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# Economic and Business Studies Journals and Readership Information from Mendeley

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**Abstract.** We present Mendeley-readership information for 30 journals from the German Handelsblatt ranking for Economics and Business Studies from 2010/2012. We use readership data to characterize both fields by journals with over twenty years of publication activity. The analysis focusses on journal output, reader counts, scientific disciplines, academic status as well as geographic origin of readers. The results show that Mendeley provides relatively good coverage of research articles for both disciplines. The majority of readers are PhD students in Business Administration from USA and Germany. Moderate correlations are found between journals' reader numbers and impact factors. The results suggest that Mendeley readership data on journal level adds useful information to research evaluation and journal rankings and helps economists to publish in the best journal according to the intended target groups.

**Keywords:** altmetrics, readership information, journal ranking, economics

## Introduction

Today social media are a good believe that it will have an impact towards different fields of study, especially Science 2.0 and scholarly communication. Within these web-based environments, it is important to have tools that help researchers to evaluate, conduct and publish their research. Hence, a large number of economic researchers in Germany often use social media, especially Wikipedia, DropBox, and Facebook to communicate, collaborate, share literature, disseminate works, sharp ideas with other people, and identify research opportunities (Siegfried, Mazarakis, & Peters, 2014). They also deal with many alternative publication formats, e.g., working papers or blogs, to disseminate their findings. These new scientific workflows lead to two main challenges: 1) the variety of publications in the web makes it difficult to decide what is important to read or where research findings should be present, which is closely connected to 2) traditional bibliometric means do not necessarily apply to these new (social) web-based publication formats and practices. As Haustein (2012) states, scientific output is growing day by day and determining the number of journals on the market of scientific publications is not easy. In bibliometric studies the basic indicator for the absolute size of published research output is the number of publications  $P$  given for a discipline, a journal, an author, or any other level of aggregation. Haustein (2012) evaluated 45 journals in physics with a total of 168,109 papers. She found out that the number of scholarly journals and average output per journal increases in some particular years and decreases in others resulting in a large amount of publications available making it difficult for researchers to decide what to read. Also, in the (social) web the notion of trustworthy high-

quality publication outlets, as typically reflected by peer-reviewed journals in the offline scientific world, changes. Moreover, journal and research rankings which assist readers and evaluators in quality assessment have been criticized for their narrow scope.

Although Seiler and Wohlrabe (2014) found the impact factor-based ranking of economic journals to be relatively robust, even when the top 5 and top 10 most cited articles were excluded, and therefore considered the impact factor (IF) a reliable quality indicator, there are good reasons for the boycott of research rankings in Economics (Berlemann & Haucap, 2012). For example, rankings often focus on articles from highly ranked journals and neglect new, but important articles which either did not make it into the top-journals because of their timeliness or have not had time to accumulate citations yet. However, social media and web-based publication formats can provide new approaches for research ranking and evaluation as has been discussed by a.o. Schlögl et al. (2013). Thelwall et al. (2013) found that some social media-mentions, i.e., altmetrics, correlate with citations. Since citations require some time to accumulate with altmetrics, researchers would get to know almost right away after publication what their research impact is, meaning how their research is used, communicated, and shared via social media tools.

The usage of social media-based metrics in science evaluation is still in its experimentation phase and it has not yet been necessarily validated to fully complement the research evaluation toolbox (e.g., regarding applicability to different disciplines; Schlögl et al., 2013). Also, it is still open whether altmetrics reflect quality or popularity of research products. Therefore, this research will focus on Economics' and Business Studies' publication outlets (i.e., journals), their coverage and usage in Mendeley and will provide more evidence on the potential of altmetrics in terms of number, geographical information, discipline, and academic status of readers. We exploit the information found on user profiles to determine the value of altmetric indicators and to add a further layer to traditional research evaluation which often only considers citations but not the characteristics of citers. For example, Haustein and Larivière (2014) have shown that the majority of users in Mendeley are PhD students and Postdocs. Also, by understanding who reads economic journals, in terms of finding the appropriate target group, researchers can better choose where to publish.

## **Methods and Data Sources**

The top 30 journal names from the Handelsblatt (handelsblatt.com) ranking are selected of which 15 come from Business Studies (from the Handelsblatt journal ranking in 2012) and the other half is from Economics (from the 2010 Handelsblatt journal ranking). The Handelsblatt ranking integrates three sources, i.e., Erasmus Research Institute of Management (EJL), German Academic Association for Business Research (VHB-JOURQUAL 2.1), and Social Science Citation Index (SSCI). In our study the journals that are shared in both disciplines are considered only once and are allocated in Business Studies (BS) whereas Economics (E) journals are replaced with journals following right after the top 15. The Handelsblatt journal ranking evaluates the impact of journals from E, BS and also considers multidisciplinary journals like *Nature*. *Nature* is ranked among the top 15 journals in the Handelsblatt ranking but because of its comparably large number of articles published (66,813) that would bias the results *Nature* was excluded and replaced with *Quarterly Journal of Economics*.

Mendeley.com is a social reference management system that allows users to search for papers, add them to their libraries, apply tags, and organize them in folders for better retrieval. Its catalog contains more than 40 million entries coming from user libraries which are merged into a single Mendeley research catalogue (Hammerton et al., 2012). As such Mendeley might be called a crowd-sourced library, since the study of Zahedi, Costas and Wouters (2013) shows that Mendeley has the highest coverage of readership information compared to Twitter, Wikipedia and Delicious. Every publication has readership counts reflecting its popularity within the Mendeley community, i.e. number of readers having a particular publication in their libraries. Moreover, users have profile pages with personal information like their discipline, research interests, academic status, and geographical information. We will provide readership information on journal level, especially regarding what researchers are active on Mendeley. Articles are categorized in disciplines only on the basis of the user information gathered from user profiles. Academic status informs about target groups such as undergraduate, postgraduate, professor, researcher, etc. of particular journals. User country metric saves geographical location of the users.

Since users are allowed to add papers to their libraries this sometimes results in duplicates within Mendeley. Additionally, Hammerton et al. (2012) stated that there might be papers without unique identifiers added and therefore could not be used for duplicate detection and removal. According to Bar-Ilan et al. (2012) and based on our self-testing, searching Mendeley by title or keywords is problematic since it does not support special character search. Moreover, if a journal name is searched to retrieve all the papers that are published in that journal, instead, this search will retrieve all entries that have a minimum of two words in common with that specified journal title.

Hence, in order to avoid data duplication, missing values, and search issues, we used DOIs for gathering readership data from Mendeley and the CrossRef API to retrieve the DOIs for all publications of the 30 journals published in the years 1994-2013. Data were collected in September 2014 and added to a MySQL database for further analyses. When searching for articles via DOIs in Mendeley, it is still possible that a DOI has been misspelled by the users and results in no hits. Or, some DOIs point to the same article but are written differently. As for example the DOI “10.5465/AMJ.2008.33665124” is found in CrossRef for the *Academy of Management Journal* but in Mendeley and at the journal webpage itself it appears as 10.5465/AMR.2008.33665124. Since by now there has been no useful way of searching Mendeley for maximal recall (i.e., combination of textual and DOI-queries) we work with DOI-based searches by knowing that results of these searches might be an underestimation of actual readership.

<b>discipline</b>	<b>total number of papers from WoS</b>	<b>total number of papers from Crossref</b>	<b>total number of papers with DOIs in Mendeley</b>
Business Studies (BS)	22,036	24,439	20,356
Economics (E)	24,573	27,034	19,581
Total	46,609	51,473	39,937

Table 1. Total number of DOIs in Mendeley

journal	short	Impact Factor	total number of papers (P)	number of issues per year
Academy of Management Journal	amj	4.974	1,502	6
Academy of Management Review	amr	7.917	1,9	4
Administrative Science Quarterly	asq	2.394	999	4
American Economic Review	aer	3.305	3,33	11
American Political Science Review	vapsr	3.844	3,588	5
Annals of Statistics	vas	2.44*	1,744	6
Econometrica	eco	3.504	1,595	6
Economic Journal	vej	2.587	2,645	8
European Economic Review	veer	1.364	1,984	8
Games and Economic Behaviour	vgeb	1.025	2,154	6
Information Systems Research	isr	2.322	689	4
International Economic Review	vier	1.415	1,056	4
International Organization	vio	2.6	665	4
Journal of Accounting and Economics	vjae	2.833*	791	5
Journal of Business and Economic Statistics	vjbes	2.32	1,326	4
Journal of Business Research	vjbr	1.306	3,039	12
Journal of Consumer Research	jcr	2.783	1,394	4
Journal of Econometrics	vje	1.533	2,495	12
Journal of Economic Theory	vjet	0.919	2,544	6
Journal of Finance	jf	6.033	2,489	6
Journal of Financial Economics	jfe	3.769	1,815	12
Journal of Health Economics	vjhe	2.254	1,381	5
Journal of Labor Economics	vjle	1.979	681	4
Journal of Marketing	jm	3.819	1,025	6
Journal of Marketing Research	jmr	2.66	1,253	6
Journal of Monetary Economics	jme	2.065	1,649	8
Journal of Political Economy	jpe	3.617	986	6
Management Science	ms	2.524	2,83	12
Quarterly Journal of Economics	qje	5.966	983	4
Review of Economic Studies	vres	3.235	941	4

Table 2. Description of journal output for 30 journals

## Results

We identified 51,473 papers from CrossRef for the publication years 1994-2013 of which 39,937 articles have a DOI in Mendeley. BS holds 24,439 papers of which 4,083 DOIs (17%) are not found either because of missing DOIs or because they are not of interest to the Mendeley community (Table 1). In E 7,453 DOIs (28%) are not retrieved from Mendeley, hence, BS journals are better covered in Mendeley although there are more E articles in CrossRef. *American Political Science Review* (*vapsr*) leads with 3,588 papers published in 20 years in twelve issues per year (see Table 2). Figure 1 shows the comparison of the total number of articles for each of the 30 journals found in Crossref and Mendeley. *Information Systems Research* (*isr*) is best covered in Mendeley, while *vapsr* is least findable although having the largest number of articles published.

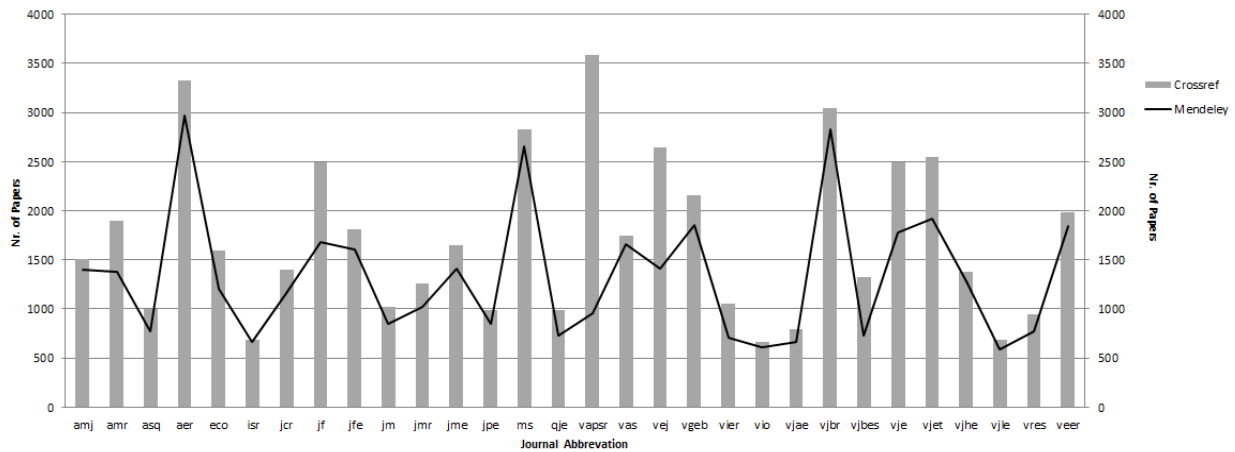


Figure 1. Comparison of DOI availability and Mendeley coverage

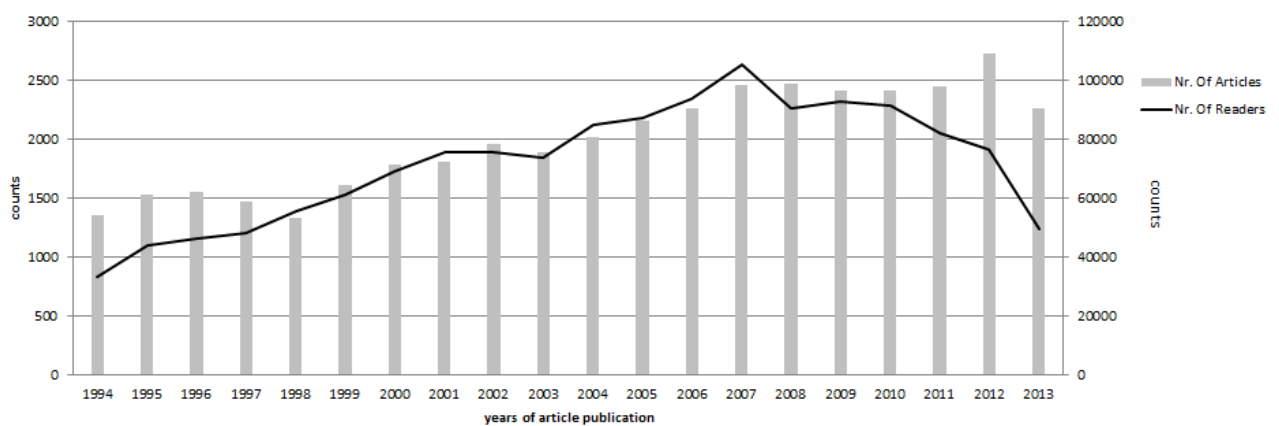


Figure 2. The year-wise distribution of articles and readers in Mendeley

When investigating the readership numbers for each publication year and the number of articles findable on Mendeley, we can see that there is a bias towards newer articles (see Figure 2). Mendeley-readers add more current papers to their libraries resulting in a good coverage of newer research. However, even that there are less older articles available on Mendeley, those articles gain comparably high reader counts.

### Reader Count based on Mendeley

The most often read article in our dataset is “The coming of Age for Qualitative Research: Embracing the Diversity of Qualitative Methods”, with a reader count of 10,125. The readership information also reveals that from BS, *Academy of Management Journal* (*amj*) has the largest reader count number and *vjbr* from E. The most popular article from *amj* was published in 2007 and the readership number for that journal increases for papers published from 2006 onwards.

Figure 3 shows a clear difference between the journals of the two disciplines. The 15 journals corresponding to BS (black) appear to be heavily read as opposed to the other half from E (grey) in terms of readership numbers. Journals that are shared from both disciplines are considered once (patterns). Based on our data, BS journals are the most read journals in 2007.

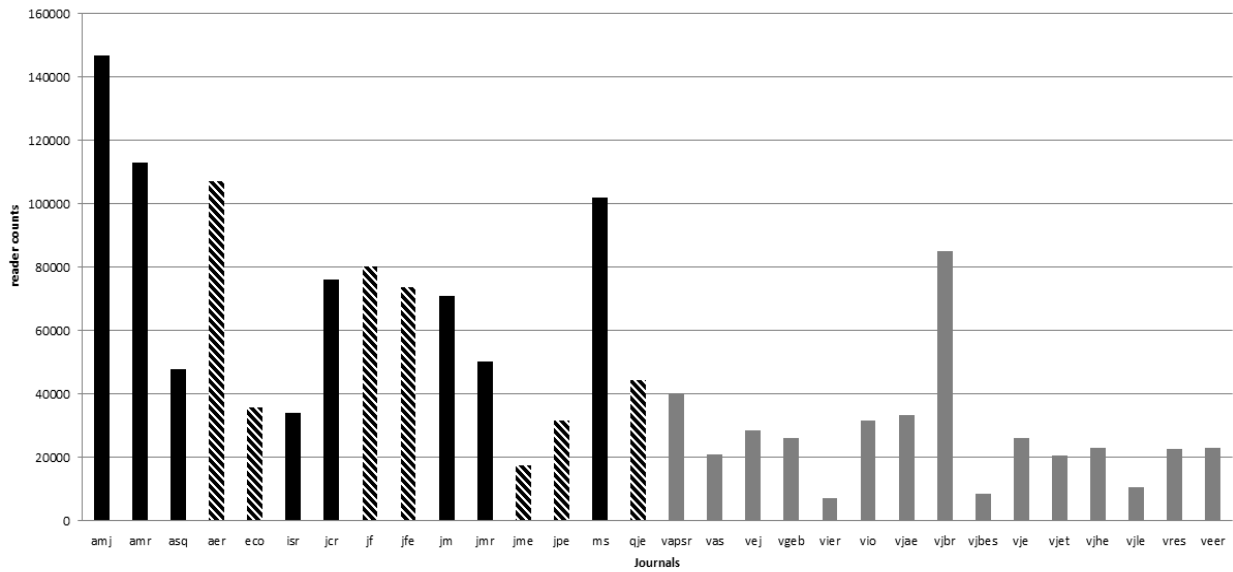


Figure 3. Journal-wise distribution of reader numbers

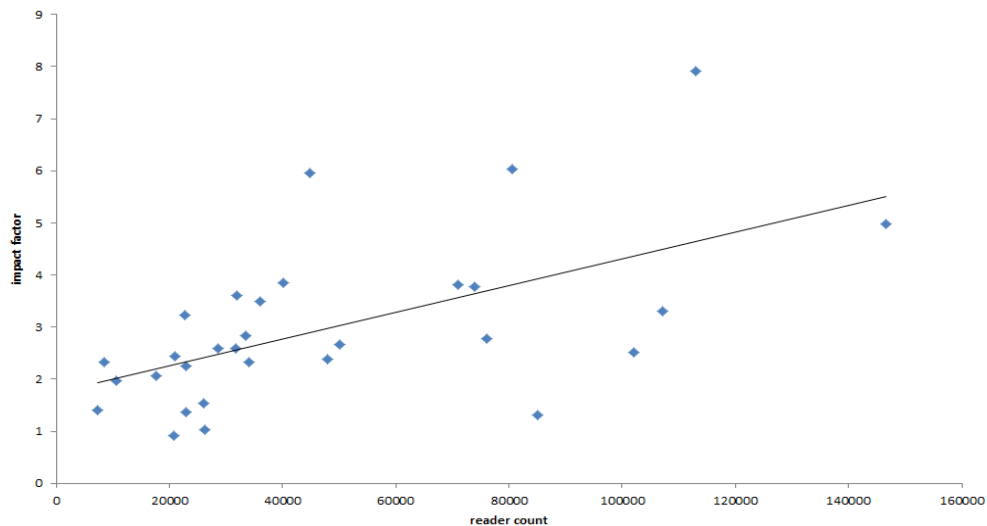


Figure 4. Scatter plot for total number of readers for 30 journals and their impact factors

Traditionally the importance of a journal is determined by the IF based on Web of Science citation data. The IF values for the 30 journals are given in Table 2 and come from the 2013 Journal Citation Reports Social Science Edition (JCRSSE). The IF of two journals (marked with \* in Table 2) had to be obtained from the journals' website since they were not included in the 2013 JCRSSE. To determine whether there is a symmetric relation between the IF and readership counts on journal level we applied both Spearman rank correlation  $\rho$  and Pearson correlation  $r$  (see Figure 4) resulting in  $\rho=.628$  and  $r=.574$ . We compare readership counts and IF since both can be used as a criterion for journal evaluation. People are more likely to make quality judgments based on these indicators because this information is available.

We found that reader numbers of both disciplines, BS and E, are positively, but only moderately correlated with the IF of the journals. This becomes also visible when comparing the journal ranking by reader count and by IF: *amj* has the highest reader count whereas the *Academy of Management Review (amr)* has the highest IF. Mohammadi and Thelwall (2014)

received similar results when comparing Mendeley's reader counts with Web of Science citations for articles from social sciences (.516) and from humanities (.428). Hence, as shown before (Haustein et al., 2014), reader counts and IFs reflect different impact on users of scholarly literature and add another means to journals evaluation.

### User Discipline based on Mendeley

Twenty-five different disciplines are identified, but Mendeley splits every discipline in further sub-disciplines. In our dataset most of the readers have a background in Business Administration with a total number of 35,819 users reading BS articles and 10,688 readers saving E articles (see Table 3).

discipline of users	Nr. of readers of Business Studies (BS) articles	Nr. of readers of Economics (E) articles
Arts and Literature	315	408
Astronomy/Astrophysics/Space Science	78	77
Biological Sciences	644	2,02
<b>Business Administration</b>	<b>35,819</b>	<b>10,688</b>
Chemistry	68	651
Computer and Information Science	4,136	3,017
Design	359	260
Earth Sciences	104	221
Economics	27,623	14,181
Education	1,232	1,552
Electrical and Electronic Engineering	201	555
Engineering	1,653	1,294
Environmental Sciences	558	986
Humanities	343	627
Law	416	489
Linguistics	89	119
Management Science / Operations Resear	9,143	3,036
Materials Science	30	26
Mathematics	1,164	2,66
Medicine	441	1,193
Philosophy	462	459
Physics	256	390
Psychology	3,985	2,122
Social Sciences	8,076	25,776
Sports and Recreation	133	86

Table 3. User's discipline for articles from BS and E

### Academic Status based on Mendeley

Figure 5 shows that for BS and E PhD Students and Master students are the core Mendeley readers. Mohammadi et al. (in press) also observed that the majority of Mendeley-readers are PhD Students from other disciplines, i.e., Clinical Medicine, Engineering and Technology, Social Science, Physics and Chemistry.



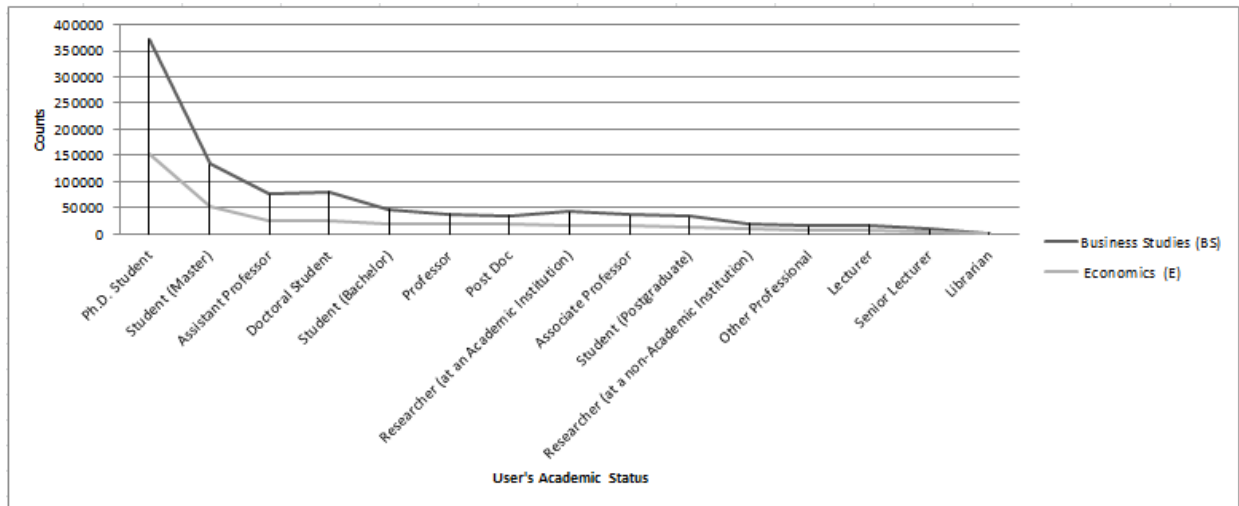


Figure 5. Readers' academic statuses for journals from BS and E

Most PhD students (in this case merged with Doctoral Students) read the *amj* whereas the least amount of PhD students use the *International Economic Review* (*vier*; see Figure 6). The best PhD student and Master student ratio can be found for the *Journal of Marketing* (*jm*).

### User Country based on Mendeley

Mendeley users are able to save their geographical location in their profiles leading to 119 different countries found. For economics journals the top 3 countries with the most readers in BS and E are from the USA, Germany and the United Kingdom.

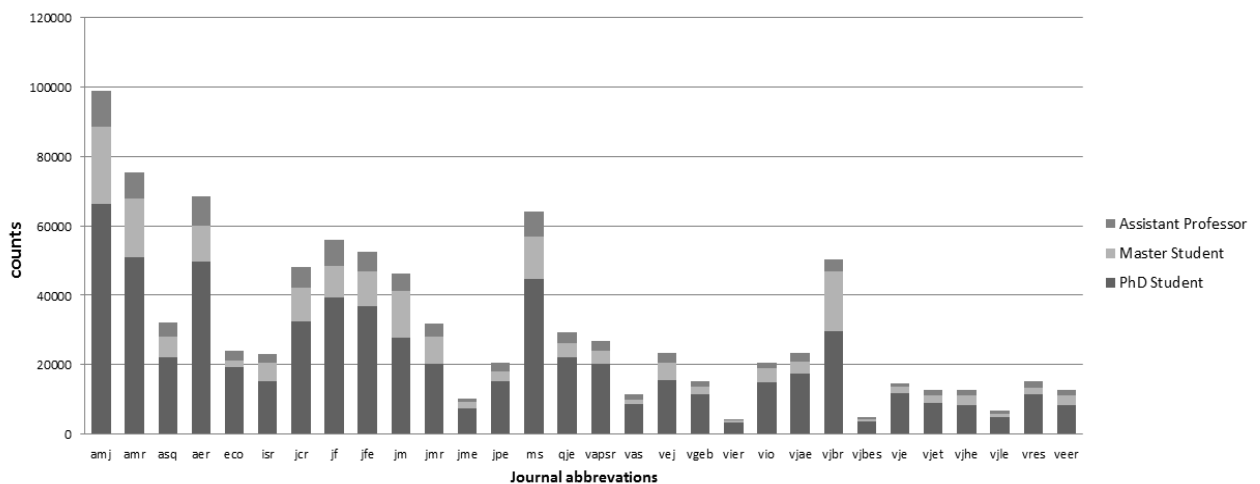


Figure 6. Top 3 academic statuses of readers per journal

### Conclusion

Previous studies (e.g., Mohammadi, Thelwall, & Kousha, in press; Mohammadi et al., in press) confirm that Mendeley readership counts are important for reflecting scholarly impact. Our analyses also revealed that Mendeley readership information provides helpful information for economic researchers on a short term basis since both coverage and popularity of journals are biased towards current research. The study aimed at characterizing 30

Economics and Business Studies journals in terms of journal output, reader count, user discipline, academic status, and location of readers. Mendeley was used as source for readership information. The *Academy of Management Journal*, which was shared from both disciplines BS and E, was the journal with the largest number of readers coming from Business Administration. Most of the readers of journals from our dataset were PhD students and Master students and often came from USA, Germany, and the United Kingdom. Since we could show that readership information was only moderately correlated with the journals' impact factor we believe that reader counts complement the research assessment toolbox by reflecting another type of journal impact which goes beyond citations although this has to be confirmed by future studies. Moreover, Mendeley can reveal reader characteristics which might be important for economists in order to determine the appropriate publication outlet in terms of target groups.

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