Ranking agricultural, environmental and natural resource economics journals: A note

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Abstract

This paper by applying Data Envelopment Analysis (DEA) ranks for the first time Economics journals in the field of Agricultural, Environmental and Natural Resource. Specifically, by using one composite input and one composite output the paper ranks 32 journals. In addition for the first time three different quality ranking reports have been incorporated to the DEA modelling problem in order to classify the journals into four categories ('A' to 'D'). The results reveal that the journals with the highest rankings in the field are *Journal of Environmental Economics and Management, Land Economics, American Journal of Agricultural Economics, Journal of Agricultural Economics, Energy Journal, Resource and Energy Economics, Environment and Planning A, Ecological Economics* and *European Review of Agricultural Economics*.

Keywords: Journals ranking; Agricultural Economics; Environmental Economics; Natural Resource Economics; Data Envelopment Analysis.

JEL classification codes: A10; A11; C02; C14; Q00.

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1. Introduction

The ranking of academic journals has been in the research agenda for several years (Halkos and Tzeremes, 2011). In Economics the ranking of the journals has always been associated with scientific quality (Ritzberger, 2008). According to Pujol (2008) citation analysis and peer review are the main approaches when ranking journals. The most recognisable ranking list in Economics has been introduced by Diamond (1989). Diamond has used data from Social Science Citation Index and has created a list of 27 economic journals known as “Diamond’s core economic journals”.

But even though the validity of the list was questioned due to its arbitrary use of weights, several authors have confirmed its validity (Burton and Phimister, 1995; Halkos and Tzeremes, 2011). Liebowitz and Palmer (1984) applied an LP-method to overcome problems of arbitrary weights. Laband and Piette (1994) presented an updated ranking based on the paper of Liebowitz and Palmer (1984). LP-method is also used by Kalaitzidakis et al. (2003) in order to construct a global ranking of universities. Kalaitzidakis et al. (2010, 2011) applied the same updated methodology in order to provide a smoother longer view and to avoid randomness.

However, Lee and Cronin (2010) suggest that when ranking Economics journals heterogeneities and heterodoxies related with different economic fields in which the journals are focusing their scientific quality must be captured. More recently Halkos and Tzeremes (2011) evaluated 229 economic journals in a Data Envelopment Analysis (DEA) context. In order to overcome the problem of bias when evaluating journals from different economic field, they used composite inputs and outputs taking into account quality rankings reports. Then in a DEA context and by applying bootstrap techniques for controlling for sample bias they derived the ranking of these 229 Economics journals.

Our paper in the same lines applies the DEA approach in a sample of 32 Economics journals in the field of Agriculture, Environment and Natural Resources.

In contrast with the previous studies our study eliminates the problem of ranking economic journal from different fields and thus to have a bias in the measurement. In addition it uses data from three different well-known qualitative reports alongside with bibliographic data and in order to classify the journals.

2. Data and Methodology

2.1 Data and variable description

The journals in our list are all indexed in the EconLit database[1] and are also included in Social Science Citation Index (SSCI)[2] and/or Scopus database[3]. In addition in order to create a quality index of the Journals under evaluation three different quality rankings have been used. First Kiel internal ranking report[4] published from the Kiel Institute for the World Economy has been used. Kiel internal ranking report is based upon the seminar work by Kodrzycki and Yu (2006). In addition the ranking provided by Academic Journal Quality Guide[5] and introduced by the Association of Business Schools (ABS) is also used.

According to Harvey et al. (2010) the ABS Academic Journal Quality Guide is a hybrid approach based on experts' opinion and on citation analysis specialized mostly in business and management journals. Finally, the 'Journal Quality List' developed by the Australian Business Deans Council (ABDC)[6] has been also used. The ABDC list is the longest of all containing ranking classifications of 2671 journals from a variety of different disciplines. The data used are concerning the recorded

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1 The EconLit database can be accessed at: http://www.aeaweb.org/econlit/journal_list.php.

2 Data from Social Science Citation Index can be retrieved from: http://thomsonreuters.com/products_services/science/science_products/a-z/social_sciences_citation_ index.

3 SCOPUS data can be retrieved from: http://www.scopus.com/home.url.

4 KIEL internal rankings for 2009 can be downloaded from: http://www.ifw-kiel.de/forschung/internal-journal-ranking.

5 ABS Academic Journal Quality Guide can be found at: http://www.the-abs.org.uk/?id=257.

6 The ABDC Jounral Quality List can be obtained from: http://www.abdc.edu.au/3.43.0.0.1.0.htm.

data of the journals as of the end of the year 2010. Our sample contains 32 economic journals in the field of Agriculture, Environment and Natural Resources.

Following Halkos and Tzeremes (2011) our study uses DEA methodology in order to rank the journals j by using one composite input and one composite output. The input x_j has been constructed as:

$$x_j = \frac{NI_j}{NV_j} \tag{1}$$

where NI_j represents the number of journals' issues (until 2010) and NV_j represents the number of journals' volumes (until 2010). The proposed composite input has the ability to control for the age and the size of the journal under evaluation.

In addition the composite output y_j has been constructed as:

$$y_j = \frac{NC_j}{NP_j / Q_j} \tag{2}$$

where NC_j represents the number of journals' citations (until 2010) excluded self citations; NP_j represents the number of papers' citied (until 2010); and whereas Q_j is a quality index controlling the qualitative aspects among the examined sample in a relative way. Therefore, the relative quality index Q_j is a composite index which is based on the three quality ranking reports i (Kiel, ABS and ABDC) and has the form of:

$$Q_j = \prod_{i=1}^{3} \frac{AR_{ji}}{\sum_j AR_j} \tag{3}$$

where AR represents the adjusted ranking reports' score from Kiel, ABS and ABDC.

In Kiel report the journals take the values from "A" (high quality journal) to "D" (lower quality journal). In addition we sign the value of 5 to "A", 4 to "B", 3 to

"C", 2 to "D" and 1 to journals which are not listed in the report. Similarly, in the ABS report five values can be assigned for journals' quality (A*, A, B, C and D).

In our case the highest quality in a journal is assigned with "6" whereas the lowest quality with "1" (i.e. the journal is not listed in the report). Finally, in the ABDC report the journals take the values from "A*" (high quality journal) to "C" (lower quality journal). In addition we sign the value of 5 to "A*", 4 to "A", 3 to "B", 2 to "C" and 1 to journals which are not listed in the report. In contrast with the KIEL quality assessment the ABS and ABDC reports "grasp" the quality of the journals within their subject area (i.e. Business, Economics, Finance, History etc.).

Halkos and Tzeremes (2011) used first the quality reports in the context of DEA for ranking Economics journals alongside with bootstrap techniques to grasp the heterogeneities of different economic fields among the examined journals. In the same fashion and for the first time, we use three different quality reports alongside with citation data in order to capture the relative quality of the number of papers being cited.

Table 1 provides descriptive statistics of the variables used alongside with descriptive statistics of the composite input and output. As can be realised (looking at the standard deviation values) even though the journals are from the same field there are a lot of heterogeneities among them in terms of the number of issues and volumes. In addition high heterogeneities are being reported in the number of citation and in the number of the cited articles. This is a first indication of the differences of the 'popularity' and/or the quality of the journals under examination. This is also confirmed when looking at the descriptive statistics of the three adaptive ranking reports (AR).

Finally, as in Burton and Phimister (1995) and Halkos and Tzeremes (2011, 2012a, 2012b) we apply DEA methodology using the composite input and output in order to rank the journals.

Table 1: Descriptive statistics of the variables used

	NC	NP	NV	NI
Mean	7124.00000	723.46875	38.21875	79.12500
Standard Deviation	9337.62123	822.84428	20.79816	47.18649
Minimum	112.00000	46.00000	4.00000	8.00000
Maximum	31161.00000	4102.00000	92.00000	219.00000
	AR(ABS)	AR(ABDC)	AR (KIEL)	
Mean	2.40625	3.18750	1.81250	
Standard Deviation	1.38795	1.09065	0.69270	
Minimum	1.00000	1.00000	1.00000	
Maximum	5.00000	5.00000	3.00000	
	Composite Input	Composite Output		
Mean	2.44514	0.0005855		
Standard Deviation	1.30475	0.0011462		
Minimum	0.69767	0.0000033		
Maximum	5.76316	0.0060337		

2.1 Data Envelopment Analysis

Following the presentation by Daraio and Simar (2007) a set of points Ψ (the production set) given p inputs and q outputs can be defined in the Euclidean space R_+^{p+q} as:

$$\Psi = \left\{(x,y)\middle| x \in R_+^p, y \in R_+^q, (x,y) \text{ is feasible}\right\} \quad (4)$$

where x is the input vector and y is the output vector. In addition the output correspondence set (for all $x \in \Psi$) can be defined as:

$$P(x) = \left\{y \in R_+^q \middle| (x,y) \in \Psi\right\} \quad (5).$$

Furthermore $P(x)$ consists of all output vectors that can be produced by a given input vector $x \in R_+^p$. Following Farrell (1957) the efficient boundaries or isoquants of the sections of Ψ can be defined in radial terms (for output space) as:

$$\partial P(x) = \left\{y \middle| y \in P(x), \lambda y \notin P(x), \forall \lambda > 1\right\} \quad (6).$$

In addition following Shephard (1970) several economic axioms can be stated:

1. *No free lunch.* i.e. $(x, y) \notin \Psi$ if $x = 0, y \geq 0, y \neq 0$.

2. *Free disposability.* i.e. Let $\tilde{x} \in R_+^p$ and $\tilde{y} \in R_+^q$, with $\tilde{x} \geq x$ and $\tilde{y} \leq y$ if $(x, y) \in \Psi$ then $\left(\tilde{x}, y\right) \in \Psi$ and $\left(x, \tilde{y}\right) \in \Psi$.

3. *Bounded.* $P(x)$ is bounded $\forall x \in R_+^p$.

4. *Closeness.* Ψ is closed.

5. *Convexity.* Ψ is convex.

Furthermore the DEA estimator of the production set can be obtained following the linear programming by Charnes et al. (1978) who model constant returns to scale (CRS) and popularized the technique[7]. Therefore, the measurement of the efficiency of a given unit (journal in our case) can be estimated as:

$$\hat{\Psi}_{DEA} = \left\{ (x, y) \in R_+^{p+q} \middle| y \leq \sum_{i=1}^{n} \gamma_i Y_i ; x \geq \sum_{i=1}^{n} \gamma_i X_i, \text{ for } (\gamma_1, \dots, \gamma_n); \\ \gamma_i \geq 0, i = 1, \dots, n \right\} \tag{7}$$

Then the estimator of the output efficiency score for a given (x_0, y_0) measure can be obtained by solving the following linear programming:

$$\hat{\lambda}_{DEA}(x_0, y_0) = \sup\left\{ \lambda \middle| (x_0, \lambda y_0) \in \hat{\Psi}_{DEA} \right\} \tag{8}$$

$$\hat{\lambda}_{DEA}(x_0, y_0) = \max\left\{ \lambda \middle| \lambda y_0 \leq \sum_{i=1}^{n} \gamma_i Y_i ; x_0 \geq \sum_{i=1}^{n} \gamma_i X_i ; \lambda > 0; \\ \gamma_i \geq 0, i = 1, \dots, n \right\} \tag{9}$$

As can be seen our paper uses an output orientation[8] under constant returns to scale assumption. Since the size of the journals has been captured from the composite input the assumption of CRS is the most appropriate for our case.

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[7] For the history and the roots of DEA see Førsund and Sarafoglou (2002) and Førsund et al. (2009).

[8] The output orientation in our case indicates that the journals try to maximise their output (i.e. citations) given their input quantities (i.e. volumes, issues). In addition this specification

3. Empirical Results and Conclusions

Table 2 presents the results from the efficiency analysis. Journals' efficiency levels can take the values between 0 and 1 (efficient journal). The mean efficiency scores indicate that there are extremely significant differences among the journals. The *Journal of Environmental Economics and Management* appears to be efficient whereas the rest of them inefficient (in terms of the DEA methodology).

Since we face a lot of variations among the efficiency scores obtained we follow Halkos and Tzeremes (2011, 2012a, 2012b) approach and we distinguish the journals into four categories based on their ranking instead of their obtained efficiency score.

In our case there are four categories (i.e. 'A' to 'D')[9] and therefore it will be able to make our results comparable with most of the quality rankings. As such we split our sample into four parts. The first part is the first 10% of the sample (i.e. the 10% of the journals with the highest efficiency scores) and indicates category 'A'. In addition the next 20% indicates category 'B', the next 30% category 'C' and the final 40% indicates category 'D'.

Looking at table 2 we realize that under category 'A' three journals have been assigned. These are *Journal of Environmental Economics and Management*, *Land Economics* and *American Journal of Agricultural Economics.*

In addition under category 'B', six journals have been assigned. These are *Journal of Agricultural Economics*, *Energy Journal*, *Resource and Energy Economics*, *Environment and Planning A*, *Ecological Economics* and *European Review of Agricultural Economics*. Moreover, under the 'C' category ten journals have been assigned. These are *Australian Journal of Agricultural and Resource Economics*, *Energy Economics*, *Agricultural Economics*, *Environmental &*

can be said is more suitable for our case because it allow us to capture further quality aspects of the examined journals.

[9] 'A' indicates the highest quality of the journals under consideration whereas 'D' the lowest.

Resource Economics, *Food Policy*, *Environment and Development Economics, Environment and Planning C*, *Journal of Environmental Planning and Management*, *Journal of Agricultural and Resource Economics* and *Canadian Journal of Agricultural Economics.*

Finally, the last category 'D' contains thirteen journals. These are *Resources Policy, Natural Resources Journal*, *Review of Agricultural Economics*, *Organization & Environment*, *Marine Resource Economics*, *Energy Policy*, *Natural Resource Modeling*, *Review of Environmental Economics and Policy*, *Environmental Values*, *Climate Policy*, *Global Environmental Politics*, *Agribusiness* and *Agricultural and Food Science.*

Our study for the first time applies DEA methodology in order to evaluate a sample of Economics journals in the field of Agriculture, Environment and Natural Resources. It uses quantitative data regarding journals' number of citations, issues, volumes and cited papers from two international databases (Scopus, SSCI). In addition data from three well-known qualitative ranking reports (ABS, ABDC, Kiel) are been also used. Then the paper constructs one composite input and one composite output based on the above data in a DEA related framework.

Finally, by applying DEA methodology the ranking of the journals is estimated. In addition by applying relative classification to the journals efficiency scores, final four main categories are been created, categorizing in such a way the journals into four main quality classes. As such our paper provides an alternative way of ranking Economics journals overcoming traditional heterogenic related problems.

Table 2: Rankings of Agriculture, Environment and Natural Resources Journals

Ranks	Journals	Score	Class
1	*Journal of Environmental Economics and Management*	1	A
2	*Land Economics*	0.864581	A
3	*American Journal of Agricultural Economics*	0.512935	A
4	*Journal of Agricultural Economics*	0.24174	B
5	*Energy Journal*	0.151505	B
6	*Resource and Energy Economics*	0.124943	B
7	*Environment and Planning A*	0.096697	B
8	*Ecological Economics*	0.079085	B
9	*European Review of Agricultural Economics*	0.068612	B
10	*Australian Journal of Agricultural and Resource Economics*	0.062059	C
11	*Energy Economics*	0.050366	C
12	*Agricultural Economics*	0.042751	C
13	*Environmental & Resource Economics*	0.036308	C
14	*Food Policy*	0.035963	C
15	*Environment and Development Economics*	0.024142	C
16	*Environment and Planning C*	0.013904	C
17	*Journal of Environmental Planning and Management*	0.012788	C
18	*Journal of Agricultural and Resource Economics*	0.010942	C
19	*Canadian Journal of Agricultural Economics*	0.010544	C
20	*Resources Policy*	0.009355	D
21	*Natural Resources Journal*	0.007255	D
22	*Review of Agricultural Economics*	0.006508	D
23	*Organization & Environment*	0.005159	D
24	*Marine Resource Economics*	0.004847	D
25	*Energy Policy*	0.003912	D
26	*Natural Resource Modeling*	0.002646	D
27	*Review of Environmental Economics and Policy*	0.001824	D
28	*Environmental Values*	0.001756	D
29	*Climate Policy*	0.001127	D
30	*Global Environmental Politics*	0.000924	D
31	*Agribusiness*	0.000389	D
32	*Agricultural and Food Science*	0.000236	D

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