MEASUREMENT OF INTRA-DISTRIBUTION DYNAMICS: AN APPLICATION OF DIFFERENT APPROACHES TO THE EUROPEAN REGIONS

ADOLFO MAZA
MARÍA HIERRO
JOSÉ VILLAVERDE
De conformidad con la base quinta de la convocatoria del Programa de Estímulo a la Investigación, este trabajo ha sido sometido a evaluación externa anónima de especialistas cualificados a fin de contrastar su nivel técnico.

La serie DOCUMENTOS DE TRABAJO incluye avances y resultados de investigaciones dentro de los programas de la Fundación de las Cajas de Ahorros.
Las opiniones son responsabilidad de los autores.
Measurement of intra-distribution dynamics: An application of different approaches to the European regions

Adolfo Maza*, María Hierro and José Villaverde

University of Cantabria, Department of Economics, Avda. de los Castros, s/n, 39005-Santander (Spain)

Abstract: This paper examines the intra-distribution dynamics of per capita income between the European regions for the periods 1980-1993 and 1993-2005. To this end, three approaches are applied: the stochastic kernel approach, the highest conditional density approach and the estimation of mobility measures based on the Markov chain approach. One main conclusion and lesson have been obtained. The conclusion is that, although the distribution exhibits a great persistence, the degree of intra-distribution mobility has been much higher in the first period than in the second. The lesson is that, in dealing with intra-distribution dynamics, the use of different but complementary approaches is highly recommended.

Keywords: Intra-distribution dynamics; stochastic kernel; highest conditional density; mobility measures; European regions

* Corresponding author. Tel.: +34-942-201652; Fax: +34-942-201603
E-mail address: mazaaj@unican.es.
Measurement of intra-distribution dynamics: An application of different approaches to the European regions

1. Introduction

In the last two or three decades there has been a huge amount of literature devoted to the study of the topic of per capita income (or productivity) convergence between economies; this is especially true for the case of the European regions, where the interest has been encouraged by the ongoing process of economic integration. As a result of this, it is virtually impossible to acknowledge all the researchers that have at some time dealt this issue. Then, just as a short reference to some of the most interesting works, it is worth mentioning the old but excellent survey edited by Armstrong and Vickerman (1995). More recently, the books edited by Cuadrado-Roura and Parellada (2002) and Fingleton (2003), and papers such as those of López-Bazo et al. (1999), Badinger et al. (2004), Magrini (2004), Miller and Genc (2005) or Melicihani (2006) are very good references.

Most of the articles analysing convergence processes between economies have applied the classical $\sigma$ and $\beta$ convergence approaches (see the seminal articles of Barro and Sala-i-Martín, 1991 and 1992). However, these approaches present several econometric problems and, in addition, fail to capture some potentially interesting features of the dynamics of the distribution under study. Specifically,
two important drawbacks arise from these approaches: they are informative neither about the shape of the distribution nor about its internal changes (Quah, 1996a and 1996b).

By using the European regions as a sort of laboratory, the aim of this paper is to apply different techniques in order to analyse the second drawback previously mentioned: the lack of knowledge about the intra-distribution dynamics. The so-called stochastic kernel approach is employed as a starting point. However, the main innovation of this paper lies in the application of two other techniques that complete the results obtained by this “traditional” one: the highest conditional density approach and the estimation of mobility measures based on the Markov chain approach.

On one hand, the highest conditional density approach is relatively new in the study of transition dynamics and, among other advantages, offers a much clearer graphical visualization than the stochastic kernel approach. On the other hand, the main advantage of the Markov chain approach is that mobility measures can be estimated, that is to say, we are able to quantify the intra-distribution mobility (Fields and Ok, 1999). With respect to this last approach, in this paper we propose a new mobility index based on the measure developed by Bartholomew (1973, 1996).

Thus, as we have just pointed out, the current paper applies these three alternative techniques for the study of intra-distribution dynamics to the European case. To
be precise, it examines the behaviour of relative per capita income (per capita GAV in PPS) of 196 European regions of the EU-15 for the periods 1980-1993 and 1993-2005\(^1\). We have chosen these two periods because they are of similar length but with different rates of growth (see Table 1): the first one registered a relatively slow growth (an annual rate of 1.67% in the EU-15), while the second recorded a faster rate (2.21%). This allows us, on the one hand, to compare the results of each approach between periods and, on the other hand, to compare the results of the three different approaches for the same period.

The remainder of the paper is organised as follows. Section II refers to the stochastic kernel approach and its application to the relative per capita income distribution of the European regions. In Section III a modification of the kernel methodology, developed by Hyndman et al. (1996), is applied to the European case; this approach is based on the representation of the so-called highest density regions. Section IV, using the Markov chain approach, proposes an aggregated mobility index that provides a numeric support for the conclusions drawn from the previous approaches. Finally, Section V outlines the main conclusions.

**II. Intra-distribution dynamics: the stochastic kernel approach**

One of the techniques most commonly used in the analysis of the dynamics of a distribution involves the calculation of stochastic kernels (see Quah, 1997; and

---

\(^1\) Data are drawn from the Cambridge Econometrics regional database. The entire list of European regions considered in this paper is shown in the Appendix.
Durlauf and Quah, 1999). This approach is based on the estimation of the conditional density of a variable $y$ (in our case, the relative per capita income in the final year) given a variable $x$ (the relative per capita income in the initial year). Therefore, when, as in this paper, the stochastic kernel approach is applied to examine intra-distribution mobility between European regions in the periods 1980-1993 and 1993-2005, the probability of jumping from a per capita income level in 1980 (or 1993 in the second period) to any other per capita income level in 1993 (2005) is measured.

The results, using the Gaussian kernel with one common (constant) bandwidth calculated following Silverman’s rule of thumb, are displayed in Figure 4. The X-axis represents the relative per capita income for the initial year of each period (variable $x$) and the Y-axis the relative per capita income for the final year (variable $y$), while the Z-axis measures the density (or conditioned probability) of each point on the X-Y plane. Thus, the lines parallel to the Y-axis show the probability of moving from a point considered on the X-axis to any other point on the Y-axis. The 2D figure on the right is the contour plot, obtained by taking a cut parallel to the X-Y plane for a particular density value; the lines of this contour plot connect points reflecting the same density on the three-dimensional graph. The interpretation of the kernel is easy, especially if we look at the contour graph.

---

2 For more recent papers see, for instance, Maza and Villaverde (2004), Meliciani (2006), Ezcurra et al. (2007) and Villaverde and Maza (2007).

3 A formal kernel definition is given, for instance, in Laurini et al. (2005).

4 The kernel density estimator is usually calculated using the same bandwidth in the two directions (of variables) $x$ and $y$. 
If the lines of this graph are situated along the positive diagonal, the degree of mobility is low, this being lower the tighter the contour lines to the diagonal are: this means persistence in the distribution. If this is not so, there has been mobility, with more mobility the further the lines are from the diagonal.

With this in mind, Figure 1a seems to show that, generally speaking, the distribution of relative per capita income in the European regions has been characterized by persistence during the period 1980-1993. This result persists, and even more clearly\(^5\), in the period 1993-2005 (Figure 1b). However, the aforementioned figures also reveal, especially in the first period of analysis, that some regions have changed their relative positions; in other words, although there seems to be a high degree of persistence, there is also a certain degree of mobility (see the width of the contour lines).

As can be seen, the results obtained by using this technique, although very informative, are not absolutely conclusive. For this reason, the next two sections of this paper will try to clarify them.

### III. Intra-distribution dynamics: the highest conditional density approach

In addition to the stochastic kernel approach, another technique to examine intra-distribution dynamics is that developed by Hyndman et al. (1996). These authors propose an alternative conditional density estimator with better statistical

\(^5\) As can be intuited from the different scale of the contour line graphics.
properties than the stochastic kernel estimators. This new approach is based on the estimation of the so-called stacked density plot and highest conditional density plot. The stacked density plot shows a number of densities plotted side by side in a perspective graph. The highest conditional density plot represents, on the other hand, the so-called highest density regions; without entering into details, the highest density region is defined ‘as the smallest region of the simple space containing a given probability’ (Hyndman et al., 1996, p. 327).

The results, employing optimal bandwidths in the two directions \( x \) and \( y \), are shown in Figure 2: the stacked density plot on its left side and the highest conditional density plot on its right side. With reference to the stacked density plots, they allow us to see the changes in the shape of the relative per capita income distribution for a given per capita income value in the initial year. Therefore, these plots are more informative than the three-dimensional graph we obtained through the kernel approach, since it highlights the conditioning between relative per capita income levels (Arbia et al., 2006). According to the results, it seems that some European regions have greatly changed their initial per capita income levels, especially in the first period under analysis.

However, a more informative way to represent the changes occurring in a distribution is based on the highest conditional density plot, which, as we have mentioned, displays the highest density regions. Thus, each vertical strip on the

---

6 This technique, unlike the kernel approach, applies a different smooth parameter or bandwidth in each direction.
right hand side of Figure 2 represents the conditional density for a relative per capita income level in the initial year. In particular, this figure shows the highest density regions for a probability of 25, 50, 75 and 90% (as it passes from a darker to a less dark area). In addition, it illustrates, as a bullet (●), the mode (value of relative per capita income in the final year where the density function takes on its maximum value) for each value in the initial year. Accordingly, the highest conditional density plot may offer additional insights into the conclusions obtained by means of the stochastic kernel approach.

With respect to the first period (right side of Figure 2a), the position of the modes indicates that, generally speaking, the poorest (richest) regions have improved (worsened) their relative per capita income levels; this is crystal-clear as the modes of the lower (higher) tail of the distribution are above (below) the main diagonal. On the other hand, if we observe the mass of probability (dark areas), we see that in both the lower and higher extremes of the distribution, the area representing a probability of 25 and 50% (and even 75 and 90% in some cases) does not cross the diagonal; this shows again the existence of certain mobility inside the per capita income distribution. Moreover, this approach also shows that mobility, given its direction, has favoured the convergence process between the European regions.

Relative to the second period under study, the right side of Figure 2b clearly shows that the mobility degree was lower (or the persistence higher) than in the first one. The modes are nearer to the diagonal and the dark areas representing a
probability of 25% cross it in most cases. Although it is true that this same circumstance also emerged from the stochastic kernel estimation, there is no doubt this is much more evident with this highest conditional density approach.

IV. Intra-distribution dynamics: the estimation of mobility measures based on a Markov chain approach

From a chronological point of view, the Markov chain approach was the first methodology used in modelling intra-distribution dynamics; although popularized by Quah (1996a) in the analysis of personal income distribution, this approach goes back, at least, to Prais (1955) and Blumen et al. (1955). This is due to the fact that Markov chains provide useful representations of dynamic processes through the estimation of the well-known transition matrices. Recent papers employing this methodology are, for instance, Le Gallo (2004) and Tortosa et al. (2005).

In order to give a simple definition of the concept of transition matrix\(^7\), it is necessary to consider that regions are classified into exhaustive and mutually exclusive states according to their relative per capita income at times \(t_0\) and \(t_1\), \(p(t_0)\) and \(p(t_1)\) being the initial and final income distribution. The link between these distributions is given by \(p(t_1) = p(t_0) \cdot P\), where operator \(P\) represents the transition probability matrix, with elements \(p_{ij}\). This expression describes the

\(^7\) For a thorough definition of this concept see, for instance, Parzen (1962).
time evolution of $p(t_0)$, by mapping $p(t_0)$ onto $p(t_1)$, that is, the changes in the income distribution between $t_0$ and $t_1$. Thus, the interpretation of a transition matrix is really intuitive: each one of its cells $p_{ij}$ indicates the probability of moving from a per capita income state $i$ to a per capita income state $j$.

The main drawback of this approach is the arbitrariness when choosing the number and size of the states. Actually, the results critically depend on this choice and there is no any theoretical method to achieve an appropriate partition of the distribution. However, the main advantage of this technique is that scalar summary indexes of mobility can be derived (Bibby, 1975; Shorrocks, 1978; Sommers and Conlisk, 1978; Bartholomew, 1973, 1996; Parker and Rougier, 2001). The two other approaches employed in this paper are very informative (the second even more than the first), but it is this one that really allows us to quantify the mobility degree.

Among the mobility measures based on a Markov chain, Bartholomew’s (1996) measure has been one of the most extensively used in the literature on social mobility because of the introduction of distance into the quantification of mobility (see, for instance, Parker and Rougier, 2001; Ezcurra et al., 2006; Hierro, 2007). Additionally, and unlike other measures, such as that proposed by Shorrocks

---

8 When it comes to the choice of the number of states, the researcher should weigh up the clarity of the results and the number of observations in each state.
(1978), Bartholomew’s general class of mobility measures is concerned with all transitions between states\(^9\).

In this paper, we propose an extension of Bartholomew’s (1996) measure. Our mobility index is given by the expression:

\[
d(\mathbf{P}) = \sum_i \sum_j \frac{1}{k_i} \cdot p_i \cdot p_{ij} \cdot d_{ij}
\]

where \( p_i \) is the initial proportion of regions in \( i \)’s income state (that is, the size of each income state), \( p_{ij} \) denotes, as we have already indicated, the probability of moving from the relative per capita income state \( i \) to the relative per capita income state \( j \), \( d_{ij} \) is a distance measure between income states \( i \) and \( j \) (defined below) and, finally, \( k_i \) is an element introduced into the expression in order to normalize the mobility index. Thus, three elements are considered in the quantification of mobility: size \( (p_i) \), transitions \( (p_{ij}) \) and distance \( (d_{ij}) \).

This index differs from the traditional Bartholomew (1996) measure in three important aspects. First, it considers an alternative definition of distance for situations of state-hierarchy\(^{10}\). In our opinion, the distance measure proposed in this paper is especially suitable for income contexts. This distance is defined as

\[d_{ij} = |i - j|\]

\(^9\) Shorrocks’s (1978) mobility measure considers exclusively the elements on the main diagonal of the transition matrix.

\(^{10}\) When there is a natural ordering of the states, Bartholomew proposes \( d_{ij} = |i - j| \) as the distance measure.
the absolute difference between the average per capita income ($\bar{y}$) of the states under consideration, that is, $d_{ij} = |\bar{y}_j - \bar{y}_i|$. Therefore, according to this definition, when dealing with transitions within each income state, the distance moved, $d_{ii}$, is 0. On the other hand, transitions between income states will give positive values of $d_{ij}$; as is evident, the distance is higher when the differences in the average income of the states considered are larger.

Second, another difference with the original Bartholomew mobility measure is that, instead of the ergodic distribution, our index includes, as a weighting factor, the initial income distribution, given by the elements $p_i$. This decision responds to the fact that, with non-stationary processes (as is usual in income contexts), the ergodic distribution does not provide a faithful picture of the ultimate consequences of the current income distribution because intra-distribution patterns do not remain unchanged. On the contrary, the initial income distribution allows us to capture the relative size of each income state at the time the mobility degree is being analysed.

Finally, the last difference consists of the introduction of the element $k_i$, defined as the largest value in the $i$’s row of $D$ (matrix of distance with generic elements $d_{ij}$), in order to obtain a normalized measure in the interval $[0, 1]$. As should be obvious, the definition of distance conditions the meaning of maximum mobility. In our particular case, a situation of maximum mobility, given by $d(P) = 1$, arises
when, from each income state, all transitions occur towards the more distanced
income state, regardless of being an upward or a downward transition.

In addition, mobility indexes for each state can be obtained. This is because the
preceding aggregate measure can be inferred by the corresponding state-by-state
mobility measures, \( d(P_i) \),

\[
d(P) = \sum_i p_i \cdot d(P_i)
\]  \[2\]

where

\[
d(P_i) = \sum_j \frac{1}{k_i} \cdot p_{ij} \cdot d_{ij}
\]  \[3\]

This allows immobile and mobile states to be identified and, accordingly, a
separate analysis of the performance of each income state to be carried out.

In order to apply the aforementioned indexes to the European regions, we have
considered the following five exhaustive and mutually exclusive income states
according to their per capita income relative to the European average: [0, 75), [75,
90), [90, 110), [110, 125), [125, +\(\infty\))\(^{11}\). Results reported in Table 2 are
enlightening, since they provide a numeric support to the conclusions drawn from
the highest conditional density and the stochastic kernel approaches. In particular,
it is shown that the aggregate mobility measure \( d(P) \) reaches a much higher

\(^{11}\) These are the income states usually employed in the literature (see, for instance, Cuadrado et al.,
2002; Ezcurra et al., 2006). In addition, this classification is normally used for the European Union
in its publications on regional issues.
value for the first period (0.23) than for the second (0.11). This means that mobility in the European income distribution over 1980-1993 has been twice as high as over the 1993-2005 period. Notwithstanding this, the relatively low level of intra-distribution mobility given by this aggregate index for both periods indicates the existence of a strong persistence in the regional per capita income distribution in Europe.

A first look into the transition matrices and the state-by-state indexes allows us to look more deeply into this result. With reference to the period 1980-1993, a feature of note is that the mobility degree is considerably higher in this period than over 1993-2005 not only for the whole distribution but also for all of the income states. This finding comes from the existence of higher transition probabilities to contiguous and non-contiguous states, along with the fact that relative distances between them are greater over this period (see Table 3). Besides, it is worth highlighting the performance of the upper income state of the distribution, \([125, +\infty)\), which reaches the highest mobility (0.36); this, together with its relatively large size in the distribution (0.28), contributes to its effect on the aggregate mobility being eventually noteworthy.

As regards the second period, the higher probabilities on the main diagonal point to a higher persistence; this is especially remarkable in the tails of the distribution. Actually, most income states register an index very close to 0. The only exception refers to the state \([110, 125)\), for which the state-state mobility index is 0.31;
however, its small size (0.14) makes its contribution to the aggregate mobility index quite small.

V. Conclusions

In this paper we have analysed the intra-distribution dynamics of the relative per capita income between the European regions in two periods: 1980-1993 and 1993-2005. To achieve this objective three different approaches have been applied: the stochastic kernel approach, the highest conditional density approach and the estimation of mobility measures based on a Markov chain approach.

The estimation of stochastic kernels, the most generally method used to handle this topic, allows the main changes having occurred in the regional per capita income distribution in Europe to be seen. According to this approach, persistence is the predominant note, although there are also some signs of mobility. More generally, the comparison of the two periods shows that mobility seems to be higher in the first (1980-1993) than in the second period (1993-2005). Nevertheless, the stochastic kernel estimation results cast some doubts.

In order to solve these doubts, the highest conditional density approach is used. This methodology is clearer from a graphical point of view and, furthermore, has better statistical properties than the stochastic kernel approach. Two features of this technique are worth mentioning: first, it highlights the conditioning between variables (while the kernel method displays the joint distribution) and, second, it
employs two bandwidth parameters, controlling the smoothness between conditional densities in the two directions $x$ and $y$. In this case, the results undoubtedly reveal that, especially in the first period under analysis, some European regions have changed their relative per capita income in a very significant way. Besides this, the results indicate that mobility (both in the first and in the second period) has favoured the convergence process between the European regions, because the poorest (richest) regions have improved (worsened) their relative positions.

Subsequently and, among other reasons, in order to test the robustness of the previous results, the estimation of mobility measures based on a Markov chain approach is carried out. This allows us to obtain an exact measure of intra-distribution mobility. More precisely, this paper has proposed an adaptation of the mobility measure proposed by Bartholomew (1973, 1996) for income contexts. When it is applied to the European regions, this technique not only confirms that the intra-distributional mobility has been higher in the first than in the second period, but it also quantifies this difference; the intra-distribution mobility has been, according to our index, twice as high between 1980 and 1993 as between 1993 and 2005. All the same, the low value of both mobility indexes also corroborates that, in general terms, the regional per capita income distribution in Europe has been characterised by persistence in the last few decades.

To conclude, this paper underlines, and perhaps this is its main lesson, that the application of different approaches is advisable to gain more insight into the
internal mobility of a given distribution. In fact, what we have shown is that the three different approaches employed to deal with the topic of intra-distribution dynamics seem to be complementary, as each one offers a specific, precise view of the issue at stake.

References


Table 1. EU per capita income: regional growth rates

<table>
<thead>
<tr>
<th>Annual average rates of growth</th>
<th>1980-1993</th>
<th>1993-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-15</td>
<td>1.67</td>
<td>2.21</td>
</tr>
<tr>
<td>Ten highest regions</td>
<td>4.06</td>
<td>4.25</td>
</tr>
<tr>
<td>Ten lowest regions</td>
<td>-0.99</td>
<td>0.54</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1.00</td>
<td>0.86</td>
</tr>
</tbody>
</table>
Fig. 1. Stochastic kernels

(a) 1980-1993

(b) 1993-2005

Fig. 1. Stochastic kernels
Fig. 2. Stacked density and highest conditional density plots

(a) 1980-1993

(b) 1993-2005
Table 2. Aggregated and state-by-state mobility indexes

(a) 1980-1993

<table>
<thead>
<tr>
<th>States</th>
<th>[0, 75)</th>
<th>[75, 90)</th>
<th>[90, 110)</th>
<th>[110, 125)</th>
<th>[125, + ∞)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 75)</td>
<td>0.51</td>
<td>0.29</td>
<td>0.18</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>[75, 90)</td>
<td>0.00</td>
<td>0.11</td>
<td>0.68</td>
<td>0.21</td>
<td>0.00</td>
</tr>
<tr>
<td>[90, 110)</td>
<td>0.00</td>
<td>0.05</td>
<td>0.81</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>[110, 125)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.27</td>
<td>0.36</td>
<td>0.36</td>
</tr>
<tr>
<td>[125, + ∞)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.41</td>
<td>0.30</td>
<td>0.28</td>
</tr>
</tbody>
</table>

\[ p_i \]

\[ d(P_i) \] 0.42 0.14 0.11 0.06 0.28

\[ d(P) \] 0.17 0.24 0.11 0.32 0.36

(b) 1993-2005

<table>
<thead>
<tr>
<th>States</th>
<th>[0, 75)</th>
<th>[75, 90)</th>
<th>[90, 110)</th>
<th>[110, 125)</th>
<th>[125, + ∞)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 75)</td>
<td>0.84</td>
<td>0.14</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>[75, 90)</td>
<td>0.00</td>
<td>0.55</td>
<td>0.42</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>[90, 110)</td>
<td>0.00</td>
<td>0.24</td>
<td>0.68</td>
<td>0.08</td>
<td>0.00</td>
</tr>
<tr>
<td>[110, 125)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.61</td>
<td>0.21</td>
<td>0.18</td>
</tr>
<tr>
<td>[125, + ∞)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.15</td>
<td>0.85</td>
</tr>
</tbody>
</table>

\[ p_i \]

\[ d(P_i) \] 0.22 0.16 0.38 0.14 0.10

\[ d(P) \] 0.05 0.10 0.09 0.31 0.06

\[ d(P) \] 0.11
Table 3. Absolute distances between states

(a) 1980-1993

<table>
<thead>
<tr>
<th>States</th>
<th>[0, 75)</th>
<th>[75, 90)</th>
<th>[90, 110)</th>
<th>[110, 125)</th>
<th>[125, +∞)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 75)</td>
<td>0.00</td>
<td>31.67</td>
<td>49.48</td>
<td>68.47</td>
<td>114.02</td>
</tr>
<tr>
<td>[75, 90)</td>
<td>31.67</td>
<td>0.00</td>
<td>17.80</td>
<td>36.80</td>
<td>82.35</td>
</tr>
<tr>
<td>[90, 110)</td>
<td>49.48</td>
<td>17.80</td>
<td>0.00</td>
<td>19.00</td>
<td>64.54</td>
</tr>
<tr>
<td>[110, 125)</td>
<td>68.47</td>
<td>36.80</td>
<td>19.00</td>
<td>0.00</td>
<td>45.55</td>
</tr>
<tr>
<td>[125, +∞)</td>
<td>114.02</td>
<td>82.35</td>
<td>64.54</td>
<td>45.55</td>
<td>0.00</td>
</tr>
</tbody>
</table>

(b) 1993-2005

<table>
<thead>
<tr>
<th>States</th>
<th>[0, 75)</th>
<th>[75, 90)</th>
<th>[90, 110)</th>
<th>[110, 125)</th>
<th>[125, +∞)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 75)</td>
<td>0.00</td>
<td>23.90</td>
<td>37.73</td>
<td>55.18</td>
<td>90.95</td>
</tr>
<tr>
<td>[75, 90)</td>
<td>23.90</td>
<td>0.00</td>
<td>13.83</td>
<td>31.28</td>
<td>67.05</td>
</tr>
<tr>
<td>[90, 110)</td>
<td>37.73</td>
<td>13.83</td>
<td>0.00</td>
<td>17.45</td>
<td>53.22</td>
</tr>
<tr>
<td>[110, 125)</td>
<td>55.18</td>
<td>31.28</td>
<td>17.45</td>
<td>0.00</td>
<td>35.77</td>
</tr>
<tr>
<td>[125, +∞)</td>
<td>90.95</td>
<td>67.05</td>
<td>53.22</td>
<td>35.77</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Appendix: List of European regions

<table>
<thead>
<tr>
<th>Número</th>
<th>Título</th>
<th>Autor(es)</th>
</tr>
</thead>
<tbody>
<tr>
<td>159/2000</td>
<td>Participación privada en la construcción y explotación de carreteras de peaje</td>
<td>Ginés de Rus, Manuel Romero y Lourdes Trujillo</td>
</tr>
<tr>
<td>160/2000</td>
<td>Errores y posibles soluciones en la aplicación del <em>Value at Risk</em></td>
<td>Mariano González Sánchez</td>
</tr>
<tr>
<td>161/2000</td>
<td>Tax neutrality on saving assets. The spahish case before and after the tax reform</td>
<td>Cristina Ruza y de Paz-Curbera</td>
</tr>
<tr>
<td>163/2000</td>
<td>El control interno del riesgo. Una propuesta de sistema de límites</td>
<td>Mariano González Sánchez</td>
</tr>
<tr>
<td>164/2001</td>
<td>La evolución de las políticas de gasto de las Administraciones Públicas en los años 90</td>
<td>Alfonso Utrilla de la Hoz y Carmen Pérez Esparrells</td>
</tr>
<tr>
<td>165/2001</td>
<td>Bank cost efficiency and output specification</td>
<td>Emili Tortosa-Ausina</td>
</tr>
<tr>
<td>166/2001</td>
<td>Recent trends in Spanish income distribution: A robust picture of falling income inequality</td>
<td>Josep Oliver-Alonso, Xavier Ramos y José Luis Raymond-Bara</td>
</tr>
<tr>
<td>167/2001</td>
<td>Efectos redistributivos y sobre el bienestar social del tratamiento de las cargas familiares en el nuevo IRPF</td>
<td>Nuria Badenes Plá, Julio López Laborda, Jorge Onrubia Fernández</td>
</tr>
<tr>
<td>168/2001</td>
<td>The Effects of Bank Debt on Financial Structure of Small and Medium Firms in some European Countries</td>
<td>Mónica Melle-Hernández</td>
</tr>
<tr>
<td>169/2001</td>
<td>La política de cohesión de la UE ampliada: la perspectiva de España</td>
<td>Ismael Sanz Labrador</td>
</tr>
<tr>
<td>170/2002</td>
<td>Riesgo de liquidez de Mercado</td>
<td>Mariano González Sánchez</td>
</tr>
<tr>
<td>171/2002</td>
<td>Los costes de administración para el afiliado en los sistemas de pensiones basados en cuentas de capitalización individual: medid y comparación internacional.</td>
<td>José Enrique Devesa Carpio, Rosa Rodriguez Barrera, Carlos Vidal Meliá</td>
</tr>
<tr>
<td>172/2002</td>
<td>La encuesta continua de presupuestos familiares (1985-1996): descripción, representatividad y propuestas de metodología para la explotación de la información de los ingresos y el gasto.</td>
<td>Llorenc Pou, Joaquin Alegre</td>
</tr>
<tr>
<td>173/2002</td>
<td>Modelos paramétricos y no paramétricos en problemas de concesión de tarjetas de credito.</td>
<td>Rosa Puertas, María Bonilla, Ignacio Olmeda</td>
</tr>
<tr>
<td>Year</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>2002</td>
<td>Mercado único, comercio intra-industrial y costes de ajuste en las manufacturas españolas.</td>
<td>José Vicente Blanes Cristóbal</td>
</tr>
<tr>
<td>2003</td>
<td>La Administración tributaria en España. Un análisis de la gestión a través de los ingresos y de los gastos.</td>
<td>Juan de Dios Jiménez Aguilera, Pedro Enrique Barrilao González</td>
</tr>
<tr>
<td>2003</td>
<td>The Falling Share of Cash Payments in Spain.</td>
<td>Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey</td>
</tr>
<tr>
<td>2003</td>
<td>Effects of ATMs and Electronic Payments on Banking Costs: The Spanish Case.</td>
<td>Santiago Carbó Valverde, Rafael López del Paso, David B. Humphrey</td>
</tr>
<tr>
<td>2003</td>
<td>Factors explaining the interest margin in the banking sectors of the European Union.</td>
<td>Joaquín Maudos y Juan Fernández Guevara</td>
</tr>
<tr>
<td>2003</td>
<td>Los planes de stock options para directivos y consejeros y su valoración por el mercado de valores en España.</td>
<td>Mónica Melle Hernández</td>
</tr>
<tr>
<td>2003</td>
<td>The Euro effect on the integration of the European stock markets.</td>
<td>Mónica Melle Hernández</td>
</tr>
<tr>
<td>2004</td>
<td>In search of complementarity in the innovation strategy: international R&amp;D and external knowledge acquisition.</td>
<td>Bruno Cassiman, Reinhilde Veugelers</td>
</tr>
<tr>
<td>2004</td>
<td>Fijación de precios en el sector público: una aplicación para el servicio municipal de suministro de agua.</td>
<td>Mª Ángeles García Valiñas</td>
</tr>
<tr>
<td>2004</td>
<td>Estimación de la economía sumergida es España: un modelo estructural de variables latentes.</td>
<td>Ángel Alañón Pardo, Miguel Gómez de Antonio</td>
</tr>
<tr>
<td>2004</td>
<td>Causas políticas y consecuencias sociales de la corrupción.</td>
<td>Joan Oriol Prats Cabrera</td>
</tr>
<tr>
<td>2004</td>
<td>Loan bankers’ decisions and sensitivity to the audit report using the belief revision model.</td>
<td>Andrés Guiral Contreras and José A. Gonzalo Angulo</td>
</tr>
<tr>
<td>2004</td>
<td>El modelo de Black, Derman y Toy en la práctica. Aplicación al mercado español.</td>
<td>Marta Tolentino García-Abadillo y Antonio Díaz Pérez</td>
</tr>
<tr>
<td>2004</td>
<td>Does market competition make banks perform well?.</td>
<td>Mónica Melle</td>
</tr>
<tr>
<td>2004</td>
<td>Efficiency differences among banks: external, technical, internal, and managerial.</td>
<td>Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso</td>
</tr>
</tbody>
</table>
190/2004  Una aproximación al análisis de los costes de la esquizofrenia en españa: los modelos jerárquicos bayesianos  
F. J. Vázquez-Polo, M. A. Negrín, J. M. Cavasés, E. Sánchez y grupo RIRAG

191/2004  Environmental proactivity and business performance: an empirical analysis  
Javier González-Benito y Óscar González-Benito

192/2004  Economic risk to beneficiaries in notional defined contribution accounts (NDCs)  
Carlos Vidal-Meliá, Inmaculada Domínguez-Fabian y José Enrique Devesa-Carpio

193/2004  Sources of efficiency gains in port reform: non parametric malmquist decomposition tfp index for Mexico  
Antonio Estache, Beatriz Tovar de la Fé y Lourdes Trujillo

194/2004  Persistencia de resultados en los fondos de inversión españoles  
Alfredo Ciriaco Fernández y Rafael Santamaría Aquilué

195/2005  El modelo de revisión de creencias como aproximación psicológica a la formación del juicio del auditor sobre la gestión continuada  
Andrés Guiral Contreras y Francisco Esteso Sánchez

196/2005  La nueva financiación sanitaria en España: descentralización y prospectiva  
David Cantarero Prieto

197/2005  A cointegration analysis of the Long-Run supply response of Spanish agriculture to the common agricultural policy  
José A. Mendez, Ricardo Mora y Carlos San Juan

198/2005  ¿Refleja la estructura temporal de los tipos de interés del mercado español preferencia por la liquidez?  
Magdalena Massot Perelló y Juan M. Nave

199/2005  Análisis de impacto de los Fondos Estructurales Europeos recibidos por una economía regional: Un enfoque a través de Matrices de Contabilidad Social  
M. Carmen Lima y M. Alejandro Cardenete

200/2005  Does the development of non-cash payments affect monetary policy transmission?  
Santiago Carbó Valverde y Rafael López del Paso

201/2005  Firm and time varying technical and allocative efficiency: an application for port cargo handling firms  
Ana Rodríguez-Álvarez, Beatriz Tovar de la Fé y Lourdes Trujillo

202/2005  Contractual complexity in strategic alliances  
Jeffrey J. Reuer y Africa Ariño

203/2005  Factores determinantes de la evolución del empleo en las empresas adquiridas por opa  
Nuria Alcalde Fradejas y Inés Pérez-Soba Aguilar

Elena Olmedo, Juan M. Valderas, Ricardo Gimeno and Lorenzo Escot
205/2005 Precio de la tierra con presión urbana: un modelo para España
Esther Decimavilla, Carlos San Juan y Stefan Sperlich

206/2005 Interregional migration in Spain: a semiparametric analysis
Adolfo Maza y José Villaverde

207/2005 Productivity growth in European banking
Carmen Murillo-Melchor, José Manuel Pastor y Emili Tortosa-Ausina

Santiago Carbó Valverde, David B. Humphrey y Rafael López del Paso

209/2005 La elasticidad de sustitución intertemporal con preferencias no separables intratemporalmente: los casos de Alemania, España y Francia.
Elena Márquez de la Cruz, Ana R. Martinez Cañete y Inés Pérez-Soba Aguilar

210/2005 Contribución de los efectos tamaño, book-to-market y momentum a la valoración de activos: el caso español.
Begoña Font-Belaire y Alfredo Juan Grau-Grau

211/2005 Permanent income, convergence and inequality among countries
José M. Pastor and Lorenzo Serrano

212/2005 The Latin Model of Welfare: Do 'Insertion Contracts' Reduce Long-Term Dependence?
Luis Ayala and Magdalena Rodríguez

213/2005 The effect of geographic expansion on the productivity of Spanish savings banks
Manuel Illueca, José M. Pastor and Emili Tortosa-Ausina

214/2005 Dynamic network interconnection under consumer switching costs
Ángel Luis López Rodríguez

215/2005 La influencia del entorno socioeconómico en la realización de estudios universitarios: una aproximación al caso español en la década de los noventa
Marta Rahona López

216/2005 The valuation of spanish ipos: efficiency analysis
Susana Álvarez Otero

217/2005 On the generation of a regular multi-input multi-output technology using parametric output distance functions
Sergio Perelman and Daniel Santín

218/2005 La gobernanza de los procesos parlamentarios: la organización industrial del congreso de los diputados en España
Gonzalo Caballero Miguez

219/2005 Determinants of bank market structure: Efficiency and political economy variables
Francisco González

220/2005 Agresividad de las órdenes introducidas en el mercado español: estrategias, determinantes y medidas de performance
David Abad Diaz
221/2005  Tendencia post-anuncio de resultados contables: evidencia para el mercado español
Carlos Forner Rodríguez, Joaquín Marhuenda Fructuoso y Sonia Sanabria García

222/2005  Human capital accumulation and geography: empirical evidence in the European Union
Jesús López-Rodríguez, J. Andrés Faíña y Jose Lopez Rodriguez

223/2005  Auditors' Forecasting in Going Concern Decisions: Framing, Confidence and Information Processing
Waymond Rodgers and Andrés Guiral

José Ramón Canelo de la Torre, J. Andrés Faín and Jesús López-Rodríguez

225/2005  The effects of ownership structure and board composition on the audit committee activity: Spanish evidence
Carlos Fernández Méndez and Rubén Arrondo García

226/2005  Cross-country determinants of bank income smoothing by managing loan loss provisions
Ana Rosa Fonseca and Francisco González

Alejandro Estellér Moré

228/2005  Region versus Industry effects: volatility transmission
Pilar Soriano Felipe and Francisco J. Climent Diranzo

Daniel Vázquez-Bustelo and Sandra Valle

Alfonso Palacio-Vera

231/2005  Reconciling Sustainability and Discounting in Cost Benefit Analysis: a methodological proposal
M. Carmen Almansa Sáez and Javier Calatrava Requena

232/2005  Can The Excess Of Liquidity Affect The Effectiveness Of The European Monetary Policy?
Santiago Carbó Valverde and Rafael López del Paso

Miguel Angel Barberán Lahuerta

Víctor M. González

Waymond Rodgers, Paul Pavlou and Andrés Guiral.

Francisco J. André, M. Alejandro Cardenete y Carlos Romero.

238/2006 Trade Effects Of Monetary Agreements: Evidence For Oecd Countries. Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano.


240/2006 La interacción entre el éxito competitivo y las condiciones del mercado doméstico como determinantes de la decisión de exportación en las Pymes. Francisco García Pérez.

241/2006 Una estimación de la depreciación del capital humano por sectores, por ocupación y en el tiempo. Inés P. Murillo.


244/2006 Did The European Exchange-Rate Mechanism Contribute To The Integration Of Peripheral Countries?. Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano.


252/2006 “The momentum effect in the Spanish stock market: Omitted risk factors or investor behaviour?”. Luis Muga and Rafael Santamaria.

254/2006 Desigualdad regional en España: renta permanente versus renta corriente. José M. Pastor, Empar Pons y Lorenzo Serrano

255/2006 Environmental implications of organic food preferences: an application of the impure public goods model. Ana Maria Aldanondo-Ochoa y Carmen Almansa-Sáez


257/2006 La internacionalización de la empresa manufacturera española: efectos del capital humano genérico y específico. José López Rodríguez

258/2006 Evaluación de las migraciones interregionales en España, 1996-2004. María Martínez Torres


266/2006 Health Human Capital And The Shift From Foraging To Farming. Paolo Rungo.


269/2006 Banking competition, financial dependence and economic growth Joaquín Maudos y Juan Fernández de Guevara

270/2006 Efficiency, subsidies and environmental adaptation of animal farming under CAP Werner Kleinhans, Carmen Murillo, Carlos San Juan y Stefan Sperlich
A. García-Lorenzo y Jesús López-Rodríguez

272/2006 Riesgo asimétrico y estrategias de momentum en el mercado de valores español
Luis Muga y Rafael Santamaría

273/2006 Valoración de capital-riesgo en proyectos de base tecnológica e innovadora a través de la teoría de opciones reales
Gracia Rubio Martín

274/2006 Capital stock and unemployment: searching for the missing link
Ana Rosa Martínez-Cañete, Elena Márquez de la Cruz, Alfonso Palacio-Vera and Inés Pérez-Soba Aguilar

275/2006 Study of the influence of the voters’ political culture on vote decision through the simulation of a political competition problem in Spain
Sagrario Lantarón, Isabel Lillo, Mª Dolores López and Javier Rodrigo

276/2006 Investment and growth in Europe during the Golden Age
Antonio Cubel and Mª Teresa Sanchis

277/2006 Efectos de vincular la pensión pública a la inversión en cantidad y calidad de hijos en un modelo de equilibrio general
Robert Meneu Gaya

278/2006 El consumo y la valoración de activos
Elena Márquez y Belén Nieto

279/2006 Economic growth and currency crisis: A real exchange rate entropic approach
David Matesanz Gómez y Guillermo J. Ortega

280/2006 Three measures of returns to education: An illustration for the case of Spain
María Arrazola y José de Hevia

281/2006 Composition of Firms versus Composition of Jobs
Antoni Cunyat

282/2006 La vocación internacional de un holding tranviario belga: la Compagnie Mutuelle de Tramways, 1895-1918
Alberte Martínez López

283/2006 Una visión panorámica de las entidades de crédito en España en la última década.
Constantino García Ramos

Alberte Martínez López

285/2006 Los intereses belgas en la red ferroviaria catalana, 1890-1936
Alberte Martínez López

286/2006 The Governance of Quality: The Case of the Agrifood Brand Names
Marta Fernández Barcala, Manuel González-Díaz y Emmanuel Raynaud

287/2006 Modelling the role of health status in the transition out of malthusian equilibrium
Paolo Rungo, Luis Currais and Berta Rivera

288/2006 Industrial Effects of Climate Change Policies through the EU Emissions Trading Scheme
Xavier Labandeira and Miguel Rodríguez
Globalisation and the Composition of Government Spending: An analysis for OECD countries
Norman Gemmell, Richard Kneller and Ismael Sanz

La producción de energía eléctrica en España: Análisis económico de la actividad tras la liberalización del Sector Eléctrico
Fernando Hernández Martínez

Further considerations on the link between adjustment costs and the productivity of R&D investment: evidence for Spain
Desiderio Romero-Jordán, José Félix Sanz-Sanz and Inmaculada Álvarez-Ayuso

Una teoría sobre la contribución de la función de compras al rendimiento empresarial
Javier González Benito

Agility drivers, enablers and outcomes: empirical test of an integrated agile manufacturing model
Daniel Vázquez-Bustelo, Lucía Avella and Esteban Fernández

Testing the parametric vs the semiparametric generalized mixed effects models
Maria José Lombardía and Stefan Sperlich

Nonlinear dynamics in energy futures
Mariano Matilla-García

Estimating Spatial Models By Generalized Maximum Entropy Or How To Get Rid Of W
Esteban Fernández Vázquez, Matías Mayor Fernández and Jorge Rodríguez-Valez

Optimización fiscal en las transmisiones lucrativas: análisis metodológico
Félix Domínguez Barrero

La situación actual de la banca online en España
Francisco José Climent Diranzo y Alexandre Momparler Pechúan

Estrategia competitiva y rendimiento del negocio: el papel mediador de la estrategia y las capacidades productivas
Javier González Benito y Isabel Suárez González

A Parametric Model to Estimate Risk in a Fixed Income Portfolio
Pilar Abad and Sonia Benito

Análisis Empírico de las Preferencias Sociales Respecto del Gasto en Obra Social de las Cajas de Ahorros
Alejandro Esteller-Moré, Jonathan Jorba Jiménez y Albert Solé-Ollé

Assessing the enlargement and deepening of regional trading blocs: The European Union case
Salvador Gil-Pareja, Rafael Llorca-Vivero y José Antonio Martínez-Serrano

¿Es la Franquicia un Medio de Financiación?: Evidencia para el Caso Español
Vanessa Solís Rodríguez y Manuel González Díaz

On the Finite-Sample Biases in Nonparametric Testing for Variance Constancy
Paulo M.M. Rodrigues and Antonio Rubia

Spain is Different: Relative Wages 1989-98
José Antonio Carrasco Gallego
Poverty reduction and SAM multipliers: An evaluation of public policies in a regional framework
Francisco Javier De Miguel-Vélez y Jesús Pérez-Mayo

La Eficiencia en la Gestión del Riesgo de Crédito en las Cajas de Ahorro
Marcelino Martínez Cabrera

Optimal environmental policy in transport: unintended effects on consumers' generalized price
M. Pilar Socorro and Ofelia Betancor

Agricultural Productivity in the European Regions: Trends and Explanatory Factors
Roberto Ezcurra, Belen Iráizoz, Pedro Pascual and Manuel Rapún

Long-run Regional Population Divergence and Modern Economic Growth in Europe: a Case Study of Spain
Maria Isabel Ayuda, Fernando Collantes and Vicente Pinilla

Financial Information effects on the measurement of Commercial Banks' Efficiency
Borja Amor, Maria T. Tascón and José L. Fanjul

Neutralidad e incentivos de las inversiones financieras en el nuevo IRPF
Félix Domínguez Barrero

The Effects of Corporate Social Responsibility Perceptions on The Valuation of Common Stock
Waymond Rodgers, Helen Choy and Andres Guiral-Contreras

Country Creditor Rights, Information Sharing and Commercial Banks’ Profitability Persistence across the world
Borja Amor, Maria T. Tascón and José L. Fanjul

¿Es Relevante el Déficit Corriente en una Unión Monetaria? El Caso Español
Javier Blanco González y Ignacio del Rosal Fernández

The Impact of Credit Rating Announcements on Spanish Corporate Fixed Income Performance: Returns, Yields and Liquidity
Pilar Abad, Antonio Díaz and M. Dolores Robles

Indicadores de Lealtad al Establecimiento y Formato Comercial Basados en la Distribución del Presupuesto
Cesar Augusto Bustos Reyes y Óscar González Benito

Migrants and Market Potential in Spain over The XXth Century: A Test Of The New Economic Geography
Daniel A. Tirado, Jordi Pons, Elisenda Paluzie and Javier Silvestre

El Impacto del Coste de Oportunidad de la Actividad Emprendedora en la Intención de los Ciudadanos Europeos de Crear Empresas
Luis Miguel Zapico Aldeano

Los belgas y los ferrocarriles de via estrecha en España, 1887-1936
Alberte Martínez López

Competición política bipartidista. Estudio geométrico del equilibrio en un caso ponderado
Isabel Lillo, Mª Dolores López y Javier Rodrigo

Human resource management and environment management systems: an empirical study
Mª Concepción López Fernández, Ana Mª Serrano Bedía and Gema García Piqueres
323/2007 Wood and industrialization. evidence and hypotheses from the case of Spain, 1860-1935. Íñaki Iriarte-Goñi and María Isabel Ayuda Bosque


325/2007 Monetary policy and structural changes in the volatility of us interest rates. Juncal Cuñado, Javier Gomez Biscarri and Fernando Perez de Gracia

326/2007 The productivity effects of intrafirm diffusion. Lucio Fuentelsaz, Jaime Gómez and Sergio Palomas


328/2007 El grado de cobertura del gasto público en España respecto a la UE-15 Nuria Rueda, Begoña Barruso, Carmen Calderón y Mª del Mar Herrador

329/2007 The Impact of Direct Subsidies in Spain before and after the CAP'92 Reform Carmen Murillo, Carlos San Juan and Stefan Sperlich

330/2007 Determinants of post-privatisation performance of Spanish divested firms Laura Cabeza García and Silvia Gómez Ansón

331/2007 ¿Por qué deciden diversificar las empresas españolas? Razones oportunistas versus razones económicas Almudena Martínez Campillo

332/2007 Dynamical Hierarchical Tree in Currency Markets Juan Gabriel Brida, David Matesanz Gómez and Wiston Adrián Risso

333/2007 Los determinantes sociodemográficos del gasto sanitario. Análisis con microdatos individuales Ana María Angulo, Ramón Barberán, Pilar Egea y Jesús Mur

334/2007 Why do companies go private? The Spanish case Inés Pérez-Soba Aguilar

335/2007 The use of gis to study transport for disabled people Verónica Cañal Fernández

336/2007 The long run consequences of M&A: An empirical application Cristina Bernad, Lucio Fuentelsaz and Jaime Gómez

337/2007 Las clasificaciones de materias en economía: principios para el desarrollo de una nueva clasificación Valentín Edo Hernández

338/2007 Reforming Taxes and Improving Health: A Revenue-Neutral Tax Reform to Eliminate Medical and Pharmaceutical VAT Santiago Álvarez-García, Carlos Pestana Barros y Juan Prieto-Rodriguez

339/2007 Impacts of an iron and steel plant on residential property values Celia Bilbao-Terol

340/2007 Firm size and capital structure: Evidence using dynamic panel data Víctor M. González and Francisco González
¿Cómo organizar una cadena hotelera? La elección de la forma de gobierno
Marta Fernández Barcala y Manuel González Díaz

Análisis de los efectos de la decisión de diversificar: un contraste del marco teórico “Agencia-Stewardship”
Almudena Martínez Campillo y Roberto Fernández Gago

Selecting portfolios given multiple eurostoxx-based uncertainty scenarios: a stochastic goal programming approach from fuzzy betas
Enrique Ballestero, Blanca Pérez-Gladish, Mar Arenas-Parra and Amelia Bilbao-Terol

“El bienestar de los inmigrantes y los factores implicados en la decisión de emigrar”
Anastasia Hernández Alemán y Carmelo J. León

Andrea Martínez-Noya and Esteban García-Canal

Diferencias salariales entre empresas públicas y privadas. El caso español
Begoña Cueto y Nuria Sánchez- Sánchez

Effects of Fiscal Treatments of Second Home Ownership on Renting Supply
Celia Bilbao Terol and Juan Prieto Rodríguez

Auditors’ ethical dilemmas in the going concern evaluation
Andres Guiral, Waymond Rodgers, Emiliano Ruiz and Jose A. Gonzalo

Convergencia en capital humano en España. Un análisis regional para el periodo 1970-2004
Susana Morales Sequera y Carmen Pérez Esparrells

Socially responsible investment: mutual funds portfolio selection using fuzzy multiobjective programming
Blanca Mª Pérez-Gladish, Mar Arenas-Parra, Amelia Bilbao-Terol and Mª Victoria Rodriguez-Uria

Persistencia del resultado contable y sus componentes: implicaciones de la medida de ajustes por devengo
Raúl Iñiguez Sánchez y Francisco Poveda Fuentes

Wage Inequality and Globalisation: What can we Learn from the Past? A General Equilibrium Approach
Concha Betrán, Javier Ferri and Maria A. Pons

Eficacia de los incentivos fiscales a la inversión en I+D en España en los años noventa
Desiderio Romero Jordán y José Félix Sanz Sanz

Convergencia regional en renta y bienestar en España
Robert Meneu Gaya

Tributación ambiental: Estado de la Cuestión y Experiencia en España
Ana Carrera Poncela

Salient features of dependence in daily us stock market indices
Luis A. Gil-Alana, Juncal Cuñado and Fernando Pérez de Gracia

La educación superior: ¿un gasto o una inversión rentable para el sector público?
Inés P. Murillo y Francisco Pedraja
358/2007 Effects of a reduction of working hours on a model with job creation and job destruction
Emilio Domínguez, Miren Ullibarri y Idoya Zabaleta

359/2007 Stock split size, signaling and earnings management: Evidence from the Spanish market
José Yagüe, J. Carlos Gómez-Sala and Francisco Poveda-Fuentes

360/2007 Modelización de las expectativas y estrategias de inversión en mercados de derivados
Begoña Font-Belaire

361/2008 Trade in capital goods during the golden age, 1953-1973
Mª Teresa Sanchis and Antonio Cubel

362/2008 El capital económico por riesgo operacional: una aplicación del modelo de distribución de pérdidas
Enrique José Jiménez Rodríguez y José Manuel Feria Domínguez

363/2008 The drivers of effectiveness in competition policy
Joan-Ramon Borrell and Juan-Luis Jiménez

364/2008 Corporate governance structure and board of directors remuneration policies: evidence from Spain
Carlos Fernández Méndez, Rubén Arrondo García and Enrique Fernández Rodríguez

365/2008 Beyond the disciplinary role of governance: how boards and donors add value to Spanish foundations
Pablo De Andrés Alonso, Valentín Azofra Palenzuela y M. Elena Romero Merino

366/2008 Complejidad y perfeccionamiento contractual para la contención del oportunismo en los acuerdos de franquicia
Vanessa Solís Rodríguez y Manuel González Díaz

367/2008 Inestabilidad y convergencia entre las regiones europeas
Jesús Mur, Fernando López y Ana Angulo

368/2008 Análisis espacial del cierre de explotaciones agrarias
Ana Aldanondo Ochoa, Carmen Almansa Sáez y Valero Casanovas Oliva

369/2008 Cross-Country Efficiency Comparison between Italian and Spanish Public Universities in the period 2000-2005
Tommaso Agasisti and Carmen Pérez Esparrells

370/2008 El desarrollo de la sociedad de la informacion en España: un análisis por comunidades autónomas
María Concepción García Jiménez y José Luis Gómez Barroso

371/2008 El medioambiente y los objetivos de fabricación: un análisis de los modelos estratégicos para su consecución
Lucía Avella Camarero, Esteban Fernández Sánchez y Daniel Vázquez-Bustelo

372/2008 Influence of bank concentration and institutions on capital structure: New international evidence
Víctor M. González and Francisco González

373/2008 Generalización del concepto de equilibrio en juegos de competición política
Mª Dolores López González y Javier Rodrigo Hitos

374/2008 Smooth Transition from Fixed Effects to Mixed Effects Models in Multi-level regression Models
Maria José Lombardía and Stefan Sperlich
375/2008  A Revenue-Neutral Tax Reform to Increase Demand for Public Transport Services
Carlos Pestana Barros and Juan Prieto-Rodriguez

376/2008  Measurement of intra-distribution dynamics: An application of different approaches to the European regions
Adolfo Maza, María Hierro and José Villaverde