Publication and citation inequality in the Spanish University System

Garcia-Zorita, C.; Iribarren-Maestro, I.; Rousseau, R.; and Sanz-Casado, E.

Universidad Carlos III de Madrid; C/ Madrid, 126, Getafe 28903 Madrid, (Spain)

KHBO - Association K.U.Leuven Industrial Sciences and Technology Zeedijk 101 - 8400 Oostende, (Belgium)

Objective
This study determines the inequality in publication behaviour over scientific fields and according to received citations over these fields among Spanish public universities.

Methodology
Inequality, in the sense of unevenness, can best be measured and represented using the well-known Gini index derived from a Lorenz curve (Nijssen et al., 1998). The raw data used were drawn from the papers produced by Spain’s forty eight public universities listed in the Web of Science from 2003 to 2007, and their distribution across 21 fields of the 22 considered by ISI Essential Science Indicators. The Multi-disciplinary Sciences category was ruled out because of the large variability in topics covered by articles in this category. The distribution of the total number of citations attributed to these publications was likewise studied.

Results
Figure 1 shows the Lorenz curves for the distribution by area of all Spanish public university publications and citations. The diagonal line represents the totally even distribution and serves as a reference line. The Gini index is equal to twice the area between the diagonal and the actual curve. The fact that the publication Lorenz curve is closer to the diagonal than the citation Lorenz curve implies a larger inequality in citations. The Gini index values for the publication and citation distributions are 0.407 and 0.472, respectively.

Figure 1. Lorenz curves by area
The Gini index values for the distribution, by area, of each university’s publications and the respective citations are plotted in Figure 2, where they are shown by increasing value of the Gini index for publications. Non-specialist, usually large (in terms of number of professors and students) universities, offering a wide range of degrees that cover the entire scientific spectrum, appear on the left side of the x-axis. Smaller, more specialized universities, including polytechnic universities (of Cartagena-UPCT, Valencia-UPV, Madrid-UPM, Catalonia-UPC and so on) appear at the opposite end of the graph. The figure shows that the citations of the papers produced by these universities are less evenly distributed than the papers themselves. Two polytechnic universities, found on the right end of the x-axis, constitute the exception to this rule: the citations received by the Polytechnic University of Madrid-UPM are more evenly distributed than its publications, while in the Polytechnic University of Catalonia-UPC, the two distributions are essentially the same.

The Spearman rank correlation coefficient between the two rankings of universities, namely according to the Gini index for inequality in publication behaviour over fields, and according to received citations over these fields is 0.87.

Conclusions
An analysis of Spanish public university publications and the number of times they are cited shows that its scientific papers are more evenly distributed by area than the citations subsequently received. These findings are consistent with the results observed in other publications (see e.g. Rousseau, 1998). A ranking according to Gini indices for publications coincides in general terms with a ranking according to specialization.

References