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Peer Review versus Citations - An Analysis of Best Paper Prizes

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An Analysis of Best Paper Prizes

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Abstract

In this paper, I analyze the ‘best paper’ prizes given by economics and finance journals to the best article published in their journal in a given year. More specifically, I compare the citations received by best paper prize-winning papers to citations received by papers that are awarded runner up prizes and to citations received by non-winning papers. In this way, I evaluate to what extent the prize jury members are able to pick the papers that are ‘best’ in terms of citations. The data show that the paper that gets the ‘best paper’ prize, is rarely the most cited paper; is, in a small majority of cases, cited more than the runner up papers and is, in most cases, cited more than the median paper.

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I. Introduction

Peer review is the most widely used performance evaluation mechanism in academia: referees and editors evaluate the quality of the papers which they consider for publication, senior faculty members evaluate the quality of the junior faculty they want to hire, and governments hire experts to evaluate research funding proposals.

Given the importance of peer review, it is not surprising that both academics and policy makers have studied how well the peer review system works. Some authors have investigated the peer review of scientific articles. Blank (1991) for example showed that double blind peer review leads to lower acceptance rates than single blind peer review. Laband and Tollison (2003) focused on accepted papers and show that there are a lot of ‘dry holes’, papers that were published but never cited. Others have focused on the papers that were rejected by the peer review system, like Shephard and Gans (1994) who provide several examples of the initial rejection of what later turned out to be important papers.

A second strand of the literature analyzes the selection of candidates for hiring or promotion. Smeets et al (2006) find that universities not always hire the candidates that later turn out to be the most productive. Combes et al (2008) show that, in the French competition for economics professorships, candidates that are linked to jury members are more likely to be selected for a professorship. Similarly, Hamermesh and Schmidt (2003) show that in elections to become a ‘Fellow of the Econometric Society’, besides quality measured by citations also location and area of specialization matter.

Yet a third category of papers studies the selection of grant proposals or departments for government funding. Broder (1993) finds that female jury members are harsher when evaluating NSF proposals of female applicants compared to when they evaluate proposals of male applicants. And Coupé (2001) finds that in the UK Research Assessment Exercise, those departments that are represented in the assessment panel receive a better quality rating, but that changes in panel composition are not correlated with changes in quality rating.

Many of these papers find that the peer review does work far from perfect. They show that important papers are sometimes not recognized (Shephard and Gans (1994)), that the more productive economists do not necessarily get selected by the best universities (Smeets et al, 2006) or that not only quality matters in whether a grant proposal (Broder, 1993), a paper (Blank,1991) or a candidate for honorary fellowships gets accepted (Hamermesh and Shmidt, 2003). In defense of peer review, Laband (1990) shows that high quality referee reports increase the citations a paper receives.

Using data from best paper prize competitions, we contribute to this literature by evaluating, to what extent decisions based on peer review correspond to decisions based on citation counts. Every year, several journals give a prize to the ‘best’ article published in their journal over a specific period of time. These best paper prize competitions are a good example of peer review as the jury consists of a number of scientists which are asked to evaluate all the articles published in the journal in a given time period. Most often peer review is used in a similar ‘short-run’ context – referees, when evaluating papers for publication, and senior faculty, when deciding

about the hiring of assistant professors, do not have much information about how important a paper will become or how productive a job market candidate will be.

In this paper, we will check whether papers that were elected ‘best paper’ by a given journal in a given year, also turn out to be the highest cited paper among all papers published in that journal and competing for that year’s best paper prize¹. Citation counts are often used as ‘objective’ measures of quality as they measure the long term impact of academic papers² (see for example, Hamermesh and Schmidt (2003), Laband (1990)). In addition, we will show what variables other than citations affect the chance to become a best paper prize winner.

The use of citations to measure academic quality is not undisputed (see for example, Bornmann and Daniel, 2008 for a review). Citation counts are imperfect measures as, amongst other, they can be manipulated through self-citations, they include ‘negative’ citations (when a paper is cited as an example of how not to do something) and authors can cite selectively, only referring to works of their friends. As a less stringent test, we therefore also check whether those papers that were elected ‘best paper’ are more cited than the median article. While one can argue that the ‘best’ paper is not the highest cited paper because of the imperfectness of citation counts, it is harder to argue that a paper that is cited relatively little should be the ‘best’ paper.

¹ One could argue that the extra attention that a winning paper gets will increase its citation count. If this is the case, our results would be biased towards finding that citations and peer review give similar results. The extent of such bias is likely to be small however as the winners are announced only once, at an association meeting, in a newsletter or in an announcement in the journal itself – after that, one has to search really hard to find which paper won the prize – indeed, for several journals I was not able to find all prize winners, even after an extensive internet search. Hence, it is unlikely that such short run extra attention would significantly affect the long term citation count.

² Klein and Chiang (2004) show that half of the economics departments in their sample usually or always use citation counts in promotion decisions.

Our sample of papers comes from 4 top Finance journals and 3 economics journals. Finance journals attach substantial amounts of money (from \$5000 to \$20000) to their prizes which makes it more likely that the prize jury will take its task serious. In addition, several finance journals identify, besides the best paper, also a runner-up paper, allowing us to test, in addition, whether the citation count of the best paper is higher than the citation count of the runner up. To broaden our sample, we add papers from three economics journals which have awarded best paper prizes for a very long time.

Studies that focus on the ‘predictive power’ of peer review of individual articles are very rare and focus on medical journals (see Bornmann, 2010). In addition, they typically compare citations of published papers to the citations of papers that were rejected by a journal but published in another journal. The problem with this approach is twofold – when papers are resubmitted to a different journal they typically are different from when they were submitted initially as authors will try to incorporate the comments of the initial set of referees. Second, the citations of an article might be influenced by the journal in which it has been published, making it hard to compare citation counts of articles from different journals. In our case, we avoid these problems by comparing articles within a given journal.

We find that only in a small number of cases, the best paper is the most cited paper. We also find that in a large majority of cases, the best paper is cited more than the median paper in competition for the best paper prize, and that in a small majority of cases the best paper prize has a higher citation count than the runner up paper(s). This suggests that ‘subjective’ peer review will often coincide with objective citation counts when distinguishing between highly cited and

infrequently cited papers, but that differences between the two methods will be larger when a distinction has to be made among highly cited papers.

II. The Best Paper Prizes in Economics and Finance

Out of the 100 most cited economics and finance journals in 2009, 26 journals currently have a regular best paper prize³. An internet search further revealed 19 more journals that have a best paper prize but are outside the top 100 economics and finance journals.

Awarding a prize is a relatively new phenomenon – while, the first prize in our sample of prizes appeared in 1960 (the Graham and Cobb award of the Financial Analyst Journal), the median year a journal awarded for the first time its prize is 1993. Only 17 prizes (out of 45) were first awarded before 1990. A typical journal (out of those awarding a prize) existed for 23 years before it started awarding a best paper prize.

There are several reasons why journals have established these prizes. Some journals establish a prize to recognize the contributions of a specific economist. The Journal of International Economics for example writes: ‘The award is intended to honour Jagdish Bhagwati for his many contributions to the field of international economics (2000, vol. 50, p13)’. About half of all prizes are named after an influential economist. Some of these are still alive (Fama-DFA prize,

³ Using ISI’s 2009 Journal Citation Reports. I combined the journals classified by ISI as ‘economics’ and ‘business and finance’ and deleted the pure accounting and business journals. I allocated the prize of the European Economic Association to its new journal, the Journal of the European Economic Association rather than to its earlier journal, the European Economic Review. The special issue prize of the Journal of Corporate Finance and the former Herman Daly Prize of ‘Ecological Economics’ are not included in the number 26. The list of prizes can be found on https://docs.google.com/leaf?id=0B_QokXC4wUSYNjEwZWlYjgtNTZjYS00NTBkLWJiZjMtZjQ0ZTg1NTliZGZh&hl=en

Jensen Prize) but most of them are named after dead economists and in some cases the death of that person is the direct reason to establish the prize (for example, the Richard Stone Prize of the Journal of Applied Econometrics or the H. Gregg Lewis Prize of the Journal of Labor Economics). Other prizes are named after the journal and sometimes a prize is named after the firm that sponsors the prize.

Some journals hope that having a prize will attract good papers. In 1990, the editor of the Economic Journal for example writes: 'I hope that the existence of the prize will encourage high-quality submissions (1990, vol. 402, p. I)'. Or more general, they hope to stimulate research in their field like the Smith-Breeden Prize ('to promote excellence in research in financial economics (Journal of Finance, 1990, p. 1).')

Note that based on the above one could argue that, for a journal and its jury, a best paper is thus the paper that helps most to 'attract good papers', that does most 'to promote excellence' or that does most to honor the economist or firm after which the prize has been named. Hence, an assumption of this paper will be that attracting good papers, promoting excellence or honoring an economist or firm, is best done by awarding the best paper prize to 'best' paper.⁴

The best paper is typically selected by a relatively small committee, most often consisting of editors. Exceptions are for example the Journal of Financial Economics where subscribers and the Review of Financial Studies where society members vote. Some juries are careful and select 'outstanding' papers, but most often one article is said to be the 'best' article among those that have been published during the previous year(s).

⁴ Very few journals explain why a paper is selected to be the best.

About three-fourths of the prize-giving journals have a monetary prize for the best paper, with 10% of all prize giving journals, mainly the finance journals, also giving monetary prizes for the second or third place. This suggests that most economics and especially the finance journals believe that purely symbolic prizes are not sufficient and a monetary incentive is needed to achieve the desired result.

Conditional on giving a prize, the mean amount of money for the first prize winner is about \$3000 (median \$2000) but there is a large variance. The largest amount of prize money is spent by the Journal of Finance. Since 1997, the Smith-Breeden prize is worth \$10000 for the winner and \$5000 for each of the two ‘distinguished’ papers. Recently, an additional prize has been established to award the best paper on corporate finance. This ‘Brattle Prize’ is worth \$10000 for the winning paper and \$5000 for the second paper. The Journal of Financial Economics is also very generous: both the Jensen Prize and the Fama-DFA prize give \$5000 to the first and \$2500 to the second paper. The ‘Barclays Global Investor best paper award’ of the Review of Financial Studies is with \$20000 the richest best paper prize in economics. The ‘EALE Labour Economics Prize’ of Labour Economics in contrast is worth only €1000. But the Hicks-Tinbergen Medal is just that: a medal.

In this paper, we will use best paper competitions from the four top journals in finance, the Journal of Finance (JoF)⁵, the Journal of Financial Economics (JFE), the Review of Financial Studies (RFS) and the Journal of Financial and Quantitative analysis (JFQA), and three economics journals with a long standing tradition of giving a best paper prize, the Journal of

⁵ The conference issues of the JoF are excluded from the competition and hence from the sample.

Economic History (JEH)⁶, the Southern Economic Journal (SEJ) and the Canadian Economic Journal (CJE). Table 1 describes some of the characteristics of the different prizes awarded by these journals. Especially worth noting is the fact that the finance journals have prizes that carry substantially higher prize money and that they have runner-up prizes. They also have higher median citations than the economics journals in the sample.

⁶ I excluded the notes and discussions from the sample as they are not considered for the best paper prize.

Table 1: The best paper prize competitions of JoF, JFE, RFS, JFQA, JEH, SEJ and CJE

	JoF	JFE	RFS	JFQA	JEH	SEJ	CJE
Competition	Smith Breeden Prize/ Brattle Prize	Jensen Prize/ Fama-DFA Prize	Barclays Global Investors Michael Brennan Award	William F. Sharpe Award	Arthur Cole Prize	Georgescu Roegen Prize	Harry Johnson Prize
Aim	“for the top three papers in JoF in any area other than corporate finance”/ “for outstanding papers on corporate finance”	“best Paper in Corporate Finance and Associations”/ “best Paper in Capital Markets and Asset Pricing”	“rewards important research in the field of finance”, “to the best paper published in RFS”	“to foster excellence in financial research”, “for the best article published each year”	for the best article	for the best academic article	for the best paper published
First Awarded in	1989/1999	1997/1997	1989	1999	1966	1987	1978
Procedure	Associate Editors of JoF give top 3 - then votes are summed	vote by subscribers	Selection by Executive Editor, Co-Editors, and Associate Editors of RFS	Nomination by JFQA readers, subscribers, and Associate Editors, followed by selection by Associate Editors.	Selection by the Board of Editors	The Editor of the SEJ, and two Vice Presidents of the Southern Economic Association.	selected by a committee of three
Prize Amount (\$)	10000/5000 (*2)	5000/2500	20000/7000	5000	0	an engraved plaque and a set portion of the earnings on the Georgescu-Roegen endowment	5000
Median Citations 1997-2007	22	18	12	6	3	2	3

II. Data and Descriptive Results

In our sample, we have 138 ‘competitions’ which were organized in the period 1987-2007. We do not take into account the more recent competitions as we want to give sufficient time for the citation counts to become meaningful. Citation counts were obtained in the period July-August 2010, hence the citation counts cover periods from 2.5 years to 21.5 years. These 138 competitions come from 118 different ‘volumes’, one year periods for specific journals that include all articles that participate in a given competition. Twenty of these volumes had 2 competitions simultaneously (each for a different subarea, like the Jensen Prize and the Fama Prize in the JFE), so we have 98 single competition volumes. The advantage of single competition volumes is that there is one prize winner which can be compared to the highest cited article. In case there are two prizes, each for a subarea, it is hard to determine to which subarea the highest cited article belongs⁷. Given that sometimes there are joint first prize winners, and that in many cases, several runners up are identified, we have more prize winners than competitions, respectively 143 first prize winners, and 88 runner up winners. Table 2 also gives disaggregated data by journal.

Table 2: the composition of the sample of best paper prizes

	Overall	JoF	JFE	RFS	JFQA	Econ
number of competitions	138	28	22	18	9	61
number of different volumes	118	19	11	18	9	61
number of volumes with 2 competitions	20	9	11	0	0	0
number of volumes with 1 competition	98	10	0	18	9	61
number of competitions with first prize and runner up prize	59	28	22	9	1	0
number of first prize articles	143	30	23	19	10	61
number of runner up articles	88	49	28	9	2	0

Econ gives the aggregate info for the economics journals which are all single competitions with just one prize (JEH and SEJ have 20 competitions, CEJ 21)

⁷ Papers can be and have been nominated for both categories.

For each article, we collect citation count data from the ISI's Web of Science⁸. Table 3 uses these citation data to give descriptive statistics on our main questions of interest using the data from the finance journals in our sample.

Table 3: the predictive ability of peer review for finance journals (numbers are percentages)

	Overall	JoF	JFE	RFS	JFQA
for single competition volumes					
Is any of the first prize winners the most cited paper?	0.10	0.1	-	0.05	0.2
Is the first prize paper more cited than the runner up prize paper(s)?	0.65	0.5	-	0.78	1
Is any of the runner up papers the most cited paper?	0.15	0.2	-	0.11	0
for double competition volumes					
Is any of the first prize winners the most cited paper?	0.25	0.11	0.36	-	-
Is the first prize paper more cited than the runner up prize paper(s)?	0.51	0.39	0.62	-	-
Is any of the runner up papers the most cited paper?	0.10	0.11	0.09	-	-
Overall					
Is an award given to an article that is cited more than the median article	0.81	0.86	0.78	0.79	0.67

From table 3, we can see that the best paper prize winner of the finance journals in the sample is rarely the highest cited article: 10 percent of the best paper prize winners of the single competition volumes and 25% of the winners of double competition issues turned out to be the highest cited article⁹. At the same time, these probabilities are clearly higher than what one would get if the jury chose the best paper article randomly: as the median single competition has 39 competitors and the median double competition (with two 'best' papers) 77 competitors, in both cases the chance to randomly pick the highest cited paper is about 2.5%. Note further that also several runner up papers turned out to be the highest cited paper.

⁸ The WoS has citation data from 1987 onwards.

⁹ Deleting self citations is unlikely to change this as the gap between the most cited paper and the citations of the best paper prize is typically more than 10%. In fact, the median prize winner has 23% of the citations of the most cited paper.

For the single competition volumes, the best paper prize juries selected in 65% of the competitions a best paper prize that has a higher citation count than the runner up paper(s). For double competition volumes, this is lower at 51%. Again this is better than random: if we would pick randomly a paper out of two papers, in 50% of the cases we would pick the highest cited paper. If we have three papers, like in the case where we have one winner and two runner ups, the probability that a randomly picked paper is the highest cited paper decreases to 33%. Based on the competitions in our sample, which have a varying number of runners up prizes, the average probability of randomly picking the highest cited paper out of the set that consists of the winning and runner up papers is 42%.

The Editor's report from the JoF provides us with an additional piece of information. At the JoF, the voting happens in 2 rounds – first, all the associate editors can nominate papers, and then the associate editors have to select among the nominated papers. From the Editor's report we also have information about which papers were nominated, that is, thought to be, by at least one associate editor, among the top 3 papers¹⁰. As an example, in 1989, 26 associate editors nominated 23 different papers. Overall, a striking 43% of all papers get nominated. Of these nominated papers, 70% score better than the median cited paper of their respective competition. In 76% of the competitions, the highest cited paper is included among the nominated papers.

¹⁰ Each editor can nominate three papers. The average ratio nominated papers on associated editors is about 0.7. From 2006 onwards the report gives the list of 'finalists', which seem to be the most frequently nominated papers, rather than of 'nominations', so we exclude 2006 and 2007 for these calculations.

Table 4 gives the statistics for the three economics journal, all of which only give one prize per year. We get similar results as for finance journals: the best prize winner is rarely the most cited paper but is often more cited than the median paper¹¹.

Table 4: the predictive ability of peer review for economics journals (numbers are percentages)

	Overall	JEH	CJE	SEJ
Is any of the first prize winners the most cited paper?	0.067	0.15	0	0.05
Is an award given to an article that is cited more than the median article	0.75	0.7	0.71	0.85

Based on the descriptive statistics so far, we can conclude that if one focuses on the ‘best’ paper, there is quite some difference between the peer review outcome and the citation-based outcome but also that these two methods coincide more often when using a lower threshold: in about 75-80% of the competitions, awards are given to papers that have more citations than the median number of citations of their competitors.

Given that there is no one-to-one correspondence between citations and peer review one can wonder what other factors determine whether a paper will receive a best paper award. In the next section, we therefore use regression analysis to check what determinants, besides the number of citations, affect the chance to be awarded a best paper prize¹².

III. Econometric results

We start by regressing a dummy that reflects whether a paper wins a prize (first or runner up) on the citation count (divided by 100) , which we use as a proxy for the quality of the paper and on a

¹¹ Given that the median number of articles in these economics competitions is 55, the chance to pick the most cited paper at random is less than 2 percent.

¹² Alternatively, one could also look at what are the determinants of citation counts, other than being awarded a prize. Given our focus on best paper prizes, we choose to use winning a prize as dependent variable and citation count as an explanatory variable.

dummy that is one for the highest cited paper. We use a conditional logit regression specification, thus controlling for competition (volume-journal) specific differences and focusing on the within competition dimension.

We then add, as explanatory variables, 2 easily obtainable characteristics of the papers, the number of pages and the number of authors. Both of these indicators can be used by jury members as a clue for potential quality. Since editors typically allow more pages to papers they think are good, the length of a paper can be correlated with (expected) quality. The fact that more authors have worked on the paper can also suggest that the quality will be higher, though it also increases the chance that jury members know one of the authors of the paper.

A third specification uses the rank ordered logit model (Beggs, Cardell and Hausman, 1981), which allows the dependent variable to be different for best papers, runner up papers and non-winning papers.

Table 5: explaining the chance to win a prize.

	Winning Paper	Winning Paper	Best/Runner Up
	(1)	(2)	(3)
Highest Cited	1.114	1.02	0.038
	(0.23)	(0.05)	(0.1)
Total Cites/100	2.048***	1.863***	0.489***
	(5.09)	(4.42)	(5.82)
# pages		1.064***	0.053***
		(5.89)	(6.64)
Two Authors		1.02	-0.060
		(0.11)	(-0.38)
Three Authors		0.699	-0.382*
		(-1.26)	(-1.8)
Four Authors or more		1.93	0.051
		(1.51)	(0.13)

Pseudo R ²	0.045	0.078	
# groups	118	118	118
#observations	6252	6252	6252

We run conditional regressions in (1) and (2); while for (3) we use a rank order logit specification. Odds ratios are given for (1) and (2), coefficients for (3), T-stats are in parenthesis, * means significant at the 10% level, ** at the 5% level and *** at the 1% level. The omitted category is papers with one author.

We find that total citations increase the chances to win a prize in a best paper competition, with the odds ratios approximately doubling for each extra 100 citations. We also find evidence that even after controlling for the quality of the paper (as proxied by the number of citations), longer papers have a substantially higher chance to win a prize. There is little evidence, however, that the number of authors matters.

As a further check, we next limit our sample to prize winning papers and compare best paper winners and the runners up. The advantage of this is twofold. First, this allows us to use only direct competitors in a conditional logit regression. Remember that for volumes with two competitions we do not know which papers of a volume should be allocated to which competition. Second, for this smaller sample of 149 papers, we more easily can collect additional information. We collect additional explanatory variables, like the percentage of authors that is from the US, the percentage of authors that is female, and an indicator, based on the abstract, of whether the paper is theoretical, empirical or combines theory and empirics.

We also collect information on the citations of each prize winning paper in Google Scholar, providing us with an alternative indicator of the impact of a paper. We find that the correlation between Google Scholar citations and ISI citations is high at 0.98. However, only for 52 out of 59 competitions which have both best papers and runners up, the ordering based on Google citations and ISI citations is the same.

Table 6: explaining which paper wins and which paper becomes runner ups.

	Best Paper	Best Paper	Best Paper	Best Paper
	(1)	(2)	(3)	(4)
Highest ISI Cited	1.815*	1.853*		
	(1.85)	(1.80)		
Highest Google Cited			1.745*	1.69
			(1.69)	(1.49)
Total ISI Cites/100	1.073	1.025		
	(0.45)	(0.15)		
Total Google Cites/100			1.028	1.021
			(0.73)	(0.54)
Theory		0.753		0.727
		(-0.69)		(-0.76)
Empirics and theory		0.422		0.465
		(-1.25)		(-1.13)
Share US affiliated		4.835		4.075
		(1.4)		(1.26)
Number of authors		1.093		1.109
		(0.34)		(0.4)
Share female authors		0.798		0.740
		(-0.27)		(-0.34)
# pages		1.016		1.015
		0.59		(0.53)
Pseudo R ²	0.06	0.11	0.07	0.11
# groups	59	59	59	59
#observations	149	149	149	149

We run a conditional logit regression. Numbers in the table are odds ratios. T-stats are in parenthesis, * means significant at the 10% level, ** at the 5% level and *** at the 1% level.

In all 4 specifications, we find that being the highest cited paper among the winning papers increases the odds to receive the best paper prize rather than the runner up prize, with the odds ratio being 1.7 to 1.85. Total citations are found to be insignificant, meaning that what counts is being higher ranked, rather than how much more on is cited. Point estimates further suggest that having female authors reduces the chances to receive the best paper prize (relative to receiving

the runner up prize) while having US affiliated scholars or having an empirical focus improves those chances, though none of these factors are found to be significant.

IV. Discussion

Our findings can be summarized as follows - we find that award winning papers have a significantly higher number of citations, that they have significantly more chance to be cited more than the median paper in a volume but also that in less than a quarter of the cases, the best paper is the highest cited paper. We also find in a small majority of cases the best paper prize has a higher citation count than the runner up paper(s). This suggests that 'subjective' peer review will often coincide with objective citation counts when distinguishing between highly cited and little cited papers, but that differences between the two methods will be larger when a distinction has to be made among highly cited papers.

We further find that not only more cited papers but also longer papers have a significantly higher chance to win a prize in a paper competition, while we find no evidence that the number of authors matters. For the choice among runner up paper and best paper, the highest cited paper is more likely to win the best paper prize, though how big the difference in citations is, is not important, nor are the characteristics of the authors of the paper.

What do these results imply? The interpretation of what we have documented depends crucially on what one believes to be true academic 'quality'. If one believes that expert opinion is the correct measure, then one can interpret the above results as showing that citation counts do not reflect academic quality that well, especially among highly cited papers. This would have

important policy implications, for example in the case of UK's Research Assessment Framework, which is used to distribute research funding among university departments. Currently, the renewed assessment system, to be used for the period 2009-2013, foresees that citation counts will be made available to some expert panels, something which has been very controversial (see for example, Corbyn, 2009). Our findings could be used to argue that providing such information could endanger the correctness of the classification of departments at the top of the quality distribution as it would allow jury members to attach an unjustified weight to the highest cited articles.

If one believes in citation counts reflecting the true impact of a paper, one can interpret the above results as indicating that experts either cannot distinguish quality *ex ante* that well or even that the above results show the biased judgments of experts. In the framework of UK's research Assessment Framework, our results thus could be used to argue for a bigger role of citation counts and a reduced role of the expert panels.

A third interpretation could be that our results show that citations and peer review to some extent reflect different aspects of academic quality. If one believes this, the policy implication would then be that an evaluation process that combines citation counts with expert analysis would be optimal.

While our results do highlight the differences between citation counts and peer review, we are, unfortunately, not able to say conclusively which of the above three beliefs is the correct one. To be able to conclusively answer the question whether citations are better than peer review or vice

versa, we would need to have a single generally accepted indicator of academic quality to which these two methods can be compared.

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