Ranking the 'Diamond Core' economic journals: A note

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Abstract

By estimating the production frontier with the application of Data Envelopment Analysis (DEA) we rank the 'Diamond Core' economic journals as has been presented by Diamond (1989). By using one composite input and one composite output the paper ranks 27 core economics journals. For the first time a study attempts to rank the 27 journals by using data from SCOPUS database for the time period of 1996-2010. In addition for the first time three different quality ranking reports are incorporated in the DEA modelling problem in order to classify the journals into four categories ('A' to 'D'). The results reveal that from the 27 'core' economics journals the five journals with the highest rankings are *Journal of Political Economy, Quarterly Journal of Economics, Journal of Economic Literature, Review of Economic Studies* and *American Economic Review*. In addition it appears that the journals' impact factor derived from SSCI database reflects their ranking position.

Keywords: Rankings; Economics Journals; Diamond's core Journals; Data Envelopment Analysis.

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

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I. INTRODUCTION

The ranking of academic journals has been in the research agenda for several years. 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 used data from Social Science Citation Index and has created a list of 27 economic journals known as "Diamond's core economic journals".

However, even though 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) have applied a Linear Programming (LP)-method to overcome problems of arbitrary weights when ranking the journals. Nearly ten years after, Laband and Piette (1994) presented an updated ranking based on the paper of Liebowitz and Palmer (1984). A 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 in turn to rank economics journals (heterodox and mainstream).

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 heterodox and mainstream Economics journals.

In that respect following both quantitative and qualitative data this paper ranks for the first time Diamond's 'core' Economics journals in an activity analysis framework producing in such a way a unified ranking approach.

II. DATA AND METHODOLOGY

II.1 Data and variable description

For our analysis we obtain bibliographic data of the journals both from Scopus database[1] and Social Science Citation Index (SSCI)[2]. In addition in order to create a quality index of the Journals under evaluation three different quality ranking reports have been used. First Kiel internal ranking report[3] 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 quality ranking report provided by Academic Journal Quality Guide[4] 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, data from a third quality report has been used derived from the Australian Business Deans Council (ABDC-'Journal Quality List')[5]. The ABDC list is the longest of all containing ranking classifications of 2671 journals from a variety of different disciplines. The data used in our study are concerning the recorded data of the journals as of the end of the year 2010. Our sample contains 27 economics journals.

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[1] The bibliographic data from SCOPUS database can be retrieved from: http://www.scopus.com/home.url.

[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] KIEL internal rankings for 2010 can be downloaded from: http://www.ifw-kiel.de/forschung/internal-journal-ranking.

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

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

Following Halkos and Tzeremes (2011) our study uses an LP formulation in a production activity framework in order to rank the journals j by using one composite input and one composite output[6]. The input x_j has been constructed as:

$$x_j = \frac{NI_j}{NV_j} \qquad (1)$$

where NI_j represents the number of journals' issues (from 1996 to 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:

$$y_j = \frac{NC_j}{NP_j / Q_j} \qquad (2)$$

where NC_j represents the number of journals' citations (from 1996 to 2010) excluded self citations; NP_j represents the number of papers citied (from 1996 to 2010); and 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 an additional composite index which is based on the three quality ranking reports i (Kiel, ABS and ABDC) and has the form of:

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

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

[6] The bibliographic data used in the input/output construction have been extracted from Scopus database.

In Kiel report the journals take the values from “A” (high quality journal) to “D” (lower quality journal). In addition we construct the adjusted ranking based on Kiel report - ‘*AR(KIEL)*’ by assigning the value of 4 to “A” class, the value of 3 to “B” class, the value of 2 to “C” class and the value of 1 to “D” class. Similarly, for the adjusted ranking report for the ABS[7] - ‘*AR(ABS)*’, we assign five values for journals’ quality. In our case the highest quality in a journal (A*) is assigned with 5 whereas the lowest quality with 1. Additionally for the adjusted ABDC ranking- ‘*AR(ABDC)*’ we assign four values[8]. We assign the value of 4 to “A*”, 3 to “A”, 2 to “B” and 1 to “C”.

Halkos and Tzeremes (2011) have used two quality reports in the context of DEA for ranking Economics journals alongside with bootstrap techniques in order to grasp the heterogeneities of different economic fields among the examined journals. In the same lines (but with different LP modelling), we use three different quality reports along side 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) a lot of heterogeneities among the journals in terms of the number of issues and volumes are being reported. In addition high heterogeneities are being reported in the number of citations 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 27 ‘core’ economics journals.

Finally, as in Burton and Phimister (1995) we apply DEA methodology using the composite input and output in order to rank the journals and thus avoiding the problem of assigning arbitrary weights to the journals.

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[7] The ABS quality ranking originally contains five scales (A*, A, B, C and D) with ‘A*’ representing the highest quality and ‘D’ the lowest.

[8] The ABDC quality ranking originally contains four scales (A*, A, B and C) with ‘A*’ representing the highest quality and ‘C’ the lowest.

Table 1: Descriptive statistics of the variables used

	NC	NP	NV	NI
Mean	34247.518519	1064.518519	79.222222	92.814815
Standard Deviation	28370.225403	830.141386	34.550224	46.877120
Minimum	5301.000000	251.000000	28.000000	31.000000
Maximum	102540.000000	4369.000000	159.000000	210.000000
	AR(ABS)	AR(ABDC)	AR (KIEL)	
Mean	3.592593	3.740741	2.925926	
Standard Deviation	0.693889	0.446576	0.780824	
Minimum	3.000000	3.000000	2.000000	
Maximum	5.000000	4.000000	4.000000	
	Composite Input	Composite Output		
Mean	1.260929	0.002500		
Standard Deviation	0.561020	0.003157		
Minimum	0.480000	0.000159		
Maximum	2.652174	0.015247		

II.2 The economic model

Let us have 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[9]:

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

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:

[9] We follow the presentation by Daraio and Simar (2007).

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.

Moreover, 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[10]. Therefore, the measurement of the efficiency of a given journal can be estimated as:

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

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:

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

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

As can be seen our paper uses an output orientation[11] 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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[10] For the history and the roots of DEA see Førsund and Sarafoglou (2002) and Førsund *et al.* (2009).

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

III. RESULTS

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 (0.139392) and the standard deviation (0.224484) indicate that there are extremely significant differences among the journals. The *Journal of Political Economy* appears to be efficient whereas the rest of them inefficient (in terms of DEA methodology)[12].

Since we face a lot of variations among the efficiency scores obtained we follow Halkos and Tzeremes (2011) by distinguishing the journals into four categories based on their ranking order instead of their obtained efficiency score. Therefore, journals' efficiency scores are used only for ranking order purposes rather than an absolute measure of journals scientific quality.

In our case there are four categories (i.e. 'A' to 'D')[13] and therefore it will be possible 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 ranking) 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 are assigned. These are *Journal of Political Economy*, *Quarterly Journal of Economics* and *Journal of Economic Literature*.

Similarly, under category 'B', five journals have been assigned. These are *Review of Economic Studies*, *American Economic Review*, *Econometrica*, *Journal of Financial Economics* and *Review of Economics and* Statistics.

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[12] Regardless our ranking analysis these 27 'core' Economics journals are regarded among the economists as top quality journals.

[13] As in many quality reports 'A' indicates the highest quality whereas 'D' the lowest.

Moreover, under the 'C' category eight journals have been assigned. These are *Journal of Economic Theory*, *Journal of Econometrics*, *Economic Journal*, *Journal of Monetary Economics*, *Journal of Law & Economics*, *Journal of International Economics*, *International Economic Review* and *Brookings Papers on Economic Activity.*

Finally, the last category 'D' contains eleven journals. These are *Journal of Development Economics*, *Journal of Public Economics*, *Rand Journal of Economics*, *Oxford Economic Papers*, *Journal of Labor Economics*, *Economica*, *European Economic Review*, *Economic Inquiry*, *Canadian Journal of Economics*, *Economics Letters* and *Journal of Mathematical Economics.*

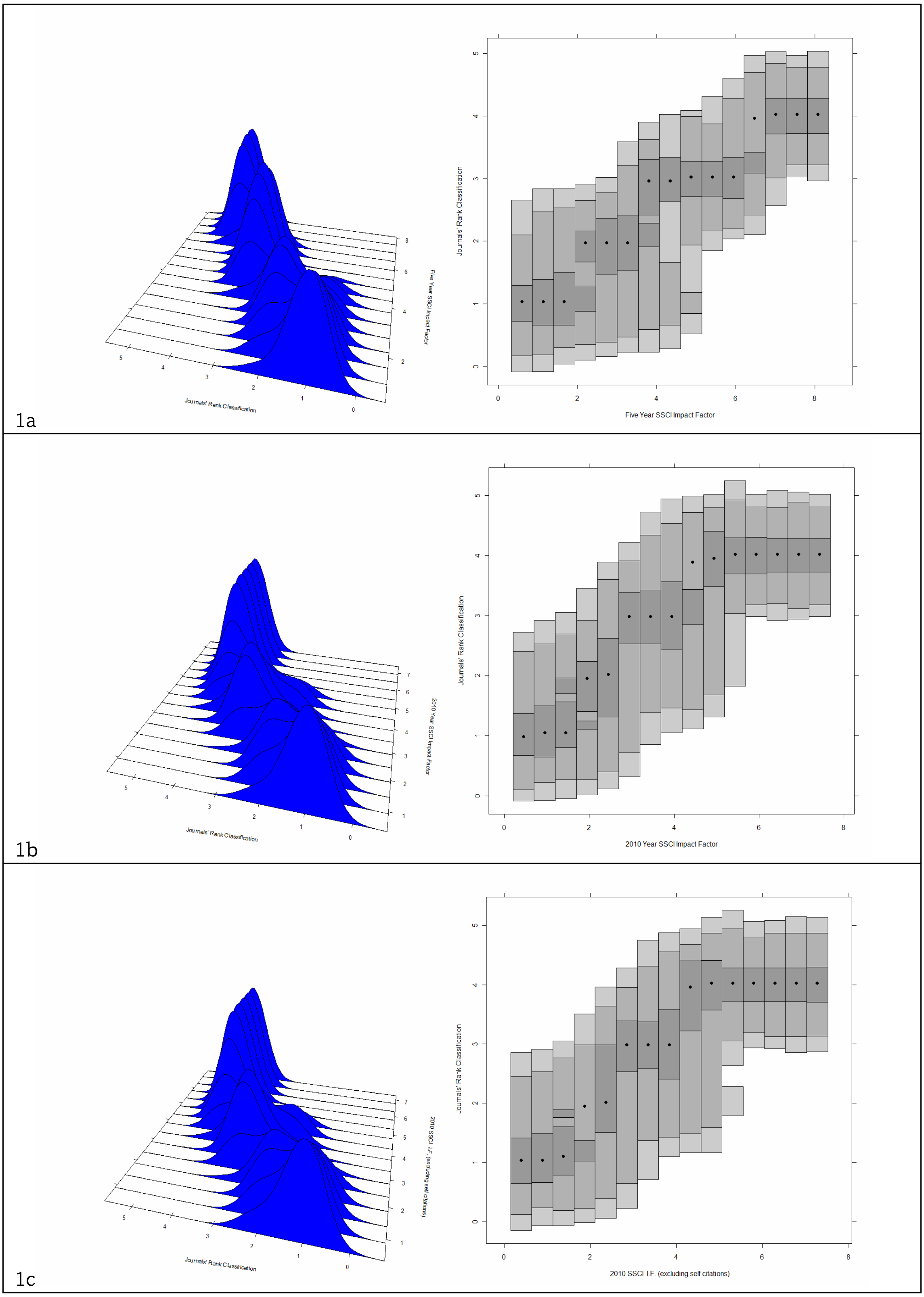
Table 2: Ranking of Diamond's 27 'core' Economics Journals

Rank	Core Economics Journals	Score	Class
1	*Journal of Political Economy*	1	A
2	*Quarterly Journal of Economics*	0.740761	A
3	*Journal of Economic Literature*	0.217591	A
4	*Review of Economic Studies*	0.212529	B
5	*American Economic Review*	0.21183	B
6	*Econometrica*	0.181354	B
7	*Journal of Financial Economics*	0.16159	B
8	*Review of Economics and Statistics*	0.147246	B
9	*Journal of Economic Theory*	0.126165	C
10	*Journal of Econometrics*	0.117008	C
11	*Economic Journal*	0.101913	C
12	*Journal of Monetary Economics*	0.083382	C
13	*Journal of Law & Economics*	0.072335	C
14	*Journal of International Economics*	0.06904	C
15	*International Economic Review*	0.053698	C
16	*Brookings Papers on Economic Activity*	0.048744	C
17	*Journal of Development Economics*	0.037559	D
18	*Journal of Public Economics*	0.030823	D
19	*Rand Journal of Economics*	0.03057	D
20	*Oxford Economic Papers*	0.029541	D
21	*Journal of Labor Economics*	0.026076	D
22	*Economica*	0.021197	D
23	*European Economic Review*	0.019738	D
24	*Economic Inquiry*	0.008365	D
25	*Canadian Journal of Economics*	0.006255	D
26	*Economics Letters*	0.004134	D
27	*Journal of Mathematical Economics*	0.004131	D
mean		0.139392	
std		0.224484	
min		0.004131	
max		1	

Additionally, figure 2 provides a kernel conditional density estimates using local polynomial estimation (Hyndman *et al.*, 1996; Bashtannyk and Hyndman, 2001; Hyndman and Yao, 2002) of the obtained journals' ranking classes (i.e. we assign 4 for 'A', 3 for 'B', 2 for 'C' and 1 for 'D' class) against their impact factors obtained from SSCI database. In such a way the stochastic kernel provide as with the visualisation of the link between their impact factors and their obtained class level under our analysis. In addition since impact factors are regarded among the scholars as a criterion for scientific quality, we are able to check for the validity of our obtained results.

Subfigure 1a indicates the link of the obtained journals' class levels against journals' five year impact factor obtained from SSCI database. As can be realised the ranking classes derived from our analysis are confirmed by the journals' impact factors since higher five year impact factors are more likely to have the journals with higher ranking class. Similarly we get the same results when looking subfigure 1b and 1c which examine journals' ranking class against 2010 journals' impact factor and against 2010 journals' impact factor excluding self citations.

Figure 1: Stochastic kernels of Journals' obtained ranking classes against their impact factors



IV. CONCLUSIONS

Our study applies a basic output oriented DEA model under the assumption of constant returns to scale in order to evaluate for the first time Diamond's 27 'core' Economics journals by using a combination of quantitative and qualitative data. The quantitative data are concerning journals' number of citations, issues, volumes, cited papers (derived from Scopus database for the year 1996-2010), their five year impact factors and 2010 impact factors including/excluding self citations (obtained from SSCI database). In addition the qualitative data are derived from three qualitative ranking reports (ABS, ABDC, Kiel). Then the paper constructs one composite input and one composite output based on the above data in a DEA related framework.

Finally, with the proposed approach we overcome the traditional ranking related problems regarding the inclusion of arbitrary weights and the combination both of qualitative and quantitative data. At the end by applying relative classification to the journals' rankings, four main categories have been created, categorizing in such a way for the first time the 27 'core' Economics journals into four main quality classes. Our results find validity since the second stage nonparametric analysis reveals that the estimated higher ranking classes correspond to higher impact factors.

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