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ARE FISCAL INCENTIVES TOWARDS CHARITABLE GIVING EFFICIENT? EVIDENCE FROM FRANCE

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SUMMARY

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ABSTRACT

This paper proposes new estimations of price and income elasticities of charitable contributions that avoid the usual empirical pitfalls (simultaneity and endogeneity of price and income variations) encountered in previous literature, by focusing on the French tax reduction system, where every taxpayer gets the same reduction rate whatever its income or the level of its gift may be. We use time variations of the reduction rate in order to identify the elasticity of charitable giving to tax incentives on data coming from a unique sample of the French Fiscal Administration with more than 500,000 taxpayers every year. Our estimation technique investigates distributional effects using the three-step censored quantile regression estimator proposed by Chernozhukov and Hong (2002) which deals with heavy censoring with minimal assumptions. Our results demonstrate that the elasticity of charitable giving with respect to tax subsidy is weaker than previously found, and is also strongly heterogenous, not only according to the level of income, but also according to the level of gift itself. This suggests that the French subsidy scheme is clearly much more generous than what would be optimal in terms of public finance or in terms of any other optimal taxation framework.

JEL: C24, D64, H31

Introduction

In many countries, charitable contributions benefit from a favorable tax treatment that may take the form of a deduction from taxable income or of a direct tax reduction. Assessing the efficiency of these tax treatments is critical: in France, as in the US, the social benefits of charitable contributions in several fields like education (universities), research, culture and fine arts, are extensively acknowledged. Compared to the US, France has been suffering from a very low level of private gifts: expressed in percentage of GDP, charitable contributions reported in tax files in France are ten times weaker than those reported by US taxpayers[2]. This striking weakness of charitable contributions in France explains the implementation of several reforms to increase fiscal incentives to give to charities. Table 1 gives a comparison of fiscal incentives towards philanthropy in several developed countries and shows that the actual French system now stands out as the most generous schedule. The reduction rate of 66% is not only the highest rate, but it is also higher than the marginal tax rate for the higher tax bracket in any other country. This implies that any other incentive system working as a deduction from taxable income (US, UK, etc.) is necessarily less generous than the French fiscal system. This generosity of the French system results from several reforms that took place during the last fifteen years and that have dramatically increased the reduction rate. These reforms provide us with an exogenous change in the subsidy rate of charitable contributions that can be exploited as a natural experiment to estimate the efficiency of charitable contributions. The efficiency of fiscal incentives toward charitable giving is indeed still debated and the empirical studies have so far produced mixed results. Given the strong effort made towards charitable contributions through fiscal incentives, it is of particular importance to evaluate the efficiency of these fiscal measures, from a public policy point of view. Are fiscal incentives the solution to foster in Europe the same benefits of private contributions that the US have experienced?

Table 1: Comparison of fiscal incentives towards charitable contributions in different countries (2006)

Deduction from taxable income	Tax reduction	No incentive
Australia	Canada (*29%*)	Austria
Belgium	**France (*66%*)**	Finland
Denmark	Italy (*19%*)	Sweden
Germany	New Zealand (*33%*)	
Greece	Portugal (*25%*)	
Ireland	Spain (*25%*)	
Japan		
Netherlands		
Norway		
Switzerland		
UK		
USA		

SOURCE :Roodman & Standley

In order to estimate the efficiency of fiscal incentives as a way of boosting private philanthropy,

[2]See Appendix. Appendix A also gives precise explanations of the construction of homogenous series of charitable giving in US and UK and details on the fiscal treatment of charitable contributions in the US and UK.

empirical papers have focused on the estimation of the price elasticity of charitable contributions. Early studies (like Feldstein & Taylor, (1976)) used cross section data to estimate both price and income elasticity of charitable giving. They found that the elasticity of giving with respect to the tax-defined price was greater than one in absolute value. However, studies on panel data (like those of Randolph (1995), Barett & al (1997), or Bakija (2000)) have called into questions these estimates, arguing that they failed to distinguish between the transitory changes in prices caused by fluctuations in income and the permanent changes in prices. When decomposing income and prices in transitory and permanent components, they found much lower estimates of the elasticity of giving to the permanent price of giving. These results suggest that taxpayers are highly responsive to transitory changes in the tax schedule, but much less to permanent changes, and that they tend to increase their gifts when they face higher transitory tax rates. The critical step in these estimates is the measurement of the permanent and transitory components of income. Auten, Sieg and Clotfelter(2003) have criticized the way previous studies had separated the permanent component of income from the transitory component. They argue that the typical method that consists in approximating the permanent income by an average of incomes in two or more years, might not yield reliable decomposition. Instead they propose a way to estimate the transitory and permanent parameters without decomposing income and price for every single individual, but by working on the variance-covariance matrix of income and prices[3]. Their estimates of the permanent price elasticity range between -0.79 and -1.26. These estimates are larger in absolute values than the previous estimates on panel data that range between -0.3 and -0.5. The estimates of the transitory price elasticity range between -0.40 and -0.61 and are, on the contrary, lower in absolute value than those found in previous studies (all above one in absolute value). In particular, Randolph (1995), working on the same dataset as Auten & al., but with a more flexible specification using an "Almost Ideal Demand system" framework[4], had found a permanent price elasticity of -0.5 and -1.5 as transitory price elasticity.

Some papers also recently focused on matching subsidies, as a special type of incentive to give. Karlan and List (2007) find in a natural field experiment, that matching subsidies have a large effect on donations, but that larger match ratio ($3:$1 or $2:$1) do not have a bigger impact than a smaller ratio of $1:$1. Although a tax deduction of rate t is equivalent, for taxpayers, to a matching subsidy of rate $m = t/(1-t)$, Eckel and Grossman (2003) show that, in a laboratory experiment, gifts are significantly higher with matching subsidies than with rebates. Falk (2007) also finds in a natural field experiment that sollicitations containing gifts (*i.e.* greeting cards) yields a large increase in the probability of giving.

Overall, the results for tax incentives are so far mixed. In this debate, much of the problem comes from the difficulty to disentangle transitory and permanent changes in prices in the US tax system, where the fiscal system towards charitable contribution is a tax deduction from taxable income. In such a system, the "price" of a gift varies with the marginal tax rate and transitory changes in income affect the price of charitable giving through changes in the marginal tax rate, causing a severe simultaneity problem for econometric analysis. Results show that the way of taking permanent and transitory changes into account affects crucially the estimated elasticities of

[3]The main idea is that a permanent shock on income will affect all the succeeding periods, and hence cause changes in the variance of the growth rate of income, but not in its autocovariance, whereas a transitory shock will affect both the covariance and the autocovariance of the growth rate.

[4] This specification adopted by Randolph, following the seminal work of Deaton & Muellbauer (1980), allows elasticity to vary across price and income.

gifts with respect to price and income. Estimates also suffer from a serious endogeneity problem: taxpayers could tend to give more in order to fall in a lower tax-bracket. Working on French data helps us to avoid this problem, because as long as households pay income taxes, they do not face transitory changes in the price of giving, but only permanent changes due to reforms in tax incentives.

In this paper, we use the 2003 reform of French fiscal incentives towards charitable contributions in a pseudo-natural experiment framework to estimate the price and income elasticities of gifts. The French tax system, working as a tax reduction and not a deduction from taxable income gives us the opportunity to keep clear of usual empirical drawbacks encountered in previous literature. Moreover, we use a unique sample of 500,000 French taxpayers every year, between 1998 and 2005 that allows us to consider the whole distribution of households and not only itemizers as the literature focusing on US data does. This unique data set and our estimation technique based on quantile regression estimators also enable us to look for the heterogeneity of responses among the distributions of income and gifts, a point on which little has been achieved in previous studies. Finally, we use the three-step censored quantile regression estimator proposed by Chernozhukov and Hong to treat the problem of censoring that has never been raised yet for the estimation of giving behaviors although it is of crucial importance. This estimator is very convenient for our purpose because it relies on minimal distributional assumptions and allows for possible heteroscedasticity while being easily computable.

Our result show that the overall effect of the 2003 reform has been modest, and that the elasticity of gifts with respect to the tax reduction rate is below one in absolute value. This suggests that the French subsidy scheme is clearly much more generous than what would be optimal in terms of public finance or in terms of any other optimal taxation framework. Nevertheless, our results also point out that the tax reduction elasticity is very heterogenous among taxpayers, according to the level of her income and gifts. Richer taxpayers tend to be more responsive, and the reform has been more effective among very little donators and the upper fraction of very large contributors.

The paper is organized as follows. In the next section, we present the theoretical framework that we adopt in order to investigate the efficiency of fiscal incentives towards charitable contributions. Then, in section 3, we describe the French tax treatment for charitable contributions, we present our data, and display some descriptive statistics concerning the impact of the reform. We explain our estimation strategy in section 4. Results are presented in section 5 and robustness checks in section 6.

1. Evaluating tax incentives

The theoretical justifications and the optimal design of subsidies to charitable contributions vary with the modeling of philanthropy in itself. Charities have first been modeled as public goods, with donors motivated by purely altruistic considerations. Indeed, charitable services may be considered as public goods even if their recipients are in fact given private goods (such as food, medical care, housing...), if other individuals value theses outcomes in general. In this case, the total amount of charities donated enters in individuals' utilities in the same way as public goods.

However, this model yields very unrealistic predictions[5]. If charities are simply assimilated to public goods, there is perfect crowding out between public spending and private charitable

[5]For a discussion of the various implications of this model see Andreoni.

contributions and there is no justification for a specific tax treatment of charitable contributions[6]. The model also predicts that individual donations asymptotes to zero in large populations. In fact, empirical evidence shows that crowding out is not complete and that individuals donate even if their gifts are very small compared with the size of charitable contributions, suggesting that they benefit from their own voluntary gifts.

In order to take into account this second motivation, models of warm-glow of giving include the size of the individual gift in the utility. In these models, a person benefits not only from the total amount of public goods G, but also from her own contribution g. With this warm-glow motive, the crowding out between charitable contributions and government spending is not perfect anymore. Saez and Diamond have investigated the optimal tax treatment of charitable contributions with warm-glow of giving motives[7]. In a non linear taxation model with additively separable preferences, Diamond shows that it might be optimal to finance public good production with a favorable tax treatment of private contributions, setting a higher tax subsidy for higher income individuals. This comes from two effects. Firstly, the incentive compatibility constraint is eased when more productive individuals are incited to donate more with a more favorable tax treatment of their charitable contributions, because these individuals would then suffer from a drop in public good provision if they decided to take a lower paid job. Secondly, some of the costs of the public good provision are now supported by the reduction in consumption of the higher paid individuals.

We follow here another setting, devised by Saez. This set-up is more appropriate to the French fiscal subsidy scheme, because it does not tie the price of charitable contributions to the level of earnings and in particular to the marginal tax rate. It is important to point out that this assumption of independence between earnings and the subsidy rate cannot hold in the model with additive utility function used by Diamond (where earnings are not independent of the price of contributions)[8]. Consider a model where individuals derive utility from three goods, private consumption c, earnings z and their own charitable contributions g (the warm-glow motive), plus the aggregate level of charitable contributions G. dividuals therefore maximize:

$$\max U(c, g, z, G)$$
$$s.t. c + g(1-t) \leq z(1-\tau) + R$$

where t is the subsidy rate (we usually consider that $t > 0$, but do not exclude cases where $t \leq 0$) and τ is the tax rate on earnings, that is used to finance a lump-sum transfer R all individuals and the subsidy on g. The number of individuals is large enough so that G is considered as fixed by individuals when maximizing their utility. The marshallian demand function for charitable contributions is then of the form:

$$g = g(1-\tau, 1-t, R, G)$$

and the indirect utility function is noted:

[6] In a setting where revenue is not sensitive to charitable taxation.

[7] Diamond presents models with and without warm glow, discusses whether the warm-glow motive should be counted in social welfare and concludes against it. The warm glow motive therefore enters the individuals'utility function but not the social welfare function.

[8] Moreover, another important difference between Saez and Diamond is that Saez allows for warm glow motives to be counted in the welfare function.

$$v = v(1-\tau, 1-t, R, G)$$

If we allow for different utility functions among individuals, and individuals are indexed by i ($i \varepsilon I$), then defining the density of individuals over I by f, and normalizing the total population to 1, we have that average contributions of private agents is equal to :

$$G^P = \int g^i f(i) di$$

It is then possible to introduce crowding-out effects: if we consider that the government can contribute directly to the public good by an amount G_0, then $G = G^P + G_0$, and G^P is therefore directly affected by G_0, since G is a component of the marshallian demand function of every individual $g^i(1-\tau, 1-t, R, G)$. To clarify this crowding-out concept, Saez introduces the average private contribution for given tax parameters and a given G_0, noted $\overline{G} = \overline{G}(1-\tau, 1-t, R, G_0)$. The crowding-out effect of increasing G_0 is therefore $\partial \overline{G} / \partial G_0$ which we denote $\overline{G}_{G_0}$ and which is usually considered as negative but superior to -1 (complete crowding out). The government program can then be expressed as the maximization of a social welfare function with respect to the tax rate τ the subsidy rate t, the lump sum transfer R, and the public contribution G_0:

$$\max W = \int \mu^i v^i (1-\tau, 1-t, R, \overline{G} + G_0) f(i) di$$

$$s.t. \tau \overline{Z} - t\overline{G} \geq R + G_0$$

where μ^i stands for the redistributive tastes of the government and $\overline{Z}$, exactly like $\overline{G}$, is the average earning for a given level of tax parameters and of public contributions. It is also very useful to introduce the parameter e representing the social marginal value of contributions in terms of public funds:

$$e = \int \beta^i \frac{v_G^i}{v_R^i} f(i) di$$

where β^i is the social marginal value of consumption by individual i in terms of public funds, and stands explicitly for the social weight of individual i in the government program[9]. This social marginal value is important since it is in fact this externality that justifies the existence of a subsidy.

In order to derive quantitative tax policy recommandations, Saez shows that in this set-up, it is useful to make three important assumptions:

(i) that there are no income effects on earnings at the individual level,

(ii) that the level of the contributions and that the subsidy rate on charitable contributions do not affect earnings ($\overline{Z}_{G_0} = 0$ and $\overline{Z}_{1-t} = 0$) and

(iii) that the compensated supply of contributions does not depend on the tax rate on earnings (in other words, that contributions are affected by a change in the tax rate on earnings only to the extent that it affects disposable earnings).

[9]Precisely, β^i is defined as $\beta^i = \mu^i v_R^i / \lambda$, where λ is the Lagrange multiplier in the government program.

The latter two assumptions are indeed implicitly made in the empirical literature on charitable contributions and Saez's model can be used to relate the empirical findings to a more general theoretical framework. Under these assumptions, Saez shows that the optimal subsidy rate is equal to the social external effect of contribution e minus a standard commodity tax component, since g is introduced as a consumption in individual utility functions. Moreover, when we allow for some crowding out by letting the government freely choose a public contribution G_0, we can explicite the link between the optimal subsidy rate (t) and ε_{1-t}, the elasticity of charitable contribution to its price $(1-t)$ [10]. Indeed, the optimal subsidy rate t is such that the following efficiency rule is verified :

$$\varepsilon_{1-t} = (1 + \overline{G}_{G_0})(1 - \beta(G)) \quad (1)$$

where $\beta(G) = \int g^i \beta^i f(i) di / \overline{G}$ is the social weight weighted by contributions levels.

However, Saez criticizes the focalization of the empirical literature on the estimation of the average price elasticity of charitable contribution, treated as a constant parameter, because it does not allow to derive an explicit expression of the optimal subsidy rate, even if it gives a rule to assess whether the current tax system provides too much or too little subsidy[11]. In his calibrations, Saez allows the elasticity to vary and chooses rather to fix the size of the price response of aggregate contributions as the exogenous immutable parameter[12]. In our estimation, we adopt another perspective. We choose to focus on the elasticity of charitable contributions to the *subsidy rate* ε_t rather than on *price* elasticity ε_{1-t}, because it allows us to see how the optimal subsidy rate should vary with the value of the elasticities. The two elasticities are related, since $\varepsilon_t = -[t/(1-t)]\varepsilon_{1-t}$, but by focusing on the former, we assume that as the subsidy increases, the same absolute increase has less and less effect, whereas the price elasticity implicitly gives more and more weight to absolute reductions in prices[13]. If we introduce ε_t instead of ε_{1-t} in equation ((1)), we have that the optimal subsidy rate is equal to:

$$t = 1 - \frac{(1+\overline{G}_{G_0})(1-\beta(G))}{(1+\overline{G}_{G_0})(1-\beta(G))+\varepsilon_t}$$

From the preceding equation, it appears that in the absence of crowding out between charitable contributions and government spending ($\overline{G}_{G_0} = 0$), and when the welfare of contributors is not

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[10] This elasticity is defined as $\varepsilon_{1-t} = -(1-t)\frac{\frac{\delta C}{\delta(1-t)}}{G}$ with G the total amount of charitable contributions and $(1-t)$ the price of charitable contributions after the deduction of the subsidy rate t.

[11] It is immediate from the preceding equation that in the absence of crowding out between charitable contributions and government spending ($\overline{G}_{G_0} = 0$), and when the welfare of contributors is not taken into account by the government, subsidies to charitable contributions should be increased when the elasticity is above unity in absolute value and reduced when it is below unity. This threshold of one for elasticity is extensively used in the empirical estimation to assess the efficiency of tax subsidies. But following equation (1), the theory predicts that the subsidy should be either negative and infinite if ($e_{1-t} < 1$)or equal to minus one (if $e_{1-t} > 1$).

[12] That is $-G_{1-t}/G$ (with G_{1-t} the derivative of private donations G with respect to the price of the subsidy $(1-t)$).

[13] Starting from a subsidy rate of 0.5, a first increase of the rate to 0.6 corresponds to an equal decrease in price and a increase in subvention of 20% but a second increase from 0.6 to 0.72 corresponds to 20% increase in subvention but a 30% decrease in price.

taken into account by the government($\beta(G) = 0$), subsidies to charitable contributions should be:

$$t = 1 - 1/(1 + \varepsilon_t) \quad (2)$$

If there is some crowding out however ($\overline{G}_{G_0} \leq 0$), t should be greater than this landmark level. The intuition is that, if there are some important crowding out effects, it is better to rely more on private contributions, so that the subsidy rate must be increased to higher levels, even if private contributions respond a little less to these higher subsidies.

It is interesting to mention that this optimality condition can be reconciled with a simple public finance objective under the assumptions that we made above, if we go just a step further and consider that financing the subsidy by the tax rate τ has only second-order effects on charitable behaviors and earnings (we neglect all income effects). In this partial equilibrium framework, where the government only wants to promote charitable contributions, increasing the subsidy rate would be efficient in a public finance point of view if the total increase in charitable contributions is greater than the loss in tax revenues, or in other words, if it yields a positive increase in money really given by taxpayers, net of the subsidy. At the optimum, this condition can be summarized as

$$\Delta[(1 - t^*)G] = 0 \quad (3)$$

Assuming that there is no crowding out, and that changes in the subsidy rate do not affect earnings,it is obvious by a very simple partial calculation that the public finance objective leads to the same efficiency rule 1 as in Saez framework, where crowding out and redistribution is excluded:

$$\Delta[(1 - t)G] \approx G\Delta(1 - t) + (1 - t)\Delta G$$
$$= G\Delta t\left(\varepsilon_t \frac{(1-t)}{t} - 1\right)$$

for small changes of t. Therefore the condition ((3)) stands that:

$$\varepsilon_t = \frac{t}{(1-t)} \quad (4)$$

which is equivalent to ((2)). Hence, if we want to assess the efficiency of the reform not according to a first-best criterium, but according to a simple public finance objective, excluding crowding out effects and redistribution, we are led to the same landmark in terms of policy recommandations, that is: "subsidy could be increased if $\varepsilon_t \geq \frac{t}{(1-t)}$ and should be decreased if $\varepsilon_t \leq \frac{t}{(1-t)}$". Moreover, if we consider that ε_t does not vary significantly according to variations of t, the optimal subsidy rate that maximizes Saez efficiency rule and a simple public finance objective is the same:

$$t^* = 1 - 1/(1 + \varepsilon_t)$$

2. The French Tax System and Charitable Contributions

One important feature of our study is to focus on the French tax system to estimate the price elasticity of charitable contributions, because it avoids usual empirical pitfalls encountered in previous literature. We present in this section the functioning of this tax system, which has two very important characteristics that we would like to emphasize : first, the fiscal incentive is a tax reduction (and not a deduction from taxable income), and second, the reduction rate has changed several times because of fiscal reforms. We give at the end of this section time series showing the impact of the 2003 reform.

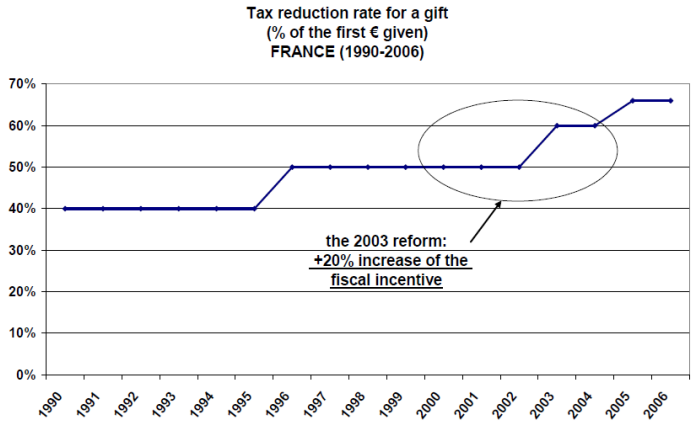
Description of the main aspects of the French tax incentives towards philanthropy

French tax system is today one of the most generous system ever seen in favor of charitable giving. This system is the heir of a very long effort made by private foundations towards the recognition of their social utility beside public action.

Deduction vs reduction

A tax incentive exists in France since 1954 but it has been strongly refined since then: in particular, the old deduction mechanism has been replaced in 1989 by a tax reduction. This modification is very important: in the deduction system, a taxpayer may deduct the amount of her gift from her taxable income. Therefore, for a $ 1 gift, she is granted a reduction τ cents equal to her marginal tax rate. Calling $(1-\tau)$ the price of a charitable contribution, and given that income tax schedule are usually progressive, taxpayer with higher incomes will benefit from higher reductions rates (or, to say it differently, from smaller prices). The tax reduction system is somewhat different, since the price of your gift is equal to $(1-t)$, t being the tax reduction rate, whatever the level of your taxable income may be. Therefore, the price and the income effect in giving behaviors can be easily separated and endogeneity problems disappear. Moreover, there is no "transitory" price as opposed to a "permanent" price. Note that the French tax incentive is truly a tax reduction and not a ``tax credit", which means that the deduction, which is equal to $(1-t)$ times the gift, cannot exceed the income tax that is due[14]. As a consequence, the tax incentive only concerns taxable households.

Chart 1: Evolution of fiscal incentives in France



[14]One must add that the gift can be deducted up to a ceiling of 20% of taxable income. Moreover, if the gift exceeds the ceiling, its reporting can be spread out over 5 years.

Several exogenous reforms of gift's price:

The French system has experienced a certain number of reforms that exogenously changed incentives towards charitable contributions. In fact, since the late 1980s, governments in France have tried to boost private philanthropy by various means. After simplifying the law applicable to private foundations of public interest, French governments have turned to fiscal incentives, implementing three main reforms :

- 1996: rate raised from 40 to 50%
- 2003: rate raised from 50 to 60%
- December 2005: rate raised from 60 to 66%

We exploit the variation in the price of charitable contributions induced by the 2003 reform in order to estimate price elasticities of charitable contributions.

Data

The data we use in our study come from an original and unique sample of the French Direction Generale des Impots with more than 500,000 taxpayers every year, oversampling rich taxpayers. This sample of tax files is called "Echantillon lourd" and is drawn every year by the Tax Administration in order to forecast the evolution of tax revenues. The available variables in the data set are detailed income level and composition, family size, age, matrimonial status, deductions asked, and furthermore, all pieces of information contained in taxpayers tax forms.

The interest of this data set is not only its large number of observations, and the quality of its information regarding income and giving, but lies in the fact that, because filing a tax form is compulsory in France, we get a picture of the whole distribution of households. Studies confronted to US or UK fiscal data are to the contrary compelled to focus solely on itemizing households. Concentrating estimation on such a subset of taxpayers has little reason to be insignificant for the results, since the selection process is by no mean orthogonal to the giving behavior. Besides, selected samples of itemizers are never representative of the whole distribution of households. In Auten & al. for instance, the weighted sample mean of income for 1980 is 68,744 $ and 85,803 $ in 1993 (current dollars), while Saez & Piketty (2007) show that the average income among all US taxpayers was 16,379 $ in 1980 and 29,357 $ in 1993 (current dollars)[15]. Hence the fact that estimated elasticities are usually made on a very definite and special fraction of taxpayers. Our dataset allows us to consider the whole distribution of taxpayers, which is critical for our purpose of evaluating the impact of a fiscal measure applicable to all taxpayers, but which is also interesting for it gives us the opportunity to look at variations of income and price elasticities among taxpayers, and in particular, over the income distribution.

Another very important feature of our dataset is that, although it has not a panel structure[16], it provides oversampling of rich taxpayers, and exhaustive sampling at the upper-end of the income distribution. Oversampling rich taxpayers is important for our study because the giving behavior is truly concentrated among the richest taxpayers.

[15]We used table A0 available at the following address http://elsa.berkeley.edu/saez/.

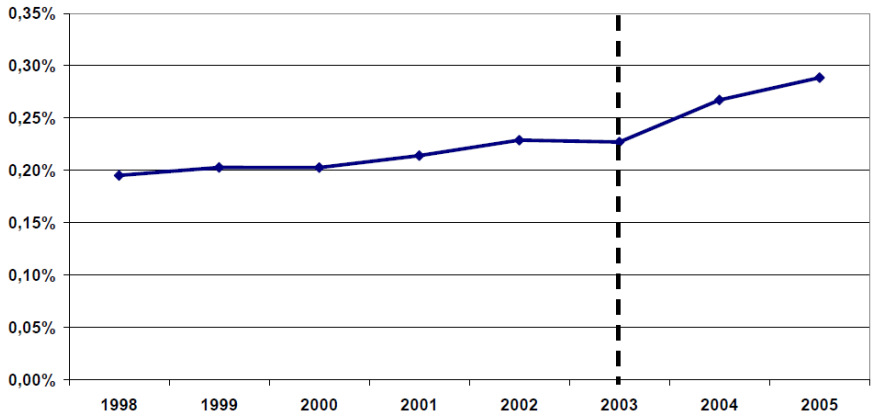
[16]The absence of a panel structure is truly of limited importance as compared to studies on US data, because we do not need here to decompose the evolution of price and income into transitory and permanent components.

The impact of the reform: first evidence

France, as we said previously, is characterized by a modest level of private charitable contributions. In 2005, total contributions amounted to 1.6 bn euros, and mean gift among french households was therefore around 36 euros.

Chart 2 shows the evolution of charitable contributions in France since 1998[17] as a percentage of total incomes. This chart reveals the impact of the 2003 reform. As we can see, charitable contributions have been fairly stable between 1998 and 2003, and have experienced a shift in 2004. Noticeably, nothing has been observed for year 2003. At this point, and to understand the timing of the 2003 reform, it is important to recall that the French Tax System is not functioning as a withholding tax: people fill a tax form on year n to declare the income they earned in year $n-1$. Tax parameters applicable to current income are then known only at the end of the year, in late December, when Fiscal Law is voted, after incomes have been earned, or after charitable contributions have been made. When a reform is passed in the end of year n with the Fiscal Law, it is then usual not to consider year n as a year of reform, since the parameters of the Fiscal Law could not have been anticipated by taxpayers. For the 2003 reform, things are less clear-cut: a law was voted in August in order to encourage private philanthropy and signified that Fiscal Law for year 2004 (voted in December 2003, applicable to income earned in 2003) would include increased tax reductions for charitable contributions. Therefore, taxpayers could have changed their charitable behaviors in the second half of 2003, in expectation of an increase of tax reductions, even though the new tax reduction rate was fully operational only from year 2004 on. But as we can see, chart 2 confirms the fact that the new tax reduction was fully operational only from 2004 on.

Chart 2: Evolution of charitable contributions as a percentage of total taxable income in France (1990-2005)



Source: Etats 1921, DGI, computed from tax files.
Note: All gifts declared through tax files are counted.

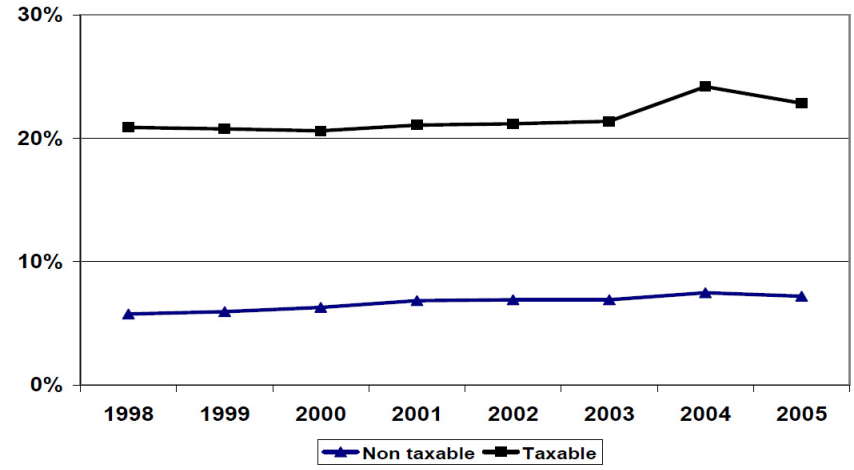
When we consider the evolution of the fraction of household giving to charities, we clearly see (Chart 3) that this fraction has increased after the reform for households that have been affected (taxable households) while nothing has changed for non taxable households who did not see any change in their incentives to give. Note that in France, filing a tax form is compulsory, even if

[17] Data come from aggregate tabulations of tax files.

you do not pay any income tax[18], so that every aspects of income and gifts are known with the same precision for taxable and non-taxable households[19].

The most striking point about the 2003 reform is the existence of important distributional effects, which are well visible in Chart 4 which shows the cumulative distribution function (CDF) of *ln(gift)* for several years, before and after the reform, and for taxable versus non-taxable households. First, we see that only taxable households, who experienced a modification of their incentives, have seen a substantial transformation of the CDF of *ln(gift)*, while the distribution of gifts for non-taxable households, for whom incentives have not changed, has not varied at all after 2003. The other noteworthy point is that the lower part of the distribution for taxable households has shifted markedly, while the upper-end has been little affected. This seems to suggest that the reform has boosted little gifts, but has not expanded larger gifts that much. These potential heterogeneous effects are of primary importance for our estimation strategy, as we explain in the following section.

Chart 3: Evolution of the fraction of households reporting a gift (France)



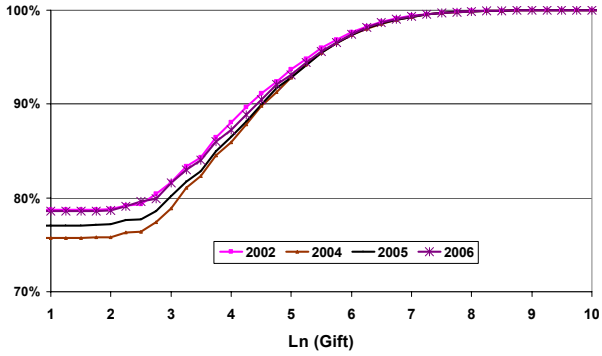
Source: Echantillons Lourds DGI.

[18]The reason being that the information you give in your tax form is used to calculate your rights for social allowances.

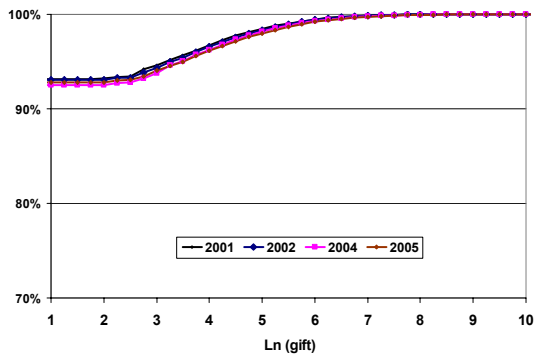
[19]Although it is possible that the incentives to report gifts are smaller for non taxable households than for taxable households, the proportion of non taxable donors that do not report their gifts to the administration can be expected not to change over time.

Chart 4: Evolution of the cumulative distribution function of the logarithm of gift (France 2000-2005)

A- Taxable households
Cumulative Distribution Function of logarithm of Gifts



B – Non-Taxable households
Cumulative Distribution Function of logarithm of Gifts non taxable households



Source: Echantillons Lourds DGI. Taxable households only.
Note: As we can see, there is a minimal amount of gift around 50 francs or 5 euros, so that the distribution of ln(gift) is in fact censored at around 2.

3. Estimation strategy

This section describes our estimation strategy. First, we emphasize that some aspects of charitable behaviors (heavy censoring and heterogeneity) have important implications for our estimation. In the first part of this section, we explain their meaning for our econometric specification, and the reason why they have never been raised in the empirical literature yet. Then we present our censored quantile regression estimation technique that addresses these features, and enables us to investigate for heterogenous treatment effects. We finally describe our strategy: we use the 2003 reform as an exogenous time variation of the reduction rate, which provides us with a "pseudo-natural experiment" setting to implement simple-difference estimates.

Modeling charitable giving:

First of all, the peculiarity of the giving behavior imposes that the econometric specification that we adopt holds some special characteristics. Since a high fraction of the population does not give any penny to charitable institutions, the giving behavior observed by the econometrician is characterized by its heavy censoring. Among taxable households, the fraction of taxpayers reporting a gift to charities is about 20% in France. Therefore dealing with the censoring process should yield considerable attention for empirical estimation. Still, in the previous literature which has mainly focused on US data, little has been done in this area. One reason is that empirical studies focus on sample of itemizing taxpayers, where the fraction of households reporting a gift to charities is obviously larger. Most studies even exclude from their sample people who did not report amounts of giving because they did not itemize deduction. This artificially solves the problem of censoring but with the limit of an endogenous selection of the sample. Randolph is the only author who truly raises the issue of endogenous selection, but in fact he only restricts the sample to those taxpayers who would have itemized personal deductions even without charitable deduction. There is unfortunately little evidence that this restriction is exogenous: itemizing personal charitable contribution and itemizing other deduction have many chances to be correlated with an unobservable variable affecting gifts such as, for instance, the level of education, the level of wealth, etc. However, Randolph does not further address the question of

people with zero gift in his estimation, letting aside the question of censoring. Moreover, on US data, the censoring problem is perhaps considered of secondary importance compared to endogeneity and simultaneity difficulties that have monopolized the debates on behavioral responses to taxation[20].

Another important aspect which we paid attention to for our econometric analysis is the homogeneity of the giving behavior. Is the giving behavior homogeneous, or should we envisage elasticity to vary across the distribution of income, of gift, etc.? In most studies, where the log-log specification is adopted, homogeneity is *de facto* assumed. But some studies have clearly shown that price elasticities and income elasticities could be quite different among rich and poor taxpayers, or between large givers and small contributors[21]. As we have seen in the previous section, the data also suggest that the impact of the price reform has been heterogenous. This is why we need to adopt a very loose specification, that allows for different behavioral responses.

Thus, we need an estimation technique that properly addresses these two characteristics of charitable behaviors, that is censoring and heterogeneity. We explain in the next subsection why using a censored quantile regression estimator appears to be sound.

The principle of censored quantile regressions:

When dealing with censored data as it is the case here since contributions are left-censored at 0, OLS estimates can immediately be excluded : the OLS estimator is inconsistent, and this inconsistency may be severe when censoring is heavy. That is why estimation strategies usually focus on the formulas of the censored conditional mean, as for instance in the Tobit model. But to compute proper expressions of the censored conditional mean and censored conditional density, one may be compelled to rely on very restrictive distributional assumptions.

To summarize this, consider a dependant variable (charitable contributions):

$$G^* = X'\beta + \varepsilon \tag{5}$$

and because of left-censoring we only observe

$$\begin{cases} G = G^* \text{ if } G^* > 0 \\ G = 0 \text{ if } G^* \leq 0 \end{cases}$$

When one first specifies the conditional distribution of G^* given the regressors x, the censored conditional density can easily be computed. This is the reason why parametric estimation techniques have first been widely used in the case of censored data. Let for example $f^*(G^*|x)$ be the conditional density of G^* given the regressors x, then if $G > 0$, $f(G|x) = f^*(G^*|x)$. When, to the contrary, $G = 0$, then the density is discrete with mass equal to the probability of observing $G^* \leq 0$, that is $f(G|x) = F^*(0|x)$. Introducing an indicator variable d for censoring, we get that the conditional density given censoring is equal to :

$$f(G|x) = [f^*(G|x)]^d * [F^*(0|x)]^{1-d} \tag{6}$$

[20] See, R. K. Triest, 1998.

[21] See, for instance, Feldstein & Lindsey 1981, and also the "Almost Ideal Demand system" chosen by Randolph, which is one possible response to deal with elasticities varying across price and income.

The most popular parametric estimation technique following this kind of approach is of course the Tobit model which relies on the assumption that

$$\varepsilon: \mathcal{N}(0, \sigma^2)$$

Therefore, $F^*(0) = Pr[X'\beta + \varepsilon \leq 0] = 1 - \Phi(X'\beta/\sigma)$ where Φ is the standard normal cdf. This leads to the canonical Tobin-Amemiya maximum likelihood estimator. As is well known, the greatest drawback of the Tobit MLE is that it so heavily relies on normality and homoscedasticity. With heteroscedastic errors for instance, the estimator becomes inconsistent.

For these reasons, we decided to implement censored quantile regression estimations. The advantage of quantile regression in our estimation problem is to be truly more flexible than parametric estimation technique, as for instance the Tobit model. In particular, our estimates have two main assets : they are distribution-free and allow for heteroscedasticity. The basic intuition behind quantile regression is to remember that the conditional **quantile** of the distribution of gifts is unaffected by the censoring mechanism. This is the reason why we can get a consistent estimation of β without specifying a complete parametric distribution of our error term, which is impossible when we rely on the conditional **mean** of the distribution (as is the case in the Tobit model). To understand this important feature of censored quantile regressions, we start from the basic quantile regression model where the (uncensored) $\tau - th$ conditional quantile of the distribution of gifts G^* given **x** can be modeled as:

$$Q_{G^*|x}(\tau) = X'\beta(\tau)$$

The principle of quantile regression is that this $\tau - th$ quantile is the solution of the following optimization problem [22]:

$$Min_\beta \sum_{i=1}^{n} \rho_\tau(G_i^* - X'_i\beta) \qquad (7)$$

where ρ_τ is a function defined as $\rho_\tau(x) \equiv x(\tau - 1(x \leq 0))$[23]

With censored observations, we slightly modify this baseline of quantile regression. To do so, we simply apply the important property of quantile regression model that is equivariance to monotonic transformation, and we easily obtain our censored quantile regression model. In our study, given that we observe G = G* if G* > 0 and G = 0 if G* is censored, then we obtain the following model:

$$Q_{G|x,C}(\tau) = max(X'\beta(\tau), 0)$$

0 being of course the censoring point.

Given this censored model, the most straightforward estimator of β would be to replace the linear form in (7) by the partially linear form

$$Min_\beta \sum_{i=1}^{n} \rho_\tau(G_i - max(X'_i\beta(\tau), 0)) \qquad (8)$$

[22] See Koenker, R., Quantile Regression, *Econometric Society Monographs*.

[23] Therefore, $\rho_\tau(G_i^* - X_i'\beta) = \begin{cases} \tau * (G_i^* - X_i'\beta) & \text{if } G_i^* > X_i'\beta \\ (\tau - 1) * (G_i^* - X_i'\beta) & \text{if } G_i^* \leq X_i'\beta \end{cases}$

But unfortunately this estimator proposed by Powell suffers from very low computational efficiency. This is the reason why it has not experienced a great development in the empirical literature. However, many authors have proposed slight amendments to this original model which lead to very practical estimators[24] with only very little loss of generality as compared to the Powell estimator described in equation (8).

We use, in order to estimate the impact of fiscal incentives on charitable giving a three-step version of censored quantile regression models proposed by Chernozhukov and Hong. This estimator relies on structured modeling restrictions that are put on the censoring probability. These restrictions enable this three-step estimator to be very easily computable, and practical, and are not too strict, so that the essential features of censored quantile regression are preserved, namely the heteroscedasticity and distribution-free character. The idea behind this three-step estimator is to first select a subset of observations where one may ensure that the true propensity score $h(X_i, C) = P(G^* > C | X_i, C)$ is strictly superior to $1 - \tau$. This condition is necessary for the conditional quantile line $X_i'\beta(\tau)$ to be above the censoring point C. Therefore, on our selected subset, the standard quantile regression that will be carried out in step 2 gives us immediately a consistent (though inefficient) initial estimator[25]. This first selection step is carried out by estimating a probability model of not censoring:

$$\eta_i = p(X_i'\lambda) + \varepsilon_i \tag{9}$$

where η_i is the probability of being a donator, and which gives an (inefficient) estimator of the true propensity score $h(X_i, C)$. In our study, we used a simple logit to model the probability of giving, with the same set of explanatory variables. It happened to fit the data quite well, which is important for the selection process. As we said previously, to obtain in the next step a consistent quantile regression estimator for conditional quantile τ, we must ensure that this conditional quantile is defined, which means that we must select observations such that $h(X_i) > 1 - \tau$. Our estimation of the true propensity score being possibly misspecified, we do not select all those observations with $p(X_i'\hat{\lambda}) > 1 - \tau$ but instead, we select these observations that have:

$$p(X_i'\hat{\lambda}) > 1 - \tau + c$$

where c is a trimming constant between 0 and τ. In practice, we chose c so that we could control the size of discarded observations from our subset $J(c) = \{i : p(X_i'\hat{\lambda}) > 1 - \tau + c\}$. The rule we made use of was to select c so that:

$$\#J(c)/\#J(0) = 90\%$$

where $J(0)$ denotes the subset J where $c = 0$. Chernozhukov and Hong give a demonstration that J does not need to be the largest subset of observations where $h(X_i) > 1 - \tau$.

The next (2nd) step consists in running a standard quantile regression estimation on $J(c)$:

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24 See for instance Buchinsky and Hahn, Khan and Powell, etc.

25Intuitively, think that to get a consistent quantile reg estimator to start with, you must ensure that the observations have covariates such that $X_i'\beta(\tau) > G > 0$. Otherwise, the minimization problem 8 would inevitably lead to $\beta(\tau) = 0$. But the probability that $X_i'\beta(\tau) > G$ given Xi and G > 0 is equal to $Pr(0 < G < X_i'\beta(\tau) | X_i) / Pr(0 < G^* | X_i) = [h(X_i) - (1 - \tau)]/h(X_i)$. Thus, it is defined if and only if $h(X_i) > 1 - \tau$.

$$Min_{\beta} \sum_{i \in J(c)} \rho_{\tau}(G_i - X'_i \beta_0(\tau)) \quad (10)$$

The estimate β_0 that we get is consistent as we said, but not efficient. Therefore, we next select all observations that have covariates X_i such that $X'_i \hat{\beta}_0(\tau) \geq 0 + \xi$ where ξ is a small positive number (with $\xi_n \to 0$). This step, practically, selects asymptotically all the observations with $X'_i \beta(\tau) \geq 0$, which brings efficiency to the QR estimation that we proceed with in step 3.

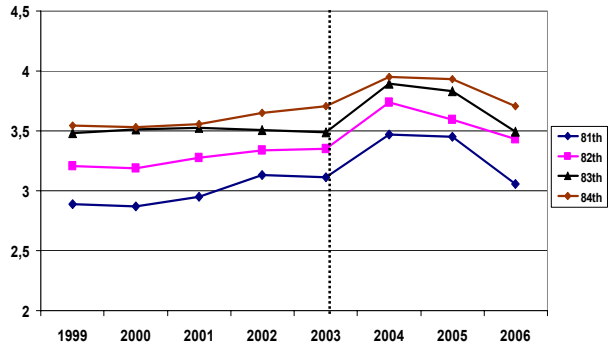
In step 3, we simply run a QR estimation on the observations selected during step 2. We then get a consistent and efficient estimation $\hat{\beta}_1(\tau)$ of $\beta(\tau)$. Note that step 3 can be repeated several number of times. In practice, rehearsal after the fourth step did not happen to be necessary. To summarize briefly, the great interest of this estimation procedure is to first select observations and then run consistent QR (with fewer and linear constraints) where the Powell estimator imposed simultaneity. Thus, the estimation procedure is milder in terms of computational requirements, which is truly convenient for our rich data set and our model with numerous regressors and several dichotomous regressors. Furthermore, it gives an estimator which deals with heavy censoring with minimal distributional assumptions, and allows for heteroscedasticity.

A Natural experiment framework

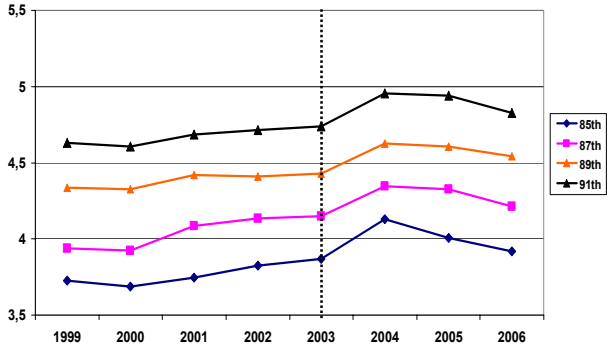
Concerning our estimation strategy, we look at the effects of the 2003 price reform that increased of one fifth (from 50% to 60%) the tax reduction rate for charitable reduction. We use this reform as a "pseudo-natural" experiment to test the impact of the reduction rate on charitable giving. In the next charts we display additional graphical evidence of the impact of the reform : we compute the evolution of unconditional quantiles of the logarithm of gifts. Note that because of censoring (approximately 20% of taxpayers report a gift), only unconditional quantiles superior to the 0.81-th exist every year since 1999. As we can see, the distribution of gifts has indeed been affected by the 2003 reform. Most of unconditional quantiles have shifted upward after year 2003. But another noteworthy point is that all quantiles seem not have reacted with the same intensity, which is clearly a pledge for quantile regression. In fact, the lower unconditional quantiles, that is close to the censoring point, seem to have reacted more sharply. The .9-th to .99-th quantiles do not seem to have shifted so markedly. This confirms the existence of strong and very interesting distributional effects of the price reform: it appears to have boosted small gifts and encouraged new donators to give, but with little effect on average contributors. These distributional effects are also reinforced by Chart 6 which plots the difference between every τ-th quantile of the distribution of the logarithm of gifts before the reform (year 2002) and the corresponding τ-th quantile of the distribution after the reform (year 2004). If nothing had happened, the distribution would have been unchanged and the plot would fit the x-Axis. If the effect of the 2003 reform had been homogenous, the two distributions would differ only by a location shift, and the plot would lie along a line parallel to the x-Axis. But we can see that the (unconditional) distributions of gifts before and after the reform are substantially different. First, new quantiles have appeared, that were not defined in 2002: this means that new donators have arised. Moreover, the lower quantiles of the distribution have shifted firmly, while the effect among larger quantiles do not seem to be very strong. The effect of the reform thus appears to be declining with respect to the level of gift. Such heterogeneity is very interesting, and implies strong heteroskedasticity that would considerably affect Tobit estimates. Practically, our quantile regression estimation may be seen as a mean of extending this type analysis to general regression settings with many covariates.

Chart 5: Unconditional quantiles of ln(gift) (1999-2005)

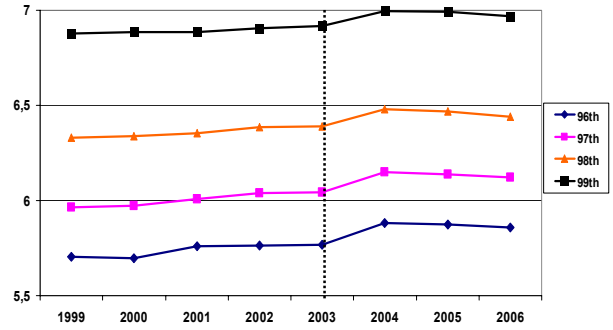
81th to 84 unconditional quantile



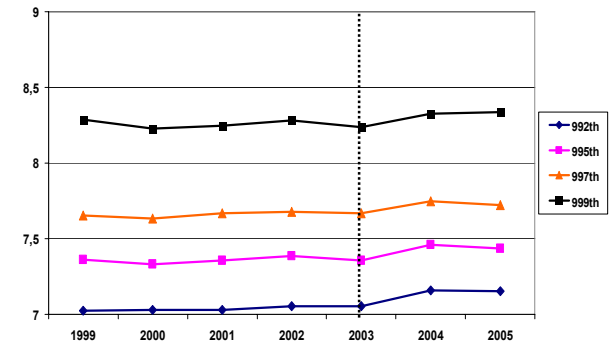
85th to 91th unconditional quantile



96th to 99th unconditional quantile



99th to 999th unconditional quantiles



92th to 95th unconditional quantile

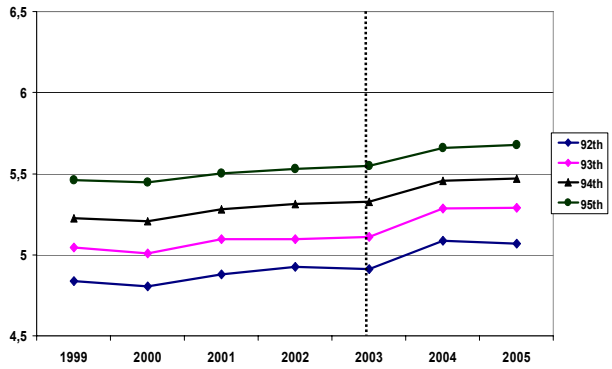
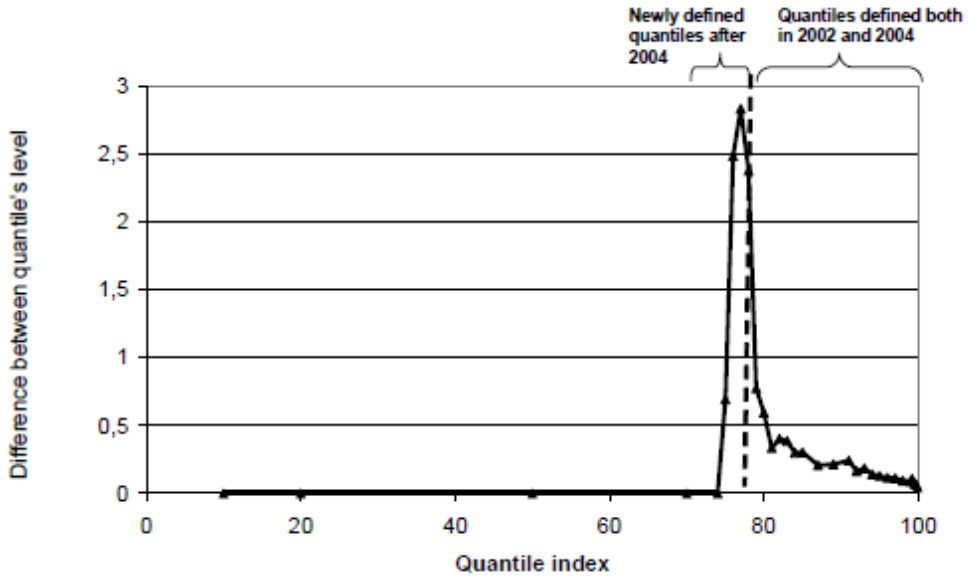


Chart 6: Difference between the level of the $\tau - th$ quantile of the unconditional distribution of gifts before and after the 2003 reform



Source: Echantillons Lourds DGI, author's computations.
Note: Only taxable households are taken into account. Year before the reform=2002, year after the reform=2004. The quantile of gifts are all unconditional. All gifts (Coluche + other gifts) are concerned.
Reading : Each scatter point represents the difference between the same τ-th quantile of ln(gift) before and after the reform

Our core analysis relies on a "simple-difference" estimation strategy. Therefore, we make some identifying assumptions of particular importance: the reform is exogenous, there is no temporal trend and no unobservable variable affecting giving behaviors during the reform. We pay in the robustness section a special attention to these assumptions.

We estimate the impact of the 2003 reform by running three-step censored quantile regression estimations described in previous subsection. The dependant variable is the logarithm of gifts (*ln (gift)*). Since many households have not given to charities, we give every households an extra dollar of gifts so that *ln(gift)* is defined for every taxpayer and ranges from 0 to ∞. This method is widespread in previous literature on the subject[26]. Our core model can be written as follows :

$$Q_{ln(gift)}(\tau) = C + \alpha_1(\tau) * ln(reductionrate) + \alpha_2(\tau) * ln(income) + X'_i\beta(\tau) \quad (11)$$

where $Q_{ln(gift)}(\tau)$ is the τ-th quantile of the logarithm of gifts conditional on all the regressors. X_i is a set of control variables including age, family size ("quotient familial"[27]), main source of income (wage, pensions, entrepreneurial income or capital income), and matrimonial status. We consider disposable income as income less income tax less charitable tax reductions so that disposable income does not depend on the level of gift. Identification of the effect of the reform

[26] See Andreoni.
[27] In France, income tax is paid at the household level, which means that income tax is paid for the whole household and not by individuals. "Quotient familial" is the number of tax units granted to an household according to its size. Single=1, Married couple=2, each child = 0,5, each child above 3 children=1. The taxable income is then calculated as the original taxable income of all the individuals in the household divided by the "Quotient familial".

is obtained through the coefficient $\alpha_1(\tau)$ of the variable "*ln(reduction rate)*". $\alpha_1(\tau)$ is therefore directly comparable to an elasticity and its interpretation is the following : when the level of the tax reduction rate is increased by 1%, the τ-th quantile of gifts increases of $\alpha_1(\tau)\%$, everything held equal. And variations of $\alpha_1(\tau)$ with respect to τ enable us to investigate distributional effects of the reform. As the reform of the reduction rate was voted during year 2003, it might be that taxpayer did not respond fully to the new incentives for the whole fiscal year. The question is thus opened whether one should exclude 2003 in the estimation. We chose to keep 2003 but excluding observations for year 2003 do not lead to significant changes in our result: the estimated effect of the reform is just very slightly larger. We estimate equation ((11)) on taxable households. To avoid any type of manipulation of the taxability status which might be correlated to charitable behaviors, we exclude people reporting previous deficits and determine taxability according to the level of taxable income. Therefore, some taxable households, according to our definition may not be taxed in practice if they benefit from high tax credits or any other type of tax reduction. This way of selecting taxable households eliminates a possible endogenous selection of the sample of taxpayers.

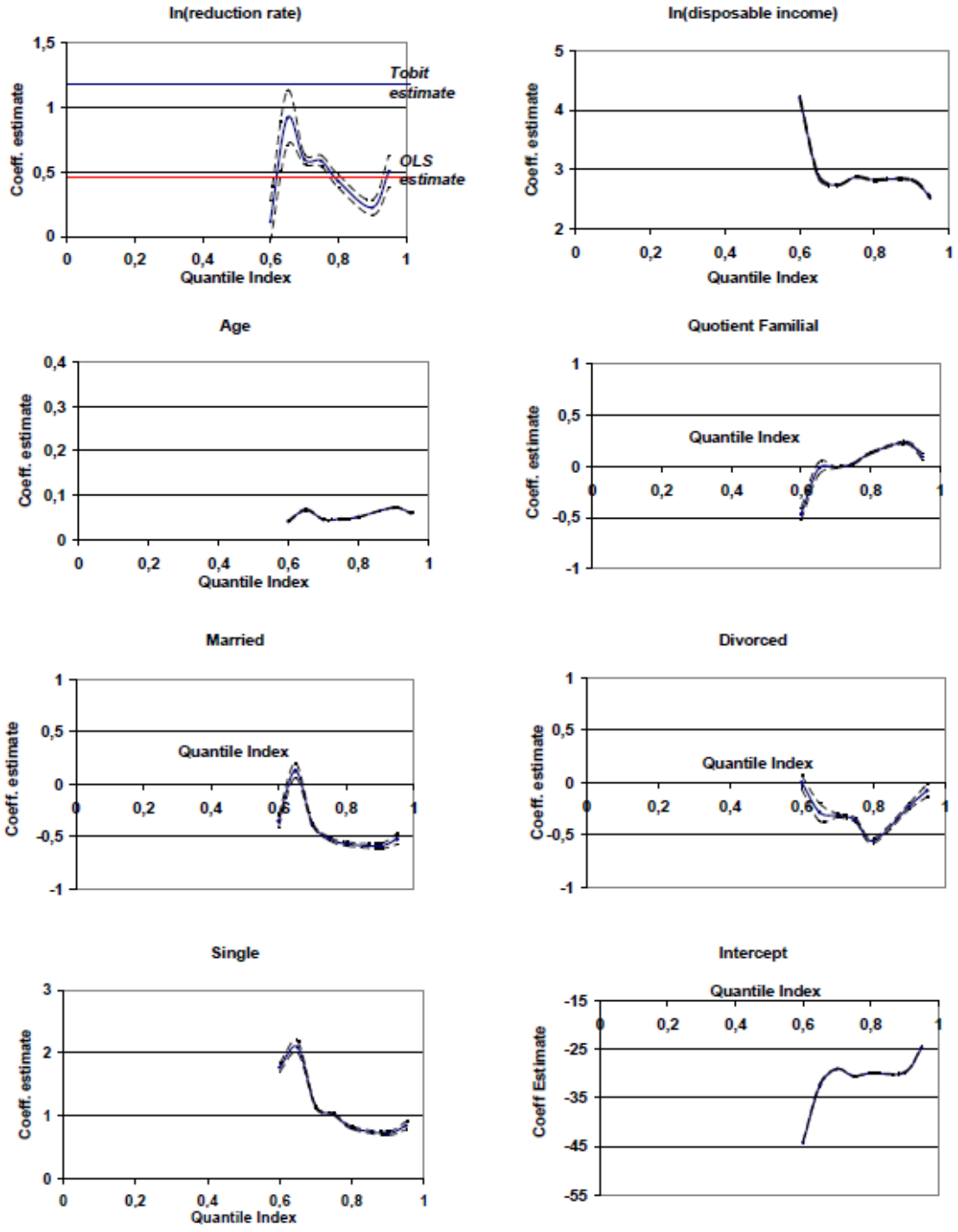
4. Results

In this section, we present the results, and discuss the overall effect of the 2003 reform on gifts, and also the impact of income on giving behaviors. Results for all taxable households are displayed in the following chart which summarizes graphically the quantile coefficient estimates. Note that because of heavy censoring it was not possible to estimate quantile coefficient below quantile .55 for the overall population of taxpayers.

The impact of the reform on fiscal incentives is shown in the upper graph on the left.

First, it appears that the overall effect of the reform is weak. For all quantiles, the coefficient estimate is below 1, which was our elasticity landmark to assess the efficiency of the reform. Most strikingly, the effect of the reform is truly heterogenous as coefficients vary significantly across quantiles. Lower quantiles of gifts and the upper-end of the distribution have reacted more firmly to the reform, as suggested by the quantile-quantile plot. If the tax reduction variation had led to homogenous behavioral responses, the whole distribution would have shifted the same way, and the coefficient estimate would have been equal across all quantiles. In our case, the homoscedasticity assumption of the Tobit estimator is evidently violated, which strongly supports our estimation strategy. Interpretation of these results is as follows: the reform has encouraged new contributors to give to charities, and led large contributors to contribute even more than they did, while average contributors have not really changed their habits. These distributional effects are interesting: they show that there is a margin on which subsidy really matters, which is the margin of people very near to the participation threshold. In a way, these results appear very similar to the effect of taxation on labor supply: labor market participation seems always more sensitive to taxation than the number of hours worked for people that already participate.

Chart 7: Coefficient estimates using a three-step censored quantile regression estimation on all taxable households

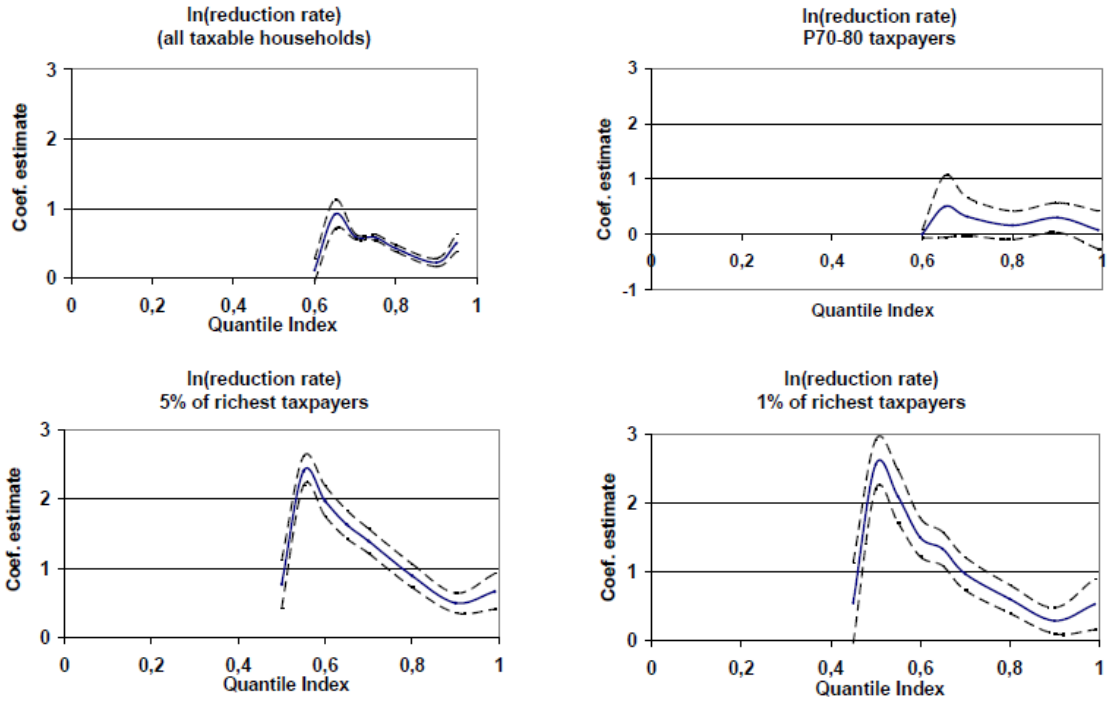


Source: Echantillons Lourds DGI.
Note: Reference for marital status is "widowed". Because of heavy computational requirements with a dataset of more than 3 million observations, we did not compute the coefficient for every percentile, but for the .6-th quantile, .65-th quantile, .7-th, etc. to the .99-th quantile.
$Pseudo - R^2$ range from 0.116 for the .65-th quantile to 0.228 for the .75-th quantile.

It is also interesting to compare our estimate with the naive OLS and the Tobit estimates, as shown in next chart. Because of heavy left-censoring, the OLS estimate is naturally biased downward, and leads to a weaker elasticity estimate. Because of the violation of the normality and homoscedasticity assumptions, the Tobit estimate is also severely biased, but contrary to the OLS estimate, it is biased upward, and leads to elasticity estimates close to 1. The existence of important distributional effects is therefore a serious drawback for traditional Tobit estimation in the case of heavy censoring because it tends to extrapolate to the whole distribution the aspect of the distribution on a few uncensored observations, whereas quantile regressions do not need to consider the shape of the distribution below the censoring threshold.

The shape and size of the income elasticity is also noticeable. It seems that the effect of income is quite large, and more important at lower levels of gifts : everything else held constant, having a greater income leads to a much higher probability of giving, but among contributors, the effect of income seems not very different according to the level of gifts. However, the estimated income elasticity appear quite large compared to results available in previous studies. One explanation might be that our income effect is not polluted by the price endogeneity that may have tended to minor the pure effect of income in US estimates. Because, as we pointed out, the tax deduction mechanism makes it particularly difficult to disentangle price and income effects on US data. But the main explanation is that charitable behaviors are very concentrated among the richest taxpayers, and that we look here at the whole distribution of taxpayers whereas the samples of US itemizing taxpayers used by most studies focus on richer taxpayers. This is the reason why we investigated how price and income elasticities vary with respect to the level of income. To do so, we ran the same three-step censored QR on subsets of taxpayers according to their level of income. The first subset focus on taxpayers of the 7-th decile of taxable income. We chose this decile because in lower parts of the income distribution, charitable contributions are negligible. Besides, because enlarging the subset too much would considerably increase the computational burden, we decide to restrict the size of the subset to a decile. The second subset includes taxpayers belonging to the first 5% of the income distribution. The third sample consists of the french top percentile of richest taxpayers.

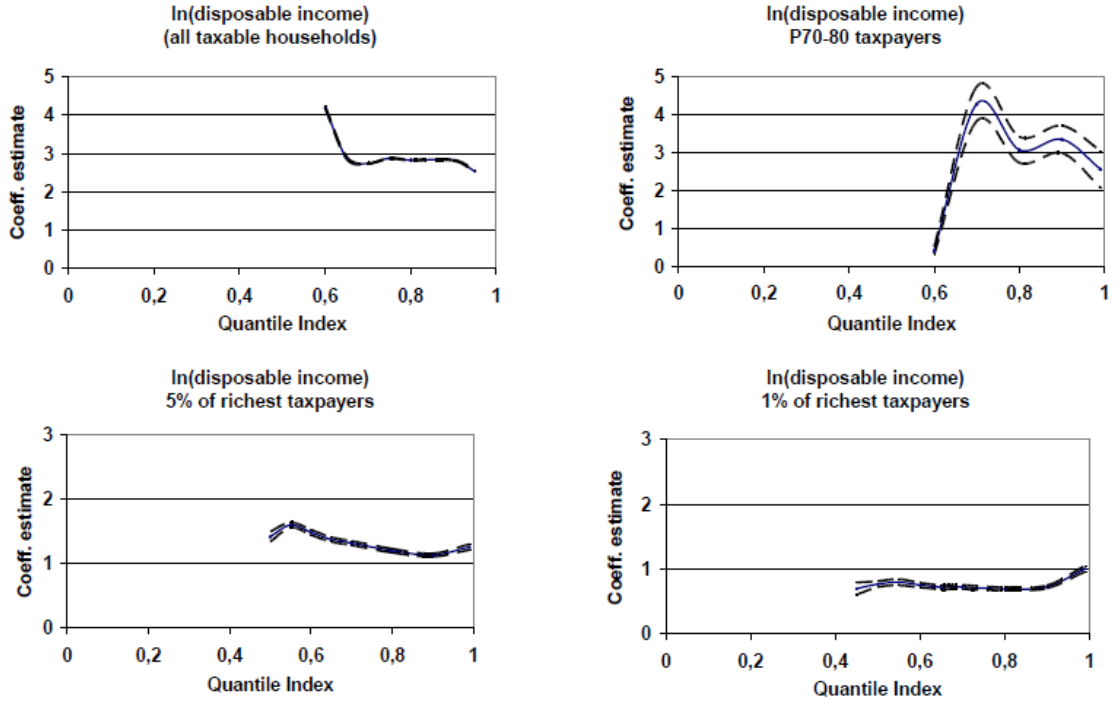
Chart 8: The effect of the 2003 tax reduction rate reform on conditional quantiles of gifts for selected populations of taxpayers



Source: Echantillons Lourds DGI.
Note: We chose to begin with the 7-th decile of income because contributions are negligible for lower levels of income. We restricted the size of subsets to a decile, half a decile, and a percentile to avoid increasing the computational burden too much.

Results of the estimated effect of the reform for different income levels are displayed in Chart 8. The first noteworthy point is that elasticity of gifts with respect to tax reduction has more or less the same pattern for every fraction of income : the lower quantiles of gifts are more affected by the reform for all groups of income. Nonetheless, higher levels of income are more responsive to the variation of the reduction rate. The effect of the reform is even superior to 1 for a certain number of quantiles among the 5% and the 1% richest households. The shape of the distributional effects is also more pronounced for the richest taxpayers, with a huge peak for lower quantiles of gifts. In general, the reform appears more efficient for the richest taxpayers, who are also the largest contributors. Still, their share of total gifts is not yet sufficient to ensure that they make the reform efficient on average. The estimated income elasticity on our three different subsets are presented in Chart 9. Not only their shape but their size are different. This suggests that income elasticities estimates are quite sensitive to the level of income of the sample. It seems that among middle income taxpayers, the effect of income is very large, and specifically on lower quantiles of gifts : having a greater income is a particularly important prerequisite to become a donator. Or to say it differently, the shape and size of the gift distribution for middle income household is very dependant on the level of income. To the contrary, the income elasticity for the 5% and 1% of richest households appear smaller, and the effect is almost stable among quantiles, suggesting that income has only a location shift effect: income in itself does not seem to have so important distributional effects on gifts among rich taxpayers. Which means that, for rich households, although having a greater income leads to more contributions, the shape of the distribution of charitable intensity is quite unaffected by income.

Chart 9: The income effect on conditional quantiles of gifts for selected populations of taxpayers



Source: Echantillons Lourds DGI.

Note: We chose to begin with the 7-th decile because contributions are negligible for lower levels of income. We restricted the size of subsets to a decile, half a decile, and a percentile to avoid increasing the computational burden too much.

It is also interesting to try to compare our estimated income and price elasticities to estimates made by previous studies. Since our results focus on distributional effects in order to avoid dealing with the (censored) mean, we do not immediately provide with a unique chart of income and price elasticity comparable to other estimates in the literature. One might nevertheless be interested in computing mean effects. In an uncensored quantile regression framework, mean effects can easily be computed as $\int_0^1 \alpha_1(\tau)d\tau$. For our purpose, one can argue whether the appropriate way of computing and interpreting mean effects is to consider the price effect on censored quantiles as zero, or to simply focus on defined quantiles.

On a public policy point of view, one is more often interested in knowing the average effect among the donators and it may be more appropriate to calculate the average on defined quantiles only. In this case, the mean elasticity of charitable contributions with respect to tax reduction is .47. If, to the contrary, we want to consider the impact of the reform on the whole distribution of taxpayers, and therefore consider that the effect on lower (undefined) quantiles is systematically zero, then the mean elasticity in France is .19. Staying away from mean effects, we now only look at the size of income and reduction rate effects *over* the uncensored part of the distribution. Concerning the reduction rate effect, it seems undeniably small, rarely superior to .5, which represents the lower bound of what was found in other studies. The income effect is quite large to the contrary, and even larger than previously found in empirical literature. Looking at richer subsets of taxpayers, which are more compatible with sample used in US empirical literature,

soften part of these discrepancies: income elasticities approach 1, and tax reduction elasticities increase with the level of income. However, the broad picture is left unchanged: tax reduction elasticities remain modest, inferior to 1 for the majority of the population, and even for the richer taxpayer on average, and truly questions the efficiency of the 2003 reform.

Assessing the efficiency of the 2003 reform

How can our results of tax reduction elasticities of charitable giving help assessing the relevance of the 2003 reform? As we showed previously, based on Saez' ``efficiency rule'' formula (1), and neglecting crowding out effects, we know that the tax reduction rate is optimal if:

$$t = 1 - 1/(1 + \varepsilon_t) \tag{12}$$

Given previous tax reduction rate of $t = 50\%$, the tax scheme can therefore be considered as optimal if the elasticity of gifts with respect to the subsidy rate is equal to $t/(1-t) = 1$. If the elasticity is below one, the tax reduction rate is too great. If the elasticity is above one, the reduction rate may be increased. According to the mean elasticities of .2 (all taxpayers) and .47 (defined quantiles only) that we computed in the previous paragraph, it seems obvious that the subsidy is above the optimal level, and that increasing the tax reduction rate is not socially desirable.

Given our mean estimates of ε_t of approximately .47 for all defined quantiles, and neglecting crowding-out and redistribution, the optimum would be reached for a subsidy of $t^* = 1 - \frac{1}{1+\varepsilon_t} \approx .32$[28]

Even if the governement had not a first best optimal taxation criterium in mind, but a much simpler public finance objective, we showed that the same efficiency rule apply, if we neglect crowding out and redistribution. Therefore, if the government only wants to promote charitable contributions in a partial equilibrium framework it seems that the subsidy rate is too great.

If we allow for a large crowding out, and in the absence of redistributive tastes in the social welfare function, it seems also hardly credible that the subsidy rate is optimal. From equation (1), we know that, at the optimum:

$$1 + \overline{G}_{G_0} = \frac{1-t}{t}\varepsilon_t$$

Therefore, with a subsidy equal to $.6$, and $\varepsilon_t = .47$, the level of crowding-out that would make the subsidy optimal would be: $\overline{G}_{G_0} = -0.69$, which is very large. If we do not think that .69 is a reasonable level of crowding-out, the only way to justify the French current subsidy rate is to consider that private contributions and public direct contributions to charities have different efficiency, so that the total level of contributions is: $G = s.G^p + G_0$. We can show, in that case, and following Saez, that the optimal subsidy rate becomes:

$$t = s - \frac{1+s\overline{G}_{G_0}}{\varepsilon_t + (1+s\overline{G}_{G_0})}$$

[28] Under the implicit assumption that ε_t is not subject to large variations when t varies.

which is strictly increasing with s. Following this equation, for a reasonable level of crowding-out of .25, considering the current subsidy rate as optimal is equivalent to assessing that $s \simeq 2.1$, which means that private contributions are twice as efficient as public contributions. This assumption seems hardly credible too.

Reasoning in terms of mean effects is however not satisfying, since we pointed out that the elasticity of charitable giving with respect to tax subsidy is truly heterogeneous. In a way, it seems that the subsidy rate is not too great for every taxpayer, since for a certain number of quantiles, the estimated elasticity is greater than one. Therefore, one would be interested in a subsidy scheme that varies according to the level of gifts. Unfortunately, optimal treatment of tax subsidy with non linear taxation and non linear subsidy yields substantial difficulties, discussed in detail in Diamond. But in our simplified framework, we can devise a first motivation of subsidy schemes varying with the level of gifts, in a third best environment, where the government follows a pure public finance objective. As we showed that this public finance objective could be linked with a true optimal taxation framework, under some very simplifying assumptions, it seems that the following is a sound first step. In practice, let people differ according to a parameter α that determines their level of gift conditionally to all other covariates. α can be seen as a generosity index[29]: conditionally to all other variables, a greater α leads to greater gifts g^{α}. α is characterized by its density $f(\alpha)$ in the population. If the government seeks to maximize its public finance objective described earlier, then, we have showed that the optimal subsidy rate t^* was such that the condition (3) was verified. Imagine now that the government has the possibility to target each group of α by a particular subsidy rate t^{α}. Then, if we envisage a variation of the subsidy scheme such that $t^{\alpha\prime} = t^{\alpha} + \Delta t$, then the condition (3) can be rewritten as

$$\Delta\left[\int g^{\alpha} f(\alpha) d\alpha - \int t^{\alpha} g^{\alpha} f(\alpha) d\alpha\right] = 0 \qquad (13)$$

Rewriting this condition helps understand the possible shape of this subsidy scheme. We have, according to (13):

$$\Delta t\left[\int g^{\alpha}\left(\varepsilon_{g^{\alpha}|t^{\alpha}} \frac{1-t^{\alpha}}{t^{\alpha}} - 1\right) f(\alpha) d\alpha\right] = 0 \qquad (14)$$

where $\varepsilon_{g^{\alpha}|t^{\alpha}}$ represents the elasticity of gifts to the subsidy t^{α} for the population characterized by generosity α. Under condition (14), it appears that an optimal scheme in our simplified environment would be characterized for every α, by a subsidy equal to

$$t^{\alpha *} = 1 - \frac{1}{1+\varepsilon_{g^{\alpha}|t^{\alpha}}} \qquad (15)$$

According to the different elasticities that we found, it is possible to compute an example of the type of subsidy scheme that would be optimal to maximize private contributions in France. The Chart 10 gives an illustration of such schemes that could be achieved by fixing different tax reduction rate according to different ceilings.

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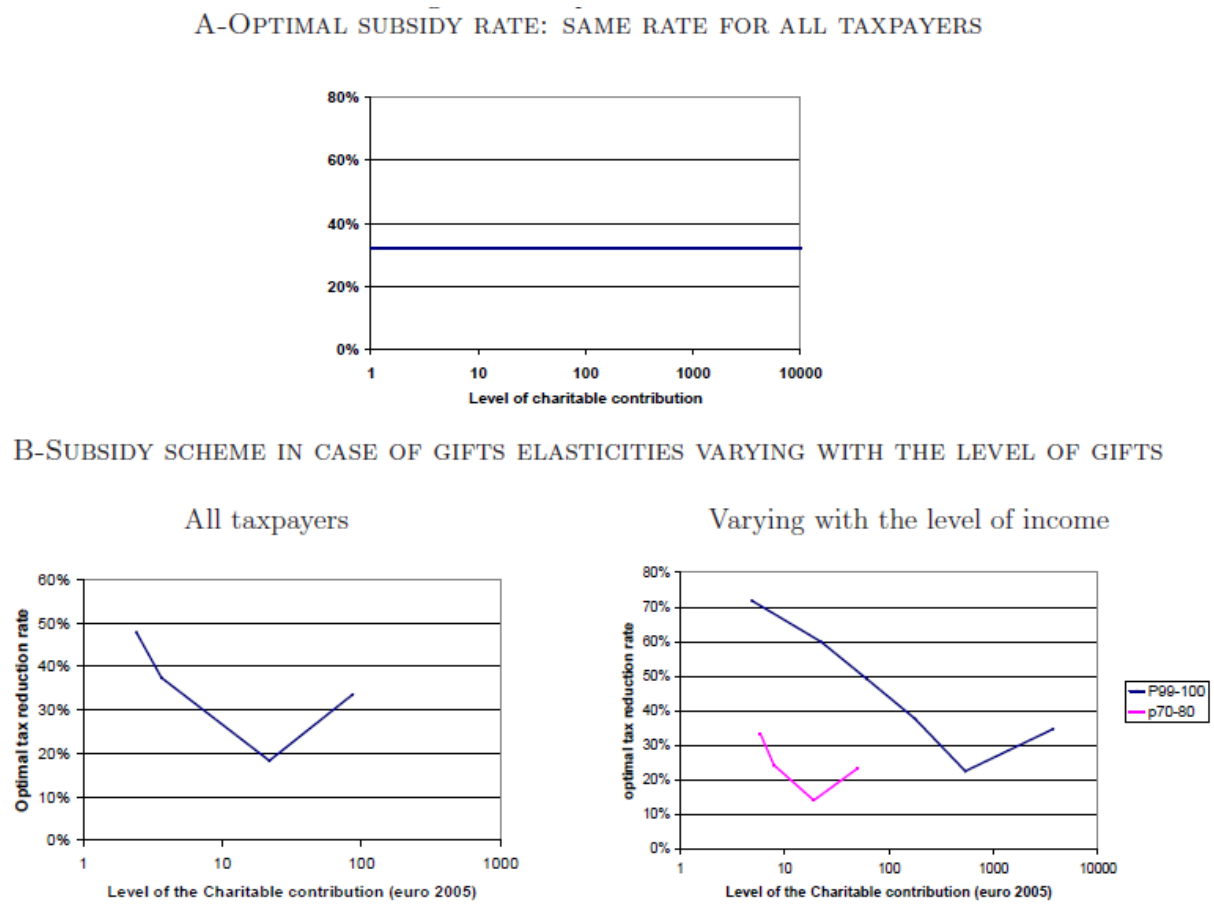
[29] We can think, for example of utility functions of the form $U^{\alpha}(g, G, c) = (g - \alpha)^{\gamma} G^{\zeta} c^{\rho}$. When α increases, it can be shown that the marshallian demand g increases, and the elasticity of gifts with respect to the fiscal subsidy decreases.

Chart 10: Optimal subsidies



Note: Optimal rates are computed using estimated elasticity and according to the formula given in equation (15). The level of gifts in absolute value is calculated using all coefficients estimates for each quantile regression.

Robustness

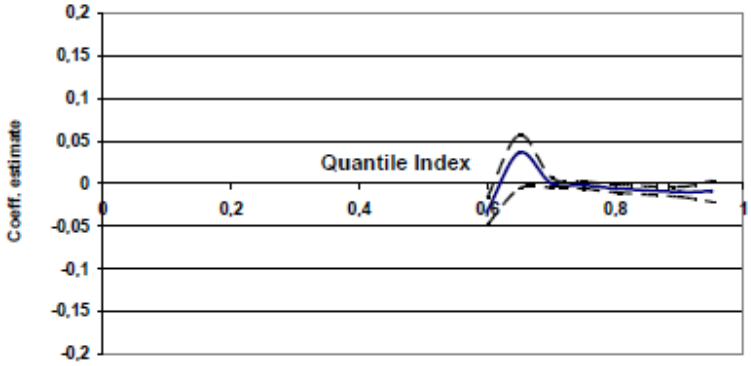
Because of our pseudo-natural experiment framework, our core "simple difference" estimation relies on some identifying assumptions that we discuss in this section.

First, our estimates rely on the fact that the shape of the distribution is not affected by a temporal trend that might reflect the action of unobservable variables correlated with time (and therefore with our identifying variable *ln(reduction rate)*) and which would pollute our estimate of the 2003 reform. To make sure that this important assumption is not violated, we run the same 3-step quantile regressions before the reform, and incorporate in the regressors a temporal trend. If the conditional quantiles of gifts were affected by unobservable variables correlated with time, the coefficient estimates of the temporal trend before the reform would be non zero! The results are displayed in Chart 11: the estimated coefficient of the trend appears not significant for almost all conditional quantiles of gifts and only for the .6-th to .65-th quantiles does it seem slightly different from zero, reflecting the fact that before the reform the proportion of donators among the whole population of households increased very modestly, *ceteris paribus*. According to these results, our identifying assumption seems to hold quite well so that the impact of the reform that

we computed in Chart 7 cannot be attributable to the underlying effect of a temporal trend.

Reasoning in terms of simple difference also requires that one makes sure that the distribution of gifts is not subject to sudden shifts, and is stable before the reform. To test this assumption, we used so-called "placebo" techniques. The principle is to check that attributing artificially the variation in the reduction rate to another year (before the real reform) leads to no significant result for the reduction rate elasticity. For instance, let us consider that the reform was in 2001. As nothing have truly happened in 2001, when creating a fake variation of the reduction rate, and running the same quantile regressions with years 1998 to 2000 against year 2001 to 2002, we should not find that the coefficient for the variable $ln(reductionrate)$ is significantly different from zero. And, in fact, as for the temporal trend, we found that the elasticity of gift with respect to the reduction rate was never significantly different from zero when falsely attributing the reform of the reduction rate to year 2000, 2001 or 2002.

Chart 11: Temporal trend



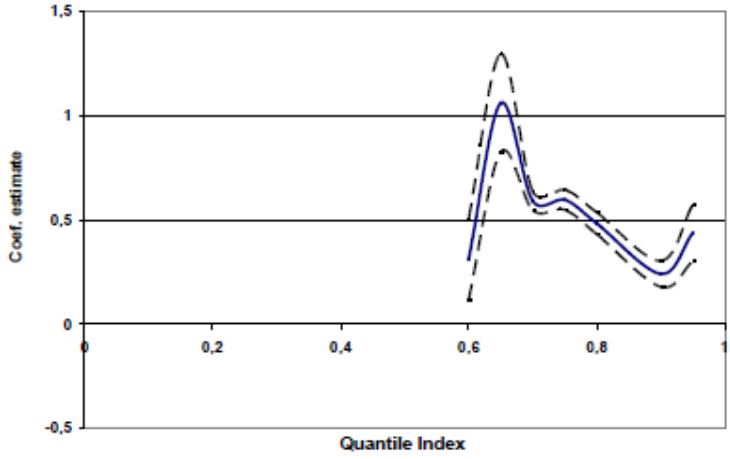
We have checked so far that no underlying unobservable variable have affected the distribution of gift before the reform. We must now make sure that no other (unobserved) event except the tax reduction reform affected the giving behavior at the very same time. In particular, we want to control for the fact that unanticipated catastrophes such as the tsunami of December 27th 2004 did not account for the variation of the distribution of charitable contributions that we observe for the years 2003 to 2005.

To control that the tsunami did not alter our results, we made a set of additional estimates, simply excluding year 2004 from our analysis. The international support to victims of the tsunami began in the last week of December, but was almost entirely reported on fiscal year 2004[30].

Excluding year 2004 thus purges the majority of the effect of the tsunami. We display in Chart 12 the results of the estimation for all taxable households without year 2004. The shape of the estimated tax reduction elasticity appears unchanged. The only difference is that the size of the elasticity is a little weaker among lower quantiles.

[30] See Cour des Comptes, Rapport public thématique, L'aide publique aux victimes du tsunami janvier 2007.

Chart 12: Estimated elasticity of charitable contributions: robustness check without year 2004 to exclude Tsunami gifts



However, one can wonder whether the Tsunami effect was not in itself a response to the new fiscal incentives. As we can see in Chart 4, the cdf of ln(gift) has shifted more sharply in 2004 than in 2005 for taxable households, but it has not varied at all for non-taxable-households. Since non-taxable households have indeed been affected by the Tsunami but not by the modification of fiscal incentives, this suggests that the larger shift in 2004 for taxable households is in itself a reaction to the tax reform. Excluding Tsunami gifts may therefore appear very conservative as far as our estimations are concerned.

Conclusion

This paper proposes new estimations of income and price elasticities of charitable contributions. To do so, we exploit the 2003 reform of French fiscal incentives towards charitable contributions as a pseudo-natural experiment. The French tax system, working as a tax reduction, gives us the opportunity to keep clear of usual empirical drawbacks encountered in previous literature. Our data set also enables us to prevent from the sample selection bias that arises from concentrating the analysis only on itemizers. We study the heterogeneity of responses among the distributions of gifts using a three-step censored quantile regression estimator proposed by Chernozhukov and Hong. This estimation technique has moreover the advantage of treating the problem of censoring that has never been raised yet for the estimation of giving behaviors although it is of crucial importance. Our result show that the overall effect of the 2003 reform has been modest, and that the elasticity of gifts with respect to the tax reduction rate is below one in absolute value. Nevertheless, our results also point out that the tax reduction elasticity is very heterogenous among taxpayers, according to the level of their income and also according to the level of their gifts. Small gifts seem to react more sharply to incentives. It appears, following our results, that tax subsidies are more efficient to boost participation to charitable giving than to increase the level of gifts among donators on average. This also suggest that tax subsidies should vary not only according to the level of income but also according to the level of gifts. Subsidy schemes with a high reduction rate for small gifts (under a ceiling constraint for instance) may therefore be justified.

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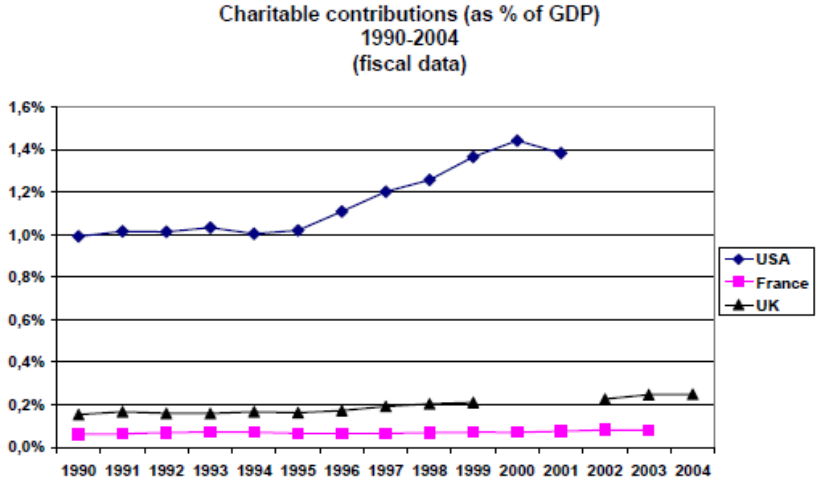
Appendix

Appendix A: International comparisons concerning charitable contributions

Usually, international comparisons of charitable giving rely on comparative data produced by specialized institutes, like for instance, the John Hopkins Comparative Nonprofit Sector Project, the Charities Aid Foundation, or the National Center for Charitable Statistics. According to these statistics, France is characterized by a very low level of private contributions. But, in most studies, statistics suffer from a certain lack of homogeneity among countries. In particular, for a large number of countries, charts are drafted upon the basis of national surveys that are conducted without any definite common methodology. As a result, the ranking of countries according to their generosity display some variations across studies.

In order to produce data that would be more homogeneous and therefore trustworthy for international comparisons, we focused on income tax data for three countries: US, UK and France[31]. It should be emphasized that gifts reported in fiscal datasets account for a vast part of the total amount of gifts reported by the associations through annual surveys. For example, in the US, the annual survey made by Giving USA report in 2001 a total amount of charitable giving of 212 $ billions, when fiscal data report a total amount of gifts of 139 billions. The difference between those two amounts arises because very small cash gifts, gifts that are non itemized, or charitable bequests are not included in income tax data. However, our fiscal data still stands for approximately 65% of the total amounts received by charities each year. Thus, the evolution given in the present charts can be relied upon.

Chart 13: Gifts reported in income tax data (France, US, UK) as a percentage of GDP



[31] The data we collected are directly held from Income Tax services in each country. For the US, the IRS produces time series of certain fiscal aggregate, like Charitable Deductions (see *http://www.irs.gov/taxstats/indtaxstats/article/0,,id=96679,00.html#_grp8*). For the UK, we also have data on the various type of deduction permitted by the Income Tax system (covenants, gift aids and give as you earn. (Source: *http://www.hmrc.gov.uk/stats/charities/menu.htm*). For France, the DGI produces through the "États 1921" each year the total amount of gifts made and reported by taxpayers in their income declaration.

Results are presented in Chart 13. The most striking fact is that, as compared to GDP, or to total adjusted gross income, the total amount of gifts reported by individuals in the United States is at least ten times bigger than in France and six times bigger than in the UK! In 2001 (the last year for which data were available for the US), the 129 millions of US taxpayers gave a total of 139 $ billions, while their 33 millions French counterparts gave only 1.120 billion euros. Those gifts represent in 2001 in the US, 2.2% of total adjusted gross income, and 1.4% of US GDP, while in France they represent 0.21% of total gross income and 0.08% of French GDP.

Appendix B: Other aspects of the French Tax system

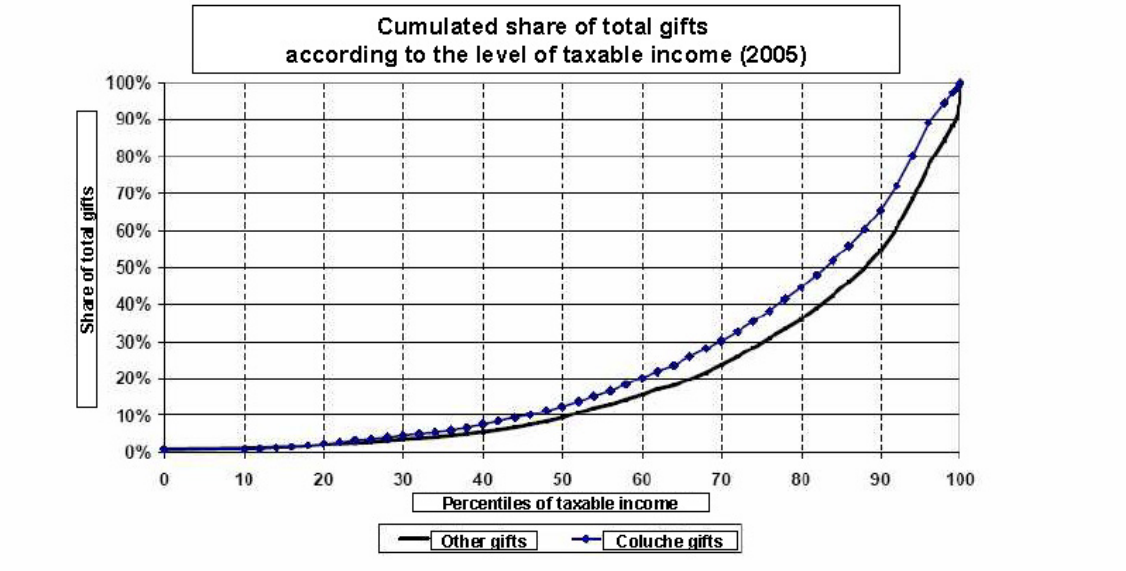
Two things must be added concerning our description of the French tax treatment of charitable contributions. First, the existence of a ceiling : the total amount of gift eligible for tax reduction must not exceed 20% of your taxable income. This ceiling is very high however, as compared to ceilings existing in other countries. The ceiling is also very high compared to the distribution of gifts as long as one remembers that the percentage of taxpayers that give more than 10% of their taxable income is less than 0,05%.

The other noteworthy detail concerning the tax reduction system is the existence of a special (higher) reduction rate for associations that help very poor people by providing them food or accommodations. For instance in 2006, gifts made for these associations ("Coluche Gifts"[32] are eligible for a tax reduction of 75%, while others gifts benefit from a tax reduction rate of 66%. Yet, this special treatment is granted only for the first 470 euros given to "Coluche associations". As far as our estimates are concerned, the existence of different prices is not important, because the "Coluche" reduction rate always moves similarly to the usual rate, and those gifts only stand for a little portion of all gifts (around 10 to 15%). But, it is still true that those two types of gifts may not have the same price elasticity. In particular, we were able to remark that gifts for Coluche associations and "other" gifts, having different purposes, are not closely substitutable. However, we did not try to disentangle the two elasticities in practice, and only look at the aggregate elasticity of charitable contributions.

[32] The special rate is often called "Coluche" rate because it has been created after intense lobbying made by the French humorist Coluche, when he created the charity called "Les Restos du Coeur" in 1988 in order to provide food to poor people.)

Appendix C: Tables & Figures

Figure 14: *Share of total gifts according to the level of income*



Source: "Echantillons Lourds" DGI, author's computations
Reading : In 2005, 50% of taxpayers with the lowest taxable income represented only 12% of Coluche gifts and only 10% of all other gifts

Figure 15: *Descriptive statistics : Echantillon Lourd DGI*

full sample

	gifts					Family								Main source of income		
fiscal year	% of taxable households	% of households reporting a gift	mean gift (2004 €)	mean "Coluche" gift (2004 €)	ln(disposable income)	mean age	mean tax (2004 €)	"Quotient familial"	% of single	% of divorced	% of widowed	% of married couples	% of wage earners	% of pension earners	% of entrepreneurial	% of capit income
1998	54%	14%	28	3	9,7	48,8	1 647	1,8	36%	11%	13%	40%	60%	29%	5%	2%
1999	53%	14%	28	4	9,7	48,8	1 693	1,8	36%	12%	12%	40%	60%	29%	4%	2%
2000	54%	14%	28	5	9,7	48,9	1 624	1,8	37%	12%	12%	39%	61%	29%	4%	2%
2001	53%	14%	30	5	9,8	48,9	1 495	1,8	38%	12%	12%	38%	61%	29%	4%	2%
2002	53%	15%	34	5	9,8	48,9	1 497	1,8	38%	12%	12%	38%	61%	29%	4%	2%
2003	52%	14%	32	5	9,8	48,9	1 418	1,8	39%	12%	12%	37%	61%	28%	4%	2%
2004	53%	16%	36	7	9,8	49,1	1 423	1,8	39%	13%	11%	36%	61%	28%	4%	2%
2005	54%	16%	36	9	9,8	49,2	1 427	1,8	40%	13%	11%	36%	61%	29%	4%	2%

taxable households only

	gifts					Family								Main source of income		
fiscal year	% of taxable households	% of households reporting a gift	mean gift (2004 €)	mean "Coluche" gift (2004 €)	ln(disposable income)	mean age	mean tax (2004 €)	"Quotient familial"	% of single	% of divorced	% of widowed	% of married couples	% of wage earners	% of pension earners	% of entrepreneurial	% of capit income
1998	100%	21%	46	5	10,2	48,0	3 080	1,8	33%	10%	8%	48%	68%	23%	6%	2%
1999	100%	21%	45	7	10,2	48,0	3 176	1,8	33%	10%	8%	48%	69%	22%	6%	2%
2000	100%	21%	45	7	10,2	47,6	3 078	1,8	35%	10%	7%	48%	70%	21%	6%	2%
2001	100%	21%	47	8	10,2	47,3	2 888	1,8	36%	11%	7%	47%	71%	21%	6%	2%
2002	100%	21%	53	8	10,2	47,4	2 892	1,8	36%	11%	7%	47%	71%	21%	6%	2%
2003	100%	21%	48	8	10,2	47,6	2 804	1,8	36%	11%	6%	46%	71%	20%	5%	2%
2004	100%	24%	54	11	10,2	47,9	2 805	1,8	36%	11%	7%	46%	71%	21%	5%	2%
2005	100%	23%	51	13	10,2	47,9	2 772	1,8	37%	11%	6%	45%	71%	22%	5%	2%

Note : Coluche gifts = gifts made to charities providing food and accomodation to very poor people. These gifts are eligible for a special reduction rate

"Quotient familial" = number of tax units granted to an household according to its size. Single=1, Married couple=2, each child = 0,5, each child above 3 children=1

Main source of income = type of income that stands for the majority of income. In 1998, for the full sample, wages were the main source of income of 60% of all households.

Incomes, gifts and taxes are expressed in 2004 euros