

2012/38



Unfair inequalities in France:
A regional comparison

Jean-François Carpentier and Christelle Sapata



CORE

DISCUSSION PAPER

Center for Operations Research
and Econometrics

Voie du Roman Pays, 34
B-1348 Louvain-la-Neuve
Belgium

<http://www.uclouvain.be/core>

CORE DISCUSSION PAPER
2012/38

**Unfair inequalities in France:
A regional comparison**

Jean-François CARPANTIER¹ and Christelle SAPATA²

September 2012

Abstract

This paper proposes a regional comparison of ex-post inequality of opportunity in France by measuring, within each region, the inequality between individuals exerting the same effort. According to the concept of equality of opportunity, inequalities due to factors for which the individual is not responsible are unfair and should be removed but inequalities due to factors for which the individual can be held responsible (effort) are fair and should be preserved. Therefore, our analysis defends a responsibility-sensitive egalitarianism whose aim is to show whether (1) regions reward equally effort, (2) inequality of opportunity is equally distributed among regions and (3) it is correlated with income inequality. In this paper, we use a direct measure of effort to measure ex-post inequality of opportunity across regions in France. To this end, we define a fair income that fulfills ex-post equality of opportunity requirements. Unfairness is measured by an unfair Gini based on the distance between the actual income and the fair income. Our findings reveal that regions display differences in the magnitude of ex- post inequality of opportunity and this is due to differences in reward schemes and differences in the impact of the non responsibility factors of income. As a consequence, this papers motivates decentralized policies to solve the problem of unequal opportunities in France. Finally, the positive correlation between income inequality and inequality of opportunity confirms previous results given in the literature.

Keywords: inequality of opportunity, fairness, regional inequalities.

¹ Université catholique de Louvain, CORE and IRES, B-1348 Louvain-la-Neuve, Belgium; University of Luxembourg, CREA. E-mail: jean-francois.carpantier@uni.lu

² Facultés Universitaires de Saint Louis, B-1000 Bruxelles, Belgium; Universitat Autònoma de Barcelona, Spain. E-mail: sapata@fusal.ac.be

The authors thank the participants of the FUSL CEREC seminar, as well as Professors Xavier Ramos, Francisco Ferreira, Juan Gabriel Rodriguez and especially Dirk Van de gaer for their comments that helped to improve the paper.

1 Research Question

In the literature on redistributive justice, growing attention has been paid to the concept of equality of opportunity. This defends a responsibility-sensitive egalitarianism. In a nutshell, individuals' advantage is decomposed into two kinds of determinants and these ones determine if inequality among individuals' advantages is fair or unfair. Unfair inequalities are due to factors for which the individual is not responsible, called circumstances. As a consequence we should remove these inequalities. On the contrary, the factors for which the individual is responsible, called effort, generate fair inequalities and this does not give room to redistribution.

The division between responsibility and non responsibility factors is far from straightforward. Nevertheless, a consensus prevails concerning certain variables. For instance in the literature, it is often accepted that education is a responsibility factor but father's education is a non-responsibility factor. But, to the extent that father's education may impact on the education of their offspring, should we consider that education is an effort variable? This example raises the question of the right measure of effort which is related to the issue about the frontier between both determinants.

More educated parents often incentive their children to get high education. If we consider that this corresponds to parents' effort, we may not want to remove the effect of parents' education on their offsprings' education. This refers to the equality of opportunity from the parents' perspective ([29]). In this case, the effort of a child should be measured by his level of education. We can say that the true effort should be the brut effort.

On the contrary, if we consider the impact of father's education on offsprings' education should be removed because this is beyond the child's responsibility. Therefore the true effort is the effort once it has been cleaned from its correlation with non-responsibility factors, as defended by Roemer [27, 28]. This can be called the net effort.

Another question concerns the measurement of inequality of opportunity. Even though the concept of equality of opportunity is unambiguous, two strategies of measurement have emerged. On the one hand, the ex-ante approach consists in studying the contribution of non-responsibility factors in shaping inequalities. Effort is not a key variable in this kind of analysis because we do not need to observe it to measure inequality of opportunity. On the other hand, the ex-post approach consists in determining if individuals

who exert the same effort actually obtain the same outcome, in other words, if outcome is a function of effort only. These two measures are equally valid but may lead to distinct conclusions because they measure inequality among distinct groups. The ex-ante approach measures the inequality between individuals who share distinct circumstances and the second perspective focuses on inequalities between individuals exerting the same effort.

These two measures of inequality of opportunity have been conducted in many developed (Italy [7], Belgium [14], France [20, 21], Norway [1], US [26] among others), and developing countries (for instance in Brazil [6], Latin America [15], India [23], Africa [9]). In France, inequality of opportunity has been recently studied for income and for health [21, 18, 13] with the ex-ante approach.

In the case of income, Lefranc et al. [21] have applied first and second stochastic dominance tools to compare the income distribution conditional on the social origin. They establish a clear hierarchy between groups of distinct social origins, this ranking has been quite constant over time (1979-2000) but the income distributions have become closer to each other, this indicates the presence of inequality of opportunity but a reduction of its magnitude. They also find that, when using the variance of incomes as an indicator of inequality, social origin explains only 5% of the overall income inequality. This reveals how difficult it is to explain income and this is true for most developed countries.

Regarding health unfair inequalities, Jusot et al. [18] and Devaux et al. [13] analyze the channels through which health inequalities are transmitted across generations. The first study investigates by how much the correlation between circumstance and effort impacts on the magnitude of inequality of opportunity. They show that circumstances affect health inequalities through their impact on effort measured by obesity, vegetable consumption, smoking habits. Whether we should or not compensate for this indirect effect, the results do not change in a large extent and in any case, parental background explain the largest part of inequalities of opportunities. The second study scrutinizes more on the mechanisms that are at the origin of inequality of opportunity in health. They show that mother's education has a direct impact on offsprings' health whereas father's education has only an indirect impact through the education and profession of the offsprings. In total, unfair health inequalities could be considerably reduced when assigning the best circumstances to all, as the standard Gini index would decrease by 57%.

The studies on income and health cited above [21, 18, 13] correspond to the ex-ante approach for inequality of opportunity to the extent that they study the contribution of circumstances in shaping income and health inequalities. Nevertheless, it could be of main interest to change the perspective such as to include indicators of effort in order to implement an ex-post approach. To our knowledge, this has not been studied for France. Instead this approach has been implemented in Norway [1] where direct indicators of effort have been used (education, profession, working hours). Several observations concerning the relationship between effort and income indicate that an ex-post approach with a direct measure of effort may be relevant for France:

First, disparities across regions of France are found to be determined more by individuals' characteristics [22, 11], mainly human capital, rather than by spacial determinants such as density and potential markets. More precisely, differences in human capital and in the sector of activity have played a major role in explaining inequalities between individuals: Godechot [17] found that the increasing inequalities in the last years are due to a rise in the salary of workers working in specific sectors: entertainment and mostly finance. Human capital and the sector are variables of effort mainly used in the literature on equality of opportunity [1, 13, 6] and they are related to income acquisition. Thus, we have effort variables that explain inequalities between individuals but no study has adopted the theory of equality of opportunity to explore the relationship between effort and income.

Secondly, when we turn to the perceptions of individuals with respect to inequality in France [16], we observe that individuals, whatever their professions, legitimate income inequalities when they are due to differences in the number of working hours, the type of job, the dedication of the employees. This gives a strong appeal to the analysis of ex-post inequality of opportunity because this theory justifies inequalities due to effort variables and precisely states that income inequalities are fair if income is a function of effort only.

Last, we have access with the EU-SILC data set in 2005 to a survey with indicators of income, effort and circumstance that allow us such an analysis.

Our second purpose is to measure ex-post inequality of opportunity across regions in France for the following reasons:

A regional analysis provides a more precise understanding of the unfair inequalities in France and, because there is no reason to accept unfair inequalities in any region, we should not accept distinct levels of unfairness across

regions. In a context where income inequalities has been found to be rather low between regions except Ile de France [11], we ask whether the same is true for unfair income inequalities. This is important for policy design. Indeed, policies should be adapted if unfair inequalities are not equally distributed as income inequalities.

In addition, even when there is no correlation a priori between income inequality and inequality of opportunity, empirical studies have shown a positive correlation between both terms in European countries and the US [20], in Italy [7] and in India [23]. In this way, our study may give new evidence on this correlation by comparing the ex-post inequality of opportunity and the income inequality across regions.

Then, we choose to explore unfair inequalities across regions because regions are old and homogeneous entities in terms of culture and this may impact on the way effort and circumstances may impact on income. Also, regions of France have displayed distinct economic histories and dynamics and this leads to different income generation processes, leading to difference in equality of opportunity. And regarding the size of the regions, they are sufficiently big in terms of population to allow reliable conclusions and sufficiently distinct to allow differences in terms of ex-post inequality of opportunity¹.

As a result, this paper will provide a first measure of ex-post inequality of opportunity across regions in France. In this way, we aim to study to which extent regions reward equally effort and only effort. We also want to determine if ex-post inequality of opportunity is equally distributed among regions and to compare the rankings of regions in terms of income inequality and equality of opportunity. To this end, we use the 2005 EU-SILC data set for France. We regress the gross labour income on responsibility and non-responsibility factors for each region separately and use Almas et al. [1] methodology to define ex-post inequality of opportunity.

The rest of the paper is organized as follows: Section 2 presents the methodology for measuring ex-post inequality of opportunity. Section 3 introduces the data, Section 4 summarizes the results and Section 5 is the conclusion.

¹An analysis per department could be also valuable but we would have too few observations for such an analysis

2 Methodology

The ex-post approach checks whether effort is the only determinant of income, therefore effort is the core input in this view. A first method proposed by Roemer [28] following the ex-post approach considers that effort can be captured indirectly through the Roemer Identification Axiom: assuming the outcome is a monotonous increasing function of effort, once we partition the population into types, that is to say into groups of individuals sharing the same non-responsibility factors, the individuals who locate at the same quantile of their income distribution per type are supposed to exert the same effort. The fact we first partition individuals into types permits to correct for the effect of the type on effort. This means that we measure net effort, that is to say, effort once it is cleaned from its correlation with circumstances.

In this case, because everything that is not a circumstance is effort, this method is often said to provide a lower bound for inequality of opportunity. However, though difficult to delimit, effort could be partially captured by some responsibility factors. This restricts the power of residuals to proxy effort. In addition, there is no guarantee that residual distributions conditional on types are equal, and no guarantee that residuals precisely capture effort. Residuals capture effort but also omitted circumstances.

For all these reasons, we propose to take into account effort variables explicitly, rather than implicitly through the residuals. The cut is not always clear between circumstances and effort. Following Arneson [2], Cohen [10] and Roemer [27, 28], our cut is strictly based on control. If the agent has, even partially, control on the determination of the variable at some moment of his life, then it is a responsibility factor. The residual still includes unobserved effort and unobserved circumstance because we are still far from capturing all the determinants of income. Nevertheless, as shown in Section 4, the responsibility and non-responsibility factors explain about half of income inequality.

We thus estimate a classical Mincerian wage (y_i) equation, where the regressors are split into two categories, X_i^E and X_i^C , where E and C stand for effort (responsibility factors) and circumstances (non responsibility factors), respectively:

$$\log(y_i) = \beta_0 + \beta^E X_i^E + \beta^C X_i^C + \epsilon_i \quad (1)$$

We do not consider residuals as part of the effort variables set. Since the residuals could include some omitted circumstances we followed the method

proposed by Bjorklund et al. [3] which consists in splitting the residuals in a term which is standardized by standard error conditional on circumstances, and an heteroskedastic term depending on circumstances². Since the dependence of the heteroskedastic term on circumstances was close to zero, we do not include this additional term in our specification for the rest of the paper.

As regards the potential correlation of effort and circumstance variables, it is common to distinguish the direct effect of circumstances on the income and the indirect effect of circumstances, exerted through the correlation with the effort variables. We thus propose to measure ex-post inequality of opportunity according to the two views, one where effort is included as such (brut effort) and the other where effort is cleaned from its correlation with the circumstances (net effort).

To this end, we regress each effort variable on the set of circumstances and the residual of each of these equations corresponds to the net effort. For continuous variables, we proceed as follows:

$$\begin{aligned} X_i^E &= f(X_i^C) + \tilde{X}_i^E \\ X_i^E &= bX_i^C + \tilde{X}_i^E \end{aligned}$$

The net effort is simply $\tilde{X}_i^E$. For binary variables such as education or gender³, the latent variables underlying the binary outcomes are unobservable. By consequence, the residuals of the probit cannot be obtained. We thus replace it by their best predictions, called the generalised residuals, whose formula (see Jusot et al. [18] for details) is the following:

$$E(\tilde{X}^E|E) = \frac{\phi(bX^C)}{\Phi(bX^C)(1 - \Phi(bX^C))}(E - \Phi(bX^C))$$

where $E(.|E)$ is the expectation conditional on brut effort, $\phi(.)$ and $\Phi(.)$ are the normal density and cumulative density function of a $N(0, 1)$ (the residuals

²Bjorklund et al.'s decomposition is based on the following formulas:

$$\begin{aligned} Var(\epsilon_i|X^C) &= \sigma_c^2 \\ \epsilon_i &= \epsilon_i - \epsilon_i/\sigma_c + \epsilon_i/\sigma_c \\ \epsilon_i &= \tilde{\epsilon}_i^c + u_i \\ u_i &= \epsilon_i/\sigma_c \\ \log(y_i) &= f(X_i^E, X_i^C) + \tilde{\epsilon}_i^c + u_i \end{aligned}$$

We find no significant effects in our data.

³All the categorical variables are binary in this research paper, since we transformed the multicategorical ones into dummy variables.

are assumed to be normally distributed). Therefore, we estimate two wage equations. The first wage equation is the one given by Equation 1 and the second one replaces the brut effort by the net effort as follows:

$$\log(y_i) = \beta'_0 + \beta'_E \tilde{X}_i^E + \beta'_C X_i^C + \epsilon_i$$

Where $\tilde{X}_i^E$ is the net effort (the residual of the effort variables regressed on circumstances).

Once we obtain the estimates, we define a situation of ex-post equality of opportunity by following the methodology developed by Almas et al. [1]. There is ex-post equality of opportunity if the individual receives a fair income that is the income due to the sole responsibility factors (and not to non-responsibility factors). This definition fulfills the conditions of ex-post equality of opportunity as income is a function of effort only.

We replicate all our results based on brut effort for net effort. Just replace X^E by $\tilde{X}^E$ in the next formulas to find the equivalent. So, the fair income based on brut effort is:

$$\log(y_i^F) = f(X_i^E) \quad (2)$$

$$y_i^F = \exp(\beta_0 + \beta X_i^E) \quad (3)$$

We replicate all our results for net effort by replacing the coming formulas E by $\tilde{E}$. The individual fair income y_i^F is then standardized so as to have the same average as the actual income.

$$y_i^F = \frac{\exp(\beta_0 + \beta X_i^E)}{\sum_j \exp(\beta_0 + \beta X_j^E)} \sum_j y_j \quad (4)$$

As a result, the standardized fair income (onwards it stands for the fair income) depends on the non-responsibility factors of the whole population and on the own individual's responsibility factors. This fair income is based on the general proportionality principle⁴ and proportional to the effort exerted by the individual.

Many statistics, such as the Gini, Theil and General Entropy indexes, are quite standard to summarize and measure inequality of opportunity. Here, we now use a new version of the Gini Index, as generalized by Almas et al. [1] to

⁴The generalized proportionality allocation has been characterized as a compromise solution in the first best by Bossert [4]

capture unfair income inequality. The standard Gini, based on Lorenz curves implicitly compare actual incomes to average income. Here, the reference income is not the average income but the fair income and this fair income is not necessarily an equal income because differences in effort justify income inequality. Almas et al. [1] thus propose an unfair Gini where the actual incomes are compared to fair incomes ⁵. The distance between the actual income and the fair income is a measure of unfairness in the distribution of the individuals' income. They formulate the unfair Gini as follows:

$$G^u(A) = \frac{2}{n(n-1)\mu(A)} \sum_i i(y_i - y_i^F) \quad (5)$$

$$\mu(A) = n^{-1} \sum_i y_i \quad (6)$$

$$A = [(y_1, y_1^F), \dots, (y_n, y_n^F)] \quad (7)$$

The unfair Gini is not derived from the standard Gini (based on actual incomes). Indeed, incomes are sorted according to an ascending order to compute the standard Gini. Instead, the unfair Gini orders the individuals according to the distance between the own actual income and the own fair income (from negative values to positive values). This gives no guarantee that individuals are ordered identically under both statistics. As a consequence, we do not obtain here a decomposition of the standard Gini between an unfair Gini and a residual part. Instead, we have an original measure of inequality where the reference income to assess inequality is not anymore the mean income but the fair income.

The measures of fairness are obtained for each region separately. To this end, we regress the wage equation on a same set of circumstances and effort variables for each region separately. There is equality of opportunity in each region if the circumstances are found not to explain income inequality. We also can check by how much effort is rewarded across regions.

Firstly, we regress wage on effort and circumstance for each region separately. Then, we obtain a distribution of fair income per region and an unfair Gini per region based on the regional regressions. We do not define the fair income nationally in order to maintain the heterogeneity among regions regarding the impact of circumstances and the way each region rewards effort. This heterogeneity may be observed because regions have distinct economic

⁵The properties of the index are available in the paper by Almas et al. [1]. It is worth noting that while the Gini index satisfies full symmetry, the unfair Gini satisfies partial symmetry.

histories and this may impact on the effect of circumstances. Because people across regions may have distinct preferences, the reward schemes may vary. Also, the impact of effort variables on income may be driven by market forces. This may reflect the relative abundance/scarcity of human capital, some specific sectorial needs and so on. If this is true, the state should take it into account when designing policies aiming at reducing unfair inequalities. An alternative would be to perform an analysis per department. As the departments that belong to the same regions are homogeneous in terms of cultures, we rather focus on regions in order to have more data for each region. For these reasons, we consider that we should not assume a priori that the national fair income should be unique, therefore we prefer to be agnostic regarding the national fair income.

Another consequence of this choice is that the regional fair income may be unequal and this is not unfair. We think that people within a country such as France are responsible for their decision of moving from one region to another one in the sense that people have, at least partially, control on this variable. Given the fair income depends only on effort variables, the differences in fair income across regions are explained by differences in reward schemes. Therefore, if people move to regions where their effort are more rewarded, according to the theory of equality of opportunity, inequalities in fair income across regions are fair. On the contrary, whatever the region, the effect of circumstance on income is unfair, thus it should be removed in all the regions. Moreover, the effect of circumstance may differ across regions, thus this analysis may help to design redistribution policies that would take these differences into account.

Defining a distribution of fair income per region has a cost: we have less observations per region and this may alter the significance of the estimates. In addition, we do not have a unique fair income distribution to display but 21 distributions.

Finally, the residual in this earning equation explains about half the income inequality. Obviously, this residual includes effort as well as circumstance variables and it is impossible to disentangle between both determinants. Like other papers that use earnings equations, we include the residual into the circumstance set [1, 5]. We think this is also more appropriate in the context of our study because we study to which extent individuals who exert the same effort obtain the same outcome with a direct measure of effort. Because we cannot capture any direct effort through the residual, it is included into the circumstance set. Then, we will not obtain a lower bound for inequality

of opportunity. Fair inequalities will be due to differences in education, experience, sector of activity and working hours only.

3 Data

The data come from the 2005 EU-SILC (European Survey on Income and Life Conditions) data set from France. This data set has been designed at the European level and implemented by INSEE for France. We take the year 2005 because this module contains detailed information about indicators of effort, family background and income.

The dataset contains two parts, the first one contains information on households, the second one concerns individuals. For our purpose, we take the module of the survey that is addressed to individuals, since inequality of opportunity refers to inequality between individuals and not between groups of individuals. Moreover, it would be much more challenging to define the concept of effort and circumstance for households.

Concerning the sample, we select individuals who are between 25 and 65 years-old, who were wage earners, worked full-time during the 12 months in 2004 and did not change their jobs between 2004 and 2005. These restrictions are partly imposed by the data set: questions about the sector of activity refer to the year 2005 but incomes refer to 2004. Therefore, we select people who did not change their professional situation to keep the information about the sector of activity.⁶ We restrict our sample to individuals between 25 and 65 years-old to focus on individuals who are more likely to be active and we avoid people being at the very beginning and very end of their professional career. Finally, because the income of self-employed is not clearly identifiable, we select wage earners only. We obtain in total 4279 observations. Details on the variables and on the sample are provided in Table 1 and Figure 1.

INSERT TABLE 1 HERE

INSERT FIGURE 1 HERE

⁶This constraint could bias our result if job mobility is correlated with effort but the sign of the correlation is not clear. On the one hand, individuals, the youngest in particular often progress by changing jobs. On the other hand, those who exert less effort are more likely to change jobs in order to benefit from unemployment benefits and are more likely to be fired. Therefore, to the extent that the sign of the bias is not clearly identifiable, we maintain this choice.

We split our sample into 21 regions. The actual number of regions in France is 27 but the survey does not separate Corse and Provence-Alpes-Cotes-d’Azur (PACA) such that we have to proceed in the same way and no data is available for the 5 overseas regions.

The dependent variable is the gross labor income. We do not include capital income in order not to mix two dimensions of equality of opportunity and we take the gross earnings to measure by how much the labor market on its own generates ex-post inequality of opportunity. As a consequence, our analysis is restricted to ex-post inequality of opportunity among employed individuals before the state operates any redistribution. Thus it is not an analysis concerning the whole adult population.

For the circumstance variables, we take father’s education, financial problems during adolescence, gender and age. Parental education is often used in empirical analysis as a circumstance [6, 15, 20, 7]. Here, father’s education takes 4 values according to the highest diploma obtained by the father (see Table 1). Financial problems during adolescence is a dummy that indicates whether or not the individual’s family faced financial difficulties when he was between 12 and 16 years old. We include this variable in order to complement the information on family background as we consider this may measure the economic capital whereas father’s education indicates human capital. Gender is included as a circumstance because we control for working hours. So, even if women may tend to prefer more leisure [12] and so tend to work less hours, because we control for this, gender should not be a determinant of inequalities. We adopt the same view for age: we consider two individuals with the same working experience should not obtain a distinct income whatever their age, because we control for experience, age is included as a circumstance variable.

Effort is defined by a set of variables: individual’s education, years of experience, sector of activity and weekly working hours (see Table 1 for complementary information). Individual’s education is a categorical variable. It takes 6 values that depend on the highest level of education attained by the individual. This variable, although correlated with father’s education is in general considered as an effort variable [1, 6] because the individual is at least partly responsible for it. Moreover, we will clean for this correlation when using the net measure of effort.

Years of experience corresponds to the years the individual spent in paid jobs. As a result, this is an indicator of generic professional capital as it

is not asked specifically the number of years spent in the sector of activity where the individuals works at the time.

Sector of activity takes 5 values and corresponds to the sector in which the individual works. Considering this variable as being an effort variable is disputable: labor market restrictions may impose constraint on individual's choice concerning the sector of activity. But to the extent that individuals have at least a partial control on their sector of activity, we consider this is a effort variable.

Lastly, the weekly working hours correspond to the hours per week an individual worked in his job. In the survey, the individuals are not asked to declare the official weekly working hours but the number of effective working hours they usually spend working in a week. This variable should be an indicator of dedication at work. But in this way, we do not account for the fact that working hours, and specially part-time jobs can be imposed.

More descriptive statistics concerning the frequencies of the variable per region for categorical variables, the mean and variance for continous variables are reported in Tables 1 and 2. In a nutshell, all the variables cited above have been commonly used in the literature on equality of opportunity. Almas et al. [1] as well Bourguignon et al. [5] for instance also use indicators of working hours, level of education, gender and sector of activity (public vs private). For France, mainly Lefranc et al. [19, 20, 21] have worked on inequality of opportunity from the ex-ante perspective using stochastic dominance tools. Therefore they use only one circumstance, the occupation of the father. Also, because they adopt a long term perspective, they use the Household Budget Survey that is available from the seventies whereas the EU-SILC has been launched since 2004. This is a reason why our data are not directly comparable. The advantage of the EU-SILC survey is the fact that many indicators of effort are available and this is not the case for the Household Budget Survey. Moreover, Lefranc et al. have focused on the gross and disposable income, by including labour and asset income, and we focus on the gross labour income only.

INSERT TABLE 2 HERE

4 Results

4.1 Preliminary results

4.1.1 An overview of wage determinants in France

Wage equations show that the effect of circumstances is mostly significant. It is not our purpose to develop these results and we refer to the Table 3 for more details. Nevertheless, we notice some interesting points.⁷

Father's education has a significant impact on offspring's education when the offspring has achieved at least upper secondary school. In this case, more educated fathers grow more educated children. Also, education depends on financial problems: if the family faced financial problems during the adolescence, it increases the probability of having a low level of education. Instead, having financial problems during adolescence has a positive effect on experience. An explanation is that the years of experience is negatively correlated with education, since individuals stop studying and enter the labour market. Concerning working hours, it depends significantly on father's education and on gender. As expected, men tend to work more hours than women do and more educated people tend to work more.

As a consequence, when turning to the national regression, coefficients vary when taking the brut or net measure of effort. As expected with the results of the effort equations, when taking the net effort (the one that is cleaned from the correlation with circumstance), the significance and the magnitude of the parameters of circumstance and effort respectively increase and decrease. Actually, we provide the wage regression at a national level in order to check for the significance of the parameters when we have a large number of observations (4279). Table 4 presents the results.

In a nutshell, we obtain that the explanatory variables explain around 41% of income inequality. And if we decompose the R squared, we obtain that 34% of income inequality is explained by the effort variables and 7% by circumstances. Our indicators of effort provide a good explanation of income inequality. Also, almost all the coefficients are significant and of expected

⁷We make a national regression to purge the effort variables from their correlation with circumstances. This may appear as inconsistent with our explanations to motivate a regional analysis. Nevertheless, we choose this option due to data constraints. Regional regression of effort variables often give very unprecise coefficient because the number of observations is limited in some regions. Thus, by doing a national regression, we get a national measure of net effort but this is a more precise measure.

sign. Only the fact of having accomplished primary school or not having any diploma does not make any difference and financial problem becomes significant only when using the net measure of effort. When turning to the rest of the variables, we observe that father’s education and age have a positive impact on income as well as being a men and working in a sector that is not agriculture. Also education is highly significant and has a increasing impact on income as the level of education increases. Experience does not present non linearity but still has a positive impact on earnings as well as the number of working hours. This national regression does not present any unexpected results, on the contrary, it is consistent with classical results in the literature and confirms the hypothesis of the presence of inequality of opportunity in France. At a national level, inequality of opportunity is mainly due to the impact of gender and father’s education and in a lower extent to age and financial problems.

INSERT TABLE 3 HERE

INSERT TABLE 4 HERE

4.1.2 A regional analysis is relevant

Our point to compare regions is related to the possible heterogeneity characterizing the French regions. A first satisfactory result is that regional dummies added to the wage equation are strongly significant (see Equation 1). Moreover, we also find that these regional differences are not due to different sectorial endowments of the regions because interaction terms between sectors and regions do not remove the significance of region specific dummies⁸. This confirms a first intuition according to which there is heterogeneity in income inequality across regions in France.

When turning to the regional equation results displayed in the Tables 5, 6, 7 and 8, we first observe that coefficients have lower significance compared to the national regression. A possible explanation is the sample size, smaller for the regions.

Regarding the circumstances, we show that they do not affect income inequality equally across regions. Firstly, despite of the small sample size, the variables “age”, “gender” and “having a father who went to the university” are circumstances that are almost always significant and have a positive

⁸Results are not reported but available upon request.

impact on earnings. But their impact is very different from one region to another. Indeed, when taking into account only the significant coefficients, the coefficient “gender” varies between 0.094 for Lorraine and 0.285 for Auvergne. The effect of gender in Auvergne is three times as much as in Lorraine once we controlled for all the other sources of income inequality. The Figure 2 shows the variation in the coefficients across regions. The same difference is observed for the effect of father’s education. By comparing only significant coefficients, the effect of having a father who went to the university with respect to a father with no diploma is the smallest in PACA-Corse with a coefficient equal to 0.366 and the effect is the largest for Limousin with a coefficient equal to 0.832. The Tables 5, 6, 7 and 8 order the region in increasing order of income level (the first table contains the poorest regions), and the smallest and largest effects have been found for the half poorest regions, therefore we cannot conclude that income level might explain the variation in the impact of unfair sources of inequalities. Finally, financial problem has a very small impact on earnings, even in Ile de France. The explanation cannot be the small sample size. As a conclusion, the transmission of advantages seem to be better captured by the human capital rather than the economic capital of the family.

When turning to the effect of effort variables, we first observe that regions do not reward equally effort. Working in a sector or another does not appear to have a significant impact on earnings⁹ as for half the regions, not even one coefficient is significantly different from zero. On the contrary, the other effort variables are often significant, especially “working hours”, “experience” and “education” (precisely the dummies that indicates that the individual achieved at least upper secondary education). This shows how much our indicators of effort are powerful in explaining income inequality and this justifies our direct measure of effort. In addition, we also obtain a great variation in the reward schemes across regions. The Figure 2 displays the effect of education and working hours on the earnings. The impact of having lower tertiary education varies between 0.073 in Nord-Pas-de-Calais and 0.314 in Limousin. The same large difference is observed for “working hours” whose impact goes from 0.07 in Nord-Pas-de-Calais to 0.036 in Champagne-Ardenne.

As a conclusion for these first results, we obtain that circumstances have in France a direct and also an indirect effect on effort. Even though the sources of unfair inequalities are in general the same across regions, the impact of

⁹We reproduce the results by changing the reference sector and obtain similar results, they are available upon request.

each source is very distinct from one region to another one. This would justify a regional approach for the design of redistribution policies. Concerning fair inequalities, the reward schemes are not the same across regions but this is not a concern in this analysis. In order to analyse to which extent regions differ in terms of ex post inequality of opportunity, we turn to the comparison of the unfair Gini.

INSERT FIGURE 2 HERE

INSERT TABLE 5 HERE

INSERT TABLE 6 HERE

INSERT TABLE 7 HERE

INSERT TABLE 8 HERE

4.2 Standard Gini versus unfair Gini

In almost all regions, the unfair Gini is smaller than the standard Gini (the Gini reduces from 0.27 to 0.22). This first result means that the distribution of actual income is closer to the distribution of fair income rather than to the egalitarian distribution. In general the unfair Gini increases as we take a net effort and not the brut effort. This is explained by the fact that circumstance impact more on income when the effort is cleaned from the effect of circumstances. Nevertheless, the difference between the standard Gini (0.27) and the unfair Gini with the brut effort (“brut Gini”) (0.23) is bigger than the difference between the unfair “brut Gini” (0.23) and the unfair “net Gini” (0.22). It indicates that the indirect effect is relatively small with respect to the direct effect of circumstances.

In addition, when we turn to the analysis per region, the differences are very strong. Firstly, Ile de France is the unique region for which the unfair Gini is bigger than the standard Gini. It means that the income distribution is closer to the equal distribution than to the fair income distribution. The relationship between effort and income in Ile de France appears to be quite weak given these results. The same holds for Rhones Alpes where the unfair Gini is equal to the standard Gini. In addition, in these two regions only, the unfair Gini reduces when accounting for the net effort and not the brut effort. It makes sense to the extent that effort do not explain much income on average, therefore, the less effort we account for, the less inequality we

have in these regions.

For the rest of the regions, the unfair Gini is lower than the standard Gini but the difference between both measures is large. In 6 regions the unfair Gini becomes lower than 0.1. This means that actually, when using the theory of equality of opportunity, unfair inequalities are very small, so few redistribution is needed. Instead, in 5 regions, the unfair Gini is smaller than the standard Gini by less than 25%. As a consequence, much more redistribution should be required to reach a situation of equality of opportunity.

A first important conclusion is that when turning to an ex-post approach, differences in regions regarding the magnitude of inequality of opportunity definitely justify decentralized policies to reduce unfair inequalities. Also, it displays a suprising but interesting result concerning Ile de France: in the biggest region in terms of population and the richest part of this country, inequalities are bigger when using the concept of equal opportunities than when using the standard analysis.

Regarding the relationship between income inequality and inequality of opportunity, there are only three big changes in terms of rankings: Auvergne and Bourgogne that display high level of income inequality perform much better in terms of equality of opportunity. On the contrary, Alsace that has a quite low level of income inequality displays high level of inequality of opportunity. For the rest, the two first maps of France illustrated in Figure 3 show a strong correlation between income inequality and inequality of opportunity. Because the unfair Ginis are lower than the standard Ginis, the actual distribution of income is more fair than egalitarian. To explore further our case, we also show in Figure 3 the rankings of regions in terms of gross labour income: the correlation between income level and inequality of opportunity appears to be much weaker among the French regions. In the last subsection we propose to explain differences in income between one region and the rest of the regions by decomposing this difference between what is due to effort and what is due to circumstances. In this way, we should explain in further detail the differences in the unfair and fair inequalities across regions of France.

INSERT TABLE 9 HERE

INSERT FIGURE 3 HERE

4.3 Decomposing income inequalities across regions

Finally, we propose an Oaxaca decomposition [24] of income across regions in order to understand better what drives our results on the unfair Gini. To this end, we compare the average income in one region, say region j , with the average income in the rest of the regions, say regions $-j$, and explain these differences by the effect due to “endowments”, “coefficients” and the interaction between coefficients and endowments. The decomposition is formalized as follows:

$$\begin{aligned}
 \log(y^j) - \log(y^{-j}) &= \Delta X^E \beta_{-j}^E + \Delta X^C \beta_{-j}^C \\
 &\quad + \Delta \beta^E X_{-j}^E + \Delta \beta^C X_{-j}^C \\
 &\quad + \Delta X^E \Delta \beta^E + \Delta X^C \Delta \beta^C \\
 \Delta X^k &= X_j^k - X_{-j}^k \\
 \Delta \beta^k &= \beta_j^k - \beta_{-j}^k \\
 k &= E, C
 \end{aligned}$$

With this decomposition, we can explain if differences in the mean income are driven by differences in circumstances or effort. And for each of these two kinds of variables, we decompose the difference between what is due to the distribution of the variables in the region with respect to the other ones and what is due to the impact of the variable on income. This decomposition does not provide a decomposition of the unfair Gini. Nevertheless, it gives a better understanding of the role of circumstances and effort in explaining differences between regions. In this way, it provides complementary conclusions concerning ex-post inequality of opportunity. The results are given in the Tables 10 and 11.

Our conclusions depend strongly on the measure of effort we adopt. If we focus on the brut measure of effort, we would conclude the following:

In Ile de France whose average income is higher than the average income of the other regions, we find that the role of circumstance plays against this difference in the sense that Ile de France has circumstances that impact negatively on its average income. The distribution of effort and its impact on income is what explained the superior average income of this region. The explanation that conciliates this finding with our previous results on the unfair Gini is the fact that the highest income are located in Ile de France and they are not well explained by the effort variables. This makes the unfair Gini to be big. But if we would exclude the very high incomes not explained by effort, the rest of the population of Ile de France earn more with respect to

the rest because they exert more effort and because the reward scheme is different: the effort variables are much more rewarded than in the rest of France.

The same is true for Rhones Alpes. Given we also find similarities between both regions in terms of the unfair Gini, this analysis allows us to group these two regions together. These two regions have large income inequality and large ex-post inequality of opportunity. Their higher level of income with respect to the rest of France are due to the impact of effort variables measured in brut terms, and to a lower extent it is due to better endowments in effort. The effect of circumstances is negative in both regions.

However, if we take the net measure of effort, the conclusions are very different. In both regions, the impact of circumstances become positive and this comes from the coefficients of circumstances. This means that, when we clean the effort from its correlation with circumstances, circumstances turn to explain most of inequalities in income between Ile de France (and Rhones-Alpes to a lower extent) and the rest of France. And this is compatible with our findings on the unfair Gini in both regions. What makes the unfair Gini so high in these regions is the correlation between circumstances and effort and the impact of circumstances on income. These regions exert also more effort but the differences on effort explain less the gap in income than the differences in circumstances when considering the net effort.

The third region that has a higher income than the rest of France is Alsace. In this case, this higher income is due to differences in circumstances when we take the brut and net measure of effort. The distribution of circumstances and the impact of circumstance explain why Alsace has a higher level of income with respect to the other regions when taking the net measure of effort. Moreover, the effect of effort endowments is negative which means that Alsace display a lower level of net effort than the rest of the regions. We observe exactly the opposite for the fourth region with a higher income than the rest of France: In Haute Normandie, the higher income is explained by effort and not by circumstances.

The other regions have a lower income than the rest of the regions in France. When we take the decomposition made with the brut effort, the effect of circumstance is positive but it turns to be negative when taking the net effort. This indicates that circumstance are negatively correlated with effort in these regions. With the net measure of effort, we conclude that regions that have a lower income than the rest of regions are composed of individuals with lower circumstance and exerting a lower degree of effort because the differences in

the endowments in circumstance and the differences in the endowments in effort are both slightly negative. Then, regarding the effect of the coefficients, it is more difficult to find a common pattern for all the regions. This shows that the impact of circumstances and effort on income are distinct across regions. Nevertheless, when we consider the decomposition made with the net effort, it seems that in most of these regions, the impact of circumstances on income explain more the difference in income than the impact of effort on income.

INSERT TABLE 10 HERE

INSERT TABLE 11 HERE

5 Conclusions

In this paper, we aimed to analyze inequality of opportunity across the French regions by following an ex-post approach to better consider the effort. To this end, we used a French data set that includes several indicators of effort and explain income inequalities by differences in responsibility and non-responsibility factors. We define the fair income by using Almas et al. methodology [1] and measure the magnitude of ex post inequality of opportunity in each region by the distance between the actual income and the fair income. Finally, we use Oaxaca decomposition to further explore the sources of unfair inequalities and the heterogeneity in unfair inequalities across regions.

We find that regions do not reward effort equally. For instance, the effect of education is in some regions three times as much as in other regions. The same is true for the effect of circumstances on income for which large differences are displayed concerning the impact of gender and father's education. In total the unfair Gini goes from about 0.1 to 0.4 depending on the region. This allows us to conclude that unfair inequalities are not equally distributed across regions and this justifies our regional approach and this may even indicate that policies aiming to reduce inequality of opportunity should be designed at a decentralized level.

Moreover, when using the Oaxaca decomposition to explain the difference between the average income in one region and the average income in the rest of the regions, we obtain that differences are not explained by the same factors. Ile de France and Rhone-Alpes have higher income than the average because their endowments in circumstances and effort are better. On

the contrary, Alsace has also a higher income than the rest of France but this is only due to its better endowment in circumstances whereas the higher income in Champagne-Ardenne is explained by the fact that its inhabitants exert more effort. For the regions whose income is lower than the average in the rest of the regions, no common pattern can be identified. This exercise has been complementary to the comparison between the unfair Gini to the extent that it helps to better understand the differences in unfair inequalities across regions.

Finally, the ranking of regions in terms of ex-post inequality of opportunity is found to be similar to the ranking in terms of income inequality which confirm previous results given in the literature, but no similar correlation appears between inequality of opportunity and income level.

References

- [1] ALMAS I., CAPPELEN A.W., LIND J.T., SORENSEN, E.O., TUNGODDEN B.: *Measuring unfair (in)equality*, Journal of Public Economics, 95(7-8), 488-499 (2011)
- [2] ARNESON R.J.: *Equality of opportunity for welfare*, Philosophical Studies, 56, 77-93 (1989)
- [3] BJORKLUND A., JANTTI M., ROEMER J.E.: *Equality of Opportunity and the Distribution of Long-Run Income in Sweden*, Institute for the Study of Labor (IZA), Discussion Papers 5466 (2011)
- [4] BOSSERT W.: *Redistribution mechanisms based on individual characteristics*, Mathematical Social Sciences, 29, 1-17.
- [5] BOURGUIGNON F., FERREIRA G.H., MENENDEZ M.: *Inequality of Outcomes and Inequality of Opportunities in Brazil*, DELTA (Ecole normale supérieure) Working Papers 24 (2003)
- [6] BOURGUIGNON F., FERREIRA G.H., MENENDEZ M.: *Inequality Of Opportunity In Brazil*, Review of Income and Wealth **53**(4) (2007) 585-618
- [7] CHECCHI D., PERAGINE, V., SERLENGA L.: *Fair and Unfair Income Inequalities in Europe*, Institute for the Study of Labor (IZA), 5025 (2010)
- [8] CHECCHI D., PERAGINE V.: *Regional Disparities and Inequality of Opportunity: The Case of Italy*, Institute for the Study of Labor (IZA), Discussion Papers 1874 (2005)
- [9] COGNEAU D., MESPLE-SOMPS S. : *Inequality of Opportunity for Income in Five Countries of Africa*, DIAL WP 04 (2008)
- [10] COHEN GA : *On the currency of egalitarian justice*, Ethics 99, 906-944 (1989)
- [11] COMBES P-P., LAFOURCADE M., THISSE J-F., TOUTAIN J-C : *The rise and fall of spatial inequalities in France: A long-run perspective*, Explorations in Economic History, Elsevier, 19(2), 243-271 (2011)
- [12] DECOSTER A., HAAN P.: *Empirical Welfare Analysis in Random Utility Models of Labour Supply* IZA Discussion Papers, 5301 (2010)

- [13] DEVAUX M., JUSOT F., TUBEUF S., TRANNOY A. : *Inequality of opportunities in health in France: a first pass*, Health Economics, 19(8), 921-938 (2010)
- [14] DEVOOGHT K.: *To Each the Same and to Each His Own. A Proposal to Measure Responsibility-Sensitive Income Inequality*, Economica, London School of Economics and Political Science, 75(298), 280-295 (2005)
- [15] FERREIRA G.H., GIGNOUX J.: *The measurement of inequality of opportunity : theory and an application to Latin America*, The World Bank, Policy Research WP4659 (2008)
- [16] FORSÉ M., PARODI M.: *La perception des Inégalités en France depuis dix ans*, Revue de l'OFCE 118 (2011)
- [17] GODECHOT O.: *Finance and the rise in inequalities in France*, Paris School of Economics WP 13 (2011)
- [18] JUSOT F., TUBEUF S., TRANNOY A. : *Effort or Circumstances: Does the Correlation Matter for Inequality of Opportunity in Health*, IRDES Document de travail 33 (2010)
- [19] LEFRANC, A., TRANNOY, A.: *Intergenerational earnings mobility in France: Is France more mobile than the US?*, IDEP Working Papers 0401 (2004)
- [20] LEFRANC, A., PISTOLESI, N., TRANNOY, A.: *Inequality of Opportunities versus Inequality of Outcomes: Are Western Societies all alike?*, Review of Income and Wealth, 54(4), 513-546 (2008)
- [21] LEFRANC A., PISTOLESI N., TRANNOY A.: *Equality of Opportunity and luck: Definitions and testable conditions, with an application to Income in France*, Journal of Public Economics, 93, 1189-1207 (2009)
- [22] MARTIN P.: *The geography of inequalities in Europe*, Swedish Economic Policy Review, 12, 83-108 (2005)
- [23] NIAZ A., YALONETZKY G.: *Inequality of Educational Opportunity in India: Changes over Time and across States*, IZA Discussion Papers 5146 (2010)
- [24] OAXACA, R.: *Male-Female Wage Differentials in Urban Labor Markets*, International Economic Review, Department of Economics, University of Pennsylvania and Osaka University Institute of Social and Economic Research Association, 14(3), 693-709 (1973)

- [25] PERAGINE V.: *Measuring and implementing equality of opportunity for income*, Social Choice and Welfare, 22(1), 187-210 (2004)
- [26] PISTOLESI N.: *Inequality of opportunity in the land of opportunities, 1968-2001?*, Journal of Economic Inequality, 7(4), 411-433 (2009)
- [27] ROEMER J.E.: *To What Extent Do Fiscal Regimes Equalize Opportunities for Income Acquisition among citizens?*, Journal of Public Economics, 87, 539-565 (2003)
- [28] ROEMER J.E.: *Equality of Opportunity*, Harvard: Harvard University Press (1998).
- [29] SWIFT A.: *Justice, luck, and the family: the intergenerational transmission of economic advantage from a normative perspective*, In S. Bowles, H. Gintis, and M. Osborne Groves (Eds.), Unequal chances: family background and economic success, 256-276, Princeton University Press (2005).
- [30] VAN DE GAER D.: *Investment in Human Capital and Equality of Opportunity*, doctoral dissertation, KULeuven, Leuven (1993)

Tables and Figures

Table 1: Description of the variables

Name	Format	Values	Category
Gross labour income	Numerical	[3,055;271,962]	Dep. variable
Age	Numerical	[25;65]	Circumstance
Gender	Dummy	0: Woman 1: Man	Circumstance
Father's education	Categorical	1: lower than 1ary education 2: 1ary education 3: 2ary education 4: 3ary education	Circumstance
Financial problems during adolescence	Categorical	0: Never or few 1: More than few	Circumstance
Weekly working hours	Numerical	[11,97]	Effort
Years of experience	Numerical	[0,49]	Effort
Individual's education	Categorical	1: Uncomplete 1ary 2: Complete 1ary 3: Complete lower 2ary 4: Complete upper 2ary 5: Complete lower 3ary 6: Ms.C, Ph.D.	Effort
Sector of activity	Categorical	1: Agriculture 2: Energy and Industry 3: Construction 4: Services 5: Public sector	Effort

Table 2: Summary statistics

Variable	Mean	Std. Dev.
Gross labour income	29,852	18,357
Worked hours	39.7	8.1
Age	42.6	9.3
Years of experience	21.5	10.5
Years of experience squared	573.7	470.5
Observations	4279	

Table 3: Regression of effort on circumstances

Circ	Probit Ind	Probit Constr	Probit Serv	Probit Public	Probit Edulary	Probit Low2ary	Probit Up2ary	Probit Low3ary	Probit PhD	OLS Expcr	OLS Wk hrs
fathed1ary	0.088 [0.869]	-0.196 [1.632]	-0.109 [1.135]	0.125 [1.267]	0.402*** [3.410]	0.266* [1.784]	0.44*** [4.716]	0.042 [0.395]	-0.221 [1.091]	-0.411 [0.563]	1.063* [1.848]
fathed2ary	-0.095 [0.893]	-0.36*** [2.755]	-0.013 [0.132]	0.261** [2.553]	-0.031 [0.219]	0.104 [0.665]	0.26*** [2.601]	0.50*** [4.524]	0.243 [1.196]	-5.50*** [7.268]	1.78*** [2.962]
fathed3ary	-0.21* [1.660]	-0.61*** [3.594]	-0.033 [0.290]	0.436*** [3.768]		-0.133 [0.698]	-0.44*** [3.791]	1.00*** [8.184]	1.00*** [4.806]	-7.87*** [9.082]	4.31*** [6.275]
F in prob	-0.006 [0.136]	0.111* [1.808]	-0.081* [1.942]	0.023 [0.547]	0.187*** [2.642]	0.098 [1.634]	0.10*** [2.603]	-0.25*** [5.871]	-0.081 [0.972]	1.42*** [4.503]	0.131 [0.527]
Gender	0.51*** [11.077]	0.875*** [10.948]	0.120*** [2.873]	-0.77*** [18.879]	0.079 [1.098]	-0.083 [1.391]	0.19*** [4.864]	-0.26*** [6.244]	-0.021 [0.268]	1.15*** [3.675]	3.22*** [13.012]
Age	-0.001* [1.732]	-0.004 [1.287]	-0.01*** [5.073]	0.02*** [7.197]	0.06*** [12.196]	0.01*** [4.294]	-0.01*** [2.904]	-0.02*** [6.686]	0.01*** [3.124]		0.04*** [3.192]
Constant	-0.90*** [5.863]	-1.70*** [8.255]	-0.033 [0.233]	-0.72*** [5.007]	-4.76*** [17.279]	-2.29*** [10.354]	-0.33*** [2.401]	0.135 [0.909]	-2.5*** [8.894]	22.9*** [29.913]	34.4*** [40.252]
Obs.	4279	4279	4279	4279	4279	4279	4279	4279	4279	4279	4279
R-squared										0.089	0.05

Notes. Absolute value of t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Wage Equation - National level

Variables	Brut effort		Net effort	
Father's education: 1ary	0.083***	[3.187]	0.132***	[5.066]
Father's education: 2ary	0.131***	[4.796]	0.242***	[8.646]
Father's education: 3ary	0.198***	[6.226]	0.464***	[14.569]
Financial problems during adolescence	0.001	[0.109]	-0.034***	[2.982]
Gender	0.165***	[13.747]	0.195***	[17.525]
Age	0.008***	[5.294]	0.006***	[4.224]
Industry	0.258***	[5.150]	0.126***	[4.580]
Construction	0.158***	[3.000]	0.059**	[2.359]
Services	0.233***	[4.680]	0.114***	[4.017]
Public sector	0.124**	[2.481]	0.049*	[1.704]
Education: 1ary	0.003	[0.092]	0.006	[0.399]
Education: low 2ary	0.169***	[6.019]	0.088***	[6.442]
Education: up 2ary	0.197***	[9.491]	0.128***	[10.145]
Education: low 3ary	0.566***	[25.141]	0.339***	[25.594]
Education: Ph.D	0.867***	[23.622]	0.394***	[23.628]
Experience	0.028***	[11.137]	0.007***	[5.197]
Experience squared	-0.000***	[9.709]	-0.000***	[6.169]
Weekly working hours	0.011***	[16.140]	0.011***	[15.854]
Constant	8.381***	[110.046]	9.665***	[136.676]
Observations	4279		4279	
R-squared	0.415		0.408	

Notes. Absolute value of t statistics in brackets. * significant at 10%; ** significant at 5%;
*** significant at 1%

Table 5: Wage Equation - Regions 1/4

	Langued-Rouss		Nrd-P-d-Calais		Picardie		Limousin		Lorraine		Basse-Norm.	
	Brut	Net	Brut	Net	Brut	Net	Brut	Net	Brut	Net	Brut	Net
Fathed1ary	0.263 [1.237]	0.324 [1.551]	-0.052 [0.490]	0.001 [0.006]	-0.284 [1.364]	-0.234 [1.126]	-0.059 [0.301]	0.092 [0.500]	0.158* [1.918]	0.217** [2.607]	-0.122 [1.391]	-0.183** [2.020]
Fathed2ary	0.285 [1.279]	0.368* [1.743]	-0.02 [0.182]	0.11 [0.998]	-0.194 [0.888]	-0.126 [0.561]	0.061 [0.301]	0.367* [1.763]	0.129 [1.390]	0.243** [2.287]		
Fathed3ary	0.546** [2.158]	0.693*** [3.000]	-0.123 [0.967]	0.208 [1.619]	-0.012 [0.663]	0.182 [0.663]	0.383 [1.609]	0.832*** [3.352]	0.142 [1.303]	0.366*** [3.161]	0.085 [0.330]	0.308 [1.161]
Fin prb ad	0.001 [0.008]	-0.032 [0.352]	-0.009 [0.253]	-0.044 [1.227]	0.001 [0.023]	-0.015 [0.234]	0.016 [0.202]	-0.05 [0.592]	0.065 [1.547]	0.03 [0.690]	-0.056 [0.756]	-0.091 [1.185]
Gender	0.227** [2.552]	0.262*** [3.057]	0.176*** [4.217]	0.200*** [5.404]	0.234*** [3.290]	0.262*** [4.048]	0.055 [0.712]	0.108 [1.406]	0.058 [1.077]	0.094* [1.948]	0.161** [1.998]	0.141* [1.905]
Age	0.002 [0.251]	0.003 [0.393]	0.007 [1.508]	0.006 [1.295]	-0.001 [0.092]	-0.002 [0.243]	0.031* [1.986]	0.038** [2.305]	0.01 [1.127]	0.005 [0.613]	0.013* [1.677]	0.009 [1.063]
Industry	0.548* [1.834]	0.231 [1.310]	0.141 [0.789]	0.022 [0.226]	0.29 [1.419]	0.15 [1.280]	0.370* [1.759]	0.227* [1.841]	0.118 [0.646]	0.12 [1.192]	0.097 [0.444]	0.037 [0.288]
Constr	0.107 [0.349]	0.009 [0.055]	0.065 [0.347]	-0.019 [0.215]	0.065 [0.303]	0.023 [0.217]	0.787** [2.533]	0.384** [2.423]	-0.001 [0.491]	-0.076 [0.15]	-0.059 [0.291]	-0.028 [0.428]
Services	0.16 [0.548]	0.018 [0.099]	0.144 [0.796]	0.026 [0.252]	0.355* [1.698]	0.198 [1.613]	0.316 [1.483]	0.182 [1.404]	0.108 [0.593]	0.115 [1.124]	0.213 [0.950]	0.098 [0.718]
Public	0.205 [0.700]	0.049 [0.261]	0.084 [0.461]	-0.011 [0.110]	0.187 [0.875]	0.098 [0.767]	0.277 [1.343]	0.182 [1.432]	-0.064 [0.356]	0.013 [0.127]	0.037 [0.168]	-0.005 [0.033]
Edu1ary	-0.036 [0.150]	0.031 [0.248]	-0.026 [0.255]	-0.024 [0.484]	0.159 [1.117]	0.112 [1.628]	0.371 [1.523]	0.165 [1.396]	-0.045 [0.407]	-0.035 [0.700]	-0.164 [1.082]	-0.09 [1.141]
Lower2ary	0.089 [0.356]	0.084 [0.638]	0.163* [1.805]	0.075* [1.765]	0.164 [1.338]	0.091 [1.539]	0.501** [2.502]	0.240** [2.449]	0.299** [2.527]	0.134** [0.917]	0.163 [0.961]	0.088 [0.185**]
Upper2ary	0.178 [1.005]	0.16 [0.445]	0.123* [1.765]	0.073* [1.719]	0.192** [2.324]	0.132** [2.602]	0.534*** [3.099]	0.314*** [2.840]	0.291*** [4.011]	0.171*** [3.855]	0.286** [2.309]	0.185** [2.324]
Lower3ary	0.393** [2.017]	0.269** [2.343]	0.556*** [7.139]	0.324*** [7.184]	0.479*** [3.609]	0.306*** [3.877]	0.772*** [4.013]	0.425*** [3.667]	0.676*** [7.815]	0.400*** [7.716]	0.723*** [5.283]	0.441*** [5.228]
PhD	0.799*** [3.151]	0.424*** [3.551]	0.911*** [7.600]	0.401*** [7.832]	1.202*** [3.396]	0.449*** [3.445]	1.991*** [6.048]	0.707*** [5.636]	0.462*** [2.904]	0.199*** [2.781]	1.197*** [3.257]	0.506*** [3.119]
Experience	0.051*** [3.105]	-0.002 [0.540]	0.011 [1.282]	0.017*** [6.112]	0.032** [2.140]	0.012 [2.013]	0.037 [1.659]	0.015** [1.175]	0.005 [0.500]	0.008 [0.971]	0.041** [2.498]	0.009 [1.306]
Experience2	-0.001*** [2.898]	-0.001* [1.686]	0 [0.502]	0 [0.419]	0 [1.630]	0 [1.615]	-0.001*** [3.008]	-0.001** [2.029]	0 [0.171]	0 [0.116]	-0.001** [2.103]	0 [1.065]
Wrkng hours	-0.001 [0.145]	0.006 [0.710]	0.016*** [5.965]	0.007* [1.684]	0.007* [1.968]	0.007** [1.382]	0.012 [1.657]	-0.017 [2.036]	0.012*** [3.123]	0.012*** [3.126]	0.007** [2.014]	0.007* [1.864]
Constant	8.605*** [20.560]	9.520*** [22.699]	8.596*** [31.455]	9.755*** [40.292]	9.034*** [21.024]	10.333*** [20.934]	7.207*** [12.030]	8.368*** [11.291]	8.561*** [24.553]	9.678*** [23.753]	8.372*** [20.029]	9.897*** [29.396]
Observ.	117	117	311	311	135	135	56	56	153	153	93	93
R-squared	0.409	0.374	0.525	0.529	0.411	0.411	0.741	0.724	0.544	0.542	0.574	0.552

Notes. Absolute value of t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Brut and Net refer to brut and net versions of effort.

Table 6: Wage Equation - Regions 2/4

	Auvergne		Poit-Charente		PACAC		Franche-Comté, L ₂		Bourgogne	
	Brut	Net	Brut	Net	Brut	Net	Brut	Net	Brut	Net
Fathed1ary	0.209 [0.446]	0.164 [0.354]	-0.07 [1.091]	-0.170** [2.455]	0.009 [0.110]	0.052 [0.645]	0.111 [0.321]	0.063 [1.522]	-0.293 [1.522]	-0.228 [1.281]
Fathed2ary	0.121 [0.255]	0.097 [0.199]			0.056 [0.654]	0.164* [1.848]	0.112 [0.620]	0.205 [0.851]	-0.244 [1.219]	-0.068 [0.365]
Fathed3ary	0.27 [0.503]	0.347 [0.631]	0.096 [0.567]	0.259 [1.649]	-0.003 [0.035]	0.268*** [2.725]	0.353 [1.848]	1.248 [1.003]	-0.255 [1.017]	0.05 [0.211]
Fin prb ado	0.091 [0.927]	0.049 [0.501]	-0.004 [0.947]	-0.053 [0.947]	-0.019 [0.456]	-0.06 [1.456]	0.001 [0.421]	0.120* [0.663]	0.076 [1.111]	
Gender	0.2857*** [2.762]	0.257*** [2.653]	0.018 [0.971]	0.085 [1.523]	0.183*** [4.230]	0.184*** [4.640]	0.240*** [3.387]	0.229*** [3.214]	0.039 [0.530]	0.038 [0.569]
Age	-0.006 [0.356]	-0.006 [0.351]	0.018** [2.420]	0.019** [2.525]	0.008* [1.692]	0.008* [1.710]	-0.01 [1.125]	-0.009 [0.731]	0.011 [0.933]	0.012 [0.997]
Industry	0.479* [1.881]	0.267* [1.810]	0.393 [1.841]	0.241 [1.340]	0.428*** [2.709]	0.217** [2.424]	-0.906*** [3.155]	-0.418** [2.601]	0.205 [0.867]	0.078 [0.611]
Constr	0.138 [0.534]	0.071 [0.547]	0.377 [1.131]	0.206 [1.323]	0.12 [0.709]	0.024 [0.293]	-0.927*** [3.102]	-0.386** [2.515]	-0.015 [0.057]	-0.034 [0.278]
Services	0.424* [1.836]	0.248* [1.819]	0.385 [1.177]	0.239 [1.333]	0.22 [1.450]	0.093 [1.050]	-0.834*** [2.945]	-0.386** [2.353]	0.073 [0.322]	0.007 [0.055]
Public	0.381 [1.625]	0.22 [1.541]	0.322 [0.981]	0.213 [1.150]	0.171 [1.135]	0.066 [0.742]	-0.957*** [3.377]	-0.464*** [2.800]	0.007 [0.030]	-0.032 [0.236]
Edu1ary	-0.028 [0.085]	0.045 [0.288]	0.102 [0.477]	0.08 [0.687]	0.121 [0.950]	0.05 [0.761]	0.111 [0.756]	0.08 [0.995]	0.411* [1.821]	0.199* [1.711]
Lower2ary	0.47 [1.433]	0.285* [1.781]	0.227 [1.639]	0.143** [2.110]	0.141 [1.380]	0.069 [1.410]	0.087 [0.418]	0.064 [0.618]	0.209 [1.038]	0.106 [1.091]
Upper2ary	0.228 [0.850]	0.208 [1.233]	0.197* [1.886]	0.150** [2.259]	0.185** [2.442]	0.114** [2.503]	0.196** [2.054]	0.139** [2.296]	0.227* [1.769]	0.147* [1.935]
Lower3ary	0.573** [2.120]	0.406** [2.495]	0.469*** [4.106]	0.299*** [4.302]	0.537*** [6.729]	0.316*** [6.761]	0.593*** [4.978]	0.376*** [5.179]	0.597*** [4.464]	0.367*** [4.666]
PhD	1.114*** [3.522]	0.494*** [3.774]	0.578* [1.906]	0.413** [2.309]	1.056*** [7.826]	0.474*** [7.733]			0.803*** [3.170]	0.323*** [3.133]
Experience	0.021 [0.823]	0.006 [1.335]	0.038*** [2.851]	-0.005 [4.729]	0.028*** [3.193]	0.004* [0.792]	0.036** [2.471]	0.023*** [0.045]	0.033 [1.591]	-0.006 [1.772]
Experience2	0 [0.154]	0 [0.128]	-0.001*** [3.594]	-0.001** [1.994]	-0.001*** [2.998]	-0.001*** [3.120]	0 [1.068]	0 [0.863]	-0.001** [2.332]	-0.001*** [3.045]
Wking hours	0.007 [1.510]	0.016 [1.063]	0.023*** [4.976]	0.023*** [0.706]	0.004* [1.775]	0.003 [0.837]	-0.001 [0.386]	0 [2.637]	0.010* [1.840]	0.009* [0.535]
Constant	8.487*** [10.178]	9.972*** [11.087]	7.523*** [15.844]	9.386*** [29.669]	8.723*** [35.543]	9.713*** [42.229]	10.327*** [20.876]	10.451*** [23.183]	8.785*** [18.646]	9.788*** [17.527]
Observ.	88	88	148	148	280	280	113	113	116	116
R-squared	0.499	0.5	0.482	0.452	0.457	0.458	0.403	0.389	0.408	0.426

Notes. Absolute value of t statistics in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%. Brut and Net refer to brut and net versions of effort.

Table 7: Wage Equation - Regions 3/4

	Bretagne		Midi-Pyrenees		Centre		Aquitaine		Haute-Normandie	
	Brut	Net	Brut	Net	Brut	Net	Brut	Net	Brut	Net
Fathed1ary	-0.027 [0.109]	0.062 [0.288]	0.136 [1.076]	0.155 [1.178]	0.119 [0.950]	0.133 [1.108]	0.201** [1.987]	0.262** [2.502]	-0.063 [0.230]	-0.017 [0.061]
Fathed2ary	0.051 [0.206]	0.197 [0.907]	0.043 [0.318]	0.149 [1.033]	0.135 [0.986]	0.203 [1.540]	0.179* [1.729]	0.318*** [2.912]	0.004 [0.386]	0.115 [0.418]
Fathed3ary	0.225 [0.858]	0.493** [2.098]	-0.012 [0.073]	0.307** [1.721]	-0.042 [0.819]	0.139 [2.552]	0.331** [2.552]	0.577*** [4.392]	0.132 [0.424]	0.418 [1.340]
Fin prb ado	-0.03 [0.644]	-0.054 [1.170]	0.103 [1.496]	0.062 [0.907]	-0.005 [0.109]	-0.035 [0.736]	-0.028 [0.542]	-0.065 [1.270]	-0.033 [0.367]	-0.086 [0.958]
Gender	0.269*** [5.624]	0.278*** [5.925]	0.228*** [2.950]	0.231*** [3.576]	0.267*** [5.210]	0.243*** [5.132]	0.094* [1.680]	0.160*** [3.035]	0.131 [1.347]	0.150* [1.669]
Age	0.010* [1.735]	0.011* [1.777]	0.005 [0.807]	0.004 [0.676]	-0.002 [0.368]	-0.003 [0.556]	0.021*** [2.976]	0.018*** [2.611]	0.023** [2.255]	0.016 [1.538]
Industry	-0.159 [0.543]	-0.114 [0.725]	0.087 [0.313]	0.058 [0.359]	0.054 [0.277]	0.031 [0.282]	0.236 [1.583]	0.119 [1.378]	0.19 [0.647]	0.04 [0.238]
Constr	-0.306 [1.007]	-0.177 [1.183]	0.195 [0.651]	0.102 [0.658]	-0.07 [0.323]	-0.03 [0.293]	0.165 [0.902]	0.059 [0.641]	-0.026 [0.156]	-0.026 [0.150]
Services	-0.346 [1.184]	-0.23 [1.432]	0.153 [0.552]	0.086 [0.532]	0.107 [0.548]	0.066 [0.593]	0.029 [0.193]	-0.001 [0.010]	0.213 [0.701]	0.073 [0.413]
Public	-0.224 [0.770]	-0.156 [0.958]	-0.004 [0.014]	-0.007 [0.047]	0.026 [0.131]	0.017 [0.145]	-0.008 [0.056]	-0.025 [0.286]	0.047 [0.162]	-0.026 [0.150]
Edu1ary	0.148 [0.535]	0.116 [0.780]	0.007 [0.029]	-0.046 [0.380]	0.094 [0.871]	0.05 [0.977]	0.039 [0.203]	0.039 [0.416]	-0.573** [1.999]	-0.295** [2.010]
Lower2ary	0.199 [0.781]	0.136 [1.141]	0.309 [1.444]	0.09 [0.901]	0.089 [0.739]	0.052 [0.908]	0.11 [0.238*]	0.065 [0.707]	0.074 [0.309]	0.04 [0.328]
Upper2ary	0.117 [0.490]	0.119 [0.898]	0.23 [0.898]	0.088 [0.766]	0.177** [2.039]	0.117** [2.243]	0.238* [1.788]	0.160* [0.933]	0.188 [1.281]	0.119 [1.291]
Lower3ary	0.430* [1.809]	0.300** [2.370]	0.694*** [3.537]	0.352*** [3.150]	0.545*** [5.688]	0.322*** [5.835]	0.558*** [3.999]	0.347*** [4.200]	0.473*** [2.964]	0.282*** [2.983]
PhD	0.779** [2.496]	0.359*** [2.851]	1.457*** [6.107]	0.664*** [6.063]	1.305*** [5.344]	0.600*** [5.420]	0.337 [1.372]	0.143 [1.349]	0.272** [2.425]	0.272** [2.225]
Experience	0.019** [1.976]	0.003 [0.608]	0.030* [1.871]	0.007 [1.955]	0.039** [3.334]	0.009* [0.063]	0.007 [0.454]	-0.001 [0.000]	0.009 [0.518]	0.002 [1.601]
Experience2	-0.000* [1.667]	0 [1.331]	-0.001 [1.622]	0 [1.345]	-0.001*** [3.034]	-0.001*** [2.959]	0 [0.642]	0 [0.203]	0 [0.521]	0 [0.528]
Wkng hrs	0.012*** [3.803]	0.012*** [3.752]	0.007 [1.592]	0.009* [1.073]	0 [0.015]	0 [1.683]	0.016*** [4.003]	0.016*** [0.223]	0.009 [1.632]	0.009 [0.255]
Constant	8.856*** [20.523]	9.406*** [27.761]	8.540*** [19.103]	9.688*** [28.767]	9.122*** [29.541]	10.039*** [34.682]	7.966*** [24.852]	8.975*** [28.086]	8.311*** [15.936]	9.340*** [17.203]
Observ.	179	179	157	157	188	188	186	186	92	92
R-squared	0.474	0.478	0.495	0.495	0.44	0.45	0.477	0.477	0.573	0.568

Notes. Absolute value of t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Brut and Net refer to brut and net versions of effort.

Table 8: Wage Equation - Regions 4/4

	Pays Loire		Champ-Ardenne		Alsace		Rhône-Alpes		Ile de Fr.	
	Brut	Net	Brut	Net	Brut	Net	Brut	Net	Brut	Net
Fathed1ary	0.019 [0.148]	0.082 [0.641]	-0.11 [0.401]	-0.053 [0.181]	0.230* [1.863]	0.264** [2.173]	0.365*** [3.889]	0.438*** [4.696]	0.150*** [3.015]	0.200*** [4.007]
Fathed2ary	0.048 [0.370]	0.230* [1.734]	0 [0.000]	-0.002 [0.006]	0.282** [2.255]	0.368*** [2.731]	0.402*** [4.031]	0.542*** [5.411]	0.169*** [3.258]	0.277*** [5.092]
Fathed3ary	0.023 [0.156]	0.363** [2.465]	0.083 [0.254]	0.147 [0.422]	0.077 [0.505]	0.288* [1.839]	0.390*** [3.393]	0.705*** [6.171]	0.232*** [4.028]	0.473*** [7.965]
Fin prb ado	-0.018 [0.472]	-0.057 [1.489]	0.036 [0.389]	0.014 [0.147]	-0.031 [0.561]	-0.057 [1.044]	0.007 [0.167]	-0.022 [0.521]	-0.019 [0.726]	-0.053** [2.014]
Gender	0.210*** [5.024]	0.244*** [6.486]	0.037 [0.436]	0.118 [1.383]	0.195*** [3.531]	0.266*** [4.906]	0.239*** [5.472]	0.276*** [6.762]	0.131*** [4.953]	0.198*** [7.647]
Age	0.019*** [3.374]	0.017*** [3.082]	-0.025** [2.531]	-0.026** [2.430]	0.013 [1.578]	0.013 [1.546]	0.005 [0.991]	0.004 [0.777]	0.011*** [3.331]	0.009** [2.580]
Industry	0.284** [2.002]	0.150* [1.900]	0.049 [0.126]	-0.025 [0.117]	0.07 [1.069]	-0.123 [0.467]	0.008 [0.097]	0.087 [0.308]	0.329 [1.203]	0.181 [1.569]
Constr	0.143 [0.969]	0.059 [0.833]	0.002 [0.006]	-0.055 [0.308]	-0.064 [0.713]	-0.171 [0.769]	0.064 [0.263]	0.064 [0.263]	0.25 [0.907]	0.121 [1.181]
Services	0.207 [1.450]	0.114 [1.378]	-0.018 [0.045]	-0.081 [0.370]	-0.177 [0.627]	-0.177 [0.627]	0.015 [0.172]	0.086 [0.299]	0.265 [0.974]	0.15 [1.238]
Public	0.146 [1.023]	0.078 [0.923]	-0.065 [0.168]	-0.106 [0.470]	-0.106 [0.470]	-0.274 [0.969]	-0.022 [0.253]	0.065 [0.221]	0.112 [0.413]	0.062 [0.497]
Edu1ary	0.119 [1.131]	0.083* [1.690]	-0.056 [0.258]	-0.019 [0.174]	-0.019 [0.174]	0.022 [0.267]	0.038 [0.290]	0.022 [0.355]	-0.073 [1.034]	-0.037 [1.061]
Lower2ary	0.024 [0.237]	0.029 [0.595]	0.384** [2.151]	0.207** [2.304]	0.045 [0.129]	0.024 [0.298]	0.214** [2.055]	0.108** [2.177]	0.134** [2.168]	0.063** [2.101]
Upper2ary	0.213*** [2.843]	0.150*** [3.330]	0.679*** [1.726]	0.387*** [1.785]	0.079 [0.959]	0.052 [1.024]	0.183*** [4.330]	0.238*** [4.506]	0.148*** [4.870]	0.148*** [5.015]
Lower3ary	0.485*** [5.689]	0.307*** [6.145]	0.841*** [4.461]	0.368*** [4.194]	0.435* [3.125]	0.215* [3.145]	0.840*** [8.322]	0.370*** [8.397]	0.545*** [10.989]	0.324*** [11.093]
PhD	0.655*** [4.583]	0.309*** [4.920]	0.841*** [2.878]	0.368*** [2.680]	0.435* [1.858]	0.215* [1.820]	0.840*** [7.422]	0.370*** [7.343]	0.545*** [9.926]	0.324*** [9.719]
Experience	0.014 [1.493]	-0.008 [1.611]	0.074*** [4.184]	0.023*** [3.781]	0.017 [1.395]	0 [3.458]	0.026*** [2.742]	0.018*** [6.219]	0.029*** [5.372]	0.007** [10.052]
Experience2	-0.000*** [3.005]	-0.000*** [2.698]	-0.001*** [2.666]	-0.001* [1.925]	-0.000* [1.750]	-0.000* [1.829]	-0.000** [2.246]	-0.000** [1.209]	-0.001*** [4.883]	-0.000*** [2.984]
Wrking hours	0.014*** [5.180]	0.014*** [5.099]	0.022*** [3.687]	0.036*** [3.855]	0.017*** [3.413]	0.018*** [3.413]	0.018*** [6.121]	0.018*** [6.121]	0.015*** [10.140]	0.015*** [2.291]
Constant	8.098*** [29.991]	9.132*** [33.302]	8.941*** [14.116]	11.256*** [18.282]	8.410*** [26.455]	9.308*** [22.898]	8.101*** [36.320]	9.442*** [38.608]	8.152*** [27.161]	9.642*** [58.729]
Observ.	285	285	101	101	148	148	375	375	958	958
R-squared	0.469	0.473	0.564	0.536	0.497	0.498	0.47	0.466	0.457	0.448

Notes. Absolute value of t statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Brut and Net refer to brut and net versions of effort.

Table 9: Inequality of Opportunity in the Regions - Gini measures

Region	Gini	Unfair Gini (brute)	Unfair Gini (net)	Annual Earnings
Ile de France	0.299	0.399	0.377	36,558
Champagne-Ardenne	0.271	0.157	0.147	28,779
Picardie	0.238	0.141	0.160	25,705
Haute-Normandie	0.294	0.227	0.253	30,773
Centre	0.212	0.066	0.097	26,360
Basse-Normandie	0.280	0.211	0.236	26,724
Bourgogne	0.222	0.046	0.053	26,824
Nord-Pas-de-Calais	0.248	0.153	0.158	28,352
Lorraine	0.190	0.100	0.086	26,215
Alsace	0.215	0.191	0.158	29,199
Franche-Comté	0.200	0.050	0.035	25,483
Pays de la Loire	0.236	0.082	0.099	26,233
Bretagne	0.218	0.064	0.069	26,856
Poitou-Charentes	0.236	0.130	0.114	25,940
Aquitaine	0.248	0.149	0.138	27,308
Midi-Pyrénées	0.277	0.186	0.173	29,750
Limousin	0.241	0.096	0.147	25,433
Rhône-Alpes	0.288	0.288	0.282	31,942
Auvergne	0.266	0.043	0.083	27,369
Languedoc-Roussillon	0.288	0.192	0.197	27,365
PACA and Corse	0.250	0.180	0.174	28,714
France	0.269	0.228	0.219	29,852

Table 10: Oaxaca decomposition of income differences into effort and circumstance factors - region j against all other regions (brut effort)

Region j	Wage region j	Wage France less region j	dlog wage	Total	Endowments	Coefficients	Interaction
				Circ Effort	Circ Effort	Circ Effort	Circ Effort
Ile de France	36,558	27,918	0.227	-0.120 0.347	-0.004 0.056	-0.112 0.284	-0.004 0.007
Champagne-Ardenne	28,779	29,878	-0.046	-1.153 1.107	-0.069 0.037	-1.176 1.139	0.093 -0.069
Picardie	25,705	29,988	-0.122	-0.012 -0.110	-0.028 -0.097	-0.009 -0.008	0.025 -0.005
Haute-Normandie	30,773	29,832	0.012	0.446 -0.434	-0.002 0.038	0.437 -0.456	0.010 -0.016
Centre	26,360	30,013	-0.087	0.406 -0.492	0.012 -0.026	0.396 -0.458	-0.002 -0.008
Basse-Normandie	26,724	29,922	-0.132	0.015 -0.147	-0.031 -0.116	0.027 -0.090	0.019 0.060
Bourgogne	26,824	29,937	-0.069	0.176 -0.245	-0.012 0.013	0.182 -0.260	0.006 0.001
Nord-Pas-de-Calais	28,352	29,970	-0.034	0.048 -0.082	0.005 -0.026	0.050 -0.067	-0.007 0.011
Lorraine	26,215	29,987	-0.071	0.253 -0.324	-0.026 -0.065	0.257 -0.249	0.023 -0.010
Alsace	29,199	29,876	0.026	0.377 -0.351	-0.006 0.004	0.383 -0.328	0.000 -0.027
Franche-Comté	25,483	29,971	-0.107	1.275 -1.383	-0.006 -0.017	1.281 -1.342	0.000 -0.023
Pays de la Loire	26,233	30,111	-0.108	0.143 -0.251	-0.006 -0.010	0.148 -0.243	0.001 0.003
Bretagne	26,856	29,983	-0.062	0.562 -0.625	-0.007 0.008	0.562 -0.643	0.007 0.010
Poitou-Charentes	25,940	29,993	-0.118	-0.649 0.531	0.001 -0.038	-0.647 0.563	-0.003 0.006
Aquitaine	27,308	29,968	-0.073	0.200 -0.273	-0.003 -0.009	0.197 -0.263	0.006 -0.001
Midi-Pyrénées	29,750	29,856	-0.009	0.134 -0.143	-0.008 0.038	0.127 -0.159	0.014 -0.022
Limousin	25,433	29,911	-0.133	-0.391 0.258	-0.085 -0.061	-0.358 0.334	0.051 -0.015
Rhône-Alpes	31,942	29,652	0.054	-0.113 0.167	0.008 0.014	-0.120 0.148	0.000 0.005
Auvergne	27,369	29,905	-0.092	-0.260 0.167	0.027 0.003	-0.261 0.136	-0.026 0.028
Languedoc-Roussillon	27,365	29,922	-0.111	0.197 -0.308	-0.009 -0.037	0.192 -0.278	0.015 0.006
PACA and Corse	28,714	29,932	-0.021	0.299 -0.319	-0.004 -0.014	0.300 -0.315	0.002 0.009

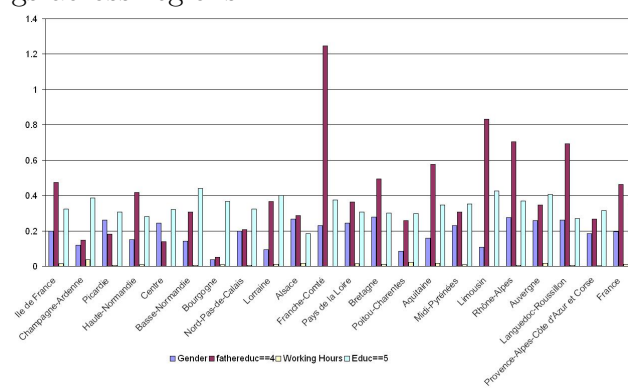
Table 11: Oaxaca decomposition of income differences into effort and circumstance factors - region j against all other regions (net effort)

Region j	Wage region j	Wage France less region j	dlog wage	Total	Endowments	Coefficients	Interaction
				Circ Effort	Circ Effort	Circ Effort	Circ Effort
Ile de France	36,558	27,918	0.227	0.183 0.043	0.011 0.045	0.170 0.002	0.002 -0.004
Champagne-Ardenne	28,779	29,878	-0.046	-0.055 0.009	-0.068 0.047	-0.071 0.028	0.084 -0.066
Picardie	25,705	29,988	-0.122	-0.024 -0.098	-0.040 -0.083	0.003 -0.018	0.013 0.003
Haute-Normandie	30,773	29,832	0.012	-0.090 0.102	-0.007 0.053	-0.094 0.079	0.011 -0.030
Centre	26,360	30,013	-0.087	-0.045 -0.042	-0.005 -0.005	-0.034 -0.030	-0.006 -0.007
Basse-Normandie	26,724	29,922	-0.132	-0.040 -0.091	-0.060 -0.085	-0.009 -0.057	0.029 0.051
Bourgogne	26,824	29,937	-0.069	-0.011 -0.058	-0.013 0.020	-0.003 -0.074	0.004 -0.004
Nord-Pas-de-Calais	28,352	29,970	-0.034	-0.058 0.024	-0.005 -0.017	-0.051 0.035	-0.003 0.007
Lorraine	26,215	29,987	-0.071	-0.022 -0.050	-0.010 -0.085	-0.025 0.030	0.014 0.005
Alsace	29,199	29,876	0.026	0.057 -0.030	0.007 -0.019	0.048 0.007	0.002 -0.018
Franche-Comté	25,483	29,971	-0.107	0.121 -0.229	-0.090 -0.240	0.149 -0.208	0.062 0.219
Pays de la Loire	26,233	30,111	-0.108	-0.095 -0.013	-0.019 0.004	-0.082 -0.014	0.006 -0.003
Bretagne	26,856	29,983	-0.062	-0.079 0.017	-0.003 0.015	-0.083 -0.001	0.006 0.003
Poitou-Charentes	25,940	29,993	-0.118	-0.062 -0.056	-0.033 -0.034	-0.048 -0.033	0.019 0.010
Aquitaine	27,308	29,968	-0.073	-0.096 0.023	0.001 -0.015	-0.102 0.040	0.005 -0.002
Midi-Pyrénées	29,750	29,856	-0.009	-0.019 0.010	-0.006 0.028	-0.025 -0.005	0.012 -0.014
Limousin	25,433	29,911	-0.133	-0.071 -0.062	-0.120 -0.007	-0.031 0.000	0.080 -0.054
Rhône-Alpes	31,942	29,652	0.054	0.029 0.025	0.006 0.017	0.023 0.006	-0.001 0.003
Auvergne	27,369	29,905	-0.092	-0.145 0.052	0.012 0.027	-0.134 0.000	-0.023 0.025
Languedoc-Roussillon	27,365	29,922	-0.111	-0.057 -0.054	-0.007 -0.021	-0.061 -0.027	0.011 -0.005
PACA and Corse	28,714	29,932	-0.021	0.027 -0.048	0.003 -0.020	0.025 -0.038	0.000 0.010

Figure 1: Data Frequencies

Region	Education										Father's education		Gender		Sector					Fin. prob.	Tot.	
	No	1ary	Low	2ary	UP	2ary	Low	3ary	PhD	No	2ary	3ary	Women	Men	Ag	Ind	Gov	Serv	Publ			
Ile de France	82	49	78	309	386	54	75	402	42.0%	31.7%	18.5%	446	513	2	137	58	385	376	520	438	958	
Champ-Ardenne	9	6	11	48	25	2	2	59	34	6	39	62	39	62	0.2%	14.3%	6.1%	40.2%	39.2%	54.3%	45.7%	100%
Picardie	9	6	11	48	25	2	2	59	34	6	39	62	39	62	0.2%	14.3%	6.1%	40.2%	39.2%	54.3%	45.7%	100%
H-Normandie	9	6	11	48	25	2	2	59	34	6	39	62	39	62	0.2%	14.3%	6.1%	40.2%	39.2%	54.3%	45.7%	100%
Centre	9	6	11	48	25	2	2	59	34	6	39	62	39	62	0.2%	14.3%	6.1%	40.2%	39.2%	54.3%	45.7%	100%
B-Normandie	9	6	11	48	25	2	2	59	34	6	39	62	39	62	0.2%	14.3%	6.1%	40.2%	39.2%	54.3%	45.7%	100%
Bourgogne	11	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Nord-P-d-Calais	15	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Lorraine	15	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Alsace	15	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Franche-Comté	15	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Pays de la Loire	19	17	20	141	81	7	6	184	77	18	114	171	114	171	1.8%	41.6%	7.1%	20.4%	29.2%	46.9%	53.1%	100%
Bretagne	9	7	6	49	35	2	2	64	45	7	49	70	49	70	0.8%	25.1%	6.1%	26.8%	41.3%	57.5%	42.5%	100%
Poit-Charentes	12	3	13	75	43	2	0	97	45	6	65	83	65	83	1	22	17	37	71	84	64	148
Aquitaine	8	1	2	0%	50.7%	29.1%	1.4%	0.0%	65.5%	30.4%	4.1%	43.9%	56.1%	43.9%	0.7%	14.9%	11.5%	25.0%	48.0%	56.8%	43.2%	100%
Midi-Pyrénées	4	9	15	65	56	8	11	75	57	14	67	90	67	90	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
Limousin	5	2	6	26	10	1	3	34	14	5	27	29	27	29	2	11	3	12	28	27	29	56
Hautes-Alpes	8	9	12	72	40	3	2	84	39	9	41	52	41	52	3.6%	11.2%	5.4%	21.4%	50.0%	48.2%	51.8%	100%
Auvergne	3	5	4	44	26	6	1	54	30	3	32	56	32	56	0.0%	29.3%	7.2%	25.1%	38.4%	53.9%	46.1%	100%
Lang-Roussillon	3	4	5	55	38	3	5	61	44	6	47	69	47	69	3.2%	37.6%	4.3%	15.1%	39.8%	55.9%	44.1%	100%
PACA Corse	24	11	20	117	60	9	20	141	84	35	122	158	122	158	2.6%	12.8%	11.1%	23.9%	49.6%	50.0%	41.0%	100%
France	363	226	206	1,883	1,362	149	208	2,341	1,315	415	1,737	2,542	1,737	2,542	53	970	316	1,251	1,689	2,345	1,934	4,279
	8.5%	5.3%	6.9%	44.0%	31.8%	3.5%	4.9%	54.7%	30.7%	9.7%	40.6%	59.4%	40.6%	59.4%	1.2%	22.7%	7.4%	25.2%	39.5%	54.8%	45.2%	100%

Figure 2: Impact of gender, father's education, education and working hours on (log) earnings across regions



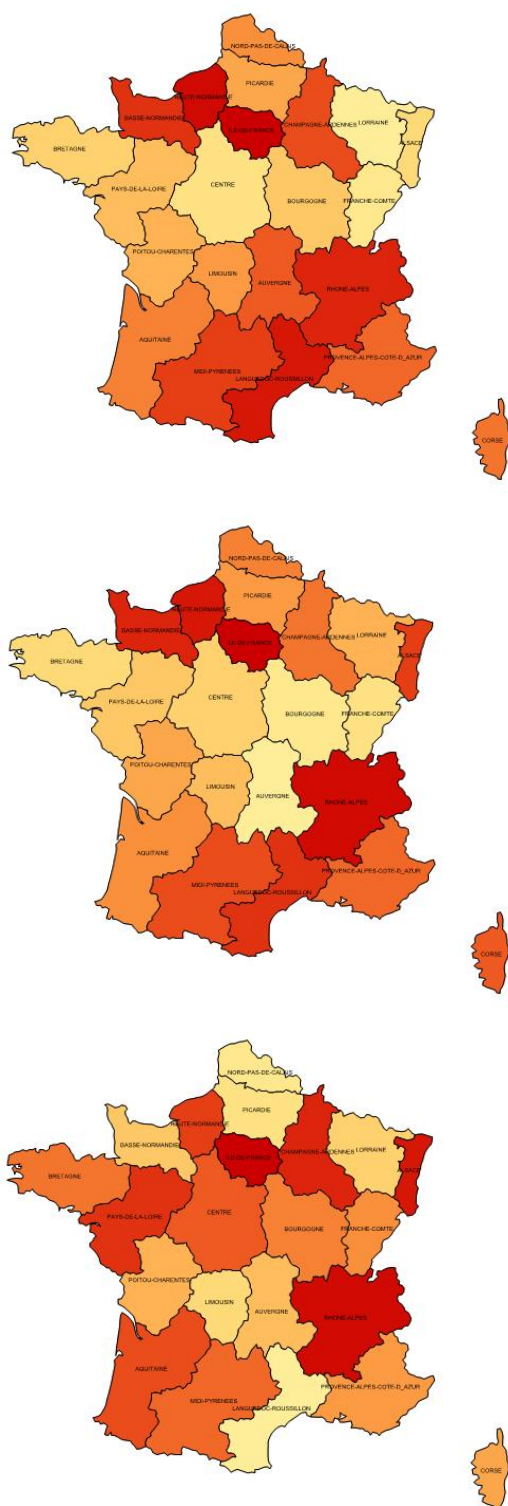


Figure 3: Regional Gini (above), unfair Gini (middle) and GDP (below) - the darker the filling, the larger the Gini/GDP

Recent titles

CORE Discussion Papers

- 2011/68. Mathieu LEFEBVRE, Pierre PESTIEAU and Grégory PONTIERE. Measuring poverty without the mortality paradox.
- 2011/69. Per J. AGRELL and Adel HATAMI-MARBINI. Frontier-based performance analysis models for supply chain management; state of the art and research directions.
- 2011/70. Olivier DEVOLDER. Stochastic first order methods in smooth convex optimization.
- 2011/71. Jens L. HOUGAARD, Juan D. MORENO-TERNERO and Lars P. ØSTERDAL. A unifying framework for the problem of adjudicating conflicting claims.
- 2011/72. Per J. AGRELL and Peter BOGETOFT. Smart-grid investments, regulation and organization.
- 2012/1. Per J. AGRELL and Axel GAUTIER. Rethinking regulatory capture.
- 2012/2. Yu. NESTEROV. Subgradient methods for huge-scale optimization problems.
- 2012/3. Jeroen K. ROMBOUTS, Lars STENTOFT and Francesco VIOLANTE. The value of multivariate model sophistication: An application to pricing Dow Jones Industrial Average options.
- 2012/4. Aitor CALO-BLANCO. Responsibility, freedom, and forgiveness in health care.
- 2012/5. Pierre PESTIEAU and Grégory PONTIERE. The public economics of increasing longevity.
- 2012/6. Thierry BRECHET and Guy MEUNIER. Are clean technology and environmental quality conflicting policy goals?
- 2012/7. Jens L. HOUGAARD, Juan D. MORENO-TERNERO and Lars P. ØSTERDAL. A new axiomatic approach to the evaluation of population health.
- 2012/8. Kirill BORISSOV, Thierry BRECHET and Stéphane LAMBRECHT. Environmental maintenance in a dynamic model with heterogeneous agents.
- 2012/9. Ken-Ichi SHIMOMURA and Jacques-François THISSE. Competition among the big and the small.
- 2012/10. Pierre PESTIEAU and Grégory PONTIERE. Optimal lifecycle fertility in a Barro-Becker economy.
- 2012/11. Catherine KRIER, Michel MOUCHART and Abderrahim OULHAJ. Neural modelling of ranking data with an application to stated preference data.
- 2012/12. Matthew O. JACKSON and Dunia LOPEZ-PINTADO. Diffusion and contagion in networks with heterogeneous agents and homophily.
- 2012/13. Claude D'ASPREMONT, Rodolphe DOS SANTOS FERREIRA and Jacques THEPOT. Hawks and doves in segmented markets: A formal approach to competitive aggressiveness.
- 2012/14. Claude D'ASPREMONT and Rodolphe DOS SANTOS FERREIRA. Household behavior and individual autonomy: An extended Lindahl mechanism.
- 2012/15. Dirk VAN DE GAER, Joost VANDENBOSSCHE and José Luis FIGUEROA. Children's health opportunities and project evaluation: Mexico's *Oportunidades* program.
- 2012/16. Giacomo VALLETTA. Health, fairness and taxation.
- 2012/17. Chiara CANTA and Pierre PESTIEAU. Long term care insurance and family norms.
- 2012/18. David DE LA CROIX and Fabio MARIANI. From polygyny to serial monogamy: a unified theory of marriage institutions.
- 2012/19. Carl GAIGNE, Stéphane RIOU and Jacques-François THISSE. Are compact cities environmentally friendly?
- 2012/20. Jean-François CARPANTIER and Besik SAMKHARADZE. The asymmetric commodity inventory effect on the optimal hedge ratio.
- 2012/21. Concetta MENDOLICCHIO, Dimitri PAOLINI and Tito PIETRA. Asymmetric information and overeducation.
- 2012/22. Tom TRUYTS. Stochastic signaling: Information substitutes and complements.
- 2012/23. Pierre DEHEZ and Samuel FEREY. How to share joint liability: A cooperative game approach.
- 2012/24. Pilar GARCIA-GOMEZ, Erik SCHOKKAERT, Tom VAN OURTI and Teresa BAGO D'UVA. Inequity in the face of death.
- 2012/25. Christian HAEDO and Michel MOUCHART. A stochastic independence approach for different measures of concentration and specialization.

Recent titles

CORE Discussion Papers - continued

- 2012/26. Xavier RAMOS and Dirk VAN DE GAER. Empirical approaches to inequality of opportunity: principles, measures, and evidence.
- 2012/27. Jacques H. DRÈZE and Erik SCHOKKAERT. Arrow's theorem of the deductible : moral hazard and stop-loss in health insurance.
- 2012/28. Luc BAUWENS and Giuseppe STORTI. Computationally efficient inference procedures for vast dimensional realized covariance models.
- 2012/29. Pierre DEHEZ. Incomplete-markets economies: The seminar work of Diamond, Drèze and Radner.
- 2012/30. Helmuth CREMER, Pierre PESTIEAU and Grégory PONTIÈRE. The economics of long-term care: a survey.
- 2012/31. Mathieu VAN VYVE, Laurence A. WOLSEY and Hande YAMAN. Relaxations for two-level multi-item lot-sizing problem.
- 2012/32. Jean-François MERTENS and Anna RUBINCHIK. Equilibria in an overlapping generations model with transfer policies and exogenous growth.
- 2012/33. Jean-François MERTENS and Anna RUBINCHIK. Pareto optimality of the golden rule equilibrium in an overlapping generations model with production and transfers.
- 2012/34. Hélène LATZER and Florian MAYNERIS. Income distribution and vertical comparative advantage. Theory and evidence.
- 2012/35. Pascal MOSSAY and Takatoshi TABUCHI. Preferential trade agreements harm third countries.
- 2012/36. Aitor CALO-BLANCO. The compensation problem with fresh starts.
- 2012/37. Jean-François CARPANTIER and Arnaud DUFAYS. Commodities volatility and the theory of storage.
- 2012/38. Jean-François CARPANTIER and Christelle SAPATA. Unfair inequalities in France: A regional comparison.

Books

- G. DURANTON, Ph. MARTIN, Th. MAYER and F. MAYNERIS (2010), *The economics of clusters – Lessons from the French experience*. Oxford University Press.
- J. HINDRIKS and I. VAN DE CLOOT (2011), *Notre pension en héritage*. Itinera Institute.
- M. FLEURBAEY and F. MANIQUET (2011), *A theory of fairness and social welfare*. Cambridge University Press.
- V. GINSBURGH and S. WEBER (2011), *How many languages make sense? The economics of linguistic diversity*. Princeton University Press.
- I. THOMAS, D. VANNESTE and X. QUERRIAU (2011), *Atlas de Belgique – Tome 4 Habitat*. Academia Press.
- W. GAERTNER and E. SCHOKKAERT (2012), *Empirical social choice*. Cambridge University Press.
- L. BAUWENS, Ch. HAFNER and S. LAURENT (2012), *Handbook of volatility models and their applications*. Wiley.
- J-C. PRAGER and J. THISSE (2012), *Economic geography and the unequal development of regions*. Routledge.
- M. FLEURBAEY and F. MANIQUET (2012), *Equality of opportunity: the economics of responsibility*. World Scientific.
- J. HINDRIKS (2012), *Gestion publique*. De Boeck.

CORE Lecture Series

- R. AMIR (2002), Supermodularity and complementarity in economics.
- R. WEISMANTEL (2006), Lectures on mixed nonlinear programming.
- A. SHAPIRO (2010), Stochastic programming: modeling and theory.