RePEc – An Independent Platform for Measuring Output in Economics

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Introduction

Research assessments have become an important part of the academic world. Since they often form the basis in appointment procedures and financing decisions within the research world, the quality of the assessment depends significantly on the quality of the underlying measurements (see Combes and Linnemer 2010). A well-known procedure in German-speaking countries for measuring research output is the ranking of the daily business newspaper *Handelsblatt*, which has gained a high degree of attention in the area of economics (see Hofmeister and Ursprung 2008). In addition to the rankings for authors there is also one for institutes. However, for the latter only economics departments at universities are included and not research institutions (such as Ifo Institute or DIW Berlin). At the international level there are the Times Higher World University Ranking and the Shanghai Ranking. The focus of these studies is on a comparison of universities.

In this article we present the RePEc network as an independent platform for current research assessment, in particular in the area of the economics. First we describe how RePEc functions, then we present how the rankings are calculated in the network, which includes both institutions (faculties, think-tanks, etc.) as well as authors. We also indicate how these rankings can be interpreted and some points that must be kept in mind. The advantages of this network are the great number of ranking criteria and that they are very up-to-date.

The RePEc network

The RePEc network (Research Papers in Economics,) is a bibliographic service for economic research and its adjunct fields such as statistics. The goal of this network consists in constructing as complete a collection as possible of all research results that have been published in some form. Also, by using this information, various evaluations or rankings can be produced. An important difference from many other ranking methods is that RePEc is based on the 'wiki' principle and the relevant information is not compiled by an individual author or institution. This principle applies both to authors as well as publishers, which to some extent are dependent on each other. On the one hand, publishers must make available the meta-information of their publications (journal articles, books, book contributions, working papers) such as author names, titles, editions, number of pages or citations. On the other hand, scholars must register themselves at RePEc and classify their works. This enables a clear allocation to the authors. With the help of the information available in the network, rankings can be computed for authors and institutions. A potential disadvantage, however, is that some information (e.g. particular journals or citations) may not have been made available to the network or, because of the concentration on economic research, publications from other disciplines may not be included. For the research community there is thus a strong incentive to make as much information as possible available in order to fully exhaust the network effect.[1]

Ranking criteria

On basis of the bibliographic information available in the network, RePEc releases monthly 34 different rankings for registered authors as well as institutions.[2] The basis is comprised of five main categories: the number of (registered) works as well as the numbers of pages of the journal articles, the number of citations, the number of cited authors and access statistics

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[1] For further information on how the RePEc networks functions, see Zimmermann (2007).
[2] The RePEc network itself considers all its rankings to be experimental.

of the RePEc network. For some of these categories, additional weightings with different quality features are carried out (see Table 1 for an overview). In the following the criteria are described in detail.

Number of works

For tallying the number of the works, all scholarly publications, i.e. working papers, journal articles, book contributions, books and software components, are considered. Since articles can be published again in different series (especially working papers) this can lead to distortions in the evaluation. Therefore different publications of the same article are counted only as one individual work.

Number of pages

For the number of the published pages only the articles that have appeared in academic journals and as book contributions are counted. The pages in working papers and books are not counted. Since books and working papers as a rule are not subject to a review process, the author has a strong influence on the number of the pages, which in the case of articles in academic journals is mostly determined externally. With this criterion it must be noted however that the number of characters per page can vary between journals and is not adjusted by RePEc.

Citations

For this criterion all citations registered in the network are counted and assessed. In order to avoid an artificial increase because of self-citations, these are not taken into consideration. In addition to a simple counting, the citations are also adjusted by the year of citation in order to reflect the current scholarly discourse. This means that an article that was quoted in recent years has more weight than an article that is quoted just as frequently but further back in the past.

On basis of the citations Hirsch's h-Index (2005) is also calculated. This is defined as follows: a scholar has an index of *h* if from his *n* articles *h* was quoted at least *h* times. The remaining *(n-h)* articles do not have more than *h* citations. This index reflects both the quality and the breadth of research results. Scholars with few but frequently cited works tend to have a lower *h*-index. A stricter variant of the *h*-Index is the Wu-index (see Wu 2008). This is calculated in a similar way as the *h*-Index, but one needs ten times as many citations to reach a value of *w*.

Cited authors

A problem with the simple counting of citations is that so-called 'citation clubs' can emerge in which a few authors quote themselves mutually. In order to avoid this, the number of different authors making the citations is also counted. Here, a weighting is also carried out that depends on the rank of the author in RePEc. If a well-ranked author quotes a less well-ranked author, the latter profits more from this than when he is quoted by an author whose ranking is not as high.

RePEc access assessment

In the RePEc network all abstract views and downloads are registered. Automated accesses, e.g. by robots, are registered by the system and filtered out. In addition a control is made for suspicious access patterns in order to avoid individual manipulations. All rankings based on these access assessments include only the last twelve months.

Quality weighting

In order to register the quality of scholarly works, in addition to the citations, further quality features are considered: the published articles are weighted with the impact factors of the publication series. These are computed by the network itself. In addition an adjustment is made for the number of authors.

Impact factors

The impact factors computed by RePEc differ from the semi-official impact factors of Thomson Scientific in that the latter uses only the number of articles from the past two years.[3] The impact factor is calculated by dividing the number of the citations in year t of the articles in the years t–1 and t–2 by the number of articles that appeared in years t–1 and t–2. An impact factor larger than 1 means that there are more citations of the articles from the last two years than articles published in this period. There are also impact factors that include more than two years, but the above-mentioned calculation method is the most widespread. The main difference between the RePEc method and the semi-official impact factors is that a corresponding value is computed for every journal and working paper series. A comparison is only partially possible,

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[3] A good survey of the historical development and interpretation of the impact factor is given by Garfield (2006).

however, since the impact factors of RePEc are not chronologically limited and since citations from non-listed sources in RePEc or in other disciplines are not registered. Another difference in the calculation of the impact factors is that the self-citations of journals (which need not necessarily be by the same author) are not considered.

A possible disadvantage of the simple impact factors is that all citations are weighted equally, i.e. citations from top journals are treated the same way as citations from journals of a lower standing. In order to adjust for this problem, the recursive impact factor is calculated in addition. Here, however, there is an optimisation problem since the weighting of the citations in turn influences the underlying impact factor of the journal. In its calculations RePEc uses algorithms that start with the simple impact factors and iteratively adjust the recursive impact factors. These recursive impact factors are to be interpreted in such a way that they measure the importance of the journals relative to each other whereas the simple impact factors register the absolute importance.

Number of the authors

In addition to the qualitative weighting of an article via the impact factor of the series, the number of authors of a publication is also taken into consideration. The more authors an article has, the fewer points an individual author receives. Differences

between main and co-authors are not observed by RePEc; every author thus has an equal share in a publication.

Calculation of an overall ranking for authors

As evident in Table 1, not all combinations of the discussed criteria and weighting are calculated. This is not always sensible (e.g. the weighting of downloads according to impact factors) and in addition particular criteria are to be assigned a greater weight in the calculation of the average ranking. This is particularly the case for citations that form the basis for 13 of the 33 rankings and are thus the main quality feature.

For every combination listed in Table 1, a value is calculated for every author, and based on this a ranking is made. These rankings form the basis for the overall ranking. For every author the best and worst placement is removed and from the remaining placements the average ranking is formed with the help of harmonious averaging.[4] Here neither the total number of articles nor the Wu index are taken into account. The average rankings are sorted in ascending order and thus display the overall ranking.

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[4] Harmonious averaging is preferred over the arithmetic averaging by those authors and institutions that are far in front in a few rankings, as is evident in Box 1.

Table 1

Academic rankings in RePEc

		Without any further weighting	Simple impact factor	Recursive impact factor	Number of authors	Number of authors + simple impact factor	Number of authors + recursive impact factor
Works	Overalls	X					
	Distinct	X	X	X	X	X	X
Citations	Overalls	X	X	X	X	X	X
	Discounted by citation year	X	X	X	X	X	X
Citing authors	Overalls	X					
	Weighted by authors slim	X					
Journal pages		X	X	X	X	X	X
Access via RePEc	Abstract views	X			X		
	Downloads	X			X		
Indices	*h*-Index	X					
	Wu-Index*	X					
* Only for authors.							

Source: www.repec.org.

Box 1

Illustration of the shifts in regional rankings

In addition to the ranking of all registered authors and institutions in the RePEc network, regional rankings are also made, for example for Germany and the European Union. Due to the affiliation of many authors to institutions from different areas, it can be the case that an author's name appears in several regional rankings. Although institutions, unlike authors, can be assigned unambiguously to a region, there can be inconsistencies also in the institutional rankings similar to those in the Europe ranking. The following simplified example briefly illustrates this problem:

Institutions A and B exist in a specific region. For these institutions, rankings were made according to five different criteria (I-V) in the table below. In the worldwide ranking, institution A is particularly well positioned in Ranking I and II. Institution B does not stand out in any criterion but is somewhat better than A in Rankings III–V. The average ranking of Institution A, however, is less than that of Institution B because of the clear advantage in I and II, both on the basis of the harmonic as well as the arithmetic mean. If the rankings are transferred to the regional assessments, the advantage of Institution A over B no longer exists. To be sure, the underlying scores of A are still clearly better than those of B, but since B is the second-best institution in this region according to criterion I and II, the difference in the ranking is only that of one place. Since, however, B is better than A in the other three rankings, a lower average ranking for A results and with this a better placement in the regional ranking. This is known as *Simpson's Paradox* (see Simpson 1951) and can only be resolved in this particular case if one were to calculate the average scores instead of the average ranking. Since the scores between the ranking criteria are not comparable, however (for the best placement in I a score of 5 000 points is necessary, but for II only three points), considerable distortions can result in such a calculation method.

Worldwide ranking

	I	II	III	IV	V	Harmonic mean	Arithmetic mean
A	9	11	202	234	198	23.1	130.8
B	175	182	135	152	178	162.3	164.4

Regional ranking

	I	II	III	IV	V	Harmonic mean	Arithmetic mean
A	1	1	2	2	2	1.4	1.6
B	2	2	1	1	1	1.3	1.4

Ranking of institutions

The idea of an institutional ranking is based on the fact that every institution can be seen as an individual author to which all the articles of affiliated persons are assigned. Every author who has registered works in RePEc contributes an added value to the corresponding institution. Building on this, the total ranking is calculated similarly to that of the author ranking. This procedure is unproblematic as long as every author can be assigned precisely to an institution. But what happens if an author assigns himself to several institutions?[5] In such cases RePEc carries out a distribution to the individual institutions. The 'main institution' receives 50 percent, and the remaining 50 percent is distributed to all the other listed institutions, with a correction being made for the number of affiliated persons. The main institution is not indicated explicitly but is determined by the registered e-mail address or the indicated Website of the author.

A European ranking for authors and institutions

Table 2 lists the 25 best institutions in Europe. A comparison of the worldwide ranking with the European one shows, for example, that the Institute for Fiscal Studies in London is in 17th place in the worldwide ranking of European institutions but is in 10th place in the Europe ranking. This inconsistency is a result of the formation of averages via the rankings and is explained in Box 1 by means of an example. Table 2 also includes the number of authors assigned to this institution in RePEc. Here it is evident that a high number does not necessarily lead to a high placement, as can be seen in particular with the Centre de Recerca en Economia Internacional (CREI) in Barcelona. In general, it should be noted for the institutional rankings that due to voluntary registration, the number of authors of a particular institution in RePEc does not necessarily have to correspond with the actual number.

Table 3 shows the Europeans rankings for authors. The large discrepancy to the worldwide placement arises from the fact that all authors of the worldwide ranking who are at least affiliated with one European institution are taken into consideration in this ranking. This is problematic in particular if the relevant

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[5] A prominent example is the affiliation in academic networks, such as the CESifo network or NBER. In most cases, this affiliation is the second institution next to the main institution.

Table 2

Ranking of institutions in Europe: top 25

Worldwide	Worldwide European institutions	Europe	Institution	Country	Number of registered authors
8	2	1	London School of Economics (LSE), London	United Kingdom	216
7	1	2	Department of Economics, Oxford University, Oxford	United Kingdom	142
19	3	3	Toulouse School of Economics (TSE), Toulouse	France	128
35	5	4	Department of Economics, University College London (UCL), London	United Kingdom	69
36	6	5	Department of Economics, University of Warwick, Coventry	United Kingdom	66
40	8	6	European Central Bank, Frankfurt am Main	Germany	122
33	4	7	CentER for Economic Research, Universiteit van Tilburg, Tilburg	Netherlands	139
38	7	8	Faculty of Economics, University of Cambridge, Cambridge	United Kingdom	68
43	9	9	Paris School of Economics, Paris	France	171
69	17	10	Institute for Fiscal Studies (IFS), London	United Kingdom	53
46	10	11	Organisation de Coopération et de Développement Économiques (OCDE), Paris	France	144
56	12	12	Wirtschaftswissenschaftliche Fakultät, Universität Zürich, Zürich	Switzerland	66
72	18	13	Institute for International Economic Studies (IIES), Stockholms Universitet, Stockholm	Sweden	20
67	15	14	Faculteit Economie en Bedrijfskunde, Universiteit van Amsterdam, Amsterdam	Netherlands	77
68	16	15	ECORE, Louvain-la-Neuve/Bruxelles	Belgium	93
53	11	16	Faculteit der Economische Wetenschappen en Bedrijfskunde, Vrije Universiteit, Amsterdam	Netherlands	80
66	14	17	Solvay Brussels School of Economics and Management, Université Libre de Bruxelles, Bruxelles	Belgium	132
85	20	18	Innocenzo Gasparini Institute for Economic Research (IGIER), Università Commerciale Luigi Bocconi, Milano	Italy	39
87	21	19	Centre for Economic Policy Research (CEPR), London	United Kingdom	258
91	23	20	Centre de Recerca en Economia Internacional (CREI), Barcelona	Spain	14
76	19	21	School of Business and Economics, Maastricht University, Maastricht	Netherlands	105
65	13	22	ifo Institut für Wirtschaftsforschung e.V., München	Germany	123
89	22	23	DIW Berlin (Deutsches Institut für Wirtschaftsforschung), Berlin	Germany	119
99	25	24	Institut National de la Statistique et des Études Économiques (INSEE), Government of France, Paris	France	56
95	24	25	School of Economics, University of Nottingham, Nottingham	United Kingdom	65

Source: www.repec.org (Status: October 2010 ranking).

authors are mainly active abroad but have assigned themselves to a well-known network such as CESifo or CEPR. In the worldwide ranking for all authors affiliated with European institutions, Peter Phillips (Yale University, University of Auckland and University of York) is in first place but in the European ranking only in place 785. This poor placement is because less than 50 percent of his output went into the European ranking whereas 100 percent was included for the worldwide ranking.

Table 3

Ranking of economists in Europe: top 25

Worldwide	Worldwide European authors	Europe	Author
9	2	1	Jean Tirole
30	5	2	Lars E.O. Svensson
35	8	3	Jordi Gali
38	9	4	Richard Blundell
79	16	5	Timothy J. Besley
80	17	6	Stephen John Nickell
87	20	7	Guido Tabellini
65	13	8	Florencio Lopez-de-Silanes
19	4	9	Nicholas Cox
103	26	10	Ernst Fehr
67	14	11	Bruno S. Frey
32	6	12	Peter Nijkamp
126	32	13	Torsten Persson
139	38	14	Christopher A Pissarides
140	39	15	Andrew J. Oswald
50	12	16	M. Hashem Pesaran
152	41	17	Soren Johansen
132	35	18	David F. Hendry
149	40	19	Anthony J. Venables
182	47	20	John Moore
153	42	21	Gilles Saint-Paul
188	48	22	Stephen Roy Bond
180	46	23	Assar Lindbeck
121	30	24	Hans-Werner Sinn
203	56	25	Athanasious Orphanides

Source: www.repec.org (Status: October 2010 ranking).

Closing remarks

This article has discussed how the RePEc network operates. In addition to the aspect of the registration and dissemination of economic research, the rankings it makes play an important role in the evaluation of authors, institutions and journals. The main advantage is in the dissemination of networks, i.e. a major portion of research output in economics (including working papers) is registered. This is, however, only guaranteed if bibliographic information is regularly maintained and the authors keep their profiles updated. In order to fully exhaust the network effects, it is important to list authors and journals that are still missing in RePEc. The independent preparation of 34 individual rankings in addition provides a transparent assessment of the research output on the basis of different criteria both for authors and for institutions.

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