms with an apparent CICE rate greater than 5% in 2013 and greater than 8% in 2014. We discard firm with a difference in CICE amount from one dataset to another (MVC vs. BRC) greater in absolute value than 50%.
We keep firms with consistent information in the three datasets (DADS, BRC and FARE). Some large national companies (also known as GEN in French) still have a part of their employees with civil servant status. As a consequence the employment level reported in DADS could be below the level in the two other datasets (FARE, BRC). We only keep firms with employment gap less than 100% and greater than -50% from one source to another; this condition is applied for firms with more than 20 employees.
We consider firms with financial indicators belonging to the interval [1%; 99%] of the firm distribution for a given year.

On the basis of these restrictions, we get a balanced panel of 133,890 firms covering the 2009 to 2014 period (Table 1).

Table 1. Matched and balanced databases**.**

	Total payroll In billions of €	CICE base (<2.5 SMIC) In billions of €	Amount of the CICE In billions of €	Average total number of employees. In millions	Total number of employees on 31/12 in millions	Number of companies in thousands
Matched DADS-BRC-FARE databases	365.90	217.04	8.68	11.87	11.72	865.13
Deletions of inconsistent observations	310.96	189.90	7.60	9.94	9.87	673.59
Balanced panel of companies with 5 or more employees covering the 2009 to 2014 period	162.53	104.42	4.18	5.14	5.14	133.89

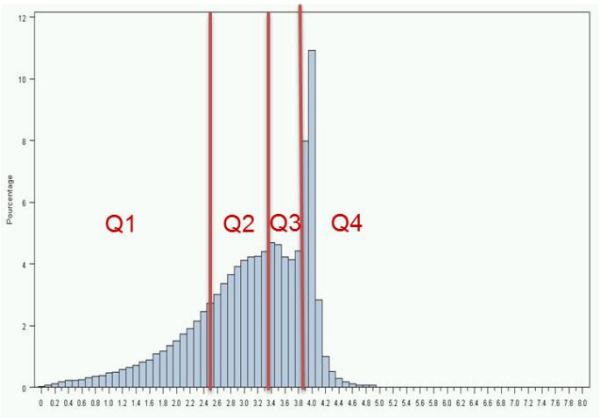
Sources: BRC (Acoss), DADS-FARE-(Insee), and MVC (DGFIP).
Field: All companies subject to corporate taxation, outside the public, agricultural, financial, insurance, and temporary work agency business sectors.

Descriptive statistics: beneficiaries of the CICE

The apparent rate of the CICE tax credit relates the amount of CICE from the MVC database to the gross wage bill from the DADS. Its distribution is shown in Figure 2 (2013) and Figure 3 (2014). The average is 2.57% in 2013 and 3.82% in 2014. The median is 3.26 in 2013 and 4.09 in 2014. There is a mass point at the rate of 4% where companies that have no employees paid above 2.5 Smic are located and very small part of firms employing all workers with wages greater than 2.5 Smic.

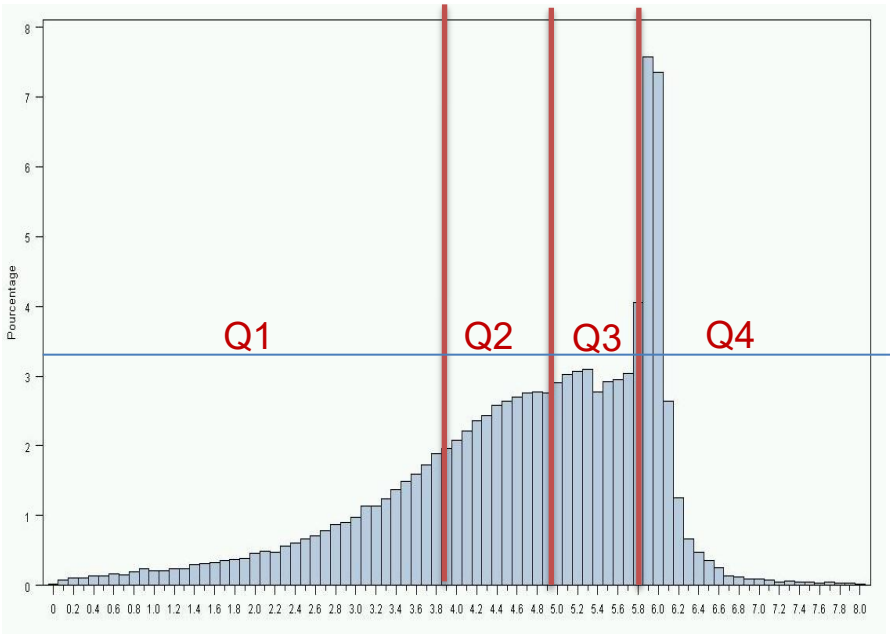
We distinguish between companies based on how much they have benefited from the CICE by creating four groups (quartiles) composed of the same number of companies from those that benefit least from the CICE to those that benefit most (Table 2).

Figure 2. Density of the apparent CICE ratio in 2013.



Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more employees during the 2009-2014 period.

Figure 3. Density of the apparent CICE ratio in 2014.



Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more employees during the 2009-2014 period.

The companies that have benefited most from the CICE (measured using the apparent CICE rate) are mainly small companies in the tertiary sector (75.6%), with fewer than 20 employees on average, gross sales of €2,234,000 in 2012, and relatively low capital intensity and export gross sales. Companies that benefit least have the opposite characteristics. Their average workforce is almost 50 employees, with gross sales of more than 15 million euros in 2012, capital intensity of more than €74,000 per employee, and a quarter of their gross sales coming from exports. They are less predominantly from the tertiary sector (64.4%).

Table 2. Main characteristics of firms according to their exposition to CICE.

Feature	**Sources**	**Quartiles of apparent CICE ratio in 2013**			
		CICE<2.62%	2.62<=CICE<3.26	3.26<=CICE<3.83	CICE>=3.83
Firms number	BRC-FARE-DADS	33 472	33 473	33 473	33 473
Average number of employees	BRC	48.71	47.75	37.76	19.21
	DADS	49.15	46.97	36.86	18.58
	FARE	45.32	42.68	32.76	15.80
Average total wage bill (*K€*)	BRC	2,076	1,340	878	388
	DADS	2,100	1,368	894	384
	FARE	2,072	1,363	930	439
Average wage per capita (*K€*)	BRC	42.61	28.06	23.25	19.99
	DADS	42.73	29.12	24.27	20.88
	FARE	45.73	31.93	28.39	27.77
Total sales (*K€*)	FARE	15,168	11,025	5 881	2 234
Labor productivity (*K€*)	FARE	90.57	60.36	49.95	45.71
Markup rate	FARE	20.33%	18.07%	15.81%	14.91%
Economic rate of return	FARE	13.19%	12.05%	11.71%	13.07%
Capitalistic intensity (*K€*)	FARE	74.74	61.08	48.74	35.29

Share of total sales exported	FARE	23.54%	7.96%	4.33%	3.17%
Investment rate (corp. Invest. / added value)	FARE	7.17%	8.53%	9.10%	7.61%
Debt ratio	FARE	26.82%	39.15%	49.23%	55.67%
Financial levy rate	FARE	6.60%	6.69%	7.39%	8.99%
Sector	FARE				
Industry		18.79%	21.93%	17.33%	19.45%
Building		16.78%	24.66%	33.26%	4.96%
Tertiary		64.43%	53.41%	49.41%	75.59%
R&D		0.31%	0.68%	0.32%	0.08%
Employment structure %	DADS				
Blue-collar		27.38%	39.42%	42.86%	43.58%
White-collar		18.14%	33.51%	40.76%	45.20%
Middle level prof.		22.31%	15.70%	11.06%	8.37%
Executive		31.02%	10.42%	4.78%	2.60%
R&D engineer		7.24%	1.21%	0.24%	0.14%
R&D technician		1.57%	0.62%	0.26%	0.13%
Women		33.38%	35.25%	40.44%	45.55%
30 years and younger		21.89%	29.20%	32.79%	37.90%
50 years and older		23.00%	20.13%	18.85%	18.03%
Long term contract		88.20%	83.90%	79.00%	76.62%
Short term contract		8.86%	13.40%	18.14%	19.15%
Full time job		87.30%	82.39%	76.19%	69.27%

Sources: BRC (Acoss), DADS-FARE-(Insee), and MVC (DGFIP).
Field: 133,890 companies subject to corporate taxation, outside the public, agricultural, financial, insurance, and temporary work agency business sectors.

The companies that benefit most are generally more financially fragile. Their profit margin is less than 15% compared to more than 20% for the companies that benefit least. The debt ratio exceeds 55% compared to 26.8% for those that benefit least and the financial levy rate is close to 9% compared to 6.6% for those that benefit least. Labor productivity is also lower in firms that benefit most.

The wage earners of these companies are mainly employees and blue collar workers. The share of intermediate professions and executives is quite low. The average wage is lower than in companies that have benefited least from the CICE. The annual average is a little over €20,000 among these companies, compared with more than double this amount in the 25% of companies that benefit least.

The share of women and those under 30 years of age is the highest, while the share of those over 50 is the lowest. Workers most frequently have fixed-term contracts (CDD) and are employed on a part-time basis. Conversely, the companies that have benefited least from the CICE are those that employ the most managers and employees over 50, where the share of women is lowest, and where the proportion of contracts of indeterminate duration (CDI) and of full-time employees is the highest.

These differences in composition have been shown to exist in both 2013 and 2014, using the apparent CICE rate as the treatment variable[10]. They refer to the effects of the 2.5 Smic threshold in attributing the CICE and suggest that it is important to control all these variables in estimates.

[10] Corresponding descriptive are available on request.

IV. Identification strategy

The CICE is a general measure with a very broad salary base that has not been tested and has applied to all companies in France since 2013. This prevent from defining a counterfactual. Very few companies have not benefited at all from the CICE (Figures 1 and 2); in addition these companies have very specific characteristics (few workers and high wages, *e.g.* holding heads). Therefore, it is not possible to get a satisfactory control group of companies, *i.e.* of firms that have not benefited from the CICE.

But a second feature of the CICE can make it possible to overcome this difficulty. The CICE is a general measure but it is targeted on wages below 2.5 Smic. While it affects all companies, it does not affect them all with the same intensity. Some companies will benefit greatly from the CICE, while others will only marginally benefit from it. A company that pays low wages will benefit from the maximum tax credit rate (its apparent CICE rate will be 6% in 2014) while a company that includes a significant proportion of employees paid over 2.5 Smic will benefit less from the measure. At its lowest, the apparent CICE rate is zero for companies that do not employ any workers paid less than 2.5 Smic. It should be noted that the 2.5 Smic threshold is a high wage distribution threshold. This threshold is between the 8th and 9th decile of wage distribution (DADS, *Insee*).

Identification by intensity of treatment

These differences in exposure to the treatment are entirely due to a single factor: differences in wage structure and more precisely the share of wages below 2.5 Smic. In each company, the apparent CICE rate, linking the amount of the CICE with the payroll, is yielded in accounting terms by multiplying the maximum CICE rate (for example 4% in 2013) by the sum of salaries below 2.5 Smic (wage earners *i*) in relation to the total payroll (the sum of salaries below 2.5 Smic (wage earners *i*) and above 2.5 Smic (employees *j*)):

$$T_{CICE} = \overline{T_{CICE}} * \frac{\sum w_i}{\sum w_i + \sum w_j}$$

$$\text{With } \overline{T_{CICE}} = \ 0.04 \ in \ 2013; 0.06 \ in \ 2014$$

It is therefore conceivable to use these differences in the intensity of treatment for evaluation purposes. To do so, it suffices to carry out a partition within companies by creating different classes of exposure to the treatment. Following the methodology proposed in Florens *and alii* (2008), the evaluation is based on the difference in the intensity of the treatment rather than whether the treatment is applied. This approach has been successfully used to evaluate general exemptions from social security contributions sharing some of CICE features, *i.e.* measures that are general, massive, and unconditional (Bunel and L'Horty, 2012). This is the approach used in this article. To proceed, we use difference-in-difference estimators (Ashenfelter and Card, 1985), considering different exposure to CICE and comparing firms between before and after the introduction of CICE.

The problem with this approach is that the companies benefiting most from the CICE do not have the same characteristics as those benefiting only a little. A control group composed of companies that have least benefited from the CICE is not randomly selected. It mainly brings together high-wage companies that are unique from the point of view of all the determinants of employment, wages, and competitiveness.

In the case of the CICE, the wage structure completely determines intensity of exposure to the treatment. However, it is also determined by the outcome variables: employment, wages, and competitiveness. For example, one can expect that a highly competitive company creates many jobs and more frequently pays high wages. It will then have little exposure to the CICE. It is important to consider this potential bias to evaluate a causal effect of the treatment (CICE). The instrumental variables method overcomes these difficulties.

To control for treatment endogeneity, we thus combine difference-in-difference with instrumental variable methods. From a large number of potential instruments among all the variables from our databases, we finally chose the simulated values of the apparent CICE rate for 2013 and 2014 on the basis of data from the years prior to the establishment of the CICE (2009-2012), following the method used in Auten and Carroll (1999). We also consider a wide range of control variables characterizing the economic situation of companies prior to the implementation of the CICE (using FARE information), and the indicators on employment structure (using DADS information).

Econometric specifications

We consider the treatment evaluation framework (Rubin, 1974) to evaluate the effects of the CICE (the *treatment*) on employment, wages, added value, gross operating surplus, investment or productivity (the *outcomes*). To assess the impact of CICE, we have to account for employment structures[11] or for different economic situations[12] prior to the implementation of CICE. All these variables refer to *covariates* or *control variables* in the evaluation framework.

Parametric cross section estimator
First, we consider the following equation for company *i*:

$$\ln(Y_{i,t}) = \alpha_0 + \alpha I(t) + \beta T_{i,t} + \gamma X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

The dependent variable of the model is the logarithm of the outcome variable $Y_{i,t}$ observed on *t* date, with $T_{i,t}$ corresponding to the treatment variable. $X_{i,t-1}$ refers to a set of past values of observable control variables to avoid simultaneity between the controls and the dependent variable. $I(t)$ is a time dummy. $\varepsilon_{i,t}$ represents the error term that is written as $\varepsilon_{i,t} = v_i + u_{i,t}$, in which v_i is an individual unobserved fixed effect differentiating companies and is potentially correlated with $X_{i,t}$, while $u_{i,t}$ is a random term that is independent of the control variables.

However, some companies have benefited more from the CICE than others. Moreover, the effect of the CICE may not be linearly related to the exposure to the CICE. To take into account the non-linearity of the effect of the treatment, instead of considering continuous CICE rate, indicators are introduced for different treatment intensity in equation (1). We estimate the following differentiated equation

$$\Delta\ln(Y_{i,t}) = \alpha + \sum_{j=1}^{j=J} \beta_j I_j(\Delta T_{i,t}) + \gamma_0 Y_{i,t-1} + \gamma \Delta X_{i,t-1} + \delta X_{i,t-1} \quad (2)$$

[11] Share of part-time workers or of female; share of workers with fixed-term contract; share of socio professional categories
[12] Past capital intensity ratio, share of exports in whole sales, profit margin or return rate, rate of investment, debt ratio.

$$+\sum_{k=1}^{k=K}\theta_k size_{i,k,t-1}+\sum_{l=1}^{l=L}\tau_l sector_{i,l}+\epsilon_{i,t}$$

with $\epsilon_{i,t}=\Delta\varepsilon_{i,t}=\Delta u_{i,t}$. In which $I_j(T_{i,t})$, *j=1,...J (with J=4)* is a set of dummies corresponding to quartiles of the degree of benefit from the CICE. $\Delta X_{i,t}=X_{i,t}-X_{i,t-1}$ and $\Delta T_{i,t}=T_{i,t}-T_{i,t-1}$ and for 2013 $\Delta T_{i,t}=T_{i,t}$ insofar as $T_{i,t-1}=0$. $\Delta\ln(Y_{i,t})=\ln(Y_{i,t})-\ln(Y_{i,t-1})$ which is approximately equal to the growth rate of the outcome variable. As this may not be enough to control for $\Delta X_{i,t-1}$, we add levels $X_{i,t-1}$ and also $Y_{i,t-1}$. In addition, a set of dummies is introduced to take into account sectoral or size effects.

For 2013, we use the information from 2011-2013 and the estimated equation is

$$\Delta\ln(Y_{i,2013})=\alpha+\sum_{j=2}^{j=J}\beta_j I_j(T_{i,2013})+\gamma_0 Y_{i,2012}+\gamma\Delta X_{i,2012}+\delta X_{i,2012}+\sum_{k=2}^{k=K}\theta_k size_{i,k,2012}+\sum_{l=2}^{l=L}\tau_l sector_{i,l,2012}+\epsilon_{i,2013} \quad (3)$$

For 2014, we consider the same equation, but to estimate the effect of the CICE variation perceived in 2014 on the evolution of employment between 2013 and 2014. To avoid other endogeneity problems, exactly the same controls are considered as for the equation estimated in 2013 (level of the *Xs* in 2012 and variation of the *Xs* between 2011 and 2012). Finally, a last estimate is considered to estimate the effect of the average CICE rate over 2013 and 2014 (variation of the CICE rate between 2013-2014 and 2012 on the evolution of the outcome variable between 2012 and 2014).

A straight forward alternative approach is panel data estimation. Considering the same identification strategy, this allows distinguishing the effects of CICE in 2013 and 2014 considering a common framework. Moreover, this approach allows time varying coefficients for control variables (firm size[13]). The following equation is estimated

$$\Delta\ln(Y_{i,t})=\alpha+\sum_{j=2}^{j=J}\beta_{j,2013} I_j(T_{i,2013})+\sum_{j=2}^{j=J}\beta_{j,2014} I_j(\Delta T_{i,2014})+\gamma_0 Y_{i,t-1}+\gamma\Delta X_{i,t-1}+\delta X_{i,t-1}+\sum_{k=2}^{k=K}\theta_{k,t} size_{i,k,t-1}+\sum_{l=2}^{l=L}\tau_l sector_{i,l,t-1}+\epsilon_{i,t} \quad (4)$$

With $\Delta T_{i,2014}=T_{i,2014}-T_{i,2013}$.

Finally, for both parametric estimators, when considering ΔlnY_i as a dependent variable of estimated equations (2) and (4), we run weighted regressions to get the impact of the CICE treatment on the outcome variable at the macroeconomic level. This is the case for most outcome variables:

[13] We systematically test for time invariance of coefficients. This hypothesis was rejected only for coefficients related to firm size.

employment, average wages, payrolls; gross sales, added value or investment; as a weight, we consider the lagged value of *Y* ($Y_{i,t-1}$). For other outcome variables (gross operating surplus – GOS – , accounting result, profit margins, productivity or dividends), we keep the level of the given outcome variable on the basis of different grounds. GOS or accounting results be positive, negative or zero. The same holds for profit margins and return rates that are ratios and can be equal to 0, or for dividends.

Semi-parametric cross section estimator

A more flexible method consists in combining instrumental variable and difference-in-difference propensity score matching. This approach was first suggested by Frölich (2007) and generalized by Frölich and Lechner (2014).
Considering our four groups of firms, we proceed by pairwise comparisons of firms that benefited more from the CICE (*Q2, Q3* or *Q4* groups) to those characterized by low rate of CICE (*Q1*). For instance, we compare firms of *Q4* to firms of *Q1*. Like in Frölich and Lechner (2014), we consider the (local) average treatment effect on the treated. In this case, *Q4* refers to treated firms (T=1, benefiting more from CICE), and *Q1* to untreated firms (*T=0*, benefiting the less from CICE).

In addition, to deal with endogeneity issue, we choose as an instrumental variable the intention to treat, *i.e.* the quartile for CICE that would have prevailed if firms characteristics would not been affected by the introduction of CICE. In practice, we compute the CICE rate considering wages provided by past information (choosing one year before 2013, *eg*: 2009, 2010, 2011 or 2012) and build quartiles for this simulated CICE rate.
When we compare firms from *Q4* to firms from *Q1*, we consider as an instrumental variable *Z* that is equal to 1 if the firm belongs to *Q4* of the simulated CICE rate, or to 0 if it belongs to *Q1* of the simulated CICE rate. The estimator is

$$\widehat{\boldsymbol{\beta}} = \boldsymbol{E}(\boldsymbol{Y_1} - \widehat{\boldsymbol{Y_0}}|\boldsymbol{T} = \boldsymbol{1}) = \frac{\sum_{\boldsymbol{i}:\boldsymbol{Z_i}=\boldsymbol{1}} \left(\boldsymbol{Y_i} - \widehat{\boldsymbol{m_0}}\left(\boldsymbol{\pi}(\boldsymbol{X_i})\right)\right)}{\sum_{\boldsymbol{i}:\boldsymbol{Z_i}=\boldsymbol{1}} \left(\boldsymbol{T_i} - \widehat{\boldsymbol{\mu_0}}\left(\boldsymbol{\pi}(\boldsymbol{X_i})\right)\right)} \quad (5)$$

Where $\boldsymbol{\pi}(\boldsymbol{X_i})$ represents the propensity score in the case of the instrumental variable estimator proposed in Frölich (2007). It refers to the probability for firm *i* to be treated (*i.e.* to belong to *Q4* of the simulated CICE rate, in contrast to *Q1*), conditional to (predetermined) control variables $\boldsymbol{X}$, *i.e.* $\boldsymbol{P}\left(\boldsymbol{Z_i} = \boldsymbol{1}|\boldsymbol{Y_{i,2012}}, \boldsymbol{X_{i,2012}}, \Delta\boldsymbol{X_{i,2012}}, \boldsymbol{sector_{i,2012}}, \boldsymbol{size_{i,2012}}\right)$.

Considering the nearest neighbor estimator, $\widehat{\boldsymbol{m_0}}(\boldsymbol{\pi}(\boldsymbol{X_i}))$ (resp. $\widehat{\boldsymbol{\mu_0}}(\boldsymbol{\pi}(\boldsymbol{X_i}))$) represents the estimated outcome value (resp. probability to be treated) of treated firm *i* (*Q4* of simulated CICE rate) if it would not have been treated, given its characteristics prior to the introduction of CICE.

In practice, we proceed in two steps for any given couple of firms groups (*Q2, Q3* or *Q4 versus Q1*). First, for instance comparing *Q4* and *Q1*, we estimate the probability for the firm to be affected to *Z=1* group (*Q4* of the simulated CICE rate) *vs Z=0* (*Q1* of the simulated CICE rate), given its predetermined characteristics. Second, using the nearest neighbor estimator, we compute matching estimators from both numerator and denominator. To assess the effect of the treatment we consider the model in difference. We consider the growth rate $\Delta\boldsymbol{lnY_i}$ if the outcome variable is expressed as natural logarithm (see model (1)). Like for parametric estimators, we weight with lagged value of $\boldsymbol{Y_i}$

if we consider $\Delta \boldsymbol{lnY_i}$ as a dependent variable of estimated equation (5). In this case, we extend the work of Frölich (2007b) for matching estimators without instrumental variables and use the same kind of weight $\boldsymbol{w_i}$ we apply to compute the matching estimator of the numerator of (5). Thus, for instance, for employment, we estimate the following expression

$$\widehat{\boldsymbol{\beta}} = \boldsymbol{E}(\boldsymbol{Y_1} - \widehat{\boldsymbol{Y_0}}|\boldsymbol{T} = \boldsymbol{1}) = \frac{\sum_{i:Z_i=1} \boldsymbol{w_i}\left(\Delta \boldsymbol{lnY_i} - \widehat{\boldsymbol{m_0}}(\boldsymbol{\pi}(\boldsymbol{X_i}))\right)}{\sum_{i:Z_i=1}\left(\boldsymbol{T_i} - \widehat{\boldsymbol{\mu_0}}(\boldsymbol{\pi}(\boldsymbol{X_i}))\right)} \quad (6)$$

Where $\boldsymbol{w_i}$ refer to $Y_{i,2012}$ when considering $\Delta \boldsymbol{lnY_{i,2013}}$.

Finally, we apply the same method when applying the semi-parametric approach, comparing every couple of quartiles of CICE rate (*Q4* and *Q1*, *Q3* and *Q1* or *Q2* and *Q1*).

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IV. Results

For each outcome variable, we provide the values of the estimated coefficients for each treatment quartile and the associated *P-Value*.[14] We also report the values of corresponding elasticities which indicate the effect of one CICE percentage point on the outcome variable. Each table also displays three tests for instruments' quality: an over-identification test, a weak instrument test, and an endogeneity test.[15]

Effects on employment

With regard to employment, we have two indicators: persons employed as of December 31 and average employment during the year. These two indicators can be measured in three sources: the BRC, the FARE, and the DADS. In total, we can estimate six effects for each quartile. Findings are provided for two years, *i.e.* 2013 and 2014.[16]

We find significant and positive effects of the CICE on employment, but only for the quartile of companies that benefit most, *i.e.* those whose apparent rate is at its maximum, with values of 4% in 2013 and 6% in 2014. It should be recalled that the companies benefiting most are primarily small companies in the tertiary sector (75.6%), with fewer than 20 employees on average.

For the three sources, these outcomes only concern the average workforce and not the end-of-the-year employment. This difference may be due to the fact that employment at the end of the year is more sensitive to the infra annual fluctuations (seasonal changes, upturn or downturn).

Considering the results provided by cross section parametric estimates (Table 3), a simple calculation indicates about 80,000 jobs created or saved.[17] On average, in 2013 and 2014, each CICE percentage point in the companies that benefit most apparently resulted in some 20,000 jobs created or saved (between 13,000 and 25,500 jobs according to the sources). In total, an estimated 100,000 jobs were created or saved during the 2013-2014 period.

Table 3. Effects of CICE tax credit on employment. Parametric estimates (2013 and 2014).

[14] We only comment on coefficients significant at the 5% threshold.

[15] The expected configuration for these three tests is rejection/non-rejection/rejection of the null hypothesis.

[16] Detailed results for each year are available on request.

[17] For example, in 2013, the CICE rate is 4%. The average of the significant elasticities is 1.16. The fourth quartile includes 25% of companies but they are smaller and account for only 12.5% of all 14 million salaried jobs in the private sectors in France. The number of jobs created or saved (or preserved) is therefore 1.16 x 12.5% x 14 million x 4% = 81,200.

Estimates / Sources and variables		Average workforce			Workforce on 31/12		
		BRC	FARE	DADS	BRC	FARE	DADS
Coefficients	Q2	-1.241 (0.297)	0.763 (0.530)	0.662 (0.559)	-0.394 (0.724)	-2.604 (0.209)	-1.185 (0.552)
	Q3	-0.148 (0.929)	-1.357 (0.332)	-0.351 (0.805)	0.85 (0.519)	2.462 (0.480)	3.399 (0.318)
	Q4	**2.197 (0.037)**	**3.542 (0.005)**	**4.285 (0.000)**	-1.888 (0.085)	-0.866 (0.537)	0.342 (0.676)
Elasticities	Q2	-0.78	0.48	0.42	-0.25	-1.64	-0.75
	Q3	-0.06	-0.58	-0.15	0.37	1.06	1.47
	Q4	**0.75**	**1.20**	**1.46**	-0.64	-0.29	0.12
Tests	endogeneity (1)	rejected	rejected	rejected	rejected	rejected	rejected
	overidentification (2)	not rejected	rejected	not rejected	not rejected	not rejected	not rejected
	weak instruments (3)	rejected	rejected	rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2010 and 2011). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term). (3) H0: (instruments not correlated with the treatment).
Reading: In 2013, the growth rate in the average workforce of companies in the second quartile of apparent CICE rate is 0.982 pp smaller than that of the companies in the first quartile. Elasticities are the ratios of estimated coefficient to the value corresponding to the average spread of the apparent CICE rate between the 2nd and the 1st quartile. For 2013, the average levels of apparent CICE rates are 1.43 in the first quartile, 2.99 in the second, 3.53 in the third, and 4 in the last.

The semi-parametric estimates are provided in Appendix 1, Table 9. The coefficients for 2013 and 2014 are once again significant and positive, for all indicators, with higher absolute values than in the parametric case. The average value of all significant elasticities is 1.82, which corresponds by rule of three to 32,000 jobs created or saved per CICE percentage point, *i.e.* more than one and a half times the result found in the case of the parametric regression. Thus CICE should have created or saved 156,000 jobs on average over 2013-2014.

The panel estimates[18] are reported in Appendix 2 (Table 15). They also indicate a positive effect on employment only in companies that have benefited most from the CICE. This effect was significant in 2013 and in 2014. These panel estimates also suggest a fairly clear increase in such effects between the two years, with an average elasticity of 0.87 in 2013 compared to 5.51 in 2014. According to these estimates, a mere 15,000 jobs were created per CICE point in 2013 compared to 96,000 in 2014. In 2013, it would appear that more than 60,000 jobs were created or saved, and more than 190,000 in 2014. On average, during 2013-2014, about 126,000 jobs were thus created or saved.

Findings provided in the previous tables refer to the overall number of employed individuals. Complementarily, Table 4 presents results regarding hours of work. First of all, we show that the CICE had a positive effect on the total number of hours worked, still only for the quartile of companies that benefit most, *i.e.* those that benefited from the largest CICE rate, in 2013 as in 2014. The following table then reveals that there is no perceptible effect on hours worked per capita, that is, on the average working hours.

Table 4A. Effects of CICE tax credit on hours worked. Parametric estimates.

Estimates / Years	2013	Δ2014	2013 and

[18] In the panel estimates of Appendix 2, the instruments are the simulated CICE rates for 2011 and 2012. We also ran these regressions with simulated rates for 2010 and 2011, with almost identical outcomes.

				2014
Coefficients	Q2	1.11 (0.132)	0.352 (0.894)	1.569 (0.375)
	Q3	-1.525 (0.091)	4.473 (0.341)	0.7 (0.809)
	Q4	**3.719** **(0.000)**	0.067 (0.986)	**5.039** **(0.000)**
Elasticities	Q2	0.85	0.50	0.99
	Q3	-0.81	4.47	0.30
	Q4	**1.56**	0.05	**1.71**
Tests	endogeneity [(1)]	rejected	not rejected	rejected
	overidentification [(2)]	not rejected	not rejected	not rejected
	weak instruments [(3)]	rejected	not rejected	rejected

Table 4B. Hours worked per capita. Parametric estimates.

Estimates / Years		2013	Δ2014	2013 and 2014
Coefficients	Q2	0.297 (0.495)	-0.933 (0.691)	-0.145 (0.907)
	Q3	0.502 (0.339)	4.93 (0.247)	3.151 (0.158)
	Q4	0.63 (0.103)	-2.405 (0.480)	0.761 (0.142)
Elasticities	Q2	0.23	-1.33	-0,09
	Q3	0.27	4.93	136
	Q4	0.26	-1.81	0.26
Tests	endogeneity (1)	rejected	not rejected	not rejected
	overidentification (2)	not rejected	not rejected	not rejected
	weak instruments (3)	rejected	not rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2010 and 2011). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term). (3) H0: (instruments not correlated with the treatment).

These findings were confirmed by the semi-parametric estimates reported in Appendix 1 (Table 10). The effect is positive on hours of work, but only for the quartile of companies most exposed to the treatment. The same applies to the panel estimates in Appendix 2 (Table 16). The positive effect on hours worked is thus robust to all considered estimation techniques.

Table 5. Effects of CICE tax credit on employment structure. Parametric estimates (2013 and 2014).

Estimates / Employment group		Blue Collar Workers	Employees	Intermediate professions	Executives	Eng. R&D	Tec. R&D	Long term contract	Fixed term contract	Full-time workers	Women	- 30 years old	+ 49 years old
Coefficients	Q2	3.322	1.172	-0.347	**-6.411**	3.019	-9.232	0.326	9.220	1.395	-1.378	-2.474	**4.201**
		(0.098)	(0.645)	(0.876)	**(0.014)**	(0.666)	(0.986)	(0.813)	(0.150)	(0.262)	(0.586)	(0.413)	**(0.026)**
	Q3	3.658	4.140	3.543	3.402	-10.710	-6.078	-1.336	5.434	-2.554	-2.121	0.130	-1.412
		(0.112)	(0.349)	(0.260)	(0.392)	(0.123)	(0.556)	(0.452)	(0.413)	(0.074)	(0.497)	(0.970)	(0.447)
	Q4	**7.198**	**7.937**	-3.056	**-24.843**	-11.021	-7.375	**5.466**	**15.936**	**4.318**	1.316	0.977	**9.142**
		(0.004)	**(0.029)**	(0.285)	**(0.000)**	(0.356)	(0.697)	**(0.000)**	**(0.003)**	**(0.001)**	(0.527)	(0.697)	**(0.000)**
Elasticities	Q2	2.09	0.74	-0.22	**-4.03**	1.90	-5.81	0.21	5.80	0.88	-0.87	-1.56	**2.64**
	Q3	1.58	1.78	1.53	1.47	-4.62	-2.62	-0.58	2.34	-1.10	-0.91	0.06	-0.61
	Q4	**2.45**	**2.70**	-1.04	**-8.45**	-3.75	-2.51	**1.86**	**5.42**	**1.47**	0.45	0.33	**3.11**
Tests	endogeneity (1)	rejected	not rejected	rejected	rejected	n/a	n/a	rejected	not rejected	rejected	rejected	rejected	rejected
	overidentification (2)	not rejected	not rejected	not rejected	not rejected	n/a	n/a	not rejected	not rejected	not rejected	not rejected	not rejected	not rejected
	weak instruments (3)	rejected	rejected	rejected	rejected	*rejected*	*rejected*	rejected	rejected	rejected	rejected	rejected	*rejected*

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2010 and 2011). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term). (3) H0: (instruments not correlated with the treatment).

As Table 5 focuses on employment structure, it is possible to determine what type of job benefited or not from the CICE. It may be noted beforehand that in the companies benefiting most from the CICE, wage earners are mainly employees and blue-collar workers. The share of intermediate professions and managers is quite low. There is a positive impact of CICE on blue-collar and employees, on full-time employment, and also on senior workers – but only in companies in the fourth quartile, *i.e.* those who received the largest CICE rate. The employment of executives was negatively impacted, both in the second and the fourth quartiles.

The semi-parametric estimates in Appendix 1 (Table 11) produce slightly different outcomes. They lead to negative findings for employees in *Q2* and positive effects for intermediate professions and blue-collar workers in *Q4* (Table 11). They robustly point to negative employment effects for executives and positive ones for the employment of blue-collar workers in *Q4*.

The panel estimates in Appendix 2 (Table 17) confirm this negative finding for executives and positive one for blue-collar workers in *Q4*, in both 2013 and 2014. They also confirm the positive impact as regards to employees and workers in the companies that benefit most from the CICE. The effect on intermediate professions is less clear-cut: it is positive in 2014 for companies in *Q3* and negative for those in *Q4*. These panel estimates also show a positive effect on short- and long-term contracts, on full-time jobs, and on jobs for people under 30 (in 2013 only), as well as for those over 50, in companies in *Q4*.

Effects on wages

The results regarding wages appear to vary depending on data sources and indicators: firm average wages per capita and firm average hourly wages.

For 2013 and 2014, we find rather negative or insignificant effects on average wages, for both average wages per capita and average hourly wages, for the companies of *Q2*. But the effects are positive for the companies that benefit most, in two of the three available sources.

Table 6. Effects of CICE tax credit on average wages in the company. Parametric estimates (2013 and 2014).

Estimates / Wage indicator		Average annual wage per capita			Average hourly wage
		BRC	FARE	DADS	DADS
Coefficients	Q2	-0.775 (0.647)	-2.441 (0.163)	**-4.188** **(0.008)**	**-3.081** **(0.000)**
	Q3	-0.591 (0.809)	1.169 (0.514)	0.656 (0.810)	-1.313 (0.084)
	Q4	**2.504** **(0.016)**	**2.120** **(0.076)**	-1.445 (0.163)	-1.301 (0.063)
Elasticities	Q2	-0.49	-1.54	**-2.63**	**-1.94**
	Q3	-0.25	0.50	0.28	-0.57
	Q4	**0.85**	**0.72**	-0.49	-0.44
Tests	endogeneity (1)	rejected	rejected	rejected	rejected
	overidentification (2)	not rejected	not rejected	not rejected	not rejected
	weak instruments (3)	rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2009 and 2010). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term). (3) H0: (instruments not correlated with the treatment).

In the semi-parametric regressions of Appendix 1, the effects on annual average wages are always negative when significant (Table 12). This is the case for almost all indicators for the companies that benefit most from the CICE (*Q4*).

The panel estimates of Appendix 2 (Table 18) also lead to negative results on average salaries. This is the case in 2013 in the DADS for companies in *Q2*, for salary per capita, as well as for the hourly wage. This is also the case in 2014 in the FARE and the DADS for companies in *Q2* and in the BRC for those in *Q4*. Only one significant coefficient is positive, which is the effect on hourly wages for companies in *Q4* in 2013.

This negative impact of CICE on average wages could be related to the CICE effect with regards to the employment structure: an increase in employment of low wages earners (blue-collar workers or employees), and a decrease in employment of high wage earners (executives).

The effects on payroll, which combine the effects on employment and wages, are more clear-cut. The effect appears to be positive, but only for the last quartile (Table 7).

Table 7. Effects of CICE tax credit on payroll. Parametric estimates (2013 and 2014).

Estimates / Source		Payroll		
		BRC	FARE	DADS
Coefficients	Q2	0.886 (0.487)	-0.573 (0.711)	1.504 (0.257)
	Q3	2.200 (0.283)	0.497 (0.810)	2.361 (0.254)

	Q4	**5.798 (0.000)**	**4.160 (0.001)**	**6.682 (0.000)**
Elasticities	Q2	0.56	-0.36	0.95
	Q3	0.95	0.21	1.02
	Q4	**1.97**	**1.41**	**2.27**
Tests	endogeneity (1)	not rejected	not rejected	not rejected
	overidentification (2)	not rejected	rejected	not rejected
	weak instruments (3)	rejected	rejected	Rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2009 and 2010). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term). (3) H0: (instruments not correlated with the treatment).

There is also a positive effect on payroll with semi-parametric estimates for 2013 and 2014 (Table 13 in Appendix 1), but it is more pronounced in 2014 than in 2013, consistent with previous employment findings. The same kinds of results are found considering the panel estimates (Table 19 in Appendix 2). The positive effect on payroll is in the quartile of companies that benefit most, and is more pronounced in 2014 than in 2013.

This positive effect of CICE on payroll suggests that positive employment effects dominate the negative ones on average wages.

Effects on the economic activity of companies

Measurement of the effects of the CICE on the economic activity of companies is dependent on the manner in which companies actually recorded the tax credit in their accounts. There were a number of accounting possibilities at their disposal: as a deduction of personnel expenses, which increases the gross operating surplus without affecting added value; as a subsidy or operating revenue, which increases the gross operating surplus and added value by the same amount; or by deducting it from the corporate tax, which is neutral for both added value and the gross operating surplus. This variety in the manner of accounting for the CICE is an argument for multiplying the indicators tracing the evolution of profit margins and the profitability of companies. This is done in Table 8 where we not only observe the effect of the CICE on gross operating surplus but also on net income.

The effect appears to be negative on the gross sales of companies that benefit least (Table 8). It is positive on corporate earnings in the third quartile and on the gross operating surplus of companies in the fourth quartile. There is no noticeable effect on investment or productivity. No effect on dividends appears either.

Table 14 in Appendix 1 completes these results by considering semi-parametric estimates. Once again, there are intermittent indications of positive effects on company accounts, with a positive effect on the gross operating surplus of companies in *Q3*. There are also positive effects on corporate gross sales in *Q4*. The same applies to added value. These regressions lead to no impact of CICE on investment and dividends.

Table 20 in Appendix 2 displays results for panel estimates. We find positive effects on corporate earnings in *Q3* in 2013 but a negative effect on the gross operating surplus. There is also a positive effect in 2013 for companies in *Q4* as regards added value and profits. These estimates also indicate a negative effect on corporate gross sales in *Q2* in 2014.

Whatever the chosen estimation method, we find no impact in 2013 and 2014 of the CICE on investment, productivity, profit margin, and return rate.

Table 8. Effects of CICE tax credit on the economic activity. Parametric estimates (2013 and 2014).

Estimates / Economic activity indicator		Gross sales	AV	GOS[(1)]	Accounting result[(1)]	Profit margin[(1)]	Return rate[(1)]	Investment	Productivity[(1)]	Dividends[(1)]
Coefficients	Q2	**-3.546**	-0.725	31.071	109.346	0.02533	0.04580	-18.230	2.025	-31.843
		(0.044)	(0.717)	(0.594)	(0.130)	(0.553)	(0.307)	(0.324)	(0.538)	(0.493)
	Q3	-0.679	-1.011	-82.412	**402.765**	0.10723	0.00800	-3.016	-2.306	-13.037
		(0.780)	(0.682)	(0.100)	**(0.017)**	(0.213)	(0.865)	(0.892)	(0.410)	(0.801)
	Q4	-0.714	2.389	**174.087**	-176.731	0.0761	-0.03645	-14.928	1.822	-73.178
		(0.689)	(0.156)	**(0.029)**	(0.385)	(0.907)	(0.499)	(0.379)	(0.077)	(0.267)
Elasticities	Q2	**-2.23**	-0.46					-11.47		
	Q3	-0.29	-0.44					-1.30		
	Q4	-0.24	0.81					-5.08		
Tests	endogeneity [(2)]	rejected	not rejected	rejected	not rejected	not rejected	not rejected	not rejected	rejected	not rejected
	overidentification [(3)]	not rejected	not rejected	not rejected	not rejected	not rejected	not rejected	not rejected	not rejected	not rejected
	weak instruments [(4)]	rejected	rejected	rejected	rejected	rejected	rejected	rejected	rejected	Rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference parametric instrumental variable parametric estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates, except for (1) - absolute variations; for these variables, elasticities were not computed. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2009 and 2010). The p-values are given in brackets. The p-values are given in brackets. (2) H0: (exogeneity of the treatment). (3) H0: (instruments not correlated with the error term). (4) H0: (instruments not correlated with the treatment). Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). In bold: significant coefficients, valid instruments at a 5% level.

Conclusion

The *Crédit d'Impôt pour la Compétitivité et l'Emploi* (tax credit for competitiveness and employment) constitutes a major reform both in terms of struggling against unemployment and of providing financial support for companies. Starting from an initial amount of more than 10 billion euros in 2013, the first year of implementation, this financial support reached almost 20 billion euros each year between 2014 and 2016, before being raised to nearly 25 billion in 2017, *i.e.* more than two GDP percentage points.

The CICE is a massive and general form of assistance which is not very focused with regard to its use. Our empirical approach has been designed to enable us to reproduce this potential diversity in how the CICE is used by firms. First, we study a broad spectrum of potential uses since we are interested in a wide variety of outcome variables, including employment, wages, and many indicators of the economic activity of companies. Second, we evaluate the impact of CICE by differentiating from the onset several classes of firms, depending on how much they have benefited from the CICE, without assuming that practices were the same in all cases. We also distinguish the CICE effects over the years. Finally, to get the CICE impact on every outcome variable, we consider several data sources, indicators, and estimation techniques (parametric or semi parametric cross section, as well as parametric panel) in order to check the robustness of our effects.

Overall, we find fairly mixed results depending on the outcome variables considered. We have detected effects for many variables, but when we detect a significant result, it is most often specific to a given year, a particular company group, or a specific indicator. These contrasts are likely to reflect the variety of uses of the CICE by firms. There were clearly neither one nor two very dominant responses to the implementation of the CICE but instead a wide variety of reactions specific to each company.

However we also find some robust results, which are confirmed independently from the data, periods, and investigation methods.

The first of these results concerns employment and payroll. We find a positive effect on average employment, and the number of hours worked, limited to companies that benefited from the largest CICE rate, which are, three times out of four, companies in the tertiary sector with fewer than twenty employees. This positive but weak effect in terms of its magnitude is accompanied by a change in the structure of employment, with an increase in employee and blue-collar worker employment, and a decline in employment of executives.

The second finding concerns the rather negative impact of CICE on average wages. It appears to have been systematically negative in 2013, in particular for workers of companies that benefit least from the CICE. For 2014, findings appear also to be negative, expect for parametric cross section estimates, which are, two times out of three, positive. This may be due to the CICE effect on the employment structure, with an increase in employment of low wages earners (blue-collar workers or employees) and a decrease in employment of high wage earners (executives).

Third, we come up with a positive impact of CICE on payroll. This reflects the fact that positive employment effects dominate the negative ones on wages.

The fourth result is on firm financial performance. We find a positive effect on a number of indicators of profitability and accounting results, with differences according to company class, years, and indicators, which may illustrate the diversity of the CICE accounting methods in corporate accounts. On the other hand, there is no effect of CICE on investment, productivity, or dividends. It will be interesting to check whether these results hold for 2015.

These results suggest that company's practices have been different according to the intensity of benefit from the CICE. In firms that benefited only slightly (those in the second quartile), the effects were not very noticeable and the main economic behaviors were not strongly affected. In companies that benefited a little more (belonging to the third quartile), it is mainly company treasuries that benefited from CICE, with a favorable effect on outcomes. In companies that benefited most from the CICE (fourth quartile), we note effects on employment, both in level and in structure, on wages, and on added value and profits.

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Appendices

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Appendix 1. Impacts of CICE tax credit. Semi-parametric cross section estimates.

Table 9. Effects of CICE tax credit on employment. Semi-parametric estimates (2013 and 2014).

Estimates / Employment indicator		Average workforce			Workforce on 31/12		
		BRC	FARE	DADS	BRC	FARE	DADS
Coefficients	Q2	0.676 (0.874)	2.648 (0.585)	0.107 (0.982)	0.375 (0.945)	-1.783 (0.770)	-2.729 (0.708)
	Q3	4.237 (0.312)	3.704 (0.209)	3.110 (0.366)	3.663 (0.399)	3.008 (0.454)	4.13 (0.249)
	Q4	**5.198** **(0.000)**	**6.573** **(0.000)**	**6.464** **(0.000)**	**3.245** **(0.046)**	**5.211** **(0.005)**	**5.499** **(0.007)**
Elasticities	Q2	0.43	1.67	0.07	0.24	-1.12	-1.72
	Q3	1.83	1.60	1.34	1.58	1.30	1.78
	Q4	**1.77**	**2.24**	**2.20**	**1.10**	**1.77**	**1.87**

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Table 10A. Effects of CICE tax credit on hours workeds. Semi-parametric estimates.

Estimates / Years		2013	Δ2014	2013 and 2014
Coefficients	Q2	2.154	2.210	2.898
		(0.204)	(0.818)	(0.503)
	Q3	1.064	*6.266*	3.597
		(0.614)	*(0.090)*	(0.259)
	Q4	**4.039**	**4.453**	**6.863**
		(0.000)	**(0.001)**	**(0.000)**
Elasticities	Q2	1.64	3.16	1.82
	Q3	0.57	6.27	1.55
	Q4	**1.70**	**3.35**	**2.33**

Table 10B. Effects of CICE tax credit on hours per capita. Semi-parametric estimates.

Estimates / Years		2013	Δ2014	2013 and 2014
Coefficients	Q2	**3.232**	-7.307	-5.328
		(0.052)	(0.227)	(0.134)
	Q3	-0.278	0.836	0.062
		(0.779)	(0.697)	(0.965)
	Q4	0.009	1.143	0.481
		(0.989)	(0.128)	(0.478)
Elasticities	Q2	**2.47**	-10.44	-3.35
	Q3	-0.15	0.84	0.03
	Q4	0.00	0.86	0.16

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Table 11. Effects of CICE tax credit on employment structure. Semi-parametric estimates (2013 and 2014).

Estimates / Employment group		Blue Collar Workers	Employees	Intermediate professions	Executives	Eng. R&D	Tec. R&D	Long term contract	Fixed term contract	Full-time workers	Women	- 30 years of age	+ 49 years of age
Coefficients	Q2	0.693	**-43.889**	2.341	7.667	20.461	18.604	-4.275	-16.864	0.098	-21.726	-9.866	**-27.377**
		(0.900)	**(0.000)**	(0.816)	(0.618)	(0.741)	(0.476)	(0.413)	(0.586)	(0.983)	(0.150)	(0.433)	**(0.029)**
	Q3	-0.123	1.395	2.215	-0.945	26.303	22.464	-0.154	5.051	-8.557	-1.912	-21.523	-9.028
		(0.988)	(0.807)	(0.865)	(0.917)	(0.488)	(0.318)	(0.966)	(0.701)	(0.083)	(0.717)	(0.233)	(0.297)
	Q4	**6.561**	1.013	**12.474**	**-13.902**	37.497	-12.825	0.703	-3.927	2.264	-4.366	**9.304**	-12.432
		(0.054)	(0.824)	**(0.014)**	**(0.001)**	(0.278)	(0.731)	(0.715)	(0.587)	(0.223)	(0.084)	**(0.049)**	(0.058)
Elasticities	Q2	0.44	**-27.60**	1.47	4.82	12.87	11.70	-2.69	-10.61	0.06	-13.66	-6.21	**-17.22**
	Q3	-0.05	0.60	0.95	-0.41	11.34	9.68	-0.07	2.18	-3.69	-0.82	-9.28	-3.89
	Q4	**2.23**	0.34	**4.24**	**-4.73**	12.75	-4.36	0.24	-1.34	0.77	-1.49	**3.16**	*-4.23*

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Table 12. Effects of CICE tax credit on average wages. Semi-parametric estimates (2013 and 2014).

Estimates / Wage indicator		Average annual wage per capita			Average hourly wage
		BRC	FARE	DADS	DADS
Coefficients	Q2	**-15.691** **(0.017)**	-8.467 (0.154)	-18.050 (0.081)	**-10.269** **(0.020)**
	Q3	-17.073 (0.099)	-5.660 (0.075)	-38.597 (0.252)	**-15.839** **(0.000)**
	Q4	**-21.813** **(0.002)**	1.297 (0.277)	**-27.907** **(0.002)**	**-11.182** **(0.000)**
Elasticities	Q2	-9.87	-5.33	-11.35	**-6.46**
	Q3	-7.36	-2.44	-16.64	**-6.83**
	Q4	**-7.42**	0.44	**-9.49**	**-3.80**

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Table 13.

Table 13. Effects of CICE tax credit on payroll. Semi-parametric estimates (2013 and 2014).

Estimates / Source		Payroll		
		BRC	FARE	DADS
Coefficients	Q2	0.737 (0.896)	-2.785 (0.631)	4.850 (0.436)
	Q3	2.440 (0.433)	3.132 (0.410)	0.408 (0.877)
	Q4	**4.889** **(0.012)**	**7.563** **(0.000)**	-3.189 (0.591)
Elasticités	Q2	0.46	-1.75	3.05
	Q3	1.05	1.35	0.18
	Q4	**1.66**	**2.57**	-1.08

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Table 14. Effects of CICE tax credit on economic activity. Semi-parametric estimates (2013 and 2014).

Estimates / Economic activity indicator		Gross sales	AV	GOS[(1)]	Accounting result[(1)]	Profit margin[(1)]	Return rate[(1)]	Investment	Productivity[(1)]	Dividends[(1)]
Coefficients	Q2	-7.186 (0.436)	-3.399 (0.663)	-78.553 (0.535)	198.450 (0.141)	-0.055067 (0.833)	0.044564 (0.986)	-728.688 (0.166)	-0.528 (0.919)	**-261.534** **(0.035)**
	Q3	1.484 (0.662)	-1.765 (0.633)	**73.131** **(0.006)**	118.109 *(0.117)*	0.119045 (0.162)	0.048532 (0.750)	-421.109 (0.245)	-1.470 (0.274)	-30.039 (0.380)
	Q4	**3.827** **(0.000)**	**5.794** **(0.000)**	9.032 (0.092)	15.189 (0.123)	0.024047 (0.986)	0.217843 (0.705)	-280.428 (0.055)	0.449 (0.557)	**-4.530** **(0.030)**
Elasticities	Q2	-4.52	-2.14					-458.29		
	Q3	0.64	-0.76					-181.51		
	Q4	**1.30**	**1.97**					-95.38		

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference propensity score matching instrumental variable estimates. Treatment variable: apparent CICE rate. Dependent variables are growth rates, except for (1) - absolute variations; for these variables, elasticities were not computed. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011). The p-values are given in brackets. In bold: significant coefficients at a 5% level.

Appendix 2. Impacts of CICE tax credit. Parametric panel estimates.

Table 15. Effects of CICE tax credit on employment. Panel estimates.

Estimates / Employment indicator			Average workforce			Workforce on 31/12		
			BRC	FARE	DADS	BRC	FARE	DADS
Coefficients	2013	Q2	-0.554 (0.286)	-0.201 (0.736)	0.261 (0.682)	0.758 (0.432)	1.000 (0.431)	1.229 (0.231)
		Q3	-0.269 (0.668)	-1.077 (0.151)	-0.443 (0.503)	**1.363 (0.049)**	**3.342 (0.030)**	1.320 (0.063)
		Q4	**1.80 (0.000)**	**1.135 (0.013)**	**2.471 (0.000)**	-1.089 (0.073)	0.274 (0.747)	1.272 (0.067)
	2014	Q2	1.078 (0.548)	2.305 (0.175)	2.335 (0.117)	1.135 (0.213)	-2.720 (0.458)	-1.162 (0.732)
		Q3	-2.275 (0.284)	**-5.185 (0.024)**	-2.567 (0.198)	1.155 (0.417)	-0.830 (0.852)	4.378 (0.232)
		Q4	**6.566 (0.004)**	**8.376 (0.000)**	**7.437 (0.000)**	-1.141 (0.403)	0.001 (0.502)	-1.892 (0.645)
Elasticities	2013	Q2	-0.53	-0.19	0.25	0.73	0.97	1.19
		Q3	-0.17	-0.66	-0.27	0.84	2.06	0.81
		Q4	**0.86**	**0.55**	**1.19**	-0.52	0.13	0.61
	2014	Q2	1.64	3.50	3.55	1.72	-4.13	-1.77
		Q3	-2.22	-5.05	-2.50	1.13	-0.81	4.27
		Q4	**4.85**	**6.19**	**5.50**	-0.84	0.25	-1.40
Tests	endogeneity[(1)]		rejected	rejected	rejected	rejected	rejected	rejected
	overidentification [(2)]		rejected	rejected	rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term).

Table 16. Effects of CICE tax credit on hours worked. Panel estimates.

Estimates / Wage indicator			Hours of work	Average hours of work per capita
Coefficients	2013	Q2	0.294 (0.638)	-0.314 (0.360)
		Q3	-0.920 (0.164)	0.044 (0.903)
		Q4	**1.450 (0.000)**	-0.315 (0.186)
	2014	Q2	1.984 (0.431)	-1.515 (0.405)
		Q3	-0.269 (0.918)	3.132 (0.091)
		Q4	**6.126 (0.045)**	-2.332 (0.288)
Elasticities	2013	Q2	0.28	-0.30
		Q3	-0.57	0.03
		Q4	**0.72**	-0.15
	2014	Q2	3.01	-2.30
		Q3	-0.26	3.05
		Q4	**4.53**	-1.72
Tests	endogeneity(1)		rejected	rejected
	overidentification (2)		rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term).

Table 17. Effects of CICE tax credit on employment structure. Panel estimates.

Estimates / Employment group			Employment indicators provided by DADS											
			Blue Collar Workers	Employees	Intermediate professions	Executives	Eng. R&D	Tec. R&D	Long term contract	Fixed term contract	Full-time workers	Women	- 30 years of age	+ 49 yea of age
Coefficients	2013	Q2	0.721 (0.608)	1.591 (0.485)	-2.028 (0.113)	-1.631 (0.275)	-3.466 (0.454)	-9.555 (0.175)	0.723 (0.497)	**11.959 (0.023)**	1.022 (0.326)	-0.302 (0.843)	-0.359 (0.981)	1.303 (0.265)
		Q3	1.907 (0.244)	-1.013 (0.506)	-1.000 (0.595)	2.300 (0.205)	-6.756 (0.141)	-0.094 (0.984)	-1.800 (0.049)	**10.287 (0.037)**	**-3.683 (0.000)**	-1.403 (0.222)	0.004 (0.997)	-2.194 (0.063)
		Q4	**5.388 (0.000)**	**3.007 (0.012)**	0.362 (0.919)	**-12.460 (0.000)**	-1.903 (0.863)	1.136 (0.890)	**3.235 (0.000)**	**20.799 (0.000)**	**3.463 (0.000)**	1.203 (0.184)	**1.864 (0.050)**	**4.949 (0.000)**
	2014	Q2	**5.278 (0.007)**	1.198 (0.720)	-1.320 (0.563)	-0.769 (0.801)	12.495 (0.105)	1.353 (0.811)	0.977 (0.502)	4.233 (0.445)	1.538 (0.221)	0.608 (0.802)	0.261 (0.926)	2.789 (0.150)
		Q3	-4.675 (0.206)	2.705 (0.298)	**8.593 (0.036)**	8.778 (0.098)	-8.025 (0.615)	4.973 (0.674)	-2.831 (0.232)	-0.603 (0.901)	-1.322 (0.438)	-4.405 (0.086)	1.585 (0.486)	**-11.009 (0.007)**
		Q4	**13.330 (0.000)**	**5.872 (0.020)**	**-14.433 (0.014)**	**-33.512 (0.000)**	-28.937 (0.239)	-1.767 (0.937)	**6.273 (0.006)**	**13.997 (0.007)**	**4.910 (0.008)**	3.943 (0.115)	4.560 (0.092)	**11.766 (0.001)**
Elasticities	2013	Q2	0.69	1.53	-1.96	-1.57	-3.34	-9.21	0.7	**11.53**	0.99	-0.29	-0.03	1.26
		Q3	1.18	-0.63	-0.62	1.42	-4.17	-0.06	-1.11	**6.35**	**-2.27**	-0.87	0.00	-1.35
		Q4	**2.59**	**1.44**	0.17	**-5.99**	-0.91	0.55	**1.55**	**9.99**	**1.66**	0.58	**0.90**	**2.38**
	2014	Q2	**8.02**	1.82	-2.01	-1.17	18.98	2.06	1.48	6.43	2.34	0.92	0.40	4.24
		Q3	-4.56	2.64	**8.38**	8.56	-7.82	4.85	-2.76	-0.59	-1.29	-4.92	1.54	**-10.73**
		Q4	**9.85**	**4.34**	**-10.67**	**-24.78**	-21.39	-1.31	**4.64**	**10.35**	**3.63**	2.91	3.37	**8.70**
Tests	endogeneity[(1)]		rejected	rejected	rejected	rejected	rejected	Rejected	rejected	n. rejected	rejected	rejected	rejected	rejected
	overidentification [(2)]		rejected	rejected	rejected	rejected	rejected	Rejected	rejected	rejected	rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term).

Table 18. Effects of CICE tax credit on average wage**.** Panel estimates.

Estimates / Wage indicator			Average annual wage per capita			Average hourly wage
			BRC	FARE	DADS	DADS
Coefficients	2013	Q2	-3.386 (0.197)	-2.499 (0.051)	**-1.766** **(0.000)**	**-0.805** **(0.029)**
		Q3	-4.808 (0.232)	-1.862 (0.155)	-0.691 (0.188)	0.199 (0.562)
		Q4	-2.727 (0.374)	0.367 (0.886)	-0.313 (0.462)	**1.015** **(0.000)**
	2014	Q2	-7.952 (0.063)	**-7.740** **(0.007)**	**-5.100** **(0.014)**	**-3.238** **(0.000)**
		Q3	-4.752 (0.469)	-1.826 (0.618)	0.343 (0.885)	-1.144 (0.328)
		Q4	**-7.723** **(0.048)**	-3.150 (0.557)	-3.955 (0.207)	**-2.313** **(0.013)**
Elasticities	2013	Q2	-3,27	-2,41	**-1,70**	**-0,78**
		Q3	-2,97	-1,15	-0,43	0,12
		Q4	-1,31	0,18	-0,15	**0,49**
	2014	Q2	-12,08	**-11,76**	**-7,75**	**-4,92**
		Q3	-4,63	-1,78	0,33	-1,12
		Q4	**-5,71**	-2,33	-2,92	**-1,71**
Tests	endogeneity[(1)]		rejected	rejected	rejected	rejected
	overdentification [(2)]		rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term).

Table 20.

Table 19. Effects of CICE tax credit on payroll. Panel estimates.

Estimate / Source			Payroll		
			BRC	FARE	DADS
Coefficients	2013	Q2	0.131 (0.814)	-0.179 (0.774)	0.279 (0.659)
		Q3	0.161 (0.803)	-0.476 (0.484)	0.106 (0.871)
		Q4	**3.432** **(0.000)**	**2.830** **(0.000)**	**4.010** **(0.000)**
	2014	Q2	0.324 (0.890)	-1.954 (0.454)	0.377 (0.871)
		Q3	-1.734 (0.488)	-4.307 (0.105)	-1.880 (0.458)
		Q4	**7.455** **(0.008)**	**6.632** **(0.021)**	**7.261** **(0.011)**
Elasticities	2013	Q2	0,13	-0,17	0,27
		Q3	0,10	-0,29	-0,07
		Q4	**1,65**	**1,36**	**1,93**
	2014	Q2	0,49	-2,97	0,57
		Q3	-1,69	-4,20	-1,83
		Q4	**5,51**	**4,90**	**5,37**
Tests	endogeneity[(1)]		rejected	rejected	rejected
	overidentification [(2)]		rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (1) H0: (exogeneity of the treatment). (2) H0: (instruments not correlated with the error term).

Table 20. Effects of CICE tax credit on economic activity. Panel estimates.

Estimates / Activity indicators			Gross sales	AV	GOS[(1)]	Accounting result[(1)]	Profit margin[(1)]	Return rate[(1)]	Investment
Coefficients	2013	Q2	-1.217 (0.220)	-0.482 (0.626)	-6.726 (0.844)	1.156 (0.363)	81.877 (0.306)	7.598 (0.301)	3.625 (0.680)
		Q3	-1.024 (0.272)	-1.5480 (0.065)	**-95.752 (0.007)**	-0.799 (0.607)	**219.820 (0.045)**	-4.084 (0.252)	6.032 (0.435)
		Q4	0.309 (0.640)	**2.318 (0.000)**	**66.872 (0.019)**	2.266 (0.545)	-84.035 (0.250)	3.157 (0.340)	-11.423 (0.068)
	2014	Q2	**-6.017 (0.048)**	-1.516 (0.574)	-8.608 (0.915)	1.516 (0.451)	-260.110 (0.322)	5.430 (0.245)	14.182 (0.373)
		Q3	0.004 (0.999)	-1.33 (0.619)	23.732 (0.805)	6.338 (0.449)	-125.811 (0.551)	-4.121 (0.405)	25.427 (0.252)
		Q4	-2.324 (0.478)	3.325 (0.248)	62.705 (0.502)	-1.479 (0.899)	-196.459 (0.342)	7.419 (0.179)	-28.057 (0.189)
Elasticities	2013	Q2	-1.17	-0.46					3.50
		Q3	-0.63	-0.96					3.72
		Q4	0.15	**1.11**					-5.49
	2014	Q2	**-9.14**	-2.30					21.54
		Q3	0.00	-1.30					24.79
		Q4	-1.72	2.46					-20.74
Tests	endogeneity[(2)]		rejected	rejected	rejected	rejected	n. rejected	rejected	rejected
	overidentification [(3)]		rejected	rejected	rejected	rejected	rejected	rejected	rejected

Sources: BRC (Acoss), DADS-FARE (Insee), and MVC (Dgfip).
Field: Balanced panel of 133,890 companies with 5 or more workers during the 2009-2014 period.
Notes: Difference-in-difference instrumental variable parametric panel estimates. Treatment variable: apparent CICE rate. Dependent variables are outcome growth rates, except for (1) - absolute variations; for these variables, elasticities were not computed. Instruments: treatment quartiles simulated by using the previous eligible payrolls (2011 and 2012). The p-values are given in brackets. In bold: significant coefficients, valid instruments at a 5% level. The p-values are given in brackets. (2) H0: (exogeneity of the treatment). (3) H0: (instruments not correlated with the error term).

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