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To what extent do exemptions from social security contributions affect firm growth? New evidence using quantile estimations on panel data [1]

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Abstract

Targeted reductions in employers' social security contributions are conceived as a key policy instrument used to facilitate job creation when labour cost is so high that it may deter companies from hiring new employees. Among the different measures implemented in France, the set of instruments implemented in the West Indian *départements* (or administrative regions) is the most accomplished form as the rates of exemption as well as the base and scope of these measures have reached their maximum there. This paper seeks to determine to what extent these instruments contribute to job creation looking at the growth rate in the number of employees through the use of a balanced panel of business entities with at least one employee, drawn from a matching between several administrative data sources from 2004 to 2011. We studied the differentiated effects of the payroll tax using a quantile regression for panel data estimation technique. We show that the impact of the exemption rate and of the intensity of use of the various measures on changes in the number of employees differ according to the establishment growth rate. They tend to be negative on the left side of the distribution and positive on the right side. However, these effects may significantly differ according to the size class and the industry in which the business operates. Large ones tend to be advantaged compared to the ones whose total number of employees is fewer than eleven, whereas the estimated correlation between growth and exemption rate is higher for most of the entities in the manufacturing industry but only for a small part of those in business services.

Keywords: firm growth, job creation, reduced social security contributions, labour cost, quantile estimations on panel data

JEL Classification Codes: C14, J3, J38, L25.

1 Introduction

> "Reduce direct taxes (social security contributions and income taxes) on those with low earnings where this would shift the structure of labour demand towards low-wage workers, while protecting their incomes."
> (OECD, *Assessing the OECD jobs strategy: past developments and reforms*, 2005).

To tackle a structurally high level of unemployment, France implemented a large set of devices aiming at reducing the labor costs of low skilled workers, through reduced social security contributions (RSSCs) targeting low wages. This kind of public policy was initially introduced in in 1993 as a very targeted instrument, specifically devoted to employees whose wages were below 1.2 times the minimum wage (SMIC) and only related to the family social security contributions. As the unemployment rate has continued to rise, the scope of the measure has been progressively extended. Major changes were introduced in 1995, in 1998, and followed the path determined by the so called "Aubry" Laws which inaugurated the transition towards the 35 weekly working hours regime from 1998 to 2000. The last 2003-2005 reform was implemented when Francois Fillon was France's Minister of Labour, in order to simplify the complex situation inherited from the Aubry laws, and to unify the targeted exemptions from social security contributions for all companies. All these changes concerned simultaneously the nature of the social security contribution which can be paid either by the employees or by the employers and the maximum threshold of eligibility. A special regime consisting in the duplication of the main measure strenghtened the set of changes thanks to a rise in the exemption rate, and an enlargement of the wages concerned complemented the pack. As a consequence, the cost of these policies for the public budget increased dramatically. The global cost of RSSCs increased continuously since its inception. It rose to €29.9 billion in 2012.

The initial measure and the subsequent extensions are based upon the idea that the labor cost of low qualified and thus low-productive workers is too high and deters firms from hiring this class of workers. Thus, is necessary to decrease the labor cost in order to increase their employability. The theoretical determinants of the relationship are recalled by Nickell and Bell (1997) in an analysis of the literature of the new theories of unemployment. These approaches propose a comprehensive set of assumptions concerning the behaviour of optimizing workers and com-

panies. They identify wage equations and deduce from it a normative theory for unemployment alternative to the Philips curve.

The core of the analysis is a general equilibrium model with imperfect competition and information on the labour and commodities markets. The unemployment described is of a classical type, i.e. caused by downward real wage rigidity which prevents the unemployed (outsiders) from getting jobs currently refused by workers (insiders). However, the requirements of the workers decrease when the level of unemployment increases, thus a decreasing relation between real wages and unemployment exists. On the contrary, the assumption of decreasing marginal productivity of labour leads to a negative relation between the demand of labour by companies and real wages. According to this theory, the imperfections on the labour market and the increase in social security contributions count among the leading causes of unemployment. As pointed out by Calmfors (1994) in a review of the literature on active employment policies, the effect of the measures intended to improve labour market functioning and which are focused on unemployed people simply rests on a Layard-Nickel diagram (1986), which describes the equilibrium process on the labour market.

According to this analysis, the labour market functions as an ordinary market on which the adjustment depends on price variations. To cancel an excess of supply (on behalf of the workers), the solution consists in letting the price, i.e. the wages, adjust downwards so that the demand by the companies increases. Some variants can be proposed according to the share of the labor costs concerned. Indeed, in most economies social laws protect the workers from dramatic drops in their purchasing power. It is thus necessary to avoid the brutal jolts of income. The solution consists then in exploiting the deferred part of the wages which corresponds to the social protection provided (health insurance, pensions, family allowances, etc.) acquired over the years. A part is funded by the companies themselves. By reducing this share which has no immediate effect on purchasing power, the public authorities facilitate the decrease in labour costs and, consequently, the hiring of additional workers (Hagens and Hambor, 1980).

To control the cost of such policies, low qualified jobs have been the main target of the policy makers. The expected effect is twofold. The fall of the relative cost resulting from the reduced social security contributions induces a substitution effect between low skilled and qualified workers (Malinvaud, 1998) and/or equipment (Mihoubi, 1997). Moreover, even without this substitution effect, the decrease in production costs improves the competitiveness of the companies benefiting from the measure which face then a higher demand leading to an increase

in their demand for labor (Turquet, 2002). A large number of applied studies have already investigated the incidence of payroll taxes on a national scale. These studies deal with public policy evaluation and are based on comparisons between supported companies and a reference group using different techniques to choose the samples and to estimate the models (Remy (2005) and Ourliac and Nouveau (2012) propose comprehensive surveys on the literature). A first generation of studies, initiated by Brittain (1971), extended by Beach and Balfour (1983) and updated by Kugler and Kugler (2009), pays attention to time series and focuses on international comparisons. A second generation of works launched by Hamermesh (1979) are based upon microdata able to reflect the broad range of payroll taxes applicable to individuals participating in the labour market. They analyze incidence effects of payroll tax roll back on labour supply (Holmlund (1983); Anderson and Meyer (2000); Lang (2003)) and have found mixed results which are still debated. The huge number of reduced social security contributions and the their cost motivated an abundant literature on their efficiency in France too. The research is organized following the same typology. After a first set of papers resting upon macro models and data (Lafargue, 2000), Sneessens (1993) initiated a long series of studies based upon micro-data. The main innovation arrived with Crépon and Desplatz (2001) who introduced a new way to handle the problem using the propensity score method[1].

Our purpose is slightly different. The question raised is not to assess the total number of jobs created by the implementation of reduced social security contributions (RSSCs) but to appreciate to what extent employers react to a decrease in the cost of labour per employee by hiring more workers. What are the dynamics of this process? Does it differ according to the type of industry? Is it influenced by any seasonality effect?

We integrate perspective from labour and industrial economics and entrepreneurship to articulate the varying characteristics of establishment, the economic context and the reduction of social security contribution for employers. We tackle these questions at the finest level, that of the establishment i.e., the most basic level of a firm where business is conducted. Our purpose is to appreciate the sensitivity of their growth rate to the exemption rate and the number of measures effectively in use considering some basic characteristics such as size, age and activity as well as qualification and labor practices. We study the relationship between firm creation

[1]The method of propensity score (Rosenbaum and Rubin 1983), or propensity score matching, is the most developed and popular strategy for causal analysis in observational studies. Introduced by it Rosenbaum and Rubin (1983), it involves calculating the conditional probability (propensity) of being in the treated group (of the exposure) given a set of covariates, weighting (or sampling) the data based on these propensity scores, and then analyzing the outcome using the weighted data.

and RSSCs thanks to a quantile regression for panel data technique applied on a sample of private taxable establishments located in French overseas regions operating from 2004 to 2011. We use a unique database made available by the French National Institute of Statistics and Economic Studies (*Institut National de la Statistique et des Etudes Economiques* - INSEE) and the Central Agency for Social Security Bodies (*Agence Centrale des Organismes de Sécurité Sociale* - ACOSS) consisting of quarterly data related to employment, wages, exemptions and social security contributions.

The first level conclusions confirm the results usually provided by the literature. We find that the growth rate of employment in the establishments is determined by the decrease in labor cost [a recent example of such a relation is given by Navaretti et al. (2012)]. The data and econometric technique used permit, however, to go beyond this general tendency and to highlight the mechanisms underlying this relationship. The use of infra-annual data enables us to enrich the analysis of the effects of such measures. Firstly, it makes it possible to cope with the seasonality of economic cycle and its influence on job creation or destruction. We have indeed been able to pinpoint the differential effect of RSSCs according to the quarter. Corresponding to a peak in tourism and, thus, to a high level of economic activity, the first quarter is naturally favourable to establishment growth, a factor which softens the impact of partial exemptions of social security contributions paid by employers. Secondly, the use of quantile regression techniques for panel data allows us to conclude that the effects of RSSCs are not equal along the distribution; instead, they differ according to establishment growth. They tend to stabilize the employment on the left side of the distribution but do not contribute to a strengthening of growth for the fast growing establishments. In the middle of the distribution, which broadly corresponds to null growth rates, the effect of exemption from social security contributions tends to be positive. The decrease in labour cost induced by this policy contributes, thus, to the stabilization of employment in these establishments.

Our study sheds some light on several important areas of employment policies and job creation literature. Fisrt, we contribute to the debate over whether reduced social security contributions boost employment (Marx, 2001). As already mentioned by Euzeby (1995), "Employers' contributions are ... at the heart of numerous discussions, controversies and proposed reforms relating to the financing of social security" (p. 227). Almost twenty years later, the question is still debated and gives rise to publication (Bunel and L'Horty, 2012). Second, we provide some insight into the question of why establishments may differ in their propensity for creating jobs

not only because of the sensitivity of the demand for labour (Hamermesh, 1993) but because other individual characteristics are taken into account thanks to the adoption of a multivariate model of firm growth usually used in industrial economics (Coad, 2009). We estimate the magnitude of jobs created considering the level of the social security contributions rebates and the characteristics of establishments which benefit from the measure. We show that the rate of exemption is far from being either the sole, or the main determinant of job creation. Instead, size, industry, qualifications and market dynamics dominate in determining establishment decisions. Third, we refine the results about the relationship between individual growth and labor cost using the quantile regression for longitudinal data method that makes it possible to consider the fixed effects of the policy at the establishment level. An additional precision results from the use of quarterly data which helps to determine how the policy measure and the period interact to produce the final result.

The remainder of the paper is structured in the following way. Section 2 reviews the empirical litterature and provides a brief background on the influence of social security contribution rebates on job creation. In section 3 the utilized database is described whereas section 4 is devoted to the model specification and econometric strategy. The results of our study are presented and discussed in section 5. Finally, in section 6, an outlook for further research is given.

2 The policy

In overseas regions, as in mainland France, exemptions from social security contributions began in the mid-nineties. In order to compensate for the high increase in the minimum wage in overseas areas in the second half of the 1990's, the coverage by the government of health insurance payment and family income support was implemented. This specific regime was set up by the "law tending to support employment, social integration and economic activity in the overseas departments" of July 25th, 1994, known as Perben law, and, initially was roughly similar to the mainland one. Progressivelly, due to the recognition of permanent handicaps for ultraperipheral regions (Easterly and Kraay, 2000), in order to facilitate job creation in the existing companies and to circumvent the reluctance to recruit new employees, the French government enhanced the system by setting up appropriate measures in overseas departments. In 2001, the law of orientation for overseas regions (Loom) increased the exemption rates and enlarged the exemption basis. This marked the beginning of a series of reforms in the exemption schemes: in

2003 by the "law of program for oversea territories" (Lopom also called the Girardin law) and in 2009 by the "law for the economic development of overseas" (Lodeom). They all consisted in strenghtening the exemption scheme, mobilising three leverage actions (exemption rate, base and implementation of specific regimes devoted to targeted industries or areas).

The overall level of expenditure has been high. A peak was reached in 2007 when the total cost of exemption was thought to have exceeded €1.28 billion[2]. It motivated a reform aiming at decreasing the burden for the public budget. The most recent scheme provided by the *Lodeom* makes a distinction between three categories of RSSCs indifferently applicable in the four main overseas departments (Guadeloupe, French Guyana, Martinique, Reunion) and two smaller islands (St Martin and St Barthelemy) and some that are specific to two specific territories or industries. It consists in :

- a decreasing scheme for companies employing less than 11 workers. For these firms, the exemption of the employer's contribution reaches 100% of the sums payable when the hourly remuneration is below 1.4 times the minimum wage. Between 1.4 times and 2.2 the minimum wage, the exemption is limited to the share of the wage below 1.4 the minimum wage. From this threshold, the amount of the exemption linearly decreases according to a scale fixed by decree[3] until cancellation for employees whose remuneration equals 3.8 times the minimum wage.

- an other decreasing scheme for companies employing 11 workers and more providing that they belong to a long list of targetted industries. In that case, the exemption of social security contribution equals 100% for any remuneration strictly below 1.4 times the minimum wage. From this maximum the rate of exemption decreases linearly down to zero for employees whose remuneration equals 3.8 times the minimum wage.

- the enhanced exemption arrangement for companies located in specific areas or operating in specific industries in the four main departments and Saint Martin. In those companies, the exemption rate is 100% for remunerations up to 2.5 times the minimum wage and decreasing up to the maximum upper limit of 4.5 times the minimum wage.

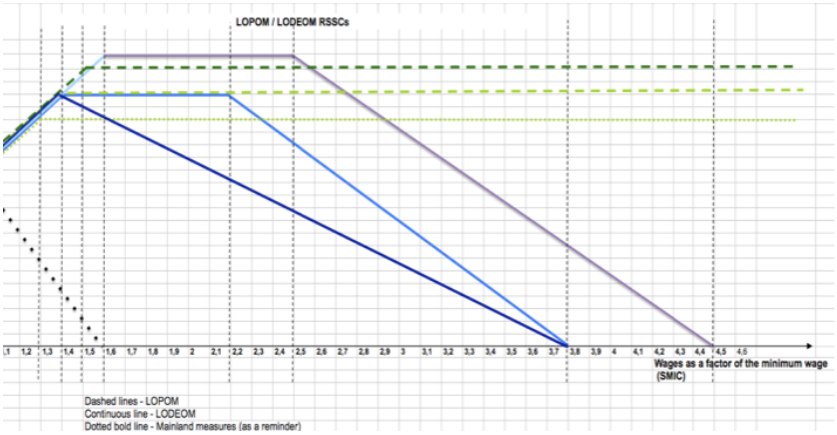
Figure 2 presents the different schemes successively in use.

Despite the numerous changes brought by the different governments, the basic principle remains the same. It consists in granting exemptions from employers' social security payments

[2]Source: ACOSS 2011

[3]The same decree applies to the two other schemes.

Figure 1: Reduced Social Security Contribution Scheme in French overseas regions



to reduce the total cost per employee. As in the national scheme (Bunel and L'Horty, 2012), they mainly concern low-skilled labour which is the area most affected by unemployment, resulting partially from the competition of low wages in the surrounding small island economies. This cost is also generally considered by employers as excessive in relation to the productivity of such workers. Nowadays, companies benefit from a mix of exemptions inherited from the Lopom enacted in 2003 and, for a majority of them, created by the Lodeom which took effect in 2010. Formally, the change that took place in 2010 consisted in eliminating peak points created by the prior enlargment of the measure. The control of public expenses required by an audit mission (Bolliet et al., 2006)[4] and the scepticism of scholars (Bauduin et al., 2011) as well as the attention paid to the deficit of the public budget makes another reform possible.

Despite the burden on the public budget, the priorities and principle have recently been reasserted. They are presented in the so-called 138 Programme devoted to "Employment in overseas areas" aiming at facilitating job creation and at enhancing labour market access for job seekers. The Ministerial Mission recalls that "This program falls under an economic reality of overseas areas marked by unemployment rates definitely higher than in the mainland, with a particularly significant number of long-term and young unemployed workers and by a significantly high number of those receiving minimum social benefits. This socially worrying situation requires the sustained effort of the State in order to reduce the existing gap with the mainland. This objective is formalised through the reduction in the labor costs by the exemption of the

[4]These policies induce a shortage of resources for the health insurance branch of the Social Security. The State makes thus a payment to the Social Security funds in order to fill the shortfall in the budgets. The result has been weak but real: the public expense that reached its maximum level (€1.2 billion) in 2007 equals €1.19 billion in 2011 (Figure 2). It however represents 50% of the total amount devoted to the Mission "overseas".

Figure 2: Cost of Reduced Social Security Charges broken down according to the main beneficiary industries

employers' social contributions which promotes job creation by the companies of the commercial sector in these departments" (Ministerial Mission; Annual performance projects, annex to the draft Budget Act, 2012).

3 Model specification

The theoretical framework linking growth to firms dates back to what has been characterized in the economics literature as Gibrat's Law. The basic principle underlyig this theory is that growth occurs randomly since "the probability of a given proportionate change in size during a specified period is the same for all firms in a given industry - regardless of their size at the beginning of the period" (Mansfield (1962), p. 1031). As the Caves (1998) and Sutton (1997) comprehensive review articles in the Journal of Economic Literature confirm, a plethora of studies on the subject have been accumulated. They test the validity of the assumption underlying Gibrat's Law that firm growth is a stochastic process, randomly distributed across firms, and that it is independent of firm-specific characteristics such as firm size and firm age. In fact, this literature consists almost exclusively of attempts to link firm-specific characteristics, principally size and age, to firm growth (Santarelli et al., 2006).

Our basic econometric model directly derives from the multivariate model of firm growth (see Coad (2009) for a survey). It begins with a standard definition of firm growth such as equation 1:

$$GROWTH_{i,t} = \ln(Empl_{i,t}) - \ln(Empl_{i,t-1}) \quad (1)$$

$GROWTH$ denotes the changes in the number of employees in establishment i at time t and $Empl$ is the number of employees declared by the establishment i in the end of each quarter. From the basic Gibrat model revisited (Coad, 2009), the best way to examine the origins of growth is to express it in a regression framework enriched with different factors determining growth. Our point of departure is thus a basic growth model as in equation 2:

$$GROWTH_{i,t} = \theta_0 + \theta_1 ln(Empl_{i,t-1}) + \theta_2 \ln(Age_{i,t}) + \varepsilon_{i,t} \quad (2)$$

where growth rate still defined by $GROWTH$, is a function of the number of employees ($Empl$) and age (Age). Age is assessed at the end of every quarter and measured as a number of months. Thus, θ_1 represents the effect of the size on the subsequent growth rate and θ_2 measures the effect of age on growth. The term $\varepsilon_{i,t}$ is a stochastic error term.

At this stage, all the variables are specific to the establishment. As in this paper we intend to estimate the effects of exemptions from social security contributions for employers, we extend this classical framework by considering the rate of exemption and the intensity of the use of such measures by the establishment. Equation 2 can thus be extended by such characteristics. The complete model takes then the following form:

$$\begin{aligned} GROWTH_{i,t} &= \theta_0 + \theta_1 ln(Empl_{i,t-1}) + \theta_2 \ln(Age_{i,t}) + \\ &\quad + \theta_4 RSSC_{i,t} + \theta_5 Intens_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

where $RSSC_t$ measures the rate of exemption at time t and $Intens_t$ the number of measures effectively applied to the establishment as a proxy for the intensity in the use of exemption of social security payments by employers. The policy is designed in such a way that the model cannot encompass in the same equation wages per capita and RSCCs, as these two factors are strongly linked. If the traditional assumption according to which growth is randomly distributed holds, coefficients will not be significantly different from zero, but if the policy factors play a role, what is the hypothesis posed in this paper, then the coefficients will not equal zero.

4 Data and econometric strategy

4.1 Dataset

The study deals with the establishments having at least one employee located in six French overseas regions[5] operating between January 2004 and the end of December 2011. To process this information and various other indicators that characterise the establishments, we have used detailed administrative data files known as CLAP (Connaissance Locale de l'Appareil productif) from the National Institute of Statistics and Economic Studies (INSEE) complemented with the computerised directory of businesses and establishments (SIRENE) to determine the age of every business entity[6]. Information about the nature of RSSCs in every firm has been calculated from data provided by the Central Agency of Social Security Organisations (ACOSS)[7]. ACOSS databases allow to determine the rate of exemption for any establishments that benefited from RSSCs. The data on each establishment comprise the wage bill, workforce numbers, RSSCs, the number of employees the reductions applied to, and payroll taxes due by business entities affiliated to the general social security system.

After matching these databases, we obtained an original dataset showing the number of employees, the type and the total of any RSSCs the establishment received, and the payroll attributable to the eligible employees. The matched database contains 4,967 establishments. They employed 81,219 employees during the last quarter of 2011 (table 1).

The sample finally used in the econometric analysis is a balanced panel of private businesses operating from 2004 to 2011. This includes establishment present both in ACOSS and INSEE datasets presented above, whose main activity is systematically recorded, but excludes temporary agency workers, sole proprietorships, in-home employers and home workers. Public establishments have also been excluded from the sample because they mainly employ civil servants who are not concerned by the RSSCs. Finally, in accordance with Hall and Mairesse's criterium (Hall and Mairesse, 1995), we streamlined the balanced dataset in three steps: (1) we cleaned out establishments with incoherent information for our main variables, (2) we eliminated

[5]Guadeloupe, Guyana, Martinique, Reunion, Saint-Barthelemy and Saint-Martin

[6]We are grateful to the Statistical Confidentiality Committee (Comité du Secret Statistique), the French body supervising access to data, for providing the data bases under strict confidentiality agreements

[7]The same agreement has been required

Table 1: Structure of the sample

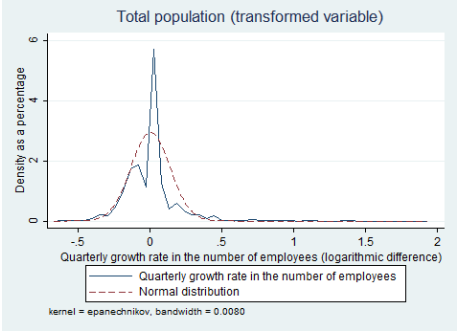
	2004Q1-2011Q4		2004Q4		2011Q4		Variation
Description (NAF Rev.2, 2008)	Number of establish-ments	Percent.	Number of establish-ments	Percent.	Number of establish-ments	Percent.	Percent.
Agriculture, forestry and fishing (from 01.1 to 03.22)	175	3.5	3,158	4.1	3271	4.0	3.6
Extractive industries (from 07.29 and 08.12)	18	0.4	479	0.6	428	0.5	-10.6
Manufacture of food products and beverages (from 10.1 to 12.0)	183	3.7	4,1766	5.5	4,148	5.1	-0.7
Manufacturing industry (from 13.3 to 33.2)	386	7.8	5,835	7.7	5,747	7.1	-1.5
Electricity, gas and water supply (from 35.1 to 38.3)	82	1.7	3,969	5.2	4,250	5.2	7.1
Construction (from 41.1. to 43.9)	293	5.9	6,049	7.9	6,935	8.5	14.6
Wholesale and retail trade and repair of motor vehicles and motorcycles (from 45.1.to 47.9)	1,545	31.1	17,981	23.6	17,707	21.8	-1.5
Transportation and storage (from 49.1 to 53.2)	198	4.0	4,152	5.4	5,191	6.4	25.0
Accomodation and food service activities (from 55.1 to 56.3)	262	5.3	4,754	6.2	5,019	6.2	5.6
Information and communication (from 58.1 to 63.9)	80	1.6	1,725	2.3	1,902	2.3	10.3
Real estate, financial services and insurance (from 64.1.to 68.3)	240	4.8	3,604	4.7	3,787	4.7	5.1
Professional, scientific, technical and support service activities (from 69.1 to 82.9)	623	12.5	7,012	9.2	7,658	9.4	9.2
Human health, residential care and social work activities (from 85.1 to 96.0)	882	17.8	13,346	17.5	15,176	18.7	13.7
TOTAL	4,967	100.0	76,240	100.0	81,219	100.0	6.5

firms with extreme outliers in the distributions and 3) we excluded establishments exhibiting huge increase (more than 200%) or decrease (less than -50%) of their employment growth rate. All these manipulations lead us to exclude 6,083 of the 11,050 establishments initially present in the sample. In the end, the 4,967 establishments correspond to 158,944 observations.

The estimation is run using the transformed form of the growth variable, i.e. the initial variable purged of fixed effects, as an explanatory variable. Figure 3 represents the quarterly growth rate of employees working in each establishment remaining in the final panel as a transformed variable. The familiar "tent-shaped" distribution widely acknowledged as a stylized fact by (Bottazzi and Secchi (2003), Bottazzi et al. (2006)) is confirmed for the total population and at the industry level (Bottazzi and Secchi, 2005).

For any establishment in the panel, we are provided with a set of variables known as playing a role in job creation according to firm growth theory. Instead of considering $ln(Empl)$ as a continuous variable, we introduce the establishment size as dummy variables. The main

Figure 3: Individual quarterly growth rate of employment (2004Q2-2011Q4) - Transformed variable



reason that led us to this choice lies in the correlation between the exemption rate and the lagged number of employees. The implemented exemption system is such that the smaller the establishment the more supported it is[8]. As a consequence, we use four size classes. The limits of the first of which are defined in accordance with the thresholds of the policy we introduce as an explanatory element. In addition to that, we complement the model with interaction variables (Harding and Lamarche, 2012) due to the strong seasonal nature of the economies under review. The exemption rate depends indeed on the level of activity which, in turn, is highly influenced by the infra-annual economic cycle (Figure 3). Interacting variables makes it then possible to take into account the seasonality of the economic activity and, thus, of employment.

The final model to be estimated is thus given by:

$$\begin{aligned} GROWTH_{i,t} &= \beta_0 + \beta_1 Size2_{i,t-1} + \beta_2 Size3_{i,t-1} + \beta_3 Size4_{i,t-1} + \\ &+ \beta_4 \ln(Age_{i,t}) + \beta_5 RSSC_{i,t} + \beta_6 Intens_{i,t} + \\ &+ \beta_7 RSSCXQ2_{i,t} \beta_8 RSSCXQ3_{i,t} \beta_9 RSSCXQ4_{i,t} + \\ &+ \beta_1 0 Q2 + \beta_1 1 Q3 + \beta_1 2 Q4 + \varepsilon_{i,t} \end{aligned} \tag{4}$$

$Q1$, $Size_1$ and $RSSCXQ1$ are used as references.

The main characteristics of the dataset are presented Table 2.

[8]The correlation matrix in Appendix permits to conclude that, even if it is quite admissible from a strict econometric point of view (about 48%), the correlation rate of smaller establishments is pushed up by the RSSCs higher and, in addition, higher enough than the other correlation rates to consider it as a problem.

Table 2: Descriptive statistics of the main explicative variables

	Observations	mean	sd	p50	min	max
Total growth	153,977	0.003	0.136	0.034	-0.657	1.923
Size1	153,977	0.681	0.466	1	0	1
Size2	153,977	0.134	0.340	0	0	1
Size3	153,977	0.129	0.335	0	0	1
Size4	153,977	0.056	0.230	0	0	1
lnage	158,944	4.903	0.666	4.963	0	6.611
RSSC	158,944	0.216	0.092	0.243	0	0.373
RSSCxQ1	158,944	0.055	0.105	0	0	0.372
RSSCxQ2	158,944	0.055	0.105	0	0	0.371
RSSCxQ3	158,944	0.055	0.106	0	0	0.373
RSSCxQ4	158,944	0.051	0.101	0	0	0.352

4.2 Estimation technique

Previous studies of the determinants of exemption of Social security contributions employ classical econometric techniques to assess the impact of a change in the policy and to compare supported firms to a reference of non-supported ones (Bunel and L'Horty, 2011). Our purpose is quite different as we are interested not only in estimating the effects of RSSCs on job creation but also how they vary across the distribution while accounting for the unobserved individual-specific heterogeneity. The econometric strategy compatible with these questions usually lies in applying a quantile regression (QR below) which makes it possible to examine the different quantiles of the conditional distribution (Koenker and Bassett, 1978) and then to identify what the differences are between the most and least performing establishments. However, the estimation of a panel data fixed effets model within a quantile regression is not straightforward. It is especially the case when T is short[9]. The main problem comes from the fact that pooled data do not take into account unobserved heterogeneity. As pointed out by Ponomareva (2010) "... the standard methods that difference out fixed effects are no longer applicable since the quantiles of the difference in general are not equal to the difference in quantiles but rather are some intractable object..." (Ponomareva (2010), p. 2).

In this paper we perform a method recently developed to introduce fixed effects in quantile method, following the work of Koenker (2004) . His estimator makes it possible to correct the endogeneity resulting from a possible correlation between fixed effects and one of the explanatory variable in the model[10]. Canay (2011) has improved this method by introducing an estimator able to clean up fixed effects. He proposes a simple transformation of the explained variable

[9]When the number of coefficients goes to infinity but the number of time periods is small, the incidental parameters problem harms the consistency of the estimators (Galvao, 2011)

[10]According to Canay (2011), Koenker (2004) method presents a serious drawback as it requires a large number of parameters to estimate. According to Matano and Naticcioni (2012) these two methods lead to roughly similar results.

that gets rid of the fixed effects under the assumption that these effects are location shifters[11]. This new method provides a new estimator consistent and asymptotically normal as both n and T go to infinity.

In our application we use the Canay (2011) method briefly described hereafter.

$$\begin{aligned} Y_{i,t} &= X'_{i,t}\theta_\mu + \alpha_i + u_{i,t} \\ \text{with} \quad & E(u_{i,t}/X_i, \alpha_i) = 0 \end{aligned} \tag{5}$$

$t = 1, \cdots, T$ and $i = 1, \cdots, n$ respectively represents the indexes of time periods and individuals. The vector $X_{i,t}$ includes explanatory variables. The constant α_i stands for the unobserved individual-specific heterogeneity. $u_{i,t}$ is an error term changing over time. Canay (2011) proposes then the following two-step procedure, noted **2-STEP**:

- Step 1 estimates the individual heterogeneity parameters such as $\widehat{\alpha_i} \equiv E_T\left[Y_{i,t} - X'_{i,t}\widehat{\theta_u}\right]$ with $E_T(.) = T^{-1}\sum_{t=1}^{T}(.)$ and $\widehat{\theta_u}$ the Within or fixed-effects estimator of θ_u
- Step 2 determines the transformed variable $\widehat{Y_{i,t}} \equiv Y_{i,t} - \widehat{\alpha_i}$ from the method made available by Koenker and Bassett (1978). It proceeds according to the following maximization program:

$$\hat{\theta}(\tau) \equiv \underset{\theta \in \Theta}{\arg\min} E_{nT}\left[\rho_\tau\left(\widehat{Y_{i,t}} - X'_{it}\theta\right)\right] \tag{6}$$

According to Canay (2011), this method provides a consistent and asymptotically normal estimator of $\theta(\tau)$ if and only if[12] :

1. $(Y^*_{it}, X_{i,t}, \alpha_i) \sim i.i.d.$ and $E(\alpha_i) = 0$ where:
   $Y^*_{i,t} \equiv \widehat{Y_{i,t}} - \widehat{r_i}$ with
   $\widehat{r_i} \equiv (\alpha_i - \widehat{\alpha_i})$

2. For all $\tau in \mathcal{T}$, $\theta \in \Theta$ where Θ a convex and compact space and τ a closed subinterval of $[0, 1]$

3. Y^* has bounded conditional on X density and $\Pi(\theta, \tau, r) \equiv E\left[g_\tau\left(W, \theta, r\right)\right]$ has a Jacobian matrix such as

[11] Location shift variables affect all quantiles in the same way. Koenker (2004) and Lamarche (2010) also foresee this asumption

[12] This presentation is directly inspired by Campos and Centeno (2012).

$J_1(\theta, \tau, r) = \frac{\partial \Pi(\theta,\tau,r)}{\partial \theta}$ is continuous and fully-ranked,

$J_2(\theta, \tau, r) = \frac{\partial \Pi(\theta,\tau,r)}{\partial r}$ is uniformly continuous

where

$W = (Y^*, X)$ and $g_\tau(W, \theta, r) = \rho_\tau(Y^* - X'\theta + r)X$ with $\rho_\tau(u) = \tau - I(u < 0)$

Canay (2011) proposes two possible methods to estimate the asymptotic variance of the coefficients : the covariance Kernel and the bootstraps. Bootstraps present serious advantages (D'Haultfoeuille and Givor, 2012) and Monte-Carlo simulations provided by Canay (2011) for $T = 10$ and $N = 100$ show better performance than previous estimators [Koenker (2004), Koenker and Bassett (1978) and Abrevaya and Dahl (2008)] and a bias which looks very decent (Campos and Centeno, 2012). Like some authors such as Bargain and Kwenda (2009) who compare wages gap in the informal sector, Matano and Naticchioni (2012) who aim at disentangling the role played by different theoretical explanations in accounting for the urban wage premium along the wage distribution, or Campos and Centeno (2012) also interested in the evolution of public wages and the public-private wage gaps, we also adopt the method proposed by Canay (2011) to estimate how the effects of employers' social security payment rebates on job creation differ across the growth distribution. As pointed out by Galvao (2011) "the quantile regression model has a significant advantage over models based on the conditional mean, since it will be less sensitive to the tail behavior of the underlying random variables representing the forecasting variable of interest, and consequently will be less sensitive to observed outliers." (p. 3)

5 Results and comments

This section presents the central empirical findings with respect to RSSCs. The first subsection reports the basic results for the total sample, while the second and third subsections consider the effects of the exemptions according to the industry and the size class to which the establishments belong.

5.1 Total sample

The results from the QR analysis on panel data are reported Table 3. The results are reported in a simplified and concentrated format but the detailed tables have been omitted.[13] The tables report estimates for the quantiles $\theta \in \{0.10, 0.25, 0.50, 0.75, 0.90\}$. Throughout this section,

[13]Complete tables are available upon request from the authors.

the dependent variables of interest are $RSSC$, $Intens$ and interaction variables. For the $Size$ variable, the omitted category corresponds to the smaller establishments employing at least 1 but fewer than 11 employees, so the estimates for the other three size classes variables ("at least 11 but fewer than 20 employees," "at least 20 but fewer than 50 employees," and "50 employees or more") should be interpreted as differences from $Size1$. The same principle applies for interaction variable, as $RSSCXQ1$ has been taken as a reference.

Looking at Table 3 it becomes clear that the reduced rates of social security contribution have a significant contribution in explaining the growth path of establishments. Their role is however different according to the growth rate of employment at the micro-level. Indeed, RSSCs play their major role in the lower tail of the conditional distribution of changes in the number of employees. The coefficient reaches its highest value in quantile .10. Furthermore, the intensity of the effect becomes smaller as the growth rate increases the value of θ being decreasing along the central part of the distribution, i.e. .25, .50 and .75 quantiles. The coefficient even becomes significantly negative for .90 quantile, which indicates that fast growing establishments do not wait for a decrease in labor cost to create jobs.These results are partially in agreement with the theoretical approaches reiterated in the review of litterature. We see that (a) reduced rates of social security contributions contribute to supporting employment, (b) this positive effect is especially strong in establishments facing sluggish growth, and (c) the difference in the efficiency of the policy is highly sensitive to the macroeconomic context.

The seasonality of the effect is, however, important as shown by figures 5, 6 and 7, which represent the coefficients for the interaction variables. For establishments whose growth rates are ranked within .10 quantile, the effect of reduced rates is significantly higher during the third quarter and, to a lesser extent, the fourth, compared to their effect during the first one. This is no longer true for establishments whose growth rate ranks from .25 to .75 quantile. The seasonality of the effect observed during the second and fourth quarters for all of them and during the third one, except for .25, is clearly negative. Exemption from employers' social security payments tend to be reduced in any quarter compared to Q1. This result is not exceptional considering the fact that the first touristic season which drives the local demand reaches its maximum level from January to March.

Looking at the number of measures the establishment make use of, one may see differentiated

Table 3: Estimate of the effects of RSSCs according to the intensity of use of the measure, establishments features and other interacting variables

VARIABLES	(1) (Growth) 10%	(2) (Growth) 25%	(3) (Growth) 50%	(4) (Growth) 75%	(5) (Growth) 90%
Size2	-0.0836***	-0.127***	-0.0879***	-0.0467***	-0.105***
	(0.00226)	(0.00113)	(0.000436)	(0.000907)	(0.00241)
Size3	-0.107***	-0.171***	-0.152***	-0.127***	-0.196***
	(0.00171)	(0.000679)	(0.000346)	(0.000650)	(0.00173)
Size4	-0.127***	-0.202***	-0.197***	-0.185***	-0.265***
	(0.00169)	(0.000782)	(0.000561)	(0.000943)	(0.00223)
lnAge	0.0115***	-0.00144***	-0.00890***	-0.0142***	-0.0404***
	(0.00114)	(0.000218)	(6.06e-05)	(0.000173)	(0.00134)
Intens	-0.00893***	-0.00209***	0.00157***	0.00583***	0.0125***
	(0.000653)	(0.000169)	(5.66e-05)	(0.000158)	(0.000677)
RSSC	0.0838***	0.0652***	0.0346***	0.0146***	-0.0341**
	(0.0170)	(0.00450)	(0.00146)	(0.00245)	(0.0143)
RSSCxQ2	0.0228	-0.0221***	-0.0103***	-0.0210***	-0.0303
	(0.0236)	(0.00587)	(0.00184)	(0.00406)	(0.0214)
RSSCxQ3	0.0683***	-0.00167	-0.00561***	-0.0212***	0.0216
	(0.0239)	(0.00543)	(0.00204)	(0.00430)	(0.0224)
RSSCxQ4	0.0412*	-0.0126**	-0.0108***	-0.0211***	0.0281
	(0.0235)	(0.00528)	(0.00179)	(0.00329)	(0.0195)
Q2	0.0165***	0.00895***	0.00314***	0.00643***	0.0148***
	(0.00411)	(0.00141)	(0.000522)	(0.00114)	(0.00431)
Q3	-0.00299	0.00250*	0.00194***	0.00701***	0.0130***
	(0.00442)	(0.00136)	(0.000572)	(0.00117)	(0.00438)
Q4	0.0117***	0.00705***	0.00380***	0.00683***	0.00951***
	(0.00422)	(0.00133)	(0.000507)	(0.000904)	(0.00335)
Constant	-0.152***	0.0208***	0.0770***	0.111***	0.346***
	(0.00627)	(0.00160)	(0.000504)	(0.00109)	(0.00767)
Observations	153,977	153,977	153,977	153,977	153,977
establishments	4,967	4,967	4,967	4,967	4,967
Pseudo R^2	0.0997	0.3037	0.2884	0.1449	0.1297

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standard errors estimated by Bootstrap (number of Bootstrap samples =100).
Growth represents the transformed variable ($Growth = lnEmpl_{i,t} - ln_{i,T-1}$ - $\hat{\alpha}_i$)

Figure 4: Individual RSSC rate (whole sample, 2004-2011)

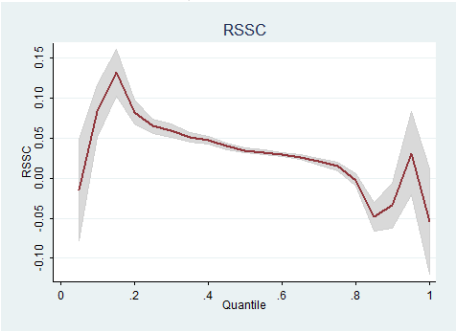
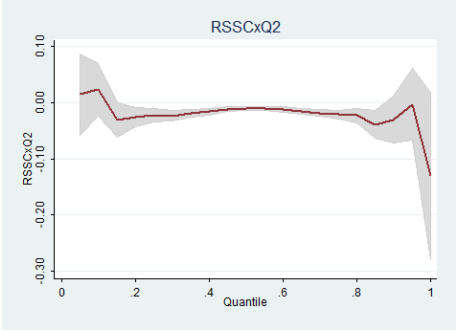


Figure 5: Individual RSSC rate, 2nd quarter of every year



effects according to the establishment size. On the left side of the distribution there is an opposite relationship between *Intens* and the change in the number of employees, whereas the relationship becomes positive from 0.5 quantile. The highest effect of the cumulation of different schemes concerns fast growing establishments.

The table also shows that the difference between *Size*2, *Size*3 and *Size*4 respects the usual

Figure 6: Individual RSSC rate, 3rd quarter of every year

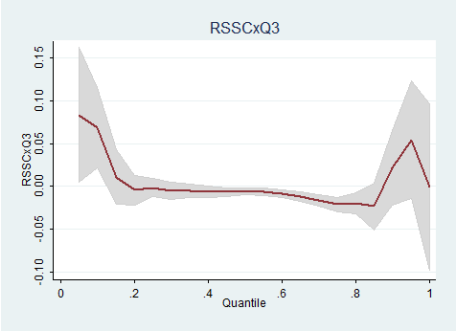
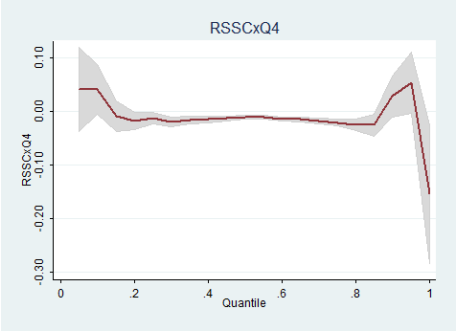


Figure 7: Individual RSSC rate, 4th quarter of every year



findings in firm growth analysis. Smaller entities tend to exhibit a higher growth rate than large ones, this hierarchy holding on any quantile. The only unusual sign concerns the variable *Age*. Indeed, it is broadly admitted that there is a reverse relationship between age and jobs creation. From quartile .25, this result is confirmed, the negative influence exerted by age being all the more important as the growth rate increases. It is however contradictory with the coefficient of the .10 quartile which exhibits a positive sign. A possible explanation may be found in the value of the explained variable for this quartile. It is clearly negative, which means that the older the establishment, the more likely it decreases. In addition, the smallest establishments can face difficulties in growing, just because they are too far from the minimum efficient scale.

These results confirm the conclusions of the previous studies (Bauduin et al., 2011). According to Fitoussi (2000), empirical evidence suggests that reductions in taxes on labour do not solve employment problems. This is consistent with Gafsi et al. (2005), according to whom the mechanisms that have been implemented in France on have had a very weak impact on employment. When one takes into account macroeconomic effects, through activity, prices, wages and fiscal balance, the impact on employment can still be considered as very low in relation to the budgetary cost of these policies. The same mitigated appreciation concerning earlier measures is expressed by Bunel et al. (2009), who studied the effects of the reform enacted in January 2003 for the RSSCs system valid in mainland France. They consider that the global consequences of the changes on job creation have been very weak, and even negative. However, these authors are quite confident in these policies as they should, in the long run, promise an increase in the rate of employment. However, they rely on radically different methods. Bunel et al. (2009) and Gafsi et al. (2005) are macroeconomic papers whereas Fitoussi (2000) proposes a survey of the literature.

5.2 Sectoral analysis

Some analyses have been carried out for the four main sectors in order to check for some specific behaviors. Table 4 presents the coefficients estimated for the main variables of the model, $Intens$ and $RSSC$. In most of the cases, the results obtained for the total population hold. For any industry, the right side of the distribution exhibits a negative correlation between the exemption rate and extablisments' growth. It confirms the hypothesis according to which fast growing establishments do not wait for a decrease in labor cost to hire new employees. The same similarities appear on the right side of the distribution. The correlation between RSSCs and employment changes is significantly positive for entities operating in the business services industry, in manufacturing industry and to a lesser extent in the trade and repair of motor vehicles industry as only .10 quartile is concerned. The same stability of the results applies for the variable $Intens$ whose value of the different estimated coefficients increases along the distribution. For .10 and .25 quantiles, the estimated coefficients are negative but rise as the growth rate increases. They become increasingly positive from .50 to .90 quantiles, which confirms the general trend in which fast growing establishments tend to make a more intensive use of the different measures provided than the stable ones (.50 quantile).

Some exceptions, however, are worth highlighting. They mainly concern the variable $RSSC$. The manufacturing industry exhibits a very specific profile as the huge majority of the establishments operating in this sector benefit from the RSSC implemented. Indeed, the estimated coefficients are always positive and significant from .10 to .75 quartile even if they are decreasing as the growth rate increases and become non-significant on the extreme right of the distribution. The results obtained for the model estimated for establishments operating in the accommodation and food service activities are slightly different from the general one not only because the estimated β_5 are non-significant on the first quantile but mainly because their value is several times higher than for the whole population. This is especially true for .75 and .90 quantiles (Table 4). It is just the reverse for establishments in the trade and repair of motor vehicles industry whose growth is clearly not supported by RSSCs. Considering the value of the estimated coefficients of interacting variables, the sign of the coefficient associated with the variable becomes negative from .25 to .75 quartiles. The only positive estimated values appear on the extreme left part of the distribution, which allows to consider that in this sector, exemptions do not contribute to job creation. Finally, for the establishments operating in the business services industry a negligible difference can be mentioned in the middle of the distribution (.50 quantile) but is still

negligible.

Table 4: Estimate of the effects of RSSCs in the four main industries

VARIABLES	(1) 10% (Growth)	(2) 25% (Growth)	(3) 50% (Growth)	(4) 75% (Growth)	(5) 90% (Growth)
Trade and repair of motor vehicles industry					
Intens	-0.00918***	-0.00190***	0.00149***	0.00479***	0.0115***
	(0.00109)	(0.000337)	(9.91e-05)	(0.000252)	(0.000876)
RSSC	0.117***	0.0587***	0.0243***	0.00329	-0.0588
	(0.0318)	(0.0120)	(0.00243)	(0.00420)	(0.0367)
Observations	47,895	47,895	47,895	47,895	47,895
Establishments	1,545				
Manufacturing industry					
Intens	-0.00391***	-0.000832	0.00235***	0.00469***	0.00763***
	(0.00134)	(0.000530)	(0.000218)	(0.000410)	(0.00104)
RSSC	0.284***	0.180***	0.119***	0.103***	0.0732
	(0.0805)	(0.0280)	(0.00878)	(0.0158)	(0.0722)
Observations	17,639	17,639	17,639	17,639	17,639
Establishments	569				
Business services industry					
Intens	-0.0185***	-0.00279***	0.00141***	0.00686***	0.0186***
	(0.00249)	(0.000443)	(0.000194)	(0.000491)	(0.00195)
RSSC	0.211***	0.0346***	-0.0200***	-0.0512***	-0.198***
	(0.0670)	(0.00974)	(0.00318)	(0.0109)	(0.0437)
Observations	19,313	19,313	19,313	19,313	19,313
Establishments	623				
Accommodation and food service activities					
Intens	-0.00280	-0.00303***	0.00228***	0.00744***	0.0136***
	(0.00300)	(0.00108)	(0.000322)	(0.00104)	(0.00226)
RSSC	0.219	0.166***	0.128***	0.147***	0.256*
	(0.218)	(0.0580)	(0.0202)	(0.0389)	(0.144)
Observations	8,122	8,122	8,122	8,122	8,122
Establishments	262				

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standard errors estimated by Bootstrap (number of Bootstrap samples =100).
Growth represents the transformed variable ($Growth = (lnEmpl_{i,t} - lnEmpl_{i,T-1})$ - $\hat{\alpha}_i$)

5.3 Analysis by size

Breaking down by size the total population also enables observation of different behavior of establishments according to their size at the beginning of the period. Four classes respecting the thresholds of the general model have been identified in accordance with the number of employees from the beginning of the period. At a second stage, any size class has been broken down to take into account the effect of the lagged size on the growth rate. As previously, we did not keep this variable as a continuous one because of the high correlation observed between size and age

which blurs the estimations [14].The results concerning the two key variables $RSSC$ and $Intens$ are presented Table 5.

The effects of reduced rates of social security contributions clearly differ according to establishments size. The coefficients estimated for the smaller ones (establishments employing more than one but fewer than 11 employees) are close to the general model. This similarity is due to the fact that the studied population is mostly composed of very small business units (3,494 among 4,967). For the establishments employing fewer than 11 employees, the estimated coefficients associated to RSSCs are thus decreasing as the growth rate increases, the maximum effect being visible for the .10 quantile. On the contrary, the influence of the variable $Intens$ follows an upward trend along the distribution. It is negative on the left side, which confirms the problems small and declining establishments are facing when they try to combine different measures, pushing up the administrative and management costs of RSSCs. It is worth noticing that the lagged size still plays a role in determining employment growth since as establishments pass the thresholds of 11 employees, the value of $\widehat{\beta}$ becomes negative compared to the reference class, i.e. the entities whose lagged size is strictly below 11 employees.

The results are entirely different for larger establishments. All in all, $RSSC$s effectively contribute to their growth; the estimated coefficients are non-significant for the extreme right tail of the distribution only, whatever the size is. Establishments employing at least 11 and fewer than 20 employees on one hand, and establishments employing at least 20 but fewer than 50 employees on the other are not equally sensitive to RSSCs based on their growth rate. The estimated coefficients are non significant on the extreme left side of the distribution (.10 quantile). They become positive and significant from .25 quantile and reach their maximum value on the extreme right side of the distribution. Exemptions of social security contrubutions tend thus to strenghten net job creation in growing and fast-growing establishments. The comparison with the value of the estimated coefficients for the whole sample (Table 3) tends to bring evidence about the unequal sensitivity of establishment growth to RSSCs according to their size. The larger ones (50 employees and more) exhibit coefficients whose value is eight to ten times higher than the ones associated to the quantiles for the general sample. These big businesses are thus the most supported by the measures.

[14]The correlation matrices for the different class sizes are available on request from the authors

Table 5: Estimate of the effects of RSSCs in the four size classes

	(1) 10%	(2) 25%	(3) 50%	(4) 75%	(5) 90%
VARIABLES	(Growth)	(Growth)	(Growth)	(Growth)	(Growth)
$1 \leq Size < 11$					
Intens	-0.0259***	-0.00253***	0.00180***	0.00655***	0.0296***
	(0.00110)	(0.000242)	(5.95e-05)	(0.000225)	(0.00121)
RSSC	0.328***	0.0608***	0.00410***	-0.0290***	-0.266***
	(0.0390)	(0.00754)	(0.00136)	(0.00367)	(0.0331)
Observations	108,345	108,345	108,345	108,345	108,345
Establishments	3,495				
$11 \leq Size < 20$					
Intens	0.00139	-8.32e-05	0.00256***	0.00588***	0.00662***
	(0.00145)	(0.000729)	(0.000293)	(0.000720)	(0.00128)
RSSC	0.0196	0.0713***	0.0598***	0.105***	0.128***
	(0.0361)	(0.0170)	(0.00710)	(0.0277)	(0.0295)
Observations	18,197	18,197	18,197	18,197	18,197
Establishments	587				
$20 \leq Size < 50$					
Intens	-8.54e-05	8.09e-05	0.00110***	0.00279***	0.00270***
	(0.000848)	(0.000393)	(0.000290)	(0.000458)	(0.000948)
RSSC	0.0354	0.101***	0.122***	0.138***	0.168***
	(0.0256)	(0.0111)	(0.00801)	(0.0147)	(0.0271)
Observations	19,313	19,313	19,313	19,313	19,313
Establishments	623				
$50 \leq Size$					
Intens	-0.000439	-0.000361	-6.60e-06	0.000719	0.000469
	(0.000877)	(0.000372)	(0.000317)	(0.000464)	(0.00108)
RSSC	-0.0169	0.0540***	0.119***	0.162***	0.260***
	(0.0326)	(0.0186)	(0.0103)	(0.0142)	(0.0357)
Observations	8,122	8,122	8,122	8,122	8,122
Establishments	262				

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standard errors estimated by Bootstrap (number of Bootstrap samples =100).
Growth represents the transformed variable ($Growth = (lnEmpl_{i,t} - lnEmpl_{i,T-1})$ - $\hat{\alpha}_i$)

The capability to use several measures simultaneously does not play as positive an effect as in the first size class. For the larger companies *Intens* is no longer significant. The value of the coefficients associated is positive for the right side of the distribution only (from .50 to .90 quartiles) when establishment employ at least 11 but fewer than 20 employees or at least 20 but fewer than 50 employees. A possible explanation of this saturation effect lies in the legal framework itself. Large establishments are not allowed to access some measures.

6 Conclusion

The aim of the enhanced scheme of reduced rates of social security contributions for low wages in the French West Indies regions was implemented to facilitate job creation in local companies. Over the last years, the scheme has been enhanced considering that a decrease in the labor

cost was a key condition to hiring of new workers. The fullfilment of such an expectation should be seen in the growth rate of establishment. The more supported, i.e. the higher the exemption rate, the faster they grow. This paper concludes that reducing the rate of social security contributions paid by the employers has a real effect on establishment growth but that this dynamic is unevenly distributed and that this policy has had very different effects depending on the size and sector.

In this paper, we use a balanced panel of establishments from 2004Q1-2011Q4. Over this period, the average exemption rate tends to increase causing an ongoing reduction in the social security contributions paid by the employers and, consequently, a steady decrease in the cost of labour input. The sample was restricted to a balanced panel because it is almost impossible to distinguish between the *ex nihilo* 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 one or more employees. After presenting the data used, we specified the model to be estimated and motivated the econometric strategy we chose.

The novelty of the results achieved comes from the use of a quite innovative econometric technique, i.e. quantile regression for panel data with fixed effects (Canay, 2011). It combines the respective advantages of quantile regression models which allow to account for unobserved heterogeneity and heterogeneous covariate effects and the ones resulting from the availability of panel data which allow to include fixed effects to control for some unobserved covariates. This methods is appropriate for the estimation of the effects of payroll tax rebates on establishments growth and highlights the difference of sensitivity. Indeed, the impacts of the exemption rate and of the intensity of use of the different measures on changes in the number of employees depend not only on the size class and on the age of the establishments but also on their growth rate. For the whole sample, the effects of RSSCs tend to be negative on the left side of the distribution and positive on the right side, a result which confirms the idea that the policy implemented tends to promote jobs creation in sucessful businesses and to temper job destruction in declining ones. Moreover, these effects may significantly differ according to the size class and the industry in which the establishments operate. Large ones tend to be advantaged compared to the ones whose total number of employees is fewer than eleven whereas the estimated correlation between growth and exemption rate is higher for most of the establishment in the manufacturing industry but only for a small part of those in business services.

These calculations are based on a micro-econometric framework and do not take into account

macroeconomic interactions via, for example, labour market equilibrium and adjustment of prices and wages. Moreover, this paper should not be considered as an evaluation as it does not take into account several aspects announced as desired effects of lightening the burden of tax and social charges on firms. Based on a balanced panel, this paper excludes the hiring of the first worker, the creation of new companies able to create numerous jobs and the gains of competitiveness resulting from the decrease in payroll taxes. But it is likely that these effects are of low amplitude according to the weakness and the limited scope of the microeconomic impact of the measure. Another limit of the method comes from its inability to take volume effects or effects of inter-industry substitution into account. In addition, it does not specify the impact of the measure by level of qualification and wage. The availability of additional data related to skills and wages could be explored in future studies.

7 Appendices

7.1 Appendix 1 - Database

The dataset used in this paper comes from the merging of different administrative databases running from 2004 to 2011. The exemption rate, the intensity of use of the different measures and the growth rate of the number of employees have been calculated from Acoss files. They provide information about 69,949 establishments located in French overseas territories. The other information (age, location,...) comes from INSEE databases (Clap-REE). After having been cleansed of businesses with incomplete data, the final dataset concerns 18,154 entities located in the same overseas areas. Merging the two datasets caused the elimination of 51,795 establishments. Others have been eliminated for different reasons : owned by the state, age at the end of the fourth quarter 2010 less than 10 months, having omitted to declare the payroll at least once over the period, and with no employee at the end of the first quarter 2004. In order to control the mergers and acquisitions as well as the transfers of employees from one business unit to another within the same corporate group, 4,723 establishments whose growth rate exceeds 200% or is below - 50% have been eliminated following Hall and Mairesse (1995) criterion. Finally, to exhibit a consistent exemption rate and cleanse the dataset of possible errors (negative values or rate exceeding 1) we excluded all the establishments whose exemption rate was below (resp. above) the value of the 1st (resp. 99th) percentile. Having applied all these conditions to cleanse the data, our final sample contains 4,967 establishments operating every quarter over the period 2004-2009.

7.2 Appendix 2 - Correlation matrix

	(1) Growth*	Growth	lnEmpl_1	Size1	Size2	Size3	Size4	lnAge	Intens	RSSC	RSSCxQ1	RSSCxQ2	RSSCxQ3	RSSCxQ4
Growth(nT)	1.000													
Growth	0.871***	1.000												
lnEmpl_1	-0.059***	-0.451***	1.000											
Size1	0.053***	0.471***	-0.763***	1.000										
Size2	-0.042***	-0.140***	0.223***	-0.574***	1.000									
Size3	-0.025***	-0.319***	0.469***	-0.563***	-0.151***	1.000								
Size4	-0.008**	-0.282***	0.534***	-0.356***	-0.096***	-0.094***	1.000							
lnAge	-0.033***	-0.091***	0.035***	-0.056***	-0.008**	0.049***	0.055***	1.000						
Intens	-0.006*	-0.136***	0.360***	-0.297***	0.137***	0.154***	0.174***	0.111***	1.000					
RSSC	0.012***	0.245***	-0.480***	0.435***	-0.164***	-0.264***	-0.254***	-0.045***	-0.062***	1.000				
RSSCxQ1	-0.024***	0.026***	-0.092***	0.084***	-0.028***	-0.052***	-0.052***	-0.044***	-0.022***	0.230***	1.000			
RSSCxQ2	0.009***	0.059***	-0.109***	0.099***	-0.040***	-0.058***	-0.057***	-0.019***	-0.027***	0.229***	-0.271***	1.000		
RSSCxQ3	0.009***	0.059***	-0.104***	0.095***	-0.038***	-0.056***	-0.055***	0.003	-0.020***	0.235***	-0.273***	-0.272***	1.000	
RSSCxQ4	0.015***	0.070***	-0.117***	0.105***	-0.038***	-0.067***	-0.059***	0.022***	0.017***	0.183***	-0.266***	-0.265***	-0.267***	1.000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

* stands for not transformed variable which is simply ($lnEmpl_{i,t} - lnEmpl_{i,t-1}$)

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