

Llinas, Joan Baro; Cabases Pique, Ma Angels; Gomez Adillon, Ma Jesus

Conference Paper

Analysis of the Concentration of the Structural Funds in the Autonomous Communities in Spain

39th Congress of the European Regional Science Association: "Regional Cohesion and Competitiveness in 21st Century Europe", August 23 - 27, 1999, Dublin, Ireland

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Llinas, Joan Baro; Cabases Pique, Ma Angels; Gomez Adillon, Ma Jesus (1999) : Analysis of the Concentration of the Structural Funds in the Autonomous Communities in Spain, 39th Congress of the European Regional Science Association: "Regional Cohesion and Competitiveness in 21st Century Europe", August 23 - 27, 1999, Dublin, Ireland, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/114270>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

ERSA 39th EUROPEAN CONGRESS 1999

THE TITTLE OF THE PAPER: ANALYSIS OF THE CONCENTRATION OF THE STRUCTURAL FUNDS IN THE AUTONOMOUS COMMUNITIES IN SPAIN

THE AUTHORS NAMES: J. BARÓ LLINÀS, M.A. CABASÉS PIQUÉ, M.J. GÓMEZ

THE AFFILIATION OF THE AUTHORS: Professors Applied Economics Department

THE ADDRESS OF EACH AUTHOR

Dr. JOAN BARÓ LLINÀS
Departamento de Economía Aplicada
Facultad de Derecho y Economía
Plaza Victor Siurana, 1 25003 LLEIDA
Tf. 973 70 20 31

Dra. M^a ANGELS CABASES PIQUE
Departamento de Economía Aplicada
Facultad de Derecho y Economía
Plaza Victor Siurana, 1 25003 LLEIDA
Tf. 973 70 20 31

M^a JESÚS GÓMEZ ADILLÓN
Departamento de Economía Aplicada
Facultad de Derecho y Economía
Plaza Victor Siurana, 1 25003 LLEIDA
M.Jesus.Gomez@econap.UdL.es
Tf. 973 70 20 31
Fax 973 70 21 15

THE THEME TO WHICH PAPER RELATES: THEORY AND METHODOLOGY OF REGIONAL SCIENCE

ANALYSIS OF THE CONCENTRATION OF STRUCTURAL FUNDS IN THE AUTONOMOUS COMMUNITIES IN SPAIN

ABSTRACT

In this paper we analyse the distribution in Spain, of the European Regional Development Fund community structural help, considering its importance in volume. This survey is carried out in each autonomous community and in two five-year periods, being the first period 1989-1992 and the second one 1994-1999.

First of all we work out measures of concentration in order to point out the difference in the concentration of the ERDF per capita, assigned by the European Union to the Autonomous Communities in the two periods which are analysed.

The indicators propose are measures derive from the concentration graph, so that we can observe the existence of greater or minor concentration depending on the degree of convexity of the graph line, and obtaining distances of interest between the straight line of equidistribution and the graph line which reflect the inequality in the distribution of the ERDF per capita.

Secondly, a typological analysis of the Autonomous Communities is carried out, for the two periods, taking into account the economic variables which affect the distribution of the European Regional Fund and with the purpose of describing repercussions of the implementation of the MAC.

INTRODUCTION

Since its incorporation into the EEC in 1986, Spain has benefited from European Community Structural Fund aid. The Treaty of Rome, which constituted the EEC and was signed in 1958, referred directly to the reduction of inequalities between the member states, but only did so in a general way. During 1958 the ESF (European Social Fund) was created and in 1962 the EAGGF- Guidance Section (European Agricultural Guidance and Guarantee Fund) was created, and these intervened in European community regional policy, in a modest and implicit way. It was not until seventeen years later, in 1975 that with the creation of the ERDF (European Regional Development Fund) a boost was given to the Community's regional policies.

The incorporation of the Spain and Portugal (1986), considerably increased the discrepancies in income between the different regions of the European Community. Shortly after this the Treaty underwent a major modification with the adoption of the Single European Act (1987). The principle of Cohesion was established, reflected in Article 130 of the new Treaty, which reinforces the European Community regional policy and its instruments of implementation.

Article 130 announced the reform of the Structural Funds (ERDF, ESF and EAGGF-G) which implied a new design of these funds and the doubling of their economic value.

The objectives of this reform of the structural funds are identified with problems, which in a general way affect an entire region or administrative territory within the European Union. The areas eligible for structural funds are indicated, with five different objectives:

Objective 1: To promote the development and adaptation of less advanced regions.

Objective 2: To reconvert those regions gravely affected by the industrial crisis.

Objective 3: To fight against long-term unemployment.

Objective 4: To facilitate professional occupation of young people.

Objective 5: Contains two objectives:

Objective 5a: To adapt the structures of production, transformation and commercialisation in agriculture and forestry.

Objective 5b: To promote the development of rural areas.

In 1989, a new stage began, as the reform of the structural funds entered into force and the European Community regional policy now had at its disposal instruments to redress imbalances between the different regions of the European Union. The same year saw the birth of the CSFs (Community Support Frameworks) applying to periods of several years, and these were to design coordinate actions and available resources. In 1993 the CSF for 1989-1993 ended and the 1994-1999 was negotiated.

In Spain, out of the total volume of aid proceeding from structural funds, the ERDF (with Objectives 1, 2 and 5b) contributes more than 50% of the total aid. If we study the aid by objectives, it is concentrated in areas eligible for Objective 1, an important part of the funds being received for this objective (aid for less advanced regions).

This study analyses the distribution, in Spain, of the community structural aid from the ERDF, given its importance in terms of volume, by autonomous region and during two five year periods, the first running from 1989 and 1993, and the second period between 1994 and 1999.

TABLE 1: PERIOD 89-93

AUTONOMOUS REGIONS	OBJECTIVE 1 (MECU)	OBJECTIVE 2 (MECU)	OBJECTIVE 5b (MECU)	ERDF (MECU)	ERDF PER CAPITA (ECU per capita)
ANDALUSIA	1729			1729	249,1
ARAGÓ		74	25	99	91,0
ASTURIES	351			351	320,9
BALEARS			7	7	22,6
CANÀRIES	560			560	374,9
CANTABRIA		55	4	59	111,9
CAS.-LA MANXA	779			779	469,7
CASTILLA-LLEÓ	705			705	276,9
CATALUNYA		426	5	431	98,7
C. VALENCIANA	510			510	132,2
EXTREMADURA	426			426	401,2
GALÍCIA	566			566	207,2
MADRID		103	3	106	77,9
MURCIA	197			197	188,4
NAVARRA		37	3	40	132,5
EUSKADI		257	2	259	123,1
RIOJA (LA)		17	4	21	138,1
CEUTA MELILLA	85			85	684,2

TABLE 2. PERIOD 94-99

AUTONOMOUS REGIONS	OBJECTIVE 1 (MECU)	OBJECTIVE 2 (MECU)	OBJECTIVE 5b (MECU)	ERDF (MECU)	ERDF PER CAPITA (ECU per capita)
ANDALUSIA	1692			1692	243,8
ARAGÓ		49,4	72,8	122,2	112,3
ASTURIES	234			234	213,9
BALEARS		8,8	12,2	21	67,9
CANÀRIES	390			390	261,1
CANTABRIA	105			105	199,1
CAS.-LA MANXA	416			416	250,8
CASTILLA-LLEÓ	600			600	235,7
CATALUNYA		402,2	36	438,2	100,3
C. VALENCIANA	607			607	157,4
EXTREMADURA	382			382	359,7
GALÍCIA	727			727	266,1
MADRID		113,7	13,2	126,9	93,3
MURCIA	197			197	188,4
NAVARRA		17,7	12,1	29,8	98,7
EUSKADI		267,8	4,5	272,3	129,4
RIOJA (LA)		10,5	10,1	20,6	135,4
CEUTA MELILLA	38			38	305,9

Specifically, measures of concentration are calculated with the sole objective of underlining the differences in ERDF concentration per capita, assigned by the European Union to the Autonomous Regions during the two periods under study. A purely quantitative calculation is performed of the differences, without entering into the analysis of the volume of projects financed in the different Autonomous Regions.

The indicators presented are measures derived from the concentration curve, since the Lorenz Diagram, with an initial graphic approach, allows us to visualise the existence of greater or lesser concentration according to the degree of convexity of the curve.

From this representation distances of interest arise between the straight line of equal distribution and the curve which reflect the inequality in the distribution of the ERDF funds per capita, always taking into account only the population assigned for objectives 1, 2 and 5b. The surface area separating the straight line from the curve is a good measure of concentration of the variable.

Taking into account the empirical observation of the data and the economic nature of the ERDF variable per capita, different theoretical functions of concentration are estimated:

- Kakwani-Podder model (1973): $q(p) = p^\alpha \cdot e^{-\beta(1-p)}$ with $\alpha \geq 1$ $\beta > 0$
- Kakwani model (1980): $q(p) = p - A \cdot p^\alpha \cdot (1-p)^\beta$ with A, α and $\beta > 0$
- Gupta model (1984): $q(p) = p \cdot A^{p-1}$ with $A > 1$

The three equations possess the usual properties of a concentration curve:

- Range between 0 and 1: $p \in (0,1) \rightarrow q(p) \in (0,1)$
- Increasing monotony: $q'(p) \geq 0$
- Convexity: $q''(p) \geq 0$

In addition these are equations which are highly operative for the calculation of the different indicators of concentration.

In the context of this study, identification in terms of random variable is applied to p as the fraction of population up to a level x , and $q(p)$ as the fraction of ERDF funds accumulated up to level x distributions being ordered in terms of per capita.

The models are estimated using the squared minimums after conversion method:

- $\ln q(p) = \alpha \ln p + \beta (p-1) + \epsilon$
- $\ln (p-q(p)) = \ln A + \alpha \ln p + \beta \ln (1-p) + \epsilon$
- $\ln q(p) - \ln p = \ln A * (p-1) + \epsilon$

These models have been chosen, firstly because they were created as concentration curves that allow the calculation of measures of inequality in the distribution of funds, and secondly because they are models which can be suitably adapted to the data presented.

CONCENTRATION MEASURES USED

From the estimations concentration measures have been calculated which are obtained from the curves and which allow the quantitative calculation of the differences in, and concentration of, the ERDF funds per capita during the two periods under consideration. So they show a greater concentration when the value that they take is greater and therefore the greater the inequality existing in the distribution of the ERDF funds per capita.

1.- g Index.

Gini's coefficient of concentration, which is well known, and corresponds to double the area enclosed between the two lines of distribution, that is, double the average of all the distances between population and ERDF accumulation, as shown by graph 1.

$$g = 2E(p-q(p)) = 1 - 2E(q(p))$$

The expression of the index in the models considered takes on the following form:

Calculation of the Gini (g) index.

Kakwani-Podder	$1 - 2e^{-\beta} \sum_{i=0}^{\infty} \frac{\beta^i}{(a+1+i) i!}$
Kakwani	$2A B(\alpha+1, \beta+1)$; with $B(\alpha+1, \beta+1)$ Beta Euler
Gupta	$\frac{A \ln^2 A - 2A \ln A + 2A - 2}{A \ln^2 A}$

2. - P Index

The P for Pietra coefficient is associated to the greater distance existing between the population and ERDF accumulations, a distance which is observed in the ERDF volume expected:

$$P = p_\mu - q(p_\mu)$$

It is known that the concentration curve has a unitary gradient at the point $((p_i, q(p_i))$, the moment in which the distances between the two lines is at its maximum (Graph 2).

$$\max [F_\xi(x) - q_\xi(x)] = p_\mu - q(p_\mu) \rightarrow q'(p) = 1$$

The coefficient P is normally used as the lowest level in the Gini index, at the same time that it responds to the double of the area of the greatest triangle that can be inscribed within the figure, i.e., that it coincides with half of the average relative difference and which in any case fulfills that $P = \underline{DMR} \leq g$

3.- d* Index

Picks up the lack of phasing between the accumulated population and ERDF both in the mean (MI) and in the median (ME). On the one hand, $p(MI)-0.5$ measures the inequality between two groups with equal ERDF and on the other, $0.5-q(p(ME))$ measures the inequality of the two groups with equal population, both correspond with the distances which separate the line of equal distribution and the concentration curve from the geometrical centre of the graph (Graph 3), its simple aggregation leads us to the index:

$$d^* = p(MI) - q(p(Me))$$

Its usage is not widely extended and it is rarely used in theoretical studies on concentration.

4.- d' Index

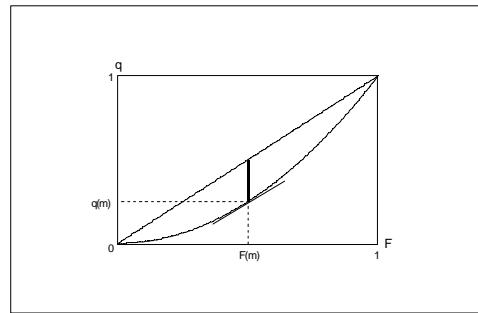
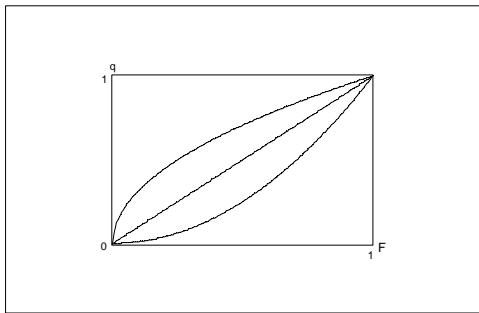
In the same way that we have considered central distances in the curve, it makes sense to measure the inequality gap that exists in the first quartile ($0.25-q(p(Q1))$) and in the third quartile ($0.75-q(p(Q3))$) (Graph 4.) The sum of these two distances gives sense to the d' coefficient:

$$d'=1 - [q(p(Q1)) + q(p(Q3))]$$

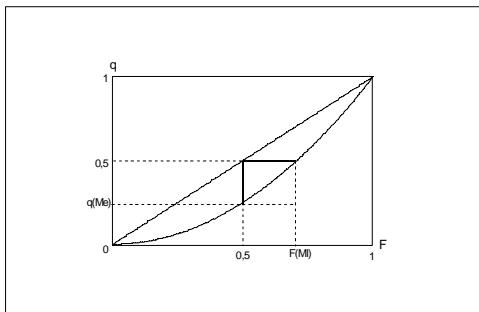
This is not a very widely used indicator either, its advantage lies in the fact that it admits the generalisation of any of the other quartiles, and in addition its calculation is immediate in any concentration function.

Graph 1: g Index

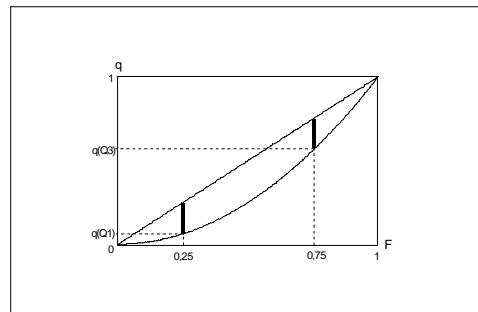
Graph 2: P_Index



Graph 3: d^* Index



Graph 4: d' Index



CONCENTRATION MODEL ESTIMATES

The three models offer adaptations of quality and an elevated degree of adherence for the two periods considered. Below we present the results of the estimates of the three models in tables 1, 2 and 3.

Table 1: Results of the Kakwani-Podder model estimation

	Predictor	Coef	DesvEst	razón-t
1989-1993	Ln p	1,32011	0,04609	28,64
	p-1	0,5071	0,1273	3,98
	s = 0,1280	F = 3.110,36		
1994-1999	Ln p	1,07240	0,01389	77,22
	p-1	0,68232	0,03832	17,81
	s = 0,03935	F = 27.035,42		

--	--

Table 2: Results of the Kakwani model estimation

	Predictor	Coef	DesvEst	razón-t
1989-1993	Constante	-0,34140	0,03357	-10,17
	Ln p	0,97566	0,01561	62,52
	Ln (1-p)	0,78323	0,01351	57,98
	$s = 0,06175$		R-cda = 99,7%	R-cda(ajda) = 99,6%
1994-1999	Constante	-0,59677	0,07352	-8,12
	Ln p	0,96058	0,03179	30,22
	Ln (1-p)	0,90906	0,03651	24,90
	$s = 0,1177$		R-cda = 98,6%	R-cda(ajda) = 98,3%

Table 3: Results of the Gupta model estimation

	Predictor	Coef	DesvEst	razón-t
1989-1993	p-1	1,3137	0,1014	12,96
	$s = 0,2489$		$F = 167,84$	
1994-1999	p-1	0,86511	0,02463	35,12
	$s = 0,06271$		$F = 1233,74$	

VALUES OF THE FUNCTIONS AT CRITICAL POINTS

Once the models were estimated, we have calculated the value of the functions of concentration at critical points such as the median, the mean and the quartiles, which are presented in tables 4, 5 and 6.

Table 4: Value of the functions at critical points according to the Kakwani-Podder model

		μ	Q_1	Me	Q_3	MI
89-93	p	0,520	0,250	0,500	0,750	0,676
	q(p)	0,330	0,109	0,310	0,588	0,500
93-99	p	0,535	0,250	0,500	0,750	0,655

	q(p)	0,372	0,135	0,338	0,619	0,500
--	------	-------	-------	-------	-------	-------

Table 5: Value of the functions at critical points according to the Kakwani model

		μ	Q_1	Me	Q_3	MI
89-93	p	0,555	0,250	0,500	0,750	0,697
	q(p)	0,342	0,103	0,289	0,568	0,500
93-99	p	0,513	0,250	0,500	0,750	0,645
	q(p)	0,363	0,138	0,349	0,631	0,500

Table 6: Value of the functions at critical points according to the Gupta model

		μ	Q_1	Me	Q_3	MI
89-93	p	0,570	0,250	0,500	0,750	0,725
	q(p)	0,324	0,093	0,259	0,540	0,500
93-99	p	0,550	0,250	0,500	0,750	0,667
	q(p)	0,372	0,130	0,324	0,604	0,500

The values obtained in the three functions of concentration for the critical points considered are very close, and therefore they lead us to very similar conclusions.

Thus for example, if we consider the critical point of the median of the distribution, as a value which differentiates the total of communities in two groups (in the first group the volume of funds does not reach half of the total and in the second it exceeds half), practically 50% of the communities have received a volume of funds above the total median in the second period. Continuing with this line, and taking the median as the dividing point of the groups, we can establish relationships between the volume of ERDF funds in each group and the volume of funds of all the communities. The values obtained for the three functions are presented in tables 7, 8 and 9.

Table 7: Kakwani-Podder model

	$\frac{1-q(p_\mu)}{1-p_\mu}$	$\frac{p_\mu}{q(p_\mu)}$	$\frac{1-q(p_\mu)}{q(p_\mu)} * \frac{p_\mu}{1-p_\mu}$
89-93	1.39	1.57	2.18
94-99	1.35	1.43	1.93

Table 8: Kakwani model

	$\frac{1-q(p_\mu)}{1-p_\mu}$	$\frac{p_\mu}{q(p_\mu)}$	$\frac{1-q(p_\mu)}{q(p_\mu)} * \frac{p_\mu}{1-p_\mu}$
89-93	1.47	1.62	2.38
94-99	1.30	1.41	1.83

Table 9: Gupta Model

	$\frac{1-q(p_\mu)}{1-p_\mu}$	$\frac{p_\mu}{q(p_\mu)}$	$\frac{1-q(p_\mu)}{q(p_\mu)} * \frac{p_\mu}{1-p_\mu}$
89-93	1.57	1.75	2.74
94-99	1.39	1.47	2.04

In the first five year period and for the Kakwani model the average volume of funds received by the communities corresponding to the group of greatest volume, exceeds by 2.38 times that of the group of lowest volume, and presents an average funds volume which is 1.47 times greater than the total volume of funds.

As regards the second five year period, these differences are reduced. We also observe that the same conclusions are reached with the other two models.

In addition, the median in the three concentration models analysed, discriminates in two equal groups the target population and analyses in each of them the value of the volume of the funds received. The period with the least concentration is the second five year period where it can be seen that the disparity between the volume of funds received by one group or another is the lesser of the two periods. Thus the communities situated above the median in the first five year period absorb 28.90% of the volume of funds, and in the second five

year period, they absorb 34.93%. The same conclusion is reached through any of the three models analysed.

MEASURES OF CONCENTRATION

To follow we present the calculation of the different measures of concentration for the three models considered.

Table 10. Concentration measures for the Kakwani-Podder model.

	P	d*	d'	g
89-93	0,189	0,365	0,301	0,260
94-99	0,162	0,316	0,245	0,216

Table 11. Concentration measures for the Kakwani model

	P	d*	d'	g
89-93	0,213	0,407	0,327	0,291
94-99	0,150	0,295	0,230	0,205

Table 12. Concentration measures for the Gupta model

	P	d*	d'	g
89-93	0,246	0,472	0,366	0,324
94-99	0,177	0,342	0,265	0,235

It is possible to observe how the indices derived from the three curves indicate that the tendency of the concentration is lesser in the second period from 94-99 than in the first period 89-93. Taking into account that in the two five year periods and in the three functions, the values are low, i.e., the inequality is not very great. The second period presents lesser inequality in the distribution of the ERDF funds among the populations eligible for the objectives.

CONCLUSIONS

In the concentration curves representation for the two periods under study, and for the three models considered, according to figures 1, 2 and 3, we can see how the ERDF funds concentration per capita has decreased in the second five year period with respect to the first, as the measures previously described indicate. Thus, the curve for the 94-99 period is much closer to the imaginary line of equal distribution, and therefore less inequality exists in the distribution of the funds. We can conclude that with the application of the Community Support Framework for this second five year period, the difference existing in the assignation of funds to the Autonomous Regions of the State of Spain has reduced with respect to the previous period.

This study corroborates the conclusions of the European Commission with representation in Barcelona, according to which the reduction of ERDF per capita in the second five year period is palpable in the Spanish Autonomous Regions, in which it has been managed to reduce the inequality of the distribution of the ERDF funds per capita amongst the eligible populations.

FIGURE 1: KAKWANI-PODDER MODEL CONCENTRATION CURVES

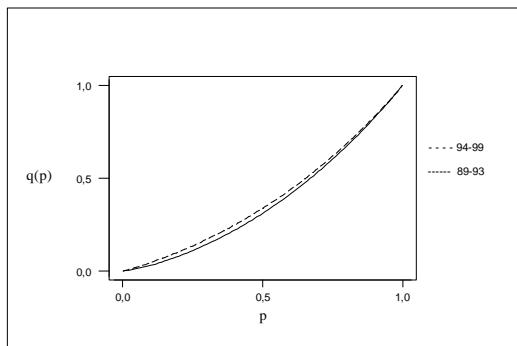


FIGURE 2. KAKWANI MODEL CONCENTRATION CURVES

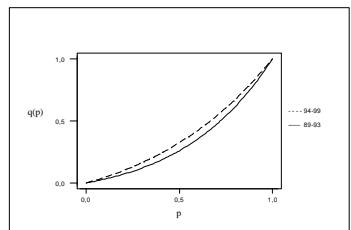
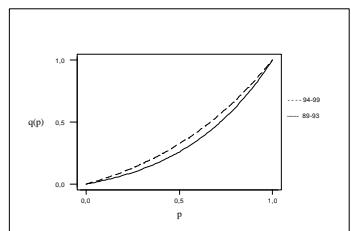


FIGURE 3. GUPTA MODEL CONCENTRATION CURVES



I. Estimation of the concentration curves Kawanni-Podder model:

$$q(p)_{89-93} = p^{1,3201} \cdot e^{-0,5071(1-p)}$$

$$q(p)_{94-99} = p^{1,0724} \cdot e^{-0,6832(1-p)}$$

p	q(p) 89-93	q(p) 94-99	p	q(p) 89-93	q(p) 94-99
2	0,01	0,00139	52	0,51	0,32066
3	0,02	0,00348	53	0,52	0,33066
4	0,03	0,00597	54	0,53	0,34080
5	0,04	0,00877	55	0,54	0,35109
6	0,05	0,01184	56	0,55	0,36153
7	0,06	0,01514	57	0,56	0,37212
8	0,07	0,01865	58	0,57	0,38285
9	0,08	0,02235	59	0,58	0,39373
10	0,09	0,02625	60	0,59	0,40477
11	0,10	0,03032	61	0,60	0,41595
12	0,11	0,03456	62	0,61	0,42729
13	0,12	0,03896	63	0,62	0,43878
14	0,13	0,04352	64	0,63	0,45042
15	0,14	0,04824	65	0,64	0,46222
16	0,15	0,05311	66	0,65	0,47418
17	0,16	0,05812	67	0,66	0,48629
18	0,17	0,06329	68	0,67	0,49857
19	0,18	0,06859	69	0,68	0,51100
20	0,19	0,07404	70	0,69	0,52359
21	0,20	0,07963	71	0,70	0,53634
22	0,21	0,08536	72	0,71	0,54926
23	0,22	0,09123	73	0,72	0,56234
24	0,23	0,09724	74	0,73	0,57558
25	0,24	0,10338	75	0,74	0,58899
26	0,25	0,10966	76	0,75	0,60257
27	0,26	0,11607	77	0,76	0,61632
28	0,27	0,12262	78	0,77	0,63023
29	0,28	0,12931	79	0,78	0,64432
30	0,29	0,13613	80	0,79	0,65858
31	0,30	0,14308	81	0,80	0,67301
32	0,31	0,15017	82	0,81	0,68762
33	0,32	0,15739	83	0,82	0,70240
34	0,33	0,16475	84	0,83	0,71736
35	0,34	0,17225	85	0,84	0,73249
36	0,35	0,17987	86	0,85	0,74781
37	0,36	0,18764	87	0,86	0,76331
38	0,37	0,19554	88	0,87	0,77898
39	0,38	0,20358	89	0,88	0,79485
40	0,39	0,21175	90	0,89	0,81089
41	0,40	0,22006	91	0,90	0,82713
42	0,41	0,22851	92	0,91	0,84355
43	0,42	0,23709	93	0,92	0,86016
44	0,43	0,24581	94	0,93	0,87696
45	0,44	0,25468	95	0,94	0,89395
46	0,45	0,26368	96	0,95	0,91113
47	0,46	0,27282	97	0,96	0,92851
48	0,47	0,28211	98	0,97	0,94609
49	0,48	0,29153	99	0,98	0,96386
50	0,49	0,30110	100	0,99	0,98183
51	0,50	0,31081	101	1,00	1,00000

II. Estimation of the concentration curves Kawanni model:

$$q(p)_{89-93} = p - 0,710774 \cdot p^{0,97566} \cdot (1-p)^{0,78323}$$

$$q(p)_{94-99} = p - 0,550587 \cdot p^{0,96058} \cdot (1-p)^{0,90906}$$

p	q(p) 89-93	q(p) 94-99	p	q(p) 89-93	q(p) 94-99
2	0,01	0,00211	52	0,51	0,29925
3	0,02	0,00461	53	0,52	0,30866
4	0,03	0,00732	54	0,53	0,31821
5	0,04	0,01022	55	0,54	0,32792
6	0,05	0,01328	56	0,55	0,33777
7	0,06	0,01649	57	0,56	0,34778
8	0,07	0,01985	58	0,57	0,35793
9	0,08	0,02336	59	0,58	0,36824
10	0,09	0,02700	60	0,59	0,37871
11	0,10	0,03078	61	0,60	0,38933
12	0,11	0,03470	62	0,61	0,40011
13	0,12	0,03875	63	0,62	0,41105
14	0,13	0,04293	64	0,63	0,42215
15	0,14	0,04724	65	0,64	0,43341
16	0,15	0,05169	66	0,65	0,44484
17	0,16	0,05627	67	0,66	0,45643
18	0,17	0,06097	68	0,67	0,46820
19	0,18	0,06581	69	0,68	0,48014
20	0,19	0,07078	70	0,69	0,49225
21	0,20	0,07587	71	0,70	0,50454
22	0,21	0,08110	72	0,71	0,51701
23	0,22	0,08645	73	0,72	0,52966
24	0,23	0,09193	74	0,73	0,54250
25	0,24	0,09754	75	0,74	0,55553
26	0,25	0,10329	76	0,75	0,56875
27	0,26	0,10916	77	0,76	0,58217
28	0,27	0,11516	78	0,77	0,59579
29	0,28	0,12129	79	0,78	0,60962
30	0,29	0,12755	80	0,79	0,62366
31	0,30	0,13394	81	0,80	0,63792
32	0,31	0,14047	82	0,81	0,65240
33	0,32	0,14712	83	0,82	0,66712
34	0,33	0,15391	84	0,83	0,68207
35	0,34	0,16083	85	0,84	0,69728
36	0,35	0,16788	86	0,85	0,71274
37	0,36	0,17506	87	0,86	0,72846
38	0,37	0,18238	88	0,87	0,74447
39	0,38	0,18983	89	0,88	0,76078
40	0,39	0,19742	90	0,89	0,77740
41	0,40	0,20514	91	0,90	0,79435
42	0,41	0,21300	92	0,91	0,81167
43	0,42	0,22100	93	0,92	0,82937
44	0,43	0,22913	94	0,93	0,84750
45	0,44	0,23740	95	0,94	0,86612
46	0,45	0,24581	96	0,95	0,88529
47	0,46	0,25436	97	0,96	0,90511
48	0,47	0,26305	98	0,97	0,92573
49	0,48	0,27189	99	0,98	0,94745
50	0,49	0,28086	100	0,99	0,97090
51	0,50	0,28998	101	1,00	1,00000

III. Estimation of the concentration curves Gupta model:

$$q(p)_{89-93} = p \cdot 3,719911^{p-1}$$

$$q(p)_{94-99} = p \cdot 2,375267^{p-1}$$

93	p			q(p) 89-			p			q(p) 89-93			q(p) 94-99		
2	0,01	0,00272		0,00425			52	0,51	0,26792				0,33379		
3	0,02	0,00552		0,00857			53	0,52	0,27679				0,34329		
4	0,03	0,00839		0,01296			54	0,53	0,28584				0,35293		
5	0,04	0,01133		0,01743			55	0,54	0,29509				0,36272		
6	0,05	0,01435		0,02198			56	0,55	0,30453				0,37264		
7	0,06	0,01745		0,02661			57	0,56	0,31416				0,38271		
8	0,07	0,02063		0,03131			58	0,57	0,32400				0,39293		
9	0,08	0,02389		0,03609			59	0,58	0,33404				0,40330		
10	0,09	0,02723		0,04096			60	0,59	0,34430				0,41382		
11	0,10	0,03066		0,04590			61	0,60	0,35476				0,42449		
12	0,11	0,03417		0,05093			62	0,61	0,36545				0,43531		
13	0,12	0,03777		0,05605			63	0,62	0,37635				0,44629		
14	0,13	0,04146		0,06125			64	0,63	0,38747				0,45743		
15	0,14	0,04523		0,06653			65	0,64	0,39883				0,46873		
16	0,15	0,04911		0,07190			66	0,65	0,41042				0,48019		
17	0,16	0,05307		0,07736			67	0,66	0,42224				0,49181		
18	0,17	0,05714		0,08291			68	0,67	0,43431				0,50360		
19	0,18	0,06130		0,08855			69	0,68	0,44662				0,51556		
20	0,19	0,06556		0,09428			70	0,69	0,45918				0,52769		
21	0,20	0,06992		0,10011			71	0,70	0,47200				0,53999		
22	0,21	0,07439		0,10602			72	0,71	0,48507				0,55246		
23	0,22	0,07896		0,11204			73	0,72	0,49841				0,56511		
24	0,23	0,08364		0,11815			74	0,73	0,51201				0,57794		
25	0,24	0,08843		0,12436			75	0,74	0,52589				0,59094		
26	0,25	0,09333		0,13066			76	0,75	0,54004				0,60413		
27	0,26	0,09835		0,13707			77	0,76	0,55448				0,61751		
28	0,27	0,10348		0,14358			78	0,77	0,56920				0,63107		
29	0,28	0,10874		0,15019			79	0,78	0,58422				0,64482		
30	0,29	0,11411		0,15691			80	0,79	0,59954				0,65876		
31	0,30	0,11960		0,16373			81	0,80	0,61515				0,67290		
32	0,31	0,12523		0,17066			82	0,81	0,63108				0,68723		
33	0,32	0,13097		0,17769			83	0,82	0,64732				0,70176		
34	0,33	0,13685		0,18484			84	0,83	0,66388				0,71648		
35	0,34	0,14287		0,19209			85	0,84	0,68076				0,73142		
36	0,35	0,14901		0,19946			86	0,85	0,69797				0,74656		
37	0,36	0,15530		0,20694			87	0,86	0,71552				0,76190		
38	0,37	0,16172		0,21454			88	0,87	0,73342				0,77746		
39	0,38	0,16829		0,22225			89	0,88	0,75166				0,79323		
40	0,39	0,17500		0,23008			90	0,89	0,77025				0,80921		
41	0,40	0,18186		0,23803			91	0,90	0,78920				0,82541		
42	0,41	0,18887		0,24610			92	0,91	0,80853				0,84184		
43	0,42	0,19604		0,25429			93	0,92	0,82822				0,85848		
44	0,43	0,20336		0,26261			94	0,93	0,84829				0,87535		
45	0,44	0,21084		0,27105			95	0,94	0,86875				0,89245		
46	0,45	0,21848		0,27962			96	0,95	0,88960				0,90978		
47	0,46	0,22629		0,28832			97	0,96	0,91086				0,92735		
48	0,47	0,23427		0,29715			98	0,97	0,93251				0,94515		
49	0,48	0,24242		0,30611			99	0,98	0,95459				0,96319		
50	0,49	0,25074		0,31520			100	0,99	0,97708				0,98147		
51	0,50	0,25924		0,32442			101	1,00	1,00000				1,00000		

REFERENCES

- ANUARIO ECONÓMICO COMARCAL, 1994. Institut d'Estadística de Catalunya. Generalitat de Catalunya, pp. 30-82.
- ANUARIO ESTADÍSTICO DE CATALUNYA, 1997. Institut d'Estadística de Catalunya. Generalitat de Catalunya, pp. 147-155.
- BARÓ, J., 1988. Función e índice de concentración de algunas distribuciones truncadas. Comunicación II reunión ASEPELT-España. Valladolid.
- BARÓ, J. ,1991. Aplicaciones del modelo de kakwani al análisis de la distribución de la renta. Document de Treball núm. 9101. Institut d'Estudis Laborals. Universitat de Barcelona.
- BARÓ, J. and MORATAL,V.,1984. Concentración y distribuciones truncadas. Qüestió, Vol.8 núm.3 pp. 127-132
- BARÓ, J. and TORRELLES, E.,1989. Sobre las medidas de concentración. Document de Treball 8904. Institut d'Estudis Laborals. Universitat de Barcelona.
- BARÓ, J.,1989. Descomposició del índice de Gini. Comunicación en III Reunión ASEPELT-España. Sevilla
- CABASÉS PIQUÉ, M.A. (1993). "Models i índex de concentració. Aplicació al volum empresarial de Lleida". Tesis Doctoral.
- COMISIÓN EUROPEA (1995). "Los Fondos Estructurales en 1994". Sexto informe anual.
- GASTWIRTH, J.L.,1972. Estimation of the Lorenz Curve and Gini Index. Review of Economics and Statistics, Vol.LIV nú.3 pp. 306-316
- GIORGİ, G. and PALLINI,A. ,1986. Di talune soglie inferiore e superiore del rapporto di concentrazione". Metron, Vol XLIV, núm. 1-4
- GUPTA, M.R. ,1984. Notes and comments. Functional Form for Estimation the Lorenz Curve. Econometrica , 52, pp. 1313-1314.
- KAKWANI, N.C. and PODDER, N., 1973. On the Estimation of Lorenz Curves from Grouped observations. International Economic Review, 14 pp. 278-292.
- KAKWANI,N.C., 1980 a. On a class of Poverty Measures. Econometrica núm. 48.

KAKWANI, N.C.,1980 b. Income inequality and poverty. Oxford University Press.

PATRONAT CATALÀ PRO EUROPA (1997). " Els fons estructurals a Catalunya". Aplicació i perspectives de la política estructural i de cohesió de la Unió Europea.