The econometrics of inequality and poverty
Chapter 1 : Introduction, bibliography and main issues

Michel Lubrano

September 2017

Contents

1 What and when

1.1 Scheduled

- First lecture : 5th of September, Tuesday, 10h00-12h00
- Location: IBD, room 17, but expected to change
- Last lecture : 12 October.
- Schedule : Tuesday 10h-12h and Thursday 10h-12h. 12 lectures
- 5, 7, 12, 14, 19, 21, 26, 28 September,
- 3, 5, 10, 12 October.
- Exam: Thursday, November 9th, 9h-12h. Usually one extra lecture for revisions and questions
- I am away between 13th October and 5th November.

1.2 Lecture notes

Web site:

http://www.vcharite.univ-mrs.fr/PP/lubrano/poverty.htm

giving all the lecture notes, data sets and references. Have a look at this page regularly, because the notes are regularly updated. Do not rely on old versions.

2 R

`R` is a freeware software that you can download for free on the internet. The software is available at

`http://www.r-project.org/`.

It is quite easy to install it on your LaTop computer. There is companion program which makes much easier to use `R`. This `Rtudio` available at

`https://www.rstudio.com/products/RStudio/`

Rstudio is a shell that manages an easy access to calculation and graphics in `R`. You can find a nice introduction to the software at

`https://cran.r-project.org/doc/manuals/R-intro.pdf`

Start as soon as possible to play with `R` and `Rstudio`. The software contains many packages. One package is devoted to the analysis of inequality and poverty. This is ineq. The manual is available at to the software at

`https://cran.r-project.org/web/packages/ineq/ineq.pdf`

This package contains a data set. Many other packages contain data sets.

3 An informal introduction

Every year in September, INSEE published an Insee Premiere about the income distribution in France. And the press react to this publication. Last year we had:

IP 1513: Les niveaux de vie en 2012. Cédric Houdré, Juliette Ponceau, Marie Zergat Bonnin, division Revenus et patrimoine des ménages, Insee

IP 1566: Les niveaux de vie en 2013. Antoine Boiron, Julie Labarthe, Lucile Richet-Mastain, Marie Zergat Bonnin, division Revenus et patrimoine des ménages, Insee

. IP 1614: Les niveaux de vie en 2014. Julie Argouarc'h, Antoine Boiron, division Revenus et patrimoine des ménages, Insee

IP 1513 was commented in:

- Le niveau de vie des Français a baissé de 1% en 2012 (LIBERATION 9 septembre 2014)
- En France, les pauvres encore plus pauvres (Le Monde.fr, 9 septembre 2014)

`http://www.liberation.fr/economie/2014/09/09/le-niveau-de-vie-des-francai`

`http://www.lemonde.fr/europe/article/2014/09/09/la-pauvrete-en-france-cha`

3.1 Le Monde: September 2012

A newspaper article published on the web site of Le Monde 7 September 2012. I am going to underline a certain number of keywords in this article in order to illustrate some basic notions. The title of the article is

Le nombre de pauvres a augmenté de 440.000 en France en 2010

It relates to the INSEE publication INSEE Première, N° 1412, September 2012, by Burricand, Houdré and Seguin. I will take the journal article and point out fundamental notions that are relevant for this lecture.
La dernière enquête de l'Insee sur les niveaux de vie, rendue publique vendredi 7 septembre, est explosive.

1. Survey data
2. Official agency INSEE
3. Standard of living

Que constate-t-elle en effet ? Qu'en 2010, le niveau de vie médian (19 270 euros annuels) a diminué de 0,5% par rapport à 2009, que seuls les plus riches s'en sont sortis et que la pauvreté, en hausse, frappe désormais 8,6 millions de personnes, soit 440.000 de plus qu'un an plus tôt.

1. Standard of living
2. Median, not mean
3. poverty headcount (number of poor)
4. Annual comparisons

Avec la fin du plan de relance, les effets de la crise se sont fait sentir massivement. En 2009, la récession n'avait que ralenti la progression en euros constants du niveau de vie médian (+ 0,4%, contre + 1,7% par an en moyenne de 2004 à 2008). Il faut remonter à 2004, précise l'Insee, pour trouver un recul semblable à celui de 2010 (0,5%).
La timide reprise économique de 2010 n'a pas eu d'effets miracle, puisque pratiquement toutes les catégories de la population, y compris les classes moyennes ou moyennes supérieures, ont vu leur niveau de vie baisser. N'a augmenté que celui des 5% des Français les plus aisés.

- Population categories, middle class, upper class
- Economic inequality: between rich and poor
- Inequality and growth

Dans un pays qui a la passion de l'égalité, la plupart des indicateurs d'inégalités sont à la hausse. L'indice de Gini, qui mesure le degré d'inégalité d'une distribution (en l'espèce, celle des niveaux de vie), a augmenté de 0,290 à 0,299 (0 correspondant à l'égalité parfaite et 1 à l'inégalité la plus forte). Le rapport entre la masse des niveaux de vie détenue par les 20% les plus riches et celle détenue par les 20% les plus modestes est passé de 4,3 à 4,5.

1. Passion for equality: social justice, relation with inequality? The origin of inequality?
2. Inequality indicators: Gini index
3. Is the variation statistically significant?
4. Interquartile inequality: why another indicator? What does it represent?
5. Income distribution

Les inégalités ont continué de se creuser par le haut. Ainsi, entre 1996 et 2010, le niveau de vie moyen des 10% les plus aisés a augmenté d'environ 2,1% par an en moyenne contre 1,4% dans l'ensemble de la population. En 2010, c'est l'évolution des salaires, limitée dans le bas de la distribution des revenus, qui explique en partie l'accentuation des inégalités, les 10% les plus aisés ayant bénéficié à la fois de salaires plus dynamiques et des rendements élevés de leurs placements.

1. Shape of the income distribution, modification of this shape
2. Income, earnings, what we observe is a mixture with different components.

3. Wage formation, shape of the wage distribution, explaining this shape (quantile regression)

4. Financial income

Déjà en hausse de 0,5 point en 2009, le taux de pauvreté monétaire a augmenté en 2010 de 0,6 point pour atteindre 14,1%, soit son plus haut niveau depuis 1997. 8,6 millions de personnes vivaient en 2010 en-dessous du seuil de pauvreté monétaire (964 euros par mois). Elles n'étaient que 8,1 millions en 2009. Mais il y a pire : une personne pauvre sur deux vit avec moins de 781 euros par mois.

1. Monetary poverty: how to define it

2. Multidimensional aspect of poverty, not only the monetary component

3. Poverty line (seuil de pauvreté)

4. Number of poor

5. Distribution among the poor

En 2010, le chômage a peu contribué à l'augmentation de la pauvreté (les chômeurs représentent à peine 4% de l'accroissement du nombre des personnes pauvres). C'est du côté des inactifs qu'il faut plutôt se tourner : les retraités (11%), les adultes inactifs autres que les étudiants et les retraités (16%) - souvent les titulaires de minima sociaux - et les enfants.

1. Decomposition of poverty, the role of unemployment

2. There are subgroups in the population. How to decompose the evolution of a poverty index?

Les moins de 18 ans contribuent pour près des deux tiers (63%) à l'augmentation du nombre de personnes pauvres. L'Insee fait observer qu'en 2009, l'accroissement du nombre d'enfants pauvres (ils vivent fréquemment dans des familles monoparentales) avait été contenue par le versement de deux primes exceptionnelles aux ménages dans le cadre du plan de relance (150 euros aux bénéficiaires de l'allocation de rentrée scolaire, et 200 euros de prime de solidarité active). L'institut rappelle aussi que les prestations familiales n'ont pas été revalorisées en 2010, après avoir bénéficié d'une revalorisation plus forte que prévu en 2009.

1. Decomposition of the evolution of the number of poor. Decomposition of a headcount index.

2. Poverty and family composition

3. What is the unit of observation: individual, household, family?

4. Poverty and economic polity. Targeting or not targeting

5. Basic income?

Claire Guélaud

3.2 Collecting notions

- In this lecture, we will be concerned with individual data, coming from surveys which are most of the time organised by public agencies. Some of the data might be macroeconomic data, at the country level.
- We are interested in income data. The first notion is GDP per capita. This is a macro notion. However, our main point of interest will be the income distribution. A first indicator is a centrality indicator. There is a difference between the mean and the median because the shape of the income distribution is asymmetric.
- Studying the shape of the income distribution is interesting in itself because it gives the importance of the rich group and of the poor group. It leads to the measurement of income inequality.
- There are various measurements for income inequality: Gini index, interquartile distance. Comparison between countries and over time. When is a variation significant. There are statistical problems.
- Inequality is related to other notions. Macro notions: inequality and growth. Inequality and justice, redistribution, taxation, basic income. A lot of economic policy notions. Targeting or not targeting, basic income.
- The observed income is the result of the mixture of different components which have different determinants: wages for most people, intermediate incomes, financial incomes. Inequality might have different meanings according to the nature of the income: fair wage for rewarding effort; payment for rewarding talent, dividends for rewarding capital owners.
- Poverty and poverty line, a particular look at the income distribution. Different indicators for poverty intensity. Monetary poverty, are there other formes of poverty. Multimensional approach, deprivation of rights.
- Decomposition of poverty between groups: males versus females, urban versus rural, working versus unemployed. There are econometric techniques for decomposing poverty and inequality indices.
- Family composition. Several individual are living on the same income, children. We have to take into account family composition using equivalence scale. A lot of econometric problems are related to this.

3.3 Some information from 2014

Le niveau de vie des Français a baissé de 1% en 2012 Effet de la crise : le niveau de vie des Français a baissé entre 2011 et 2012. Selon une étude de l'Insee, le niveau de vie médian (celui qui partage la population en deux parties de mêmes effectifs) était de 19 740 euros annuels en 2012, soit 1% de moins que l'année précédente. La situation se détériore pour toutes les

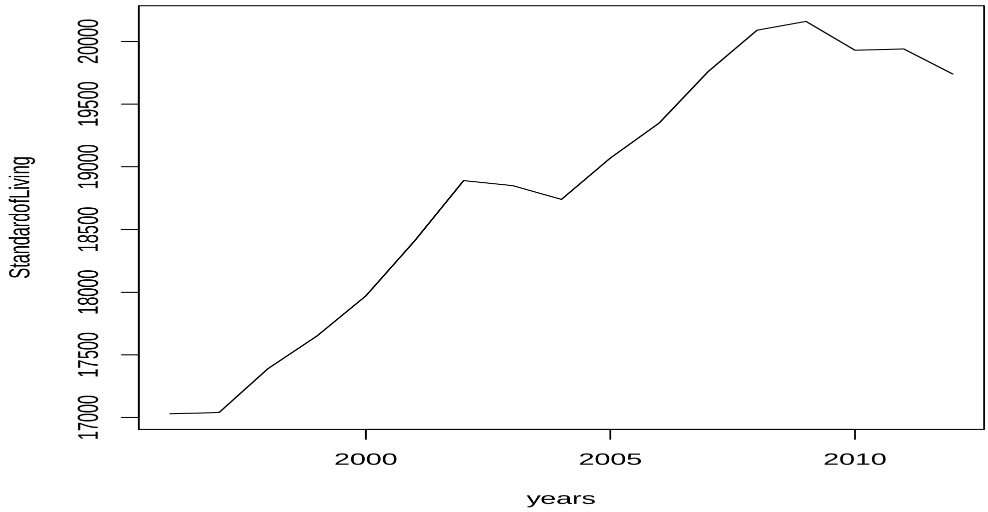

Figure 1: Standard of living in France in constant Euros

catégories de revenus, bien que les plus riches et les plus pauvres soient concernés au premier chef.

1. Chez les 10% les plus modestes, la baisse de 1,2% prolonge une dégradation entamée dès 2009. Leur niveau de vie est inférieur à 10 610 euros.

2. Les catégories intermédiaires sont moins touchées, avec des baisses s'échelonnant de 0,5% à 1%.

3. Pour les 10% les plus aisés, le niveau de vie médian diminue ainsi de 2%, effaçant la hausse qu'ils avaient connue au cours des deux années antérieures. Il se monte désormais à 37 430 euros annuels.

L'Insee définit le niveau de vie comme "le revenu disponible du ménage divisé par le nombre d'unités de consommation (uc)". Dans chaque ménage, le premier adulte représente 1 uc, les autres personnes de 14 ou plus 0,5 uc, les enfants de moins de 14 ans 0,3 uc.
Chez les plus riches, cette tendance s'explique par la baisse des revenus du patrimoine, qui représentent une part importante de leurs revenus totaux, ainsi que par la baisse des revenus d'activités et par la hausse des impôts. Chez les ménages les plus fragiles, c'est la montée du chômage qui joue en premier lieu, ainsi que des prestations sociales dont le montant a augmenté moins vite que l'inflation. Ces évolutions parallèles expliquent que les inégalités de niveau de vie se soient légèrement réduites entre 2011 et 2012.
Autre donnée du rapport : le seuil de pauvreté, fixé à 60% du niveau de vie médian de la population, s'établit désormais à 987 euros mensuels. Mesurée par rapport à ce seuil, la pauvreté

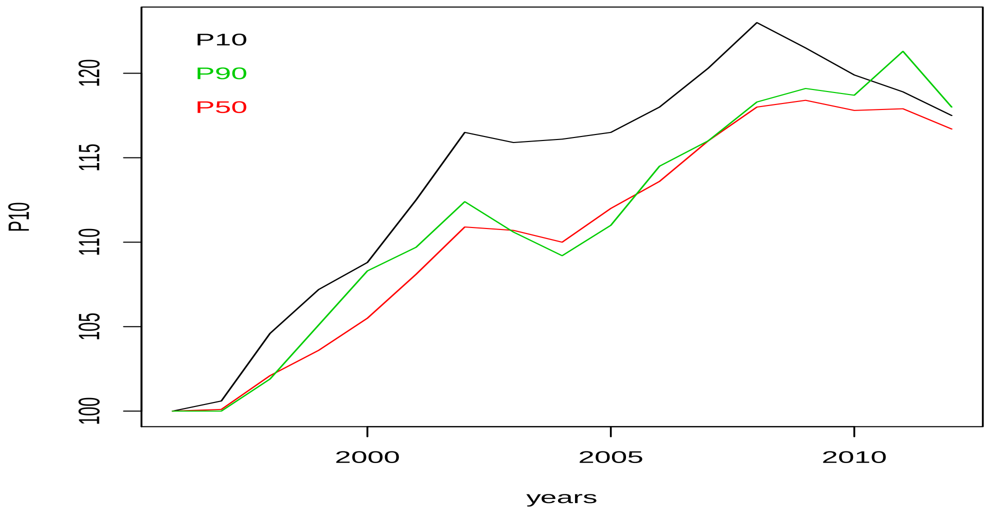

Figure 2: Evolution of different income deciles since 1996

recule et revient à un niveau proche de celui de 2010 : elle concerne aujourd'hui 8,5 millions de personnes (13,9% de la population), contre 8,7 millions en 2011 (14,3%). Dans le même temps, cependant, la pauvreté gagne en intensité - c'est-à-dire que les personnes pauvres le sont relativement plus qu'avant. Ainsi, si l'on fixe le seuil de pauvreté à 50% du niveau de vie médian, et non à 60%, le taux de pauvreté passe de 7,9% en 2011 à 8,1% en 2012.
Cette pauvreté touche plus d'un tiers des chômeurs, près d'un étudiant sur cinq, environ 20% des moins de 18 ans, et 22% des familles monoparentales. La situation relative des retraités, elle, s'améliore légèrement, leur taux de pauvreté passant de 9,3% à 8,4%.

4 A provisional bibliography

This lecture grew out of a discussion paper (Introduction à l'économétrie des mesures de pauvreté, DP 2008-09, published in French in the book

Leroux A. and Livet P. (2009) *La Pauvreté dans les Pays Riches*. Economica, Paris.

Since that book, a lot of improvements were added and several papers published, mainly with PhD students.

4.1 Textbooks

First reference :

Deaton Angus (1997) *The Analysis of Household Surveys*. The John Hopkins University Press, Baltimore and London.

a general textbook which covers a lot of material which goes from economic theory to econometric methods. Available at the library. A companion book for the economic theory aspect could be

Lambert P.J. (2001) *The Distribution and Redistribution of Income*. Manchester University Press.

while some complementary notions are in

Cowell Frank (1995) *Measuring Inequality*. London, Prentice Hall.

Duclos, Jean-Yves and Araar, Abdelkrim (2006) *Poverty and Equity: Measurement, Policy and Estimation with DAD*. Springer Verlag, New-York. http://www.idrc.ca/openebooks/229-5/

This book is built around explaining what does a software called DAD. DAD stands for "Distributive analysis/Analyse distributive"— It is designed to facilitate the analysis and the comparison of social welfare, inequality, poverty and equity using micro (or disaggregated) data. A web site exists around this software which contains, among other things, various data sets which are directly available. `http://132.203.59.36/DAD/index.html`.

4.2 Economic theory

The three fundamental papers defining the welfarist approach to the measurement of inequality and poverty are

Atkinson A.B. (1970) The measurement of inequality. *Journal of Economic theory*, 2, 244-263.

Sen A. (1976) Poverty: An ordinal approach to measurement. *Econometrica* 44(2) 219-231.

Atkinson A.B. (1987) On the measurement of poverty. *Econometrica* 55, 749-764.

A companion paper is

Foster James, Greer J. and Thorbecke Eric (1984) A class of decomposable poverty measures. *Econometrica* 52, 761-765.

4.3 Econometric issues

There is a great interest in estimating the income distribution using non-parametric methods :

Marron, J. S. and H. P. Schmitz (1992). "Simultaneous density estimation of several income distributions ". Econometric Theory, 8, 476-448.

Estimating parametric distributions is an alternative, but flexible distributions are needed for that exercise:

Singh S.K. and G.S. Maddala (1976) A function for the size distribution of incomes. *Econometrica* 44, 963-970

An alternative to both the non-parametric approach and the parametric approach if given by using mixture of distributions:

Flachaire, E., and O. Nunez (2002): "Estimation of the income distribution and detection of sub-populations: An explanatory model," Computational Statistics and Data Analysis, 51(7), 3368-3380.

Testing for stochastic dominance is a complicated topic. Some elements are found in :

Davidson Russell and Duclos Jean-Yves (2000) Statistical inference for stochastic dominance and for the measurement of poverty and inequality. *Econometrica* 68, 1435-1464.

Testing for the equality of two indexes is a much simpler exercise :

Kakwani N. (1993) Statistical inference in the measurement of poverty. *Review of Economics and Statistics* 75, 632-639.

But the distribution of some indices is quite complicated:

Giles, D. E. A. (2004). "Calculating a standard error for the Gini coefficient: some further results", Oxford Bulletin of Economics and Statistics, Vol. 66, pp. 425-433.

Davidson Russell (2009) Reliable inference for the Gini index. Journal of Econometrics Volume 150, Issue 1, May 2009, Pages 30-40.

When we want to go beyond a simple description of the income distribution, for instance modeling its dynamics:

Jenkins, S.P. (2000): "Modelling Household Income Dynamics," *Journal of Population Economics*, 13, 529–567.

or when we are interested in analysing the shape of a distribution using quantile regressions:

Koenker R. and G. Basset (1978) Regression quantiles. *Econometrica* 46(1), 33-50.

A new approach to quantile regression is given in:

Firpo, Sergio, Fortin Nicole and Lemieux, Thomas (2009) Unconditional Quantile Regressions. *Econometrica* 77(3), 953-973.

which is much simpler and more powerful.

4.4 Empirical applications

A lot of applications are available, some of which are already contained in the book of Deaton, together with the `stata` code used for them. The book

Atkinson A.B. (1998) *Poverty in Europe*. Blackwell, Oxford.

is in fact the text of a Yrjo Jahnsson lecture given Tony Atkinson in 1990 at the University of Helsinki. It details all the pitfalls that an econometrician can meet when analysing and comparing European income data.

The following book has the great advantage of presented the last state of art in this domain. It is a book made of contributed articles:

Jenkins Stephen and John Micklewright (2007) *Inequality and Poverty Re-examined*. Oxford University Press, Oxford.

I will use some of these articles to illustrate various notions such as inequality in Europe, inequality and education, the relation between growth and inequality,... which are widely debated issues. Note also the two books by Tony Atkinson and by Thomas Piketty :

Piketty Thomas (2000) *Les hauts revenus en France au 20ème siècle Inégalités et redistributions, 1901-1998*. Grasset, Paris (en français).

This book presents an extensive analysis of what are called incomes in France over the last century. High incomes corresponds to the 10th percentile of the income distribution. The next book is a collection of articles that generalises the problematic of the former book to the rest of Europe and the USA. These books rely mainly on descriptive statistics.

Atkinson A.B. and Thomas Piketty (2007) *Top Incomes over the Twentieth Century: A Contrast Between Continental European and English-Speaking Countries*. Oxford University Press.

4.5 Happiness economics

We shall see that two types of data are available when discussing income inequality. Observed individual data coming from administrations like census or fiscal administrations corresponding to objective and measurable quantities such as income earnings, family composition and subjective data resulting from answers to questionnaires made of questions such as *how happy are you*, *how difficult is it to make the ends meet at the end of the month* and the like.
This type of data are used for making inference on equivalences scales, but also to measure *utility*. The latter refers to happiness economics. The first paper is a general survey while the second paper examines the relation between happiness and economic growth.

Bruno S. Frey and Alois Stutzer (2002) What Can Economists Learn from Happiness Research? *Journal of Economic Literature*, Vol. 40, No. 2 (Jun., 2002), pp. 402-435.

Rafael Di Tella, Robert J. MacCulloch, Andrew J. Oswald (2003) The Macroeconomics of Happiness. *The Review of Economics and Statistics*, Vol. 85, No. 4 (Nov., 2003), pp. 809-827.

A good survey of the empirical literature is given in

B.M.S. van Praag and A. Ferrer-i-Carbonell (2004) *Happiness Quantified: A Satisfaction Calculus Approach*. Oxford University Press, Oxford, UK

even if it presents mainly the view of the Leyden School.

Two recent and important articles on the topic are:

Andrew E. Clark and Claudia Senik (2010) Who compares to whom? The anatomy of income comparisons in Europe. *The Economic Journal*, 120 (May), 573-594.

Viola Angelini, Danilo Cavapozzi, Luca Corazzini and Omar Paccagnella (2014) Do Danes and Italians Rate Life Satisfaction in the Same Way? Using Vignettes to Correct for Individual-Specific Scale Biases. *Oxford Bulletin of Economics and Statistic*, Volume 76, Issue 5, Pages 643–666. doi: 10.1111/obes.12039.

4.6 General readings

These three references are books written originally written in French or translated in French that are of prime importance for your information and that you should know as a scholar:

Thomas Piketty (2013) *Le capital au XXIe siècle*. Seuil, 25 euros

Camille Landais, Thomas Piketty and Emmanuel Saez (2011) *Pour une révolution fiscale : Un impôt sur le revenu pour le XXIe siècle*. Seuil, 11.80 euros

François Bourguignon (2012) *The Globalisation of Inequality*. Seuil, Princeton University Press.

Amartya Sen (2012) *L'idée de Justice*. Flammarion, 12 euros.

Joseph Stiglitz (2015) *La Grande Fracture*, LLL edition 25 euros

This last book is very interesting if you want to have a global look at modern economic theory: Jean Tirole (2016, 2017) The Economics of the Common Good. Princeton University Press

5 General items

The lectures will be organised around this bibliography. Lectures notes are available in 11 different chapters which are available in pdf file at
`http://www.vcharite.univ-mrs.fr/PP/lubrano/poverty.htm`

1. Lecture 1: this introduction
2. Lecture 2: Why should we be concerned by inequality and poverty
3. Lecture 3: Welfare functions, inequality and poverty
4. Lecture 4: Lorenz curve, the Gini coefficient and parametric distributions
5. Lecture 5: Modelling the income distribution
6. Lecture 6: Equivalence scales
7. Lecture 7: Stochastic dominance
8. Lecture 8: Confidence intervals and testing
9. Lecture 9: The pitfalls of empirical works: Poverty in Europe
10. Lecture 10: Explaining poverty and inequality using econometric models
11. Lecture 11: Happiness Econometrics: the use of subjective data

The following items are possible continuations

1. Inequality and poverty in China
2. The World Income Distribution and world poverty
3. Taxation and redistribution
4. Measuring the aversion to inequality
5. Modelling wage inequalities and high incomes
6. What is the middle class