Systematic Bias in the Progress of Research

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We analyze the extent to which citing practices may be driven by strategic considerations. The discontinuation of the *Journal of Business* (JB) in 2006 for extraneous reasons serves as an exogenous shock for analyzing strategic citing behavior. Using a difference-in-differences analysis, we find that articles published in JB before 2006 experienced a relative reduction in citations of approximately 20% after 2006. Since the discontinuation of JB is unrelated to the scientific contributions of its articles, the results imply that the referencing of articles is systematically affected by strategic considerations, which hinders scientific progress.

I. Introduction

Review processes are not perfect; significant contributions may sometimes be misjudged by top experts while being correctly appraised by those with less impressive reputations. The novels *Harry Potter*, *The Chronicles of Narnia*, *Animal Farm*, *Chicken Soup for the Soul*, and *The Da Vinci Code* are all examples of this phenomenon. They were repeatedly rejected by

We are grateful to the editor, James Heckman, and three anonymous referees for excellent suggestions. We also thank Doron Avramov, Izak Benbasat, Eli Berkowitz, Frederik Beuk, Assaf Eisdorfer, Ronen Israel, Roni Michaely, Terry Odean, Oded Sarig, Dan Segal, Amit Seru, Avanidhar Subrahmanyam, and Alexander Vedrashko for their valuable comments and suggestions. We appreciate the research support of the Social Sciences and Humanities Research Council of Canada. Data are provided as supplementary material online.

Electronically published July 12, 2021
[*Journal of Political Economy*, 2021, vol. 129, no. 9]

top publishers but were successfully published by small-scale unknown publishers and eventually became world renowned. The academic-publishing process is also known to make mistakes, and good articles sometimes get rejected by top-tier outlets (Kuhn 1962; Gans and Shepherd 1994). One would think that academic research would follow patterns similar to the novel-publishing process, where, once published, the research makes an impact according to its contribution.

Ideally, an article's outlet should not affect its impact or possible influence on the trajectory of science, and important contributions, regardless of where they are eventually published, should be referenced in subsequent work. However, unlike the novel-publishing process, in the field of finance, there is a notable dearth of influential scientific contributions that were not published in top-tier journals. Rarely would one praise an article published in a second- or third-tier journal, and highly cited papers seem to almost always be published in top-tier journals. This is not only true in finance; for example, Kim, Morse, and Zingales (2006) show that out of the top 41 economics journals, more than half the influential papers appear in three journals (*Econometrica*, *Journal of Political Economy*, and *American Economic Review*). Indeed, somewhat like novel publications, in academic publications, the outlet's reputation embeds information about the potential quality of an article, which may explain the phenomenon. This motivates the following question: Is the situation in which all significant academic contributions in finance seem to appear in a few top-tier journals an outcome of a very efficient review process, or are authors fixated on referencing articles published in the highest-tier outlets, which creates a significant systematic bias in citing practices?

Understanding why certain contributions make an impact is of utmost importance. The practice of referencing previous relevant research allows readers to better assess the incremental contributions of new research and acknowledge the prior contributions on which that research is based (Merton 1968). The importance of adequate referencing practices is exemplified by the fact that article citation counts have become the primary measure for quantifying an article's scientific contribution; moreover, journals are segmented into different quality tiers based on the average citation counts of their articles (Gross and Gross 1927; Coats 1971; White and White 1977; Liebowitz and Palmer 1984). The segmentation into tiers has considerable ramifications. It appears that any association with a top-tier journal automatically serves as a quality signal. Thus, the scientific community may, to an extent, be attached to the top-tier journal rather than the contents of its articles. For example, in business and economics schools, the number of top-tier journal publications has become the core determinant of faculty career opportunities and pay (Gomez-Mejia and Balkin 1992; Heckman and Moktan 2020). Being an editor or a referee of a top-tier journal is a considerable quality signal for the merits of a

researcher. Similarly, many would agree that when a top-tier journal article is cited as a relevant reference, it helps signal the quality of the citing article and its authors. Under these conditions, one must ask whether top-tier journals would have been similarly referenced had they not become a core tool for signaling quality.

In broad terms, rather than just serving their intended objective of referencing relevant work, citations of articles published in top-tier journals may be driven by agency considerations because authors focus on achieving professional goals with respect to these journals. These personal goals include, most obviously, the desire to obtain publications in top-tier journals but can also include the desire to get invited to a conference sponsored by such journals, become a referee in those journals, or receive reference letters from scholars associated with the journals. To facilitate this, authors may cite top-tier journals as a way to enhance their relationships with those journals.[1] They may further consider the preferences of top-tier journals' referees for such citations. Typically, these referees serve more than one top-tier journal, which they potentially even more appreciate as quality signals and whose top-tier status they wish to preserve by receiving citations. Consequently, authors may consider the expected positive impact of top-tier journal citations in satisfying referees. Overall, the agency considerations that emerged from the certification of quality by top-tier journals may have inflated the number of their citations out of proportion. It is possible that had some of the noted professional externalities, for both authors and referees, been eliminated, citations of top-tier journal articles may have been reduced. Our goal is to analyze whether systematic strategic citing of top journals exists and whether it is partially responsible for their high impact.

To test our hypothesis of strategic citing, we utilize a natural experiment setting. In early 2004, the University of Chicago Press decided to discontinue the *Journal of Business* (JB) at the end of 2006. The decision to discontinue was for administrative reasons,[2] even though JB was considered one of the top five finance journals. Thus, if significant strategic citing exists, it may be reflected through this exogenous shock, as strategic, professional-goal-related citing of JB's articles would become lax. While the contributions made in JB have not changed, the finance community's attachment to the journal has reduced because it no longer exists,

[1] A journal citation marginally enhances the author's relationship with the cited journal. With every reference to a journal, the author has greater knowledge of work published in the journal. This allows the author to better relate to the journal, converse about the journal's papers in discussions, and mention his or her own papers as relevant to the journal's papers. Thus, a journal citation has a strategic positive externality for the author's future success with respect to that journal.

[2] We thank Douglas Diamond, the editor of the *Journal of Business* for 13 years, who told us that the main reason for the discontinuation was the difficulty in finding an editor from within Booth's faculty.

and it has no editorial board, referees, conferences, or newsletters. After discontinuation, JB is neither a potential target for accomplishing professional goals nor does it need to preserve its reputation. In other words, if considerable numbers of citations of top-tier articles are not referenced because of their relevance and scientific merits, but rather because of these agency considerations, this would be reflected by the journal's discontinuation, as the merits of the published articles are unchanged. Accordingly, there are two strategic aspects that are expected following JB's discontinuation: authors may reduce their tendency to reference low-relevance JB articles, and there may be increased negligence in citing relevant JB articles.

We analyze citation practices before and after the discontinuation of JB. The main analysis concerns articles published in the top-tier finance journals prior to the discontinuation in 2006.[3] We hypothesize that in the post-2006 period, authors reduced their tendency to cite JB articles because of strategic considerations, as the academic merits of these already published papers have obviously not changed. Our empirical findings reveal that in the post-2006 period, the citation count trajectory of JB articles was systematically altered downward compared to that of articles that had been published in the other top four finance journals.

We compare the difference in citation count, in the pre- and post-JB-discontinuation periods, between JB articles and matched articles published in the other four top-tier finance journals. First, we match each article published in JB with article(s) from each of the other four journals (or with all articles from the pool of articles of all four journals) based on the JB article's publication year and citation count in the first 2 years following the publication year. Thus, the matching of articles is based on the articles having the same influence in the first 2 years and, hence, their similar expected citation trajectory. Second, we use propensity score matching (PSM) and match each article published in JB with four other articles, one from each of the other top-tier journals in finance. The matching is based on the matched articles having the same publication year and the closest propensity score based on the initial 2 year citation count and various article and author characteristics, as well as their *Journal of Economic Literature* (JEL) classification codes. In addition, we conduct a pooling PSM, where we match each JB article to the best match out of all articles in the top four journals published in the same year. We find strong evidence that compared to the matched articles of the other four journals, the citations of JB articles that were published prior to 2006 were significantly

[3] The most relevant comparison articles are those published in the other top-tier general-topic finance journals, which according to our conjecture would be cited often for strategic reasons. These journals include the *Journal of Finance*, the *Journal of Financial Economics*, the *Review of Financial Studies*, and the *Journal of Financial and Quantitative Analysis*.

negatively affected after 2006. Furthermore, we do not find any change in the citation count difference in the years prior to the discontinuation decision, which implies that the change in citing practices occurred during the time when publishing in JB was no longer possible.

As an additional analysis, we use an autoregressive specification. We model each journal's citation count trajectory separately to capture any changes in citation counts in the post-2006 period compared to the pre-2006 period. We then compare the difference in these possible changes between articles published in JB and articles published in the other four journals and find that compared to the other four journals, JB articles' citation count trajectory was adversely affected in the post-2006 years.

We verify that the findings are robust to the possible confounding effect that authors may tend to cite articles from the same journal in which the article is published (self-citation). We also show that the results are robust to the exclusion of articles published between 2004 and 2006 (after the discontinuation decision was made public), as well as to comparisons made to lower tier journals, such as the *Journal of Banking and Finance* (JBF) and *Financial Management* (FM). Finally, an analysis of JB articles that are not finance related (16% of JB's articles) reveals that they were also adversely affected following JB's discontinuation, implying that the strategic citation phenomenon also exists among nonfinance academics.

We also provide evidence for a possible mechanism through which the reduced citation count of JB articles occurs. Specifically, we examine cases in which two articles, one of which is a JB article and the other is from another top-tier journal, deliver a similar message and, therefore, are often cited together. We identify a sample of pairs and analyze three trends of citation sources related to the pairs: articles that cite both the JB and the matched article, articles that cite only the JB article, and articles that cite only the matched article. We find that the number of references made to the JB article is reduced compared to the number of references made to the matched (non-JB) article, which is consistent with the idea that after discontinuation, there is increased negligence in citing JB articles.

Finally, we provide insights regarding the cost to science of the strategic citation bias we uncovered. While we cannot measure alternative paths that the field of finance would have taken if strategic citations were nonexistent, we can measure the possible deadweight loss associated with these adverse practices in terms of inefficient research space allocation in top academic outlets. We test whether papers with evidence of possible strategic citing tend to be of lower quality, possibly because these papers are associated with the application of the less rigorous scientific practices. We provide evidence that articles that do not cite JB articles (conditional on them being expected to cite JB articles) in the post-2006 period are more likely not to be cited after their publication, which is consistent with the idea that strategic citations are associated with reduced research quality.

The current paper contributes to the literature by providing evidence of agency citing practices resulting from incentive-based contracts in the production of scientific knowledge. University researchers, monitored by university officials, are agents who produce a public good for the use of society.[4] The work environment of a typical faculty member has two ingredients that make moral hazard severe, that is, independence and specialized knowledge (Holmstrom 1979). Given these conditions, it is not surprising that university officials direct their incentive structure to encourage faculty researchers to publish in top-tier outlets, which can be considered a relatively "objective" observable measure of research success (Gomez-Mejia and Balkin 1992). However, as articulated by Baker, Jensen, and Murphy (1988), a disadvantage of such objective compensation schemes (to publish in top-tier outlets) is that a resourceful researcher may optimize with respect to the observable measure rather than the intended outcome of progressing science. Situations in which well-intended incentive contracts do not necessarily lead to optimal outcomes may not be uncommon, but quantifying them and providing empirical evidence of their occurrence is not trivial.[5] Previous works within corporate finance settings found that CEOs can manipulate the effects of contracts (to maximize firm value), often resulting in a net cost borne by shareholders (Yermack 1997; Lie 2005; Heron and Lie 2007; Narayanan and Seyhun 2008; Morse, Nanda, and Seru 2011).[6] The current paper provides new evidence of agency inefficiencies in the production of research.

Similar to the strategic aspects of article citation practices that we show in the finance field, strategic behavior in patent citations may occur. As such, the paper also contributes to the innovation literature, which has recognized the possibility of strategic citing practices of patents (Lampe

[4] See Stephan (1996) and David (1998) for a review of the economics literature concerning the efficient production of knowledge to increase social welfare.

[5] An important condition for agency behavior to exist is that it must not be easily identifiable and it should be hard to monitor (e.g., Jensen and Meckling 1976). Therefore, finding evidence of strategic agency-related citations is challenging. In app. B, we show that when agency behavior can be trivially monitored, such as in the case of excessively citing editors' authored papers, the evidence for agency citations is weak. On the other hand, in sec. VI, we provide evidence of strategic citations after an author's death, which further corroborates the idea that agency citations are high only when it is difficult to monitor such behavior.

[6] Better monitoring of authors to ensure proper citation practices can help mitigate the agency conflict. However, monitoring is not always efficient, and the corporate finance literature provides insights into the various problems arising from difficulties in the monitoring of management (Hermalin and Weisbach 1998; Ferris, Jagannathan, and Pritchard 2003; Ryan and Wiggins 2004). Surprisingly, the economics of science literature has not exerted effort toward providing theories, nor has it provided empirical evidence regarding possible agency concerns in the publication monitoring process, such as how the preferences of referees (i.e., monitors of authors) affect the quality of the publication process. One possibility for this absence is the lack of observables on the monitoring agent: board members are known, while referees are anonymous. Frey (2003) suggests that the anonymity of the referees is a major pitfall in the integrity of the refereeing process.

2012) but has overlooked the possibility that future citation counts may be systematically biased because of these practices.[7] Furthermore, our findings suggest that if citation counts of patents are similarly systematically biased due to firms' strategic citing behavior, treating a patent's citation count as an exogenous measure of its scientific contribution may be unwarranted. We discuss this and other implications of our findings in section VIII.

Finally, the paper provides an introspection on the research and publication process. Previous literature provides evidence that editors tend to use their authority to enhance publication efficiency rather than promote favoritism (Laband and Piette 1994; Brogaard, Engelberg, and Parsons 2014), and there is also evidence that, over time, inequities in the publication process have been reduced (Kim, Morse, and Zingales 2009). On the other hand, there has been a growing acknowledgment that there are also problems in the publication process. In a recent paper, Heckman and Moktan (2020) posit that the overemphasis on publication in the "top five" diverts researchers away from basic research and incentivizes scholars to pursue follow-up replication work at the expense of creative pioneering research. The current paper provides evidence of an additional problem that arises from this focus on top-tier publication; namely, the impact of research becomes biased from its scientific contribution, which implies that important contributions may be slow to make an impact, and less important contributions may make more of an impact than warranted.

The rest of the paper is organized as follows: In section II, we describe the data and variables. Sections III and IV provide evidence that JB's discontinuation causally affected the citation of its already published articles. Section V provides evidence of the strategic mechanisms. Section VI further analyzes the effect of an author's death on the tendencies to strategically cite his/her articles. Section VII provides an analysis of the deadweight loss associated with the strategic referencing phenomenon. In section VIII, we discuss the implications of our study, and section IX concludes.

II. Data and Variables

A. Main Sample

We have obtained data pertaining to our research questions from the Thomson Reuters Web of Science (WOS). Since the hypothesis is that

[7] An important aspect of the patent application process is that most of the references are added by the patent examiner rather than the inventor, and since 2001, the US Patent and Trademark Office has distinguished the origin of references (inventor or examiner). This has allowed researchers to identify the innovation path (Alcarer and Gittelman 2006) and the strategic aspects of the innovation process (Lampe 2012).

articles published in the top five finance journals tend to be cited also because of strategic reasons (rather than merits and relevance only), our main data sample consists of articles published in the top five finance journals: the *Journal of Business* (JB), the *Journal of Finance* (JF), the *Journal of Financial Economics* (JFE), the *Review of Financial Studies* (RFS), and the *Journal of Financial and Quantitative Analysis* (JFQA). The effect of JB's shutdown on citations is reflected most in comparison to these other top-tier journals, and furthermore, the top-tier finance journals are all general interest and of high perceived quality, which makes it easier to match and compare JB's articles to these other journals' articles.[8]

Our main sample includes all research articles published in these top five finance journals during the period of 1995–2006. An article's citation count is the number of articles citing it in a given calendar year. We follow each article's citation count over the first 10 years following its publication.[9] We exclude from the analysis citation counts in the article's publication year because having citations in the publication year is rare (77% of the articles in our sample have no citations in the year of publication).[10] Hence, the citation count sample starts in 1996 and ends in 2016 (10 years after JB's discontinuation), meaning that the yearly observations prior to discontinuation are 1996–2006 and the yearly observations following discontinuation are 2007–2016. The citing articles are research articles as defined by the WOS. Citations made in other types of publications, such as proceedings papers, editorial materials, book reviews, meeting abstracts, or notes, are not part of our sample.

Table 1 provides the distribution of the main sample of articles we follow in this study. All of these articles were published during the period prior to JB's discontinuation. In total, the sample includes 2,930 articles, yielding a sample of 29,300 article-year citation count observations.

B. Secondary Samples

To analyze the effect of an author's death (sec. VII) on an article's citation count trajectory, we collected data on the death of economists from

[8] We later provide a robustness analysis with regard to the lower tier finance journals, *Journal of Banking and Finance* (JBF) and *Financial Management* (FM).

[9] The preference of a 10 year age limit is due to our desire to have observations during a period in which the annual citation count is predominantly increasing and tends to be concave (Cano and Lind 1991; Aksnes 2006; Levitt and Thelwall 2008). Additionally, our sample would include more citations of older articles in the period after 2006 compared to the period prior to 2006 unless we put an age limit on the years an article's citation is included in the sample. All the results reported are robust to not capping the article age in the sample. Appendix D provides results with no age limit on the sample.

[10] Including year zero (the publication year of the article) does not alter in any significant way the results reported in the paper.

TABLE 1
SAMPLE

	Journal of Business	*Journal of Finance*	*Journal of Financial Economics*	*Review of Financial Studies*	*Journal of Financial and Quantitative Analysis*	Total Articles
Journal abbreviation	JB	JF	JFE	RFS	JFQA	
Year of publication:						
1995	20	60	42	36	33	191
1996	19	69	46	37	29	200
1997	19	82	55	35	26	217
1998	17	76	49	27	24	193
1999	20	77	55	40	23	215
2000	22	89	56	36	29	232
2001	22	77	61	38	25	223
2002	24	86	58	46	28	242
2003	26	93	60	36	36	251
2004	46	89	75	37	38	285
2005	81	86	79	40	36	322
2006	107	87	87	41	37	359
Total articles	423	971	723	449	364	2,930
Observations (year-article)	4,230	9,710	7,230	4,490	3,640	29,300

IDEAS, the bibliographic database dedicated to economics (ideas.repec.org). We included all economists who died during the years 2000–2013 and who had at least one published article in the business and economics category of the WOS (this includes 96 journals). This procedure yielded a sample of 110 authors and 744 articles. To further analyze the effect of an author's death on citations we collected information on all economics Nobel laureates during the years 1990–2015, as well as their published articles' citations over the years.

The deadweight cost analysis (sec. VIII) requires the inclusion of articles published after 2006. For this analysis, we augment our sample of articles published prior to JB's discontinuation with top-tier finance articles published after 2006 (articles in the top four journals, as JB is discontinued). Finally, for a robustness analysis, we also include data on all of *Financial Management* and *Journal of Banking and Finance* articles published between 1995 and 2006.

C. Variables

Following Stremersch, Verniers, and Verhoef (2007), who find that the article and author characteristics matter for future citations, we produce author and article characteristic variables generated from information

obtained from the WOS, Web Archive, and EconLit. The article characteristics include an indicator of whether the article is a lead article, the number of authors, the number of pages, the number of references, and the number of characters in the title. The authors' variables include information on whether the author is an associate editor or editor in a top-tier finance journal, the affiliations of the authors, and whether one of the authors has previously published in a top-tier article in the last 3 years. We also generate two types of classifications of articles into topics, which are based on the JEL codes of the articles. Appendix A (apps. A–I are available online) provides the definitions of author and article characteristic variables, as well as our JEL-based classification scheme for associating an article with a topic.

To ensure that the results of our study are not driven by any particular measure of citations, we employ three variables to capture an article's scientific influence in a given year (henceforth, influence variables): *Citation* is the log of 1 plus the number of citations an article receives in a calendar year; *nonzero indicator* is a yearly dummy variable that equals 1 if the number of citations an article received in that year is greater than zero, and zero otherwise; and *H5 indicator* is a similarly constructed yearly dummy variable that equals 1 if the number of citations an article received is greater than four, and zero otherwise.[11]

III. Empirical Analysis

A. *Influence Variables over the Sample Period*

We start our analysis by describing the influence variables of our main sample of articles over time (published between the years 1995 and 2006). In three diagrams, figure 1 provides the changes in the means of the influence variables for each of the five top journals. In the first diagram (panel A), we plot the mean citation; in the second diagram (panel B), we plot the mean nonzero indicator; and in the third diagram (panel C), we plot the mean H5 indicator. Several observations can be derived from the figure. First, according to the three variables, articles from all five journals demonstrate a trend of increased influence over time. Second, the ordering of the journals in terms of their articles' influence is rather stable over time. JF and JFE are ranked highest over the entire sample period. RFS, while ranked third during most of the sample period, has

[11] It has been widely documented that the citation counts of articles are skewed (Seglen 1992; Stephan 1996; Chan, Chang, and Chang 2013; Stern 2013), and therefore, the average number of citations may not be reflective of other distributional properties of a journal's impact. Utilizing three different influence measures mitigates the concern that our results are driven by distributional differences across journals.

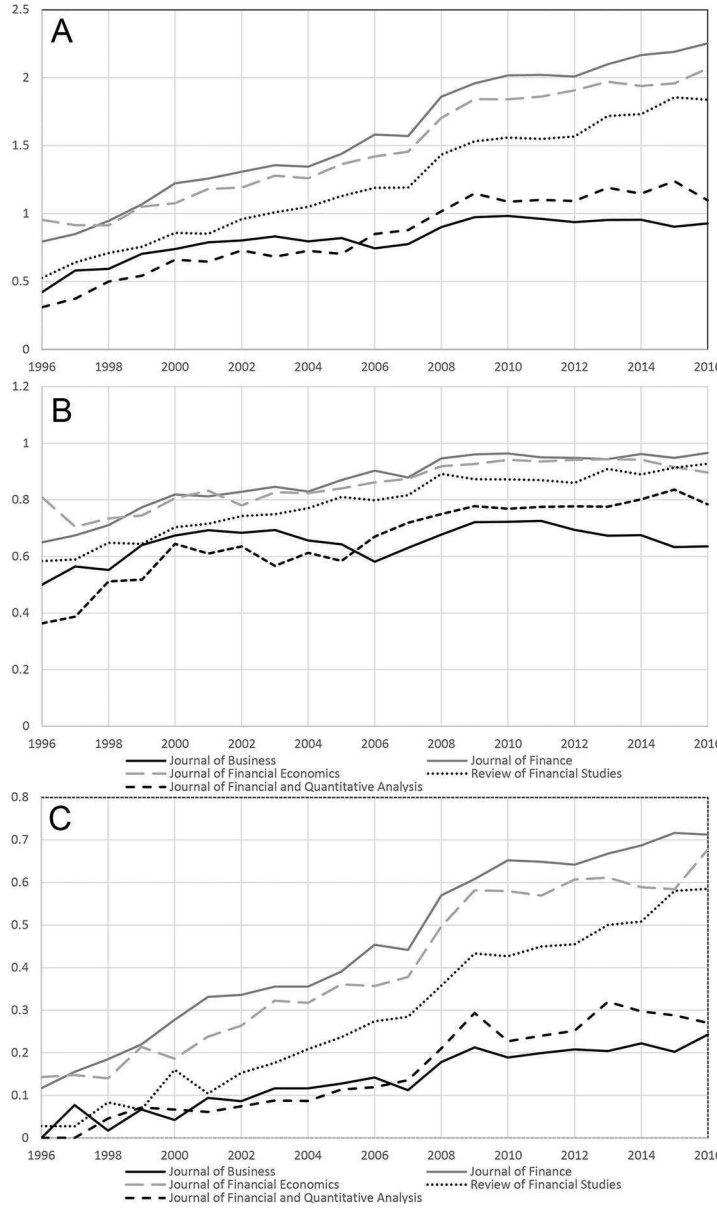

FIG. 1.—Influence of journals' articles over the years. The figure depicts the citation count attributes of the top five finance journals over the years. The first diagram (*A*) depicts the mean log of (1 + citation count) (citation), the second diagram (*B*) depicts the fraction of the journals' articles with at least one citation (nonzero indicator), and the third diagram (*C*) depicts the fraction of the journals' articles with more than four citations in a given calendar year (H5 indicator). All articles from the five journals published during 1995–2006 are included as long as the article is between 1 and 10 years old.

clearly gained momentum in its influence over time. According to all three plots, RFS's articles had an influence that was similar to that of JB's and JFQA's articles in the earlier years sampled, but in recent years, the influence of the RFS articles has almost reached that of the JFE and JF articles. It is also noticeable that in the earlier years, JB's articles had more of an influence than JFQA's articles, but in the second half of the sample, this is no longer the case, and JFQA has surpassed JB. Finally, in all three panels, in the latter part of the sample, the trajectory of JB's influence seems significantly lower than that of the other journals.

B. Matching Articles Based on the 2 Year Citation Count

The evidence provided in the previous section shows a reduction in the citation count trajectory of JB articles compared to that of the other four journals. Of course, this by itself does not mean that the discontinuation of JB is the causal reason for the reduced influence of JB's articles. For example, in figure 1*A*, in the years prior to 2006, there is a noticeable difference in both the mean and the slope of the citation count trajectory of JB and JFQA compared to the other three journals, which implies a selection bias in the allocation of articles to journals. Namely, although all the journals studied are considered top tier, the assignment of articles to journals is not random, and thus, the ex ante expected trajectory is not uniform across the journals. In this section, we address this concern by matching each JB article to all the other top-tier journal articles published in the same year and with the same 2 year initial citation count as the JB article (one-to-many matching). Under this matching procedure, each JB article may have several matches, and non-JB articles may be matched multiple times (to different JB articles, as the matching is done with replacement).[12] This procedure mitigates concerns that quality differences between JB articles and non-JB articles are driving the results because the ex post initial 2 year citation count, a proxy for the article's quality (Stern 2014), is identical for the matched articles.

The top portion of table 2 provides the number of JB articles that had an exact match (out of the 423 JB articles) in each of the other top four journals, which together yielded our pooled sample. For example, we were able to match 415 of the JB articles with RFS articles, and these 415 JB articles were matched to 2,122 RFS articles. From the rightmost column, we see that the pooled sample included 10,547 articles matched

[12] A one-to-many matching without replacement is not feasible in our case, as many JB articles may have the same 2 year citation counts. Furthermore, even in a one-to-one matching, a matching without replacement will be order dependent; i.e., the first JB article that is matched would have a larger pool of possible matches than the JB articles that are consecutively matched, making matching without replacement a less appropriate procedure.

TABLE 2
One-to-Many Matches: Mean Difference in the Influence of JB Articles Compared to Matched Articles

		Matched articles				
	JB	JF	JFE	RFS	JFQA	All (Pooled)
JB matched		423	418	415	386	423
Matched other		3,115	2,863	2,122	2,447	10,547
1996–2006:						
Citation	.764	.802*	.814***	.695	.493***	.718**
		(−1.91)	(−4.26)	(1.18)	(9.15)	(2.54)
Nonzero indicator	.640	.684***	.674***	.624	.489***	.628
		(−3.39)	(−3.20)	(.24)	(7.29)	(.88)
H5 indicator	.104	.111	.119***	.075	.507***	.093
		(−.75)	(−3.56)	(1.26)	(1.87)	(1.50)
2007–2016:						
Citation	.923	1.309***	1.245***	1.097***	.790***	1.123***
		(−22.93)	(−20.12)	(−11.38)	(2.91)	(−12.63)
Nonzero indicator	.683	.845***	.825***	.761***	.663	.778***
		(−21.14)	(−18.08)	(−8.99)	(.24)	(−11.82)
H5 indicator	.190	.319***	.295***	.231***	.123***	.247***
		(−13.95)	(−12.02)	(−5.63)	(3.89)	(−6.90)

Note.—Each JB article is matched to all other articles published in the other (matched) top-tier journal (or pooled sample of all other journals), provided that the articles are published in the same calendar year and have the exact same number of accumulated citations over the first 2 years since publication. Difference-of-means tests are provided for the periods of 1996–2006 and 2007–2016. "JB matched" is the number of JB articles (out of 423) that had at least one match, and "matched other" is the total number of matches from the corresponding group. Citation is the log of 1 plus the number of citations of an article in a calendar year. Nonzero indicator equals 1 if the number of citations is greater than zero, and zero otherwise. H5 indicator equals 1 if the number of citations is greater than 4, and zero otherwise. The difference-of-means test *t*-statistics (for citation) and *z*-statistics (for nonzero and H5 indicators) that compare the JB articles to the various groups of matched articles appear in parentheses.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

to the 423 JB articles. The table provides the influence of the five journals' articles as well as difference-of-means tests that compare the mean of the JB articles' influence to that of articles of the other top four journals (and the entire pooled set). We conduct the analysis for the two subperiods covering the years 1996–2006 (pre-JB-discontinuation period) and 2007–2016 (post-JB-discontinuation period).

In the 1996–2006 period, the JB citation measure is 0.764, which is higher than that of the pooled sample, which is 0.718. This difference is significant at the 5% level. It is clear from the table that although we match articles based on the 2 year initial citation count, in the pre-discontinuation period, the JB articles are, on average, better than their JFQA counterparts in all influence measures, similarly to the RFS articles (JB's articles have a higher influence, but the difference is not significant), and are inferior to JF's and JFE's articles.

Moving to the analysis of the years 2007–2016, table 2 reveals that in the post-discontinuation period, JB's articles are significantly less influential than the pooled sample according to all three influence variables. In particular, JF, JFE, and RFS articles have a much greater influence than JB articles, while the influence of JFQA's articles is lower than that of JB's articles. Figure 2 presents a graphical illustration of the change in citation of the JB articles and the pooled sample. There is an apparent structural break that seems to emerge at around 2006. After JB's discontinuation, there is a shift in which the influence of the pool of matched articles is higher than that of JB articles.

C. Propensity Score Matching

The approach of the previous section used the 2 year citation count as a proxy for quality, in order to correct for the quality-related selection bias in the allocation of an article to a journal. However, the possible selection bias in the initial allocation of an article to a journal may be related to other characteristics of the article or the authors that can also affect the citation trajectory. That is, citations are not only related to quality but also affected by a host of characteristics, such as the popularity of the topic covered, the reputation of the author, and the length of the article (e.g., Stremersch, Verniers, and Verhoef 2007). To deal with these concerns, in this section, we use a PSM analysis.

Our PSM is applied with regard to the allocation of articles to journals in order to find nontreated articles (not being subject to a shutdown of their outlet, i.e., non-JB articles), which are as similar as possible to the treated articles (being subject to a shutdown of their outlet, i.e., JB articles) in all variables that may affect allocation to an outlet. Once this is done, any difference in future influence can be attributed to the shutdown treatment.

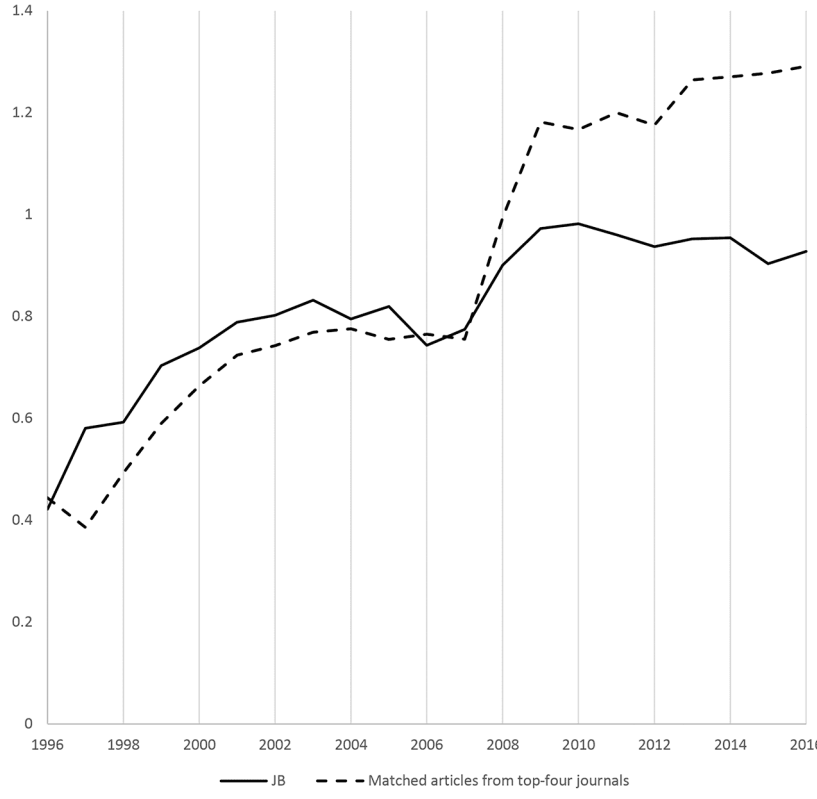

FIG. 2.—One-to-many matches: Citation of articles published in JB and matched articles. The figure depicts the mean log of (1 + citation count) of JB and matched articles. Each JB article is matched to all the articles in the sample that were published in the same year and have the exact same 2 year accumulated citation count.

The propensity score (PS) of an article is the predictive value of one of the following probit regressions:

$$\mathrm{JB}_i = \beta_0 + \beta_1 \mathrm{CC}_i + \sum_{k=2}^{12} \beta_k \mathrm{Control}_i + \sum_j \delta_j \mathrm{PubYear}_i + \varepsilon_{i,t}, \tag{1}$$

$$\mathrm{JB}_i = \beta_0 + \beta_1 \mathrm{CC}_i + \sum_{k=2}^{12} \beta_k \mathrm{Control}_i + \sum_j \delta_j \mathrm{PubYear}_i + \sum_{l=1}^{48} \gamma_l \mathrm{Topic}_i + \varepsilon_{i,t}, \tag{2}$$

where JB_i is an indicator that equals 1 if the article is published in JB, and zero otherwise. CC_i is the log of 1 plus the average number of citations of article i in the first 2 years since publication, $\mathrm{Control}_i$ represents the author and article characteristics (app. A), $\mathrm{PubYear}_i$ represents the publication

year indicators, and Topic_i represents the 48 JEL-based topic indicators (app. A). Note that the only difference between equations (1) and (2) is the inclusion of the topic indicators in equation (2), which are not included in equation (1). There are advantages and disadvantages to including topic indicators. The advantage is that articles that cover similar topics may be important determinants for the authors' choice of outlet and may have similar citation paths. The disadvantage is that if some of the topics are thinly populated, the PSM procedure becomes less appropriate. Specifically, with topic indicators, the less populated the topic of an article is, the more arbitrary are its matches. Nevertheless, Arpino and Mealii (2011) suggest that even when cluster (i.e., in our case, topic) sizes are small, including a dummy variable can be appropriate for the estimation of propensity scores. We, thus, conduct both types of PSM (eq. [1] and eq. [2]) for robustness purposes.[13]

Our difference-in-differences analysis compares articles published in JB to articles published in each of the other four journals separately. Each JB article is matched to an article published in the other journal in the same publication year[14] and with the closest propensity score (i.e., the absolute difference between the propensity score of the JB article and the chosen match is the smallest considering all of the articles published in the matched journal in the same year). We also conduct a pooled matched analysis, under which each JB article is matched to an article that has the closest propensity score to that of the JB article, out of the pool of the four top-tier finance journals published in the same year.

Table 3 provides the difference-in-differences results. The first row provides the mean value of each of the influence variables (citation, nonzero indicator, and H5 indicator) in the 423 JB articles. For example, the mean citation of JB is 0.764 during the period of 1996–2006, and it is 0.923 in the 2007–2016 period. Panel A provides the mean influence of the matched articles, as well as the difference in influence compared to the JB articles when the matching is based on the PSM of equation (1). The first four rows of panel A concern the pooled matching analysis. As indicated in the first row of the table, this procedure leads to 115, 134, 78, and 96 matched articles published in JF, JFE, RFS, and JFQA, respectively. The mean citation of these articles in the 1996–2006 period is 0.815, which is marginally larger than the 0.764 of JB (t-statistic of 1.84). Conversely, the citation value of the pooled matched sample in the 2007–2016 period

[13] Appendix C provides more information and results concerning the significance of characteristics in predicting allocation to JB (vs. the other journals) in the full sample, as well as in the sample generated by the PSM, according to both eq. (1) and eq. (2).

[14] Although the inclusion of year indicators for calculating the propensity score only adds a constant to all articles published in the same year, it is important to include the publication year indicators in eq. (1) and eq. (2) because the estimation is done on the entire sample of articles, so the year effects can affect the coefficients of the other characteristics.

is 1.20, which is significantly larger than 0.923 of JB (*t*-statistic of 12.4). We then conduct a difference-in-differences test and find that there is a significant deterioration of JB articles compared to the pooled sample (*t*-statistic of 7.61). The results concerning the other measures (nonzero indicator and H5 indicator) provide similar interpretations. Moving on to a matching procedure that considers only one journal at a time for possible article matches, the results are broadly consistent throughout. Namely, there is a clear drop in the influence of JB articles in the 2007–2016 period compared to the matched articles from the other journals. Overall, in 14 out of 15 difference-in-differences tests, the results show a comparative reduction in JB articles' influence compared to their matched counterparts.

Panel B repeats the analysis using the PSM of equation (2). According to this procedure, there is no significant difference in influence between JB and the matched articles in the 1996–2006 period (apart from the comparison to JFQA, where JB articles have a higher influence than JFQA, with a *t*-statistic of 3.07). However, the influence of JB articles is greatly reduced in the 2007–2016 period compared to the matched samples, and this is confirmed at the 1% level in all difference-in-differences tests (15 out of 15).

Figure 3 depicts the mean citation of JB and that of the propensity-score-matched articles taken from the pool of all other articles, based on either equation (1) or equation (2), each in a separate plot. The figure clearly shows a structural break in the trajectory of JB (compared to the matched samples) at around JB's discontinuation.

D. Autoregressive Specification for Analyzing Difference in Differences

As an additional analysis, we model the citation trajectory for each journal as an autoregressive process. We then analyze whether there is a structural break at around 2006, which would be consistent with our hypothesis of adverse citing practices. The advantage of the autoregressive specifications over the analysis of table 3 is that they allow us to conduct the difference-in-differences analysis using all articles of the other top four journals, which is not possible in the matching procedures. The model includes an indicator for the years after 2006, which captures a possible change in the article's drift in the years after JB's discontinuation. The specification of the model is as follows:

$$\begin{aligned} \mathrm{Inf}_{i,t} = {} & \beta_0 + \beta_1 \mathrm{Inf}_{i,t-1} + \beta_2 \mathrm{Post}_t + \beta_3 \mathrm{CC}_i + \sum_{k=4}^{14} \beta_k \mathrm{Control}_i \\ & + \sum_{j=1}^{48} \gamma_j \mathrm{Topic}_i + \varepsilon_{i,t}, \end{aligned} \tag{3}$$

TABLE 3
One-to-One Matching: Mean Difference in the Influence of JB Articles Compared to Matched Articles

	Citation			Nonzero Indicator			H5 Indicator		
	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences
JB	.764	.923		.640	.683		.104	.190	
	A: Propensity Score According to Equation (1), That Is, Calculated without Topic Fixed Effects (Pooled Matching Procedure Fitted Articles: 115 JF, 134 JFE, 78 RFS, 96 JFQA)								
Pooled	.815	1.200		.648	.800		.130	.272	
JB-pooled	−.051	−.277***	−.226***	−.008	−.116***	−.108***	−.025	−.082***	−.057***
	(−1.84)	(−12.4)	(−7.61)	(−.47)	(−10.0)	(−5.71)	(−2.09)	(−7.34)	(−3.72)
JF	.872	1.43		.688	.868		.154	−.385	
JB-JF	−.107***	−.506***	−.400***	−.049***	−.185***	−.139***	−.050***	−.195***	−.145***
	(−3.87)	(−22.8)	(−12.8)	(−2.78)	(−17.0)	(−7.54)	(−4.02)	(−16.5)	(−8.46)
JFE	.864	1.329		.675	.841		.147	.363	
JB-JFE	−.099***	−.406***	−.307***	−.035	−.157***	−.122***	−.043***	−.173***	−.131***
	(−3.60)	(−18.3)	(−10.1)	(−1.97)	(−14.1)	(−6.56)	(−3.45)	(−14.8)	(−7.96)
RFS	.765	1.133		.654	.756		.103	.250	
JB-RFS	.00	−.211***	−.211***	−.014	−.072***	−.058***	.001	−.059***	−.061***
	(.01)	(−9.32)	(−5.97)	(−.78)	(−6.05)	(−2.81)	(.12)	(−5.40)	(−3.59)
JFQA	.723	1.004		.611	.789		.093	.202	
JB-JFQA	.041	−.081***	−.123***	.029	−.075***	−.104***	.011	−.012	−.023
	(1.57)	(−3.80)	(−3.62)	(1.58)	(−6.30)	(−5.11)	(1.00)	(−1.11)	(−1.37)

	B: Propensity Score According to Equation (2), That Is, Calculated with Topic Fixed Effects (Pooled Matching Procedure Fitted Articles: 152 JF, 115 JFE, 70 RFS, 86 JFQA)								
Pooled	.749	1.28		.620	.827		.110	.323	
JB-pooled	.015	−.35***	−.37***	.020	−.144***	−.164***	−.006	−.133***	−.127***
	(.57)	(−16.0)	(−11.2)	(1.09)	(−12.73)	(−8.34)	(−.48)	(−11.5)	(−7.44)
JF	.777	1.36		.611	.864		.138	.354	
JB-JF	−.012	−.441***	−.296	.028	−.181***	−.210***	−.033***	−.164***	−.131***
	(−.45)	(−20.2)	(−12.82)	(1.58)	(−16.6)	(−10.8)	(−2.70)	(−14.0)	(−7.45)
JFE	.803	1.209		.672	.795		.115	.298	
JB-JFE	−.037	−.287***	−.249***	−.032	−.111***	−.079***	−.011	−.107***	−.096***
	(−1.40)	(−12.8)	(−7.64)	(−1.81)	(−9.56)	(−4.02)	(−.95)	(−9.46)	(−5.84)
RFS	.738	1.306		.654	.842		.078	.312	
JB-RFS	.027	−.383***	−.411***	−.014	−.159***	−.145***	.026	−.122***	−.148***
	(1.06)	(−17.4)	(−11.5)	(−.78)	(−14.2)	(−7.31)	(2.40)	(−10.6)	(−8.28)
JFQA	.683	1.004		.582	.703		.089	.190	
JB-JFQA	.081***	−.082***	−.167***	.058***	−.020	−.078***	.015	−.074***	−.089***
	(3.07)	(−3.67)	(−4.82)	(3.15)	(−1.62)	(−3.63)	(1.39)	(−6.62)	(−5.20)

NOTE.—Each JB article is matched with a non-JB article that was published in the other (matched) top-tier journal (or pooled sample of all other journals). A matched article was published in the same calendar year and has the closest propensity score. Differences of means in influence are provided for the periods of 1996–2006 and 2007–2016. Citation, nonzero indicator, and H5 indicator are as defined in table 2. The difference-of-means test *t*-statistics (for citation) and *z*-statistics (for nonzero and H5 indicators) that compare the JB articles to the various groups of matched articles appear in parentheses.

*** $p < .01$.

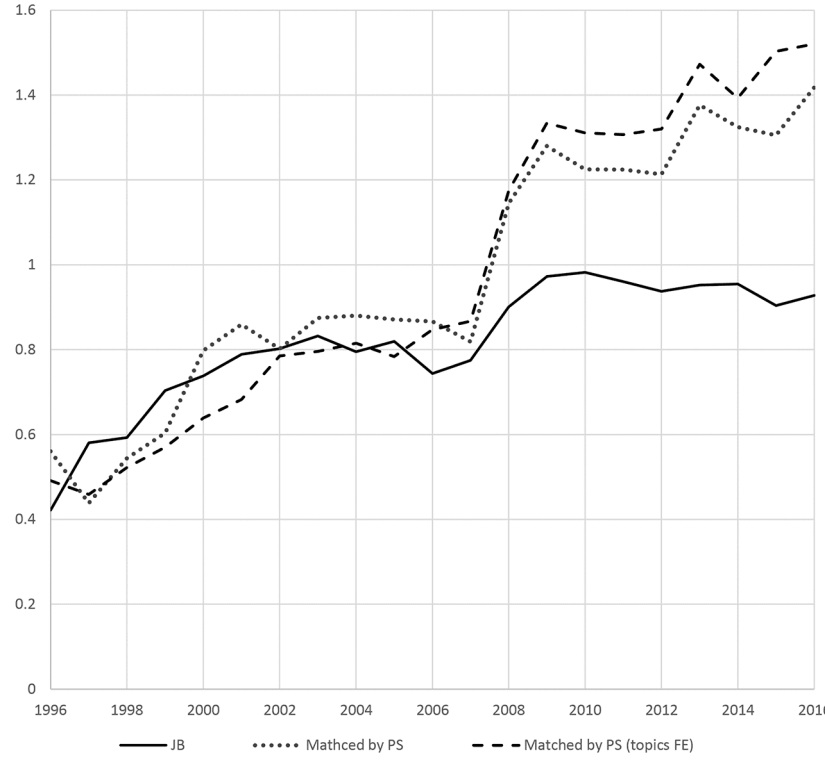

FIG. 3.—One-to-one matching based on propensity score. The figure depicts the mean log of (1 + citation count) of JB articles and that of matched articles taken from the pool of all other articles in the top four finance journals, based on having the closest propensity score. PS and PS (topics FE) correspond to propensity score matching based on equations (1) and (2), respectively.

where $\text{Inf}_{i,t}$ is defined according to the three different influence variables for article i in year t; CC_i is the log of 1 plus the average number of citations of article i in the first 2 years since publication, Control_i represents the author and article characteristics (app. A), Topic_i represents the 48 JEL-based topic indicators (app. A), and Post_t is an indicator that equals 1 if t is within the range of 2007–2016, and zero otherwise.[15] The model is run separately for each journal over all articles in the years 3–10 following publication (as CC_i is measured over the initial 2 years of the article). This procedure allows for a different autoregressive specification for each of the five journals, which allows for a different trajectory over time

[15] We are not dogmatic about the exact break point in the influence trajectory. We choose 2006 as the break point because it is the year in which JB discontinued. Of course, agency citations could have started prior to 2006 because knowledge about JB's closure was known to the public as early as 2004.

for each journal.[16] When $Inf_{i,t}$ is defined as citation, the model is estimated using OLS; a probit estimation is applied when $Inf_{i,t}$ is either the nonzero indicator or the H5 indicator.

The autoregressive specifications above are estimated to facilitate a difference-in-differences analysis of the coefficients. A significantly lower $Post_t$ coefficient in the JB specification compared to the other four journals indicates a relative decrease in influence in JB in the post-discontinuation period compared to the other journals. Hence, the agency citation hypothesis is that the $Post_t$ coefficient is significantly smaller in the JB specifications compared to the specifications of the other four journals. The results of these difference-in-differences tests are provided in the lower part of each of the three types of specifications (corresponding to the three dependent variables) of table 4 (below the "difference β_2 p-value" labels).

We start by providing a description of the autoregressive specification outputs. The results in table 4 show that in all influence variable specifications, the $Post_t$ coefficients (β_2) of JF, JFE, RFS, and JFQA are positive and highly significant at the 1% level.[17] In contrast, the $Post_t$ coefficient is not significant in the JB specifications. To gain a sense of the magnitude of these results, we numerically compare the JB and JFQA coefficients in the citation specifications. According to the citation specifications, the coefficient of $Post_t$ is 0.03 for JB (not significant), and it is 0.132 and highly significant for JFQA. This translates to JB articles receiving approximately 20% fewer citations in the post-discontinuation period than the citations JFQA received.[18]

[16] An alternative specification could also include the age of the article and its squared term because the annual citation counts of articles may be very different as they age. Such modeling may better capture a situation in which annual citations reach a peak and then drop. Robustness specifications addressing this are provided in app. D and show no effect on our results. We also conduct augmented Dickey-Fuller unit-root tests for the three influence variables for each journal separately, and we find that we cannot reject the null of a trend-stationary process.

[17] We do not hypothesize a change in drift in the post-2006 period. Rather, our hypothesis concerns differences in drifts in the post-2006 periods between JB and the other journals. Still, when analyzing drifts, the results show evidence of an increased drift in the post-2006 period for all journals, except for JB. The increase in citations in the post-2006 period can be attributed to the rapid-publication, online-only megajournals of the last decade (e.g., Petersen et al. 2019).

[18] We compare JFQA and JB because they have similar means in the sample. The (untabulated) mean log(1 + citation) in the sample is 0.87 and 0.875 for JB and JFQA, respectively, which translates to an average citation count of $\exp(0.870) - 1 = 1.39$ and $\exp(0.875) - 1 = 1.40$, respectively. Adding the coefficient of $Post_t$ to the citation count makes the count equal to $\exp(0.90) - 1 = 1.46$ and $\exp(1.007) - 1 = 1.74$, respectively. Hence, the increase in the post-shutdown period for JB is 0.07, and the increase for JFQA is 0.34. For JFQA, a comparative increase of 0.27 (0.34–0.07) on the mean of 1.4 constitutes an increase of 19.2%.

TABLE 4
AUTOREGRESSIVE INFLUENCE REGRESSIONS

	JB	JF	JFE	RFS	JFQA
Observations	3,384	7,768	5,784	3,592	2,912
(1) Citation:					
Lagged dependent β_1	.496***	.582***	.568***	.536***	.459***
	(28.33)	(57.80)	(47.53)	(34.77)	(25.77)
Post β_2	.030	.083***	.096***	.095***	.132***
	(1.21)	(5.75)	(5.77)	(4.31)	(5.28)
Difference β_2 p-value:					
Compared to JF	.0674*				
Compared to JFE	.0265**	.5275			
Compared to RFS	.0504*	.6379	.9541		
Compared to JFQA	.0036***	.0821*	.2284	.2556	
(2) Nonzero indicator:					
Lagged dependent β_1	.139***	.057***	.066***	.121***	.143***
	(9.26)	(8.06)	(7.52)	(9.91)	(8.91)
Post β_2	.005	.026***	.033***	.037***	.087***
	(.30)	(4.02)	(4.45)	(3.10)	(5.07)
Difference β_2 p-value:					
Compared to JF	.1512				
Compared to JFE	.0807*	.5025			
Compared to RFS	.1823	.8838	.7409		
Compared to JFQA	.001***	.0036***	.015**	.0156**	
(3) H5 indicator:					
Lagged dependent β_1	.192***	.253***	.263***	.276***	.183***
	(16.95)	(34.22)	(29.70)	(24.67)	(14.29)
Post β_2	.016	.052***	.065***	.061***	.091***
	(1.23)	(5.68)	(6.03)	(4.62)	(6.45)
Difference β_2 p-value:					
Compared to JF	.0739*				
Compared to JFE	.0203**	.4487			
Compared to RFS	.0446**	.5960	.8887		
Compared to JFQA	.0021***	.0786*	.3102	.2863	

NOTE.—Regression results in which each journal (JB, JF, JFE, RFS, JFQA) is estimated separately using the following AR(1) specification model: $\text{Inf}_{i,t} = \beta_0 + \beta_1 \text{Inf}_{i,t-1} + \beta_2 \text{Post}_t + \beta_3 \text{CC}_i + \Sigma_{k=4}^{14} \beta_k \text{Control}_i + \Sigma_{j=1}^{48} \gamma_j \text{Topic}_i + \varepsilon_{i,t}$, where $\text{Inf}_{i,t}$ is one of the three different influence variables for article i in year t defined in table 2. CC_i is the log of 1 plus the average number of citations of article i in the first 2 years since publication, Post_t is an indicator that equals 1 if the article is published in the 2007–2016 period, and zero otherwise. Control_i represents the 11 authors and article characteristics, and Topic_i represents the 48 topic indicators (defined in app. A). The model is estimated for articles aged 3 to 10 years. Specification (1) is estimated with OLS, and specifications (2) and (3) are estimated with probit, for which marginal coefficients are provided. All specifications include an intercept; t-statistics (z-statistics) are calculated with the robust estimator of Huber and White and are provided in parentheses. The bottom four rows of each specification provide the p-values of the χ^2-tests for the comparison of the coefficient β_2 across the five journal regressions.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

Examining the difference-in-differences results for citation, a χ^2-test comparing the Post_t coefficients (β_2) of JB and JFQA reveals that one can reject the null of no difference between the two coefficients. These results persist in tests comparing the Post_t coefficient of JB with those of JF, JFE, and RFS. All comparison tests of JB compared to the other four journals show that JB's β_2 is smaller than that of the other journals. The only other significant result is that the β_2 of JFQA is significantly different from that of JF (p-value of .0821). Note, however, that JFQA (which was arguably the more comparable journal to JB in terms of quality just prior to JB's discontinuation) has a higher Post coefficient than JF, which is in complete contrast to what we find for JB.

The qualitative interpretation of the results concerning the nonzero indicator and the H5 indicator is similar. For example, we observe an insignificant increase of 0.5% in the probability of having citations in the later period for JB's articles and a significant increase of 3.3% in the probability of having citations in the later period for JFE's articles. The χ^2 comparison tests reveal that JB's Post coefficient is significantly smaller than that of JFE and JFQA. Finally, we observe an insignificant increase of 1.6% in the probability of having five or more citations in the later period for articles that were published in JB, while articles that were published in RFS, for example, had an increase of 6.1%. As with citation, the χ^2-tests in which H5 is the dependent variable reveal that JB's Post coefficient is significantly smaller than the coefficient of any of the other journals.

IV. Robustness

In this section, we analyze the robustness of our results. First, we conduct placebo tests to determine whether similar regression results to those of table 4 could have been generated if we were to assume that JB stopped publishing articles in earlier years. Second, we analyze whether there are confounding factors related to the results that we uncover. These include the possibility that JB's articles were adversely affected due to self-citation (i.e., the tendency of authors to cite publications made in the same journal in which the paper is published because of explicit expectations of editors that are commonplace across all journals), and the possibility that the phenomenon we uncover is due to reduced readership or reduced perceived quality of JB's articles after the journal's discontinuation. We also present evidence for the robustness of the results under different comparison samples, namely, when including only articles published before JB's discontinuation became publicly known (in 2004), when comparing to lower tier journals, and when considering articles that are not finance.

A. *Placebo*

To verify that the results of table 4 are not due to a general time trend unrelated to JB's discontinuation year, we conduct placebo tests. The analysis of table 5 can be referred to as a "shutdown placebo" that considers any one of the years 2000–2006 as the year from which no publications

TABLE 5
PLACEBO TEST CONSIDERING VARIOUS YEARS AS THE SHUTDOWN YEAR

	A. PLACEBO TEST: 1999 AS THE SHUTDOWN YEAR				
	JB	JF	JFE	RFS	JFQA
Observations	760	2,912	1,976	1,400	1,080
(1) Citation:					
Lagged dependent β_1	.351***	.521***	.537***	.487***	.356***
	(8.34)	(29.61)	(26.42)	(18.76)	(11.27)
Post β_2	.067	.019	.068	.106*	.042
	(.79)	(.40)	(1.24)	(1.88)	(.75)
(2) Nonzero indicator:					
Lagged dependent β_1	.018	.078***	.073***	.129	.119***
	(.57)	(5.89)	(4.40)	(6.03)	(4.45)
Post β_2	.033	.004	.011	.030	.027
	(.62)	(.15)	(.40)	(.88)	(.60)
(3) H5 indicator:					
Lagged dependent β_1	.118***	.238***	.266***	.275	.098***
	(4.57)	(18.99)	(17.50)	(.275)	(4.43)
Post β_2	.053	.041	.052	.098**	−.012
	(1.35)	(1.39)	(1.44)	(2.34)	(−.38)

	B. POST β_2 COEFFICIENT DEPENDING ON THE PLACEBO SHUTDOWN YEAR							
	1999	2000	2001	2002	2003	2004	2005	2006
JB	.067	.089	.065	.078	.089	.098	.0592[2]	.0304[4]
JF	.019	−.020	.005	.044	.073	.109	.112	.083
JFE	.068	.107	.091	.102	.115	.148	.111	.096
RFS	.106	.062	.130	.094	.107	.109	.116	.095
JFQA	.042	.018	.057	.049	.092	.115	.153	.132

NOTE.—Panel A provides regression results in which each journal (JB, JF, JFE, RFS, JFQA) is estimated separately using the same specification as table 4, where the dependent variable is citation, nonzero indicator, or H5 indicator (defined in table 2). All articles published by the end of 1999 are included. $\text{Post}_{i,t}$ is an indicator that equals 1 if the year is in the 2000–2016 period, and zero otherwise. Specification (1) is estimated with OLS, and specifications (2) and (3) are estimated with probit, for which marginal coefficients are provided. Panel B tabulates the coefficients of the $\text{Post}_{i,t}$, where the dependent variable is citation and articles published by the end of the year of the column heading are included. The tabulated $\text{Post}_{i,t}$ indicator is an indicator that equals 1 if the year follows the year in the column heading, and zero otherwise. The JB $\text{Post}_{i,t}$ coefficients with superscripts are significantly smaller than those of other journals. These superscripts indicate the number of journals whose $\text{Post}_{i,t}$ coefficient is significantly (10% level or below) higher than that of JB. If there is no superscript, there is no significant difference between the $\text{Post}_{i,t}$ coefficient of JB and any of the other four journals. In both panels, all the independent variables are included and are as defined in table 4, and the model is run for articles aged 3 to 10 years. All specifications include an intercept; *t*-statistics (*z*-statistics) are calculated with the robust estimator of Huber and White and are provided in parentheses.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

were made. We start in considering 1999 as the shutdown year, so the year 2000 is the year from which no further JB publications are assumed to exist, so articles published after 2000 are not part of the analysis. With this setting, in table 5, panel A, the Post indicator equals 1 if the calendar year is after 1999 and zero otherwise. An analysis of the results of panel A shows that the Post coefficient is not significantly different for JB compared to the other four journals. In fact, JB's Post coefficient is not even the smallest, but rather ranked third out of the five journals (JF and JFQA have a smaller Post coefficient). In panel B, we provide the results of the analysis for all other possible shutdown years 1999–2006, where the dependent variable is citation. The panel tabulates only the Post (β_2) coefficient, where Post is an indicator that equals 1 if the year is after the year in the column heading, and zero otherwise. Coefficients with superscripts are the cases in which the β_2 of the JB regression is smaller than that of other journals. The superscript indicates the number of journals whose β_2 is significantly (10% level or below) higher than that of JB. If there is no superscript, there is no significant difference between the β_2 of JB and that of any of the other four journals. The analysis shows that the β_2 is smallest for JB in the actual shutdown of 2006, or when considering a placebo shutdown in 2005. In 2005, however, JB's β_2 is significantly smaller only compared to that of JFE and JF, while in 2006 it is significantly smaller than that of all other journals. Hence, our placebo shutdown analysis appears to converge to the actual shutdown year of 2006, and there is no evidence that the adverse effect on JB articles' citation counts is occurring prior to the true shutdown.[19]

B. Self-Citation

A reasonable concern is whether the relative reduction in citations of the articles that were published in JB is an outcome of a possible tendency of authors to self-cite articles published in the same journal because of explicit expectations of editors that are commonplace across all journals, both top and lower tier. We therefore collect data on all references that cite the articles in our main sample. This enables us to separately count the annual citation count that each article in our sample received from each of the top five finance journals. We then extract from each article's annual citation count the number of citations that come from JB articles.

[19] A different placebo test would be to test whether the results concerning the Post indicator in table 4 could be achieved if we were to define a break point in the trend of the full sample of articles published until 2006. This would not constitute a "shutdown" placebo but would allow us to see whether the trend for the pre-2007 published articles could be attributed to a different year. We conduct such an analysis in app. D and obtain results that the break in trend of the pre-2007 articles is well modeled at 2006.

Descriptive statistics for the years prior to JB's discontinuation reveal that only 6.2% of the citations received by JB articles (and 4.3% of those received by non-JB articles) come from JB articles. Given the relatively small magnitude of the difference, that is, 1.9%, our findings are unlikely to be notably affected by self-citation tendencies. Nevertheless, in appendix E, we conduct three types of PSM matching based on equations (1) and (2). In the first matching procedure, we exclude from the annual citation count the number of citations made from the same journal as the cited article; in the second procedure, we exclude from the citation count of all articles their JB citations (i.e., JB articles that cite them are not included in their citation count). Finally, as an additional analysis, we generate citation counts that exclude citations made in any of the five journals analyzed. All of these analyses show that the results concerning the break at around the time of JB's discontinuation are robust to self-citation considerations and that such considerations have a minimal effect.

C. Other Samples

1. Lower Tier Finance Journals

Our main sample enables us to compare JB articles to other articles of similar quality and scope. We compare JB to the other top four journals as they are all perceived as higher quality relative to other finance journals. Matching a JB article to a lower tier finance journal may be inappropriate, as lower tier journals tend to be topic specific and their articles' quality is often lower. Still, when comparing JB only to the top four journals, it may be possible that our results are driven by some particular trend within the group of top-tier finance journals only. We therefore repeat the PSM procedure with two additional high-quality, but just below top-tier, finance journals, that is, the *Journal of Banking and Finance* (JBF) and *Financial Management* (FM). Table 6, panel A, provides the same type of analysis as in table 3, but we match each JB article to an article from the pool of JBF and FM articles (published in the same year). The PSM is done as before, according to either equation (1) or equation (2). Panel A shows that no matter which PSM procedure we use, the JB articles have a higher influence in the pre-2006 period and a lower influence in the post-2006 period. A difference-in-differences analysis confirms the robustness of these results. Figure 4*A* provides a graphical representation of the results. According to this diagram, the JB articles' citation trajectory is above the matched articles until 2004, but after that point, it clearly experiences a structural break.[20]

[20] For illustrative purposes, in app. F we provide an extension of fig. 1, in which we include plots pertaining to the articles published in JBF and FM.

TABLE 6

Other Samples: Mean Difference in the Influence of JB Articles Compared to the Matched Articles of Different Samples

	Citation			Nonzero Indicator			H5 Indicator		
	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences
	A. Lower-Tier Journals (JB Matched to Pool of JBF and FM Articles)								
Matching based on PS according to equation (1) (i.e., not including topic fixed effects: 335 JBF, 88 FM):									
JB	.765	.981		.640	.697		.104	.211	
Matched	.582	1.064		.499	.691		.085	.251	
JB-matched	.187***	−.084***	−.271***	.142***	.005	−.136***	.019	−.040***	−.059***
	(6.99)	(−4.24)	(−7.09)	(7.78)	(.54)	(−6.58)	(1.78)	(−4.39)	(−3.50)
Matching based on PS according to equation (2) (i.e., including topic fixed effects: 299 JBF, 124 FM):									
JB	.765	.981		.640	.697		.104	.211	
Matched	.591	1.029		.512	.681		.082	.233	
JB-matched	.178***	−.048	−.227***	.129***	−.016	−.112***	.023	−.022	−.045***
	(6.70)	(−2.44)	(−6.13)	(7.06)	(−1.62)	(−5.52)	(2.11)	(−2.46)	(−2.76)

TABLE 6 (*Continued*)

	Citation			Nonzero Indicator			H5 Indicator		
	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences	1996–2006	2007–2016	Difference in Differences
	B. Pre-2004 Published Articles (189 JB Articles Matched to Pool of Top-Four Articles)								
Matching based on PS according to equation (1) (i.e., not including topic fixed effects: 65 JF, 49 JFE, 36 RFS, 39 JFQA):									
JB	.817	1.149		.665	.752		.116	.264	
Matched	.955	1.386		.711	.823		.200	.367	
JB-matched	−.138***	−.237***	−.106***	−.046	−.071***	−.025	−.084***	−.102***	−.018
	(−4.60)	(−7.75)	(−2.81)	(−2.53)	(−5.39)	(−1.23)	(−5.85)	(−6.79)	(−.90)
Matching based on PS, according to equation (2) (i.e., including topic fixed effects: 68 JF, 45 JFE, 37 RFS, 39 JFQA):									
JB	.817	1.149		.665	.752		.116	.264	
Matched	.980	1.488		.704	.860		.211	.419	
JB-matched	−.163***	−.339***	−.176***	−.039	−.108***	−.069***	−.094***	−.154***	−.059***
	(−5.32)	(−11.35)	(−4.11)	(−2.13)	(−8.52)	(−3.25)	(−6.48)	(−10.11)	(−2.72)

	C. Nonfinance Published Articles (77 JB Articles Matched to Pool of Top-Four Articles)								
Matching based on PS according to equation (1) (i.e., not including topic fixed effects, pool of top-four articles: 20 JF, 18 JFE, 6 RFS, 33 JFQA):									
JB	.755	.855		.635	.653		.105	.160	
Matched	.728	1.146		.623	.777		.118	.269	
JB-matched	.027	−.291***	−.317***	.011	−.123***	−.081***	−.014	−.109***	−.095***
	(.51)	(−6.98)	(−4.94)	(.31)	(−5.41)	(−3.44)	(−.59)	(−5.26)	(−2.99)
Matching based on PS according to equation (1) (i.e., not including topic fixed effects, pool of top-four nonfinance articles: 29 JF, 22 JFE, 8 RFS, 18 JFQA):									
JB	.755	.855		.635	.653		.105	.160	
Matched	.826	1.137		.640	.743		.153	.269	
JB-matched	−.071	−.282***	−.212***	−.006	−.090***	−.084	−.048	−.109***	−.058
	(−1.26)	(−6.20)	(−2.87)	(−.16)	(−3.85)	(−2.05)	(−1.91)	(−5.26)	(−1.69)

NOTE.—Each JB article is matched to one non-JB article published in the same year based on the closest propensity score. Panel A matches each JB article to either a JBF or FM article; panel B matches only articles published prior to 2004 (JB to the pool of other top four journals' articles); panel C matches only JB articles that have no JEL code that is under JEL's finance categories (defined in app. A). Differences of means in influence are provided for the periods of 1996–2006 and 2007–2016. Citation, nonzero indicator, and H5 indicator are as defined in table 2. The difference-of-means test *t*-statistics (for citation) and *z*-statistics (for nonzero and H5 indicators) that compare JB articles to the various groups of matched articles appear in parentheses.

*** $p < .01$.

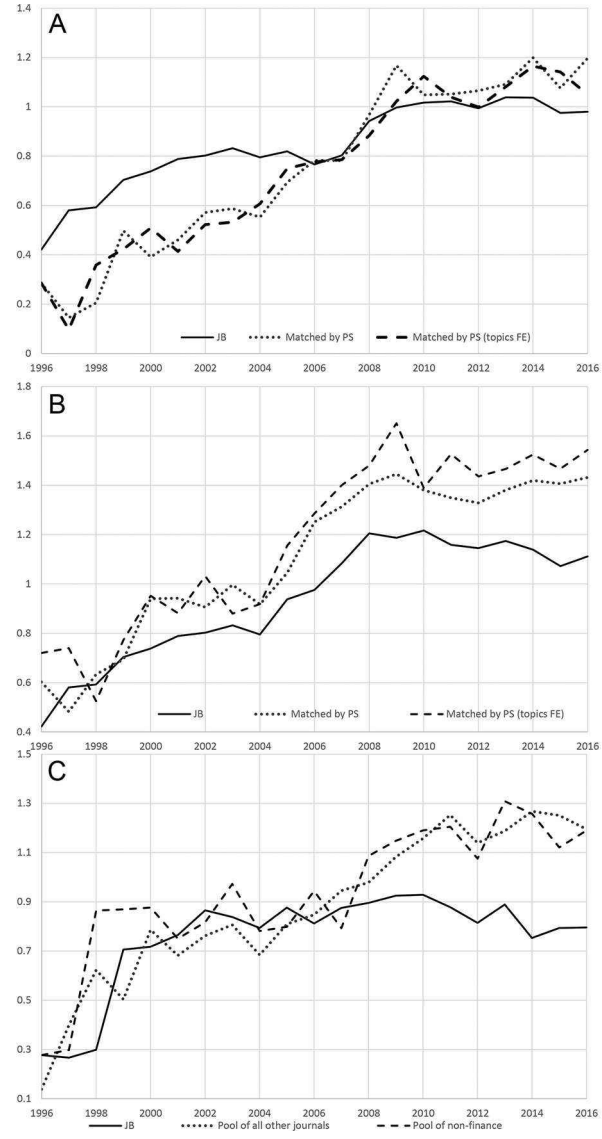

FIG. 4.—One-to-one matching of different samples of JB articles and pools of matched articles. The figure depicts the mean log of (1 + citation count) of JB articles and matched articles published in the same year. In the first diagram (*A*), JB articles are matched to JBF/FM articles. The second diagram (*B*) includes the subsample of articles published prior to 2004. The third diagram (*C*) includes only the 77 JB articles that have no JEL code that is under JEL's finance categories (defined in app. A), and the matching is done based on equation (1); "pool of all other journals" includes all top-four articles, and "pool of non-finance" includes only top-four articles that have the nonfinance major classification indicator equal to 1. PS and PS (topics FE) correspond to propensity score matching based on equations (1) and (2), respectively.

2. Pre-2004 Articles

As can be seen from table 1, the number of articles published in JB increased during the years 2004–2006, after the discontinuation was made public. We note that the increased number of publications in 2004–2006 was likely due to a queue of previously accepted articles.[21] However, a possible concern is that the structural break that we observe is driven by issues related to the larger number of JB's published articles just prior to the shutdown. We therefore repeat the PSM pooling analysis of table 3, while including only the subsample of articles published between the years 1995 and 2003. The difference-in-differences results of this analysis are provided in table 6, panel B, and the graphical representation is depicted in figure 4*B*. It is apparent from the analysis that compared to their matched pairs, these earlier cohorts of JB articles were adversely affected around the time of JB's discontinuation.

3. Evidence of Strategic Citations in Other Disciplines

JB occasionally included articles from other related business disciplines. If only finance academics are subject to the agency citation phenomenon, one may expect the structural break for JB to be concentrated only in finance-related articles. While JB's articles are not classified into different fields in the WOS, it is not difficult to identify the nonfinance articles based on JEL's classification code (see app. A). Namely, if an article has no JEL code that is under JEL's finance categories, we classify it as a nonfinance article. This classification scheme results in 77 JB articles that are nonfinance, which constitute 16% of our JB sample. To match these articles to comparable articles, we created two pools of top-four articles. The first pool includes all top four journals' articles, while the second pool includes only the top four journals' articles that have at least one JEL code that is a nonfinance classification. In this analysis, for each of the pools of articles, we use only the PSM of equation (1) because the topic indicators of the JB sample are relatively unpopulated with non-JB articles. The results of these matching procedures are presented in table 6, panel C, and figure 4*C*. Despite the small number of articles in this comparison, the results clearly show an adverse effect on JB's articles compared to their matched counterparts.[22] Thus, we conclude that the agency citation phenomenon is not limited to finance articles but is more broadly inclusive of articles in business economics.

[21] The time from submission of an article to a top (A) journal until its acceptance is, on average, 2 years (Ellison 2002), and the time from acceptance to publication is, on average, 1 year (Holden 2017). Hence, one would expect more articles to be published during the years 2004–2006 to eliminate the queue from acceptance to publication.

[22] We also run PSM analyses excluding these 77 articles and find that the results are qualitatively similar to those reported previously.

D. *Readership*

Changes in readership levels can potentially affect JB's citation count after its discontinuation. If access to JB's articles decreased after its discontinuation, it could potentially lead to their reduced citation counts. It should be noted, however, that in fact JB's accessibility has increased upon discontinuation, as the journal became freely available on the web. Namely, scholars were able to access the journal from any network (i.e., without IP restrictions), and scholars from schools that previously did not subscribe to JB were now able to read JB for free. This is expected to increase impact rather than reduce it; consistent with this idea, there is evidence that open-access articles have significantly higher citations than non-open-access journals (e.g., Eysenbach 2006; Gargouri et al. 2010).

Despite its open-access status, it is possible to perceive a situation in which JB's readership decreased after its discontinuation, which in turn may have led to a reduction in the citation count for JB's published articles. To test the viability of this possibility, we conduct an empirical analysis that controls for readership levels. Though we do not have historical data on past readership, the WOS provides a variable that measures the download activity in the previous 5 years. This variable, which we name *readership*, was retrieved at the end of 2018, which allows us to quantify the level to which any article in our sample was downloaded during the 2014–2018 period, proxying for the level to which it was accessed. We estimate a regression specification that includes the same controls as before, but which is purely cross-sectional, as readership is available only at the end of 2018. The dependent variable is the total citation count during the 5 year period of 2014–2018, and the independent variable of interest is readership. In all journals, the coefficient is expected to be positive because an increased readership should lead to more citations. Furthermore, if the reason for the reduced citations of JB's articles is reduced readership, we expect JB's readership coefficient to be similar to that of the other four journals. Such a result would imply that the citation count for JB is similarly affected by readership as the other journals (in recent years), and thus, if JB experienced reduced readership, it could have accounted for the reduced citations. On the other hand, the prediction of the agency citation hypothesis is a lower readership coefficient for JB than for the other journals, as that would imply that for a given level of readership, JB received fewer citations than the other journals in recent years.[23] This could be regarded as a "smaller bang for the buck" hypothesis, where the "bang" is citations and the "buck" is readership.[24] Table 7 provides this analysis.

[23] Because we do not have readership data prior to 2014, we are not able to conduct a difference-in-differences analysis. The conjecture of the current analysis is that prior to 2006, the mapping from readership to citations is similar across the five journals.

[24] Several papers study the relationship between download activity and citations to develop predictive models of citations based on usage (e.g., Brody, Harnad, and Carr 2006; Li, Thelwall, and Giustini 2011).

TABLE 7
ARTICLES' READERSHIP

	JB	JF	JFE	RFS	JFQA
Readership	.651***	1.281***	1.030***	1.087***	1.054***
	(9.38)	(29.95)	(21.02)	(13.38)	(10.32)
Two-year citation count	.181***	.030***	.044***	.080***	.179***
	(11.18)	(7.01)	(7.73)	(7.62)	(8.81)
Age	.051***	.036***	.045***	.038***	.043***
	(3.88)	(4.17)	(4.82)	(2.71)	(2.83)
Observations	423	971	723	449	364
Adjusted R^2	.535	.707	.654	.535	.521

NOTE.—The table provides regression results, where the dependent variable is the log of (1 + citation count) that an article received during the period of 2014–2018. Readership is the log of (1 + download activity) on the WOS during the period of 2014–2018. Age is the article's age as of 2018. All regressions include the 11 author and article characteristics and the 48 topic indicators (defined in app. A).

*** $p < .01$.

We find that JB's readership coefficient is smaller than that of any of the other journals. When comparing the coefficient of readership for JB to any of the other top four journals, this result is significant at the 1% level, which is broadly consistent with the agency citation hypothesis.

E. Possible Reduction in the Perceived Quality of JB's Articles

The next possibility that we study is whether JB's discontinuation affected the perceived quality of its articles, which in turn affected its citation count. Though the strategic value of citing JB articles has reduced after its discontinuation because JB is not a viable option for pursuing professional goals, we want to verify that the reputation of the journal as a top-level scientific outlet has been sustained also after the discontinuation event. To assess whether a change in perceived quality occurred, we refer to two types of studies, that is, surveys conducted on perceived quality of finance journals (Oltheten, Theoharakis, and Travlos 2005; Wu, Hao, and Yao 2009), and studies that analyze the number of references that constitute the reading material of PhD syllabi (Corrado and Ferris 1997; Johnson et al. 2013).

Ideally, to analyze possible changes in perceived quality of articles from different journals, surveys conducted before as well as surveys conducted after the discontinuation are preferable. Survey studies of this type are not common, but fortunately, two surveys of this type are available, one conducted in the year 2001, and the other in 2008. The two syllabi studies of finance articles that we found cover either the syllabi from the years 1993–1995 or those from the years 2001–2005. These syllabi studies further help assess the consistency in JB articles' perceived quality in the sample period.

TABLE 8
PERCEIVED QUALITY OF JB'S ARTICLES BASED ON SURVEYS AND PHD SYLLABI

	SURVEY STUDIES		SYLLABI STUDIES	
	Oltheten, Theoharakis, and Travlos (2005)	Wu, Hao, and Yao (2009)	Corrado and Ferris (1997)	Johnson et al. (2013)
Sample	862 finance faculty	460 deans	33 finance doctoral programs	66 accredited business schools
Date of survey	November 2001	March/April 2008	Syllabi 1993–1995	Syllabi 2001–2005
Parameter	Percentage top 10	Deans' ranking	Syllabi percentage	Syllabi percentage
Journal:				
JF	99.5 (1)	97.1 (1)	38.1 (1)	39.2 (1)
RFS	96.6 (2)	78.2 (5)	5.8 (4)	8.8 (3)
JFE	96.5 (3)	93.2 (2)	29.5 (2)	28.4 (2)
JPE	93.0 (4)	NA	4.3 (6)	5.3 (4)
AER	91.2 (5)	NA	4.0 (7)	4.7 (5)
ECO	88.4 (6)	NA	4.9 (5)	3.7 (7)
JB	76.5 (7)	82.7 (3)	4.9 (5)	4.0 (6)
JFQA	74.6 (8)	81.7 (4)	8.4 (3)	3.1 (8)
QJE	74.6 (9)	NA	.1 (8)	2.8 (9)
JBF	44.2 (10)	75.3 (6)	NA	NA
FM	39.3 (11)	72.1 (7)	NA	NA

NOTE.—The table provides the perceived quality measures extracted from surveys found in the literature. "Percentage top 10" is the percentage of finance academics surveyed that consider the respective quality of the journal's articles to be in the level of the top 10 journals for finance academics; "deans' ranking" is measured by averaging the deans' assessment of the tier level of the journal, where 1 is the top-tier assessment and 4 is the lowest tier. The final ranking of journal i equals $100\{[\sum_{j=1}^{4} R_{ij}(5 - j)]/4n\}$, where $j \in (1, 2, 3, 4)$, $n = 460$ (number of respondents), and R_{ij} is the number of respondents that ranked journal i as tier j. "Syllabi percentage" is the percentage of articles in PhD syllabi published in the journal (out of the list of top five finance and top four economics journals). The ranking of the journal is in parentheses. The journal abbreviations (apart from the top five finance journals) are as follows: JPE, *Journal of Political Economy*; AER, *American Economic Review*; ECO, *Econometrica*; QJE, *Quarterly Journal of Economics*; JBF, *Journal of Banking and Finance*; FM, *Financial Management*.

Of course, different survey studies would typically have different coverage and scope. The two survey studies vary with respect to the groups of individuals surveyed (finance faculty in the 2001 survey and deans in the 2008 survey), the metric for ranking perceived quality, and the list of journals covered. In table 8, we present the relevant information for comparing the top-tier academic journals.[25] We provide information regarding

[25] The correlation between the different perceived quality measures in these surveys is high. We provide the constructs that are relevant as measures for "perceived quality" of articles. For example, readership is not highly related to perceived quality because infrequent reading by finance academics of journals, such as *Econometrica* or the *Journal of Political Economy*, does not tell us much about the perceived quality of their articles, and similarly, articles in practitioner type journals are read by many, but their perceived quality is not high. On the other hand, a ranking that is based on finance academics' perception of whether the journal is among the top 10 journals for finance faculty to publish in, or a ranking that is based on a journal's familiarity to a dean for tenure decisions, is suitable to capture the perceived quality of articles published in the journal.

11 journals: the seven finance journals (top five, JBF, and FM), and the top four economics journals (the top five economics journals, but excluding the *Review of Economic Studies*, which does not appear in the list of the journals in any of the four studies summarized in table 8).

From the information found in the table, one can see that throughout the 2001–2008 period, the perceived quality of the journals is rather consistent. Certainly, there is nothing to suggest that JB articles should suddenly be less cited. In 2001, the percentage of finance academics that ranked JB among the top 10 finance journals is 76.5%; JFQA is 74.6%. JF, JFE, and RFS have significantly higher perceived quality levels, with more than 96% of the academics ranking them among the top 10 finance journals. FM and JBF, on the other hand, have considerably lower perceived quality levels, with only approximately 40%–44% of the academics ranking them among the top 10. Similarly, in 2008, though the ordering among the top five finance journals has somewhat changed (JB is ranked 3), the differences (apart from the surprising lower RFS perceived quality among deans) seem small.

Regarding the PhD syllabi percentages, the ranking of JB is rather consistent as well; it is ranked 5 in the earlier period and 6 in the later period. JF and JFE are the most populated in the syllabi in both periods, while JFQA has deteriorated from third place to eighth place. There is also a marginal increase in the visibility of economics journals in the syllabi (in particular, *Journal of Political Economy*, *American Economic Review*, and *Quarterly Journal of Economics*). Our overall take from these studies is that around the time of the discontinuation, JB articles' perceived quality was rather similar to that of JFQA and RFS articles, considerably higher than that of JBF and FM articles, and considerably lower than that of JF and JFE articles.[26]

V. Mechanisms

The primary hypothesis we were interested in testing was whether JB's discontinuation has a direct effect on JB's already published articles' citation trajectory. In this section, we seek to shed light on particular possible mechanisms through which reduced citations are materialized. In particular, we conjecture that the lower quality articles of JB are those that are more adversely affected in the post-discontinuation period, and furthermore, we provide evidence for the way some JB articles are neglected in the post-JB-discontinuation years.

[26] Appendix G provides additional evidence for a consistent perceived quality. If the perceived quality of JB articles is indeed reduced due to discontinuation, the articles published just prior to discontinuation should be the ones most affected (rather than older papers, which were published well before the discontinuation). Appendix G shows that both types of papers are similarly affected by the discontinuation.

A. *Which Articles Are Most Affected by Agency Citations?*

We seek to learn whether the reduced citations in the post-2006 period of JB articles compared to articles of the other four journals are more often driven by the lower quality articles. A common claim is that the median annual citation number is very low and many articles receive zero citations in a given year (e.g., Laband and Tollison 2003; Stern 2013). While low-quality articles are less likely to be cited for scientific reasons (than high-quality articles), citing a low-quality article that is published in a top-tier outlet still has a strategic advantage (regardless of its scientific merits). Because the "certification quality" of a journal carries over to all its articles, irrespective of the article's actual merit, strategic incentive is stronger when the referee is relatively uninformed compared to the author with respect to the exact content of the cited reference and, thus, its relevance to statements made in the paper. Intuitively, less information asymmetry is expected in the more cited papers (more exposure, and probably more merit), and therefore we expect that agency-based citations comprise a small component of total citations in highly cited articles. Thus, ceteris paribus, compared to highly cited articles, the scantily cited articles of top-tier outlets are expected to have a larger component of their citations driven by strategic, professional goals, motives rather than merit. This means that if agency (rather than merit alone) is an important element in citation of top-tier articles, the relative reduction in citations that we observe for JB in the post-discontinuation period should be most noticeable at the lower tail of the citation distribution.

To test the hypothesis that the lower quality articles have a larger component of agency citation we engage in an ex post analysis, where we first classify articles based on total citations, and then analyze the post-2006 coefficient (β_2), conditional on citation quintiles. We separately classify articles of each journal into quantiles, based on the articles' total citation counts.[27] Figure 5 provides information on the β_2 coefficient derived from the 25 quintile-journal regressions of equation (3). The figure reveals that the β_2 coefficient of JB is lower than that of the other four journals in all quintiles. The average β_2 of the other four journals (i.e., excluding JB) is approximately 0.3 in quintiles 2, 3, and 4; and 0.15 in quintiles 1 and 5. This implies that the increased citations in the post-2006 period are somewhat lower in the least and most cited articles (quintiles 1 and 5). A rank ordering, comparing β_2 in the various JB quantiles to the respective quantiles in the other journals, reveals that JB articles in quintile 2 are

[27] To establish journal quantiles, articles having the same publication year and journal outlet are grouped together. Each group is partitioned to five quintiles based on the total number of citations received during the first 10 years since publication. A quantile of a journal is the aggregation of that journal's respective quantile in each of the publication years.

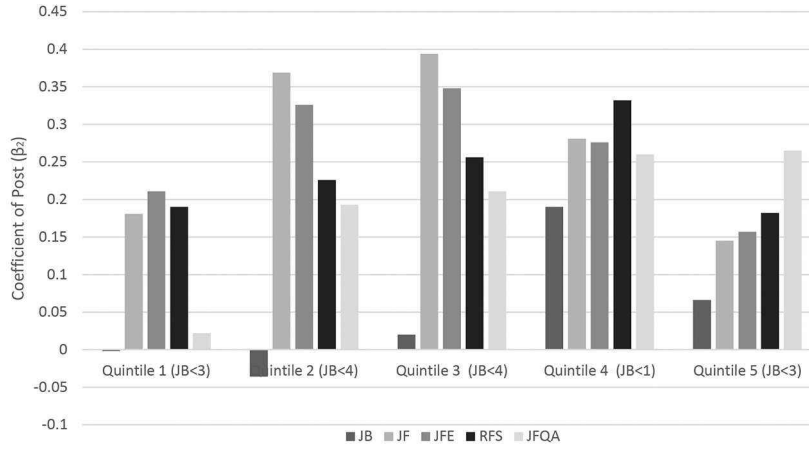

FIG. 5.—Citation quintiles and the change in citation count in the post-2006 period. The figure plots the coefficient of β_2 of equation (3), where the dependent variable is the log of (1 + citation count), and the specification of the regression is as described in table 4. The classification of articles according to quintiles is done independently for each journal publication year and is based on the total number of citations received during the initial 10 years since publication. Quintiles 1 and 5 include the articles with the lowest and highest citation counts, respectively. The notation JB < X in parentheses is the number (X) of journals that have a significantly higher β_2 coefficient compared to that of JB, within the respective quintile.

the most affected. In quintile 2, JB's β_2 is negative, while the average of the other journals is approximately 0.3. Second ranked would be quantiles 1 and 3. Fourth ranked are JB articles of quintile 5, and finally, JB articles of quintile 4 are the least affected. Hence, the adverse effects of the discontinuation are not monotonically decreasing by quantile, but the results show that overall, lower quality articles of JB are more influenced by the discontinuation.

B. The Neglect Mechanism

We next analyze facilitating conditions in which strategic authors neglect to cite a somewhat relevant JB article after JB's discontinuation. We envision the following: Suppose that there are two references that are somewhat relevant for making a point in a paper; one is a JF article and the other is a JB article. We expect that after JB's discontinuation, some authors may neglect citing the JB article, as JB's advantage for advancing personal goals is reduced. Furthermore, realizing that referees' appreciation of JB citations is reduced, researchers may use the discontinuation as a (subconscious) excuse for not citing the JB article if it is not fully aligned with all the points made in the paper at hand. Not citing the JB article because of authors' strategic considerations is more probable if a related article

can be cited to deliver a point. We thus define a neglect mechanism as that in which an author does not cite a JB article when a closely related article to the JB article is cited.

To study the materialization of this mechanism, we analyze a sample of 70 articles, from which we generate pairs that include a JB article and a non-JB article that are often cited together. Namely, from our main sample of 2,930 articles, we chose the first and last article from each issue published in a calendar year that cites at least one JB article. This was done for each of the five top-tier journals in each of the years 2000–2006. The choice of years comes from the desire to focus on pairs that were cited together close to the discontinuation year. Next, we manually analyze each of these 70 articles and extract all JB articles that are cited in these articles for a possible matched pair. We require the following two criteria to identify pairs of JB articles and non-JB articles:

1. The non-JB article must be cited in the same paragraph as the JB article, and the difference between the published year of the JB article and the matched article is no more than 10 years. In many cases, this actually means that the two articles were cited in the same sentence or even referenced together to make the exact same point.
2. The pair of articles should be of a similar topic and have an important similar nontrivial contribution that ties them together.

If a JB article is cited alone or is cited with many other references that seem to be associated with a well-studied or established fact that provides for a rather weak link, we drop the JB cited paper from the sample. Finally, once a pair is identified, we further ensure that the pair is cited together at least one more time by a top-tier finance journal during the period of 1995–2006. The result of this procedure yielded 96 pairs.[28]

In the empirical analysis, we follow three trends of citation counts related to a pair: (1) number of papers citing both the JB article and the matched article, (2) the number of papers that cite the JB article alone (without the matched article), and (3) the number of papers that cite the other article alone. Notably, the matched articles may have been published in different years. To mitigate concerns that the variation in the articles' age drives any of the results, we include only observations in which both articles (of the pair) had been published less than 20 years prior to the publication year of the referencing article. We further control with an article age variable (and its squared term), using the following specification:

$$\mathrm{Inf}_{i,t} = \beta_0 + \beta_1 \mathrm{Inf}_{i,t-1} + \beta_2 \mathrm{Post}_t + \beta_3 \mathrm{Age}_{i,t} + \beta_4 \mathrm{Age}_{i,t}^2 + \varepsilon_{i,t}, \quad (4)$$

[28] In app. H, we provide two examples of identified pairs.

where the influence variable ($Inf_{i,t}$) is either citation or nonzero indicator of article i in year t; $Post_t$ equals 1 if the year falls after 2006, and zero otherwise. $Age_{i,t}$ is the number of years elapsed since the publication of the article. When we follow the number of articles that cite both the JB article and its matched pair, both the age (and the squared term) of the JB article and the matched article are included as controls.

Table 9, panel A, provides the results of an analysis that includes all 96 pairs, while panel B includes only the matched pairs in which the JB article is matched to an article that was published in one of the top four finance journals (70 pairs). We conjecture that after JB's discontinuation, cases in which a JB article and its matched article are cited together are reduced

TABLE 9
Neglecting to Cite JB Articles

	Citation			Nonzero Indicator		
	Citing Both	JB	Other Article	Citing Both	JB	Other Article
	A. All Pairs (96 Pairs)					
Lagged dependent	.372***	.430***	.718***	.217***	.196***	.385***
	(6.04)	(8.19)	(12.61)	(5.59)	(4.73)	(10.86)
Post	−.095**	.035	.098**	−.158***	.024	.079**
	(−2.42)	(.81)	(2.54)	(−3.98)	(.56)	(2.04)
Observations	926	926	926	926	926	926
Adjusted R^2 (pseudo-R^2)	.151	.196	.513	.065	.039	.154
	B. Only the Pairs in Which the Other Article Is Published in Either JF, JFE, RFS, or JFQA (70 Pairs)					
Lagged dependent	.375***	.420***	.702***	.216***	.164***	.366***
	(5.76)	(7.15)	(11.02)	(5.04)	(3.55)	(9.43)
Post	−.114**	.031	.099**	−.178***	.018	.080**
	(−2.52)	(.69)	(2.19)	(−3.98)	(.39)	(1.86)
Observations	757	757	757	757	757	757
Adjusted R^2 (pseudo-R^2)	.162	.187	.492	.074	.033	.138

Note.—The table analyzes pairs that include a JB article and a non-JB article that are often cited together. The table provides regression results of three specifications, where the different citations are partitioned to three trends: (1) articles that cite both JB and the matched article, (2) articles that cite the JB article but do not cite the matched article, and (3) articles that cite the matched article but do not cite the JB article. The following panel regression is estimated: $Inf_{i,t} = \beta_0 + \beta_1 Inf_{i,t-1} + \beta_2 Post_t + \beta_3 Age_{i,t} + \beta_4 Age^2_{i,t} + \varepsilon_{i,t}$, where the influence variable ($Inf_{i,t}$) is either citation or nonzero indicator (defined in table 2) of article i at year t; $Post_t$ is equal to 1 if the year falls after 2006, and zero otherwise. $Age_{i,t}$ is the number of years elapsed since the publication of the article. In specification (1), both the age (and age squared) of the JB article and the matched article are included as controls. Standard errors are clustered at the article level, and margin coefficients are provided for the nonzero indicator specification.

** $p < .05$.

*** $p < .01$.

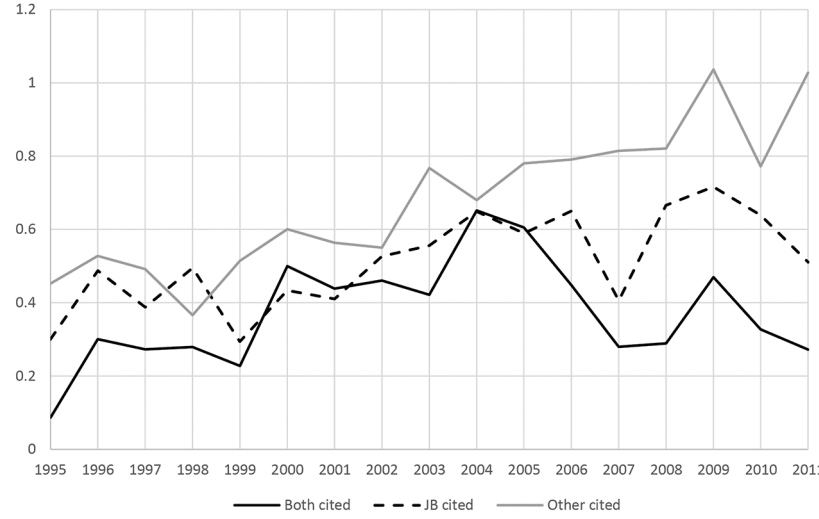

FIG. 6.—Neglecting to cite JB. The figure depicts the mean log of (1 + citation count) of pairs of articles that tend to appear together, and that consist of a JB article and a top four finance journal article. The citations are partitioned into three categories based on whether the JB article is cited alone, the other matched article is cited alone, or both are referenced in the citing article.

significantly. This drop should be more pronounced compared to cases in which a JB article is cited alone (representing the rate of occurrences where the other article cannot make the same point). Furthermore, at least in theory, due to the neglect mechanism, the citations (alone) of the other article should increase by the drop of citations in which the pair is cited together. This is because cases that were supposed to reference both a JB article and its match would now only cite the matched article. The autoregressive regression results of table 9 provide evidence of the neglect mechanism viability. The coefficient of Post_t is positive for the trajectory of citations of non-JB articles, not significant for the JB-alone trajectory, and negative for the cases in which both articles are cited together. Figure 6 is also consistent with the neglect mechanism viability, as it shows at around 2005–2007 a large drop in the number of cases in which the paired articles are cited together, and a relative increase in the occurrences of the "other cited" compared to the "JB cited" trajectory.

VI. Authors' Death and Tendency to Cite

The tendency to cite top-tier articles due to strategic consideration is not the only possible manifestation of strategic citing. There are other nonscientific considerations that may lead authors to cite strategically. One possibility that we explore in appendix B is the tendency to cite editors

and associate editors, in the hope that these decision makers would be more approving of papers that cite their work. Another possibility that we explore in this section, in two different scenarios, is the reduced tendency to cite articles after the death of one of their authors.

A. *Death of an Author and Citations of Top-Tier versus Non-Top-Tier Articles*

An authors' death may facilitate reduced citation of his/her articles since the author cannot serve as a referee, and furthermore cannot help in the future career endeavors of the author. We note, however, that since articles published in top-tier outlets are expected to be strategically cited by other articles, reduced citing due to an author's death may be more apparent in his/her articles published in non-top-tier outlets. To some extent, there may actually be a halo effect of citing a top-tier article of a recently deceased author (similar to the strategic motives of a radio station to play the song of a deceased famous singer to attract listeners or the reprint of a book of a famous deceased author to attract potential buyers). Thus, our hypothesis is that there is a reduced citation count of non-top-tier articles following the death of their author compared to the citation count of deceased authors' top-tier articles.

Our sample of deceased authors comes from IDEAS, and those authors' articles are extracted from the WOS from the list of papers that are classified under the business and economics category of the WOS. We considered an article an A-article (top-tier article) if it was published in one of the top five finance or economics journals.[29] An article's trajectory is followed during the period starting 20 years prior to the author's death and ending 5 years after the respective death. Table 10, panel A, provides the results of the following specification estimation:

$$\text{Inf}_{i,t} = \beta_0 + \beta_1 \text{Inf}_{i,t-1} + \beta_2 \text{Post}_{i,t} + \beta_3 \text{Age}_{i,t} + \beta_4 \text{Age}_{i,t}^2 + \varepsilon_{i,t}, \quad (5)$$

where the influence variable ($\text{Inf}_{i,t}$) is the citation of article i in year t; $\text{Post}_{i,t}$ is equal to 1 if the year falls after the death year of an author of the article, and zero otherwise; $\text{Age}_{i,t}$ is the number of years elapsed since the publication of the article. The analysis includes only authors whose death is no later than 2013, so we have the full 5 year trajectory of citations following the death of an author. Furthermore, because citations change over time depending on articles' age, we include age (and its squared term) in the autoregressive specification. Differently from the other analyses of the paper, which concern articles from the well-defined

[29] We consider top-tier articles to be those published in any of the top five finance and top five economics journals because the authors in this analysis are economists, but not necessarily financial economists.

TABLE 10
STRATEGIC CITATIONS AND AUTHORS' DEATH

	A. Economist Death Events			
	All Articles	Non-A-Articles	A-Articles	Difference
All authors:				
Post (death)	−.0013	−.031	.034*	.065**
t-statistics	(−.09)	(−1.52)	(1.89)	(2.35)
Number of articles	727	399	328	
Authors that have both tier-level articles:				
Post (death)	−.001	−.039*	.032*	.071**
t-statistics	(−.07)	(−1.79)	(1.66)	(2.44)
Number of articles	528	244	284	
Authors who died at less than 60 years of age:				
Post (death)	−.098	−.138	.453	.591
t-statistics	(−1.00)	(−1.40)	(1.17)	(1.54)
Number of articles	30	28	2	
Sole-authored papers:				
Post (death)	−.003	−.035*	.025	.061**
t-statistics	(−.26)	(−1.85)	(1.48)	(2.37)
Number of articles	566	270	296	
	B. Nobel Laureates			
	All Articles	Deceased Laureate	Living Co-Laureate	Difference
Award:				
Post (Nobel award)	.057***			
t-statistics	(4.86)			
Number of articles	2058			
Death:				
Post (laureate's death)	.021	−.044	.071	.115**
t-statistics	(.81)	(−1.10)	(2.15)	(2.24)
Number of articles	441	192	249	

NOTE.—Panel A analyzes the effect of authors' death on their top-tier and second-tier citation count. Panel B provides an analysis of citations of articles authored by Nobel laureates before and after the year the Nobel Prize was received, as well as before and after the year of the Nobel laureate author's death compared to the living co-laureates (of the same year Nobel Prize). In both panels A and B, for each article the following regression is estimated: $\text{Inf}_{i,t} = \beta_0 + \beta_1 \text{Inf}_{i,t-1} + \beta_2 \text{Post}_{i,t} + \beta_3 \text{Age}_{i,t} + \beta_4 \text{Age}_{i,t}^2 + \varepsilon_{i,t}$, where the influence variable ($\text{Inf}_{i,t}$) is citation (defined in table 2) of article i at year t; $\text{Post}_{i,t}$ is equal to 1 if the year falls after the event (granting of Nobel Prize or death of the author), and zero otherwise. $\text{Age}_{i,t}$ is the number of years elapsed since the publication of the article, and regressions are run for $t - 20 \leq t \leq t + 5$, where t is the event year. A-articles are published in either the top five economics or top five finance journals.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

group of journals over the same time frame, the outlets of the articles considered in this analysis are rather diverse in terms of quality, topics covered, and year of publication. Therefore, we run article level regressions; that is, the regression of each article i is run separately.

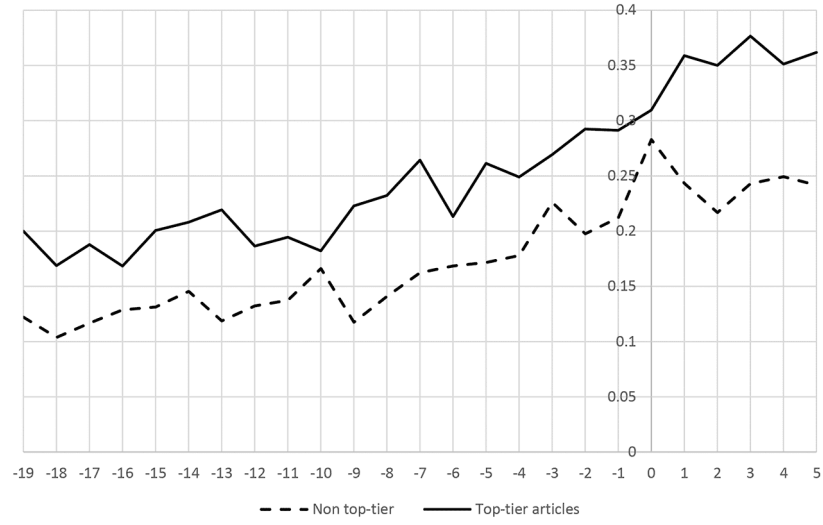

FIG. 7.—Citations before and after the death of an author. The figure depicts the mean log of (1 + citation count) of top-tier and non-top-tier articles around the death of the author. The author's death year is year zero.

The results of table 10, panel A, show that there is a wedge between A-articles (top-tier articles) and non-A-articles. Namely, non-A-articles tend to be adversely affected after the death of the author, while A-articles tend to be relatively unaffected, or even gain citations after the death of the author. The table provides difference-in-differences *t*-tests that compare the Post coefficients. The panel provides evidence that A-articles are either not affected or positively affected after the death of the author, while non-A-articles are negatively affected by the death of the author. To further analyze aspects of strategic citations, we investigate other possibilities related to deceased authors' citations, for example, that the effect of reduced citations of non-top-tier articles should be noticeable in the sample of sole-authored papers, and find supporting evidence. Finally, for illustrative purposes, figure 7 depicts the mean citation count of top-tier and non-top-tier articles around the year of their authors' death. There is a noticeable wedge between the two series after the death of the authors.

B. Nobel Laureates: Awarding of the Prize and the Death of a Laureate

We explore two additional special events that may affect strategic citations: We analyze whether there is evidence for increased citation of Nobel laureates' articles following their receipt of a prize, and additionally,

we analyze whether strategic consideration may lead to a drop in citations of laureates' articles following their death.

We begin with strategic citations following the granting of the Nobel Prize. Arguably, the granting of the prize has little information value for authors in the field, but leads to strategic citations motives. Specifically, laureates are well known for their merit within the field prior to their receiving the prize. However, upon receipt of the Nobel Prize, their global influence dramatically increases, which may lead to authors' strategic considerations. Accordingly, we speculate that published papers of Nobel laureates are cited more after their authors are granted the award. The top part of table 10, panel B, provides evidence that the annual count for authored articles significantly increases during the 5 years after the Nobel was awarded compared to previous years.

However, it is possible that the granting of a Nobel attracts more researchers to the field, which may (partially) drive the results. A less debatable exogenous shock would be the passing away of a Nobel laureate. We match deceased Nobel laureates with their living co-laureates (the laureates who received the prize in the same year in which the deceased laureate received it). Because it is common to grant the Nobel Prize to authors that make a major contribution in a particular area, the matching is ideal. Differently than in the analysis of panel A, with such a matching, the difference in increased publicity due to the death (i.e., the halo effect) should be relatively small as both the deceased and the matched living scholars are already the most influential people in the field. Consistent with the strategic motives for citation, we find that the deceased authors' articles are adversely affected compared to the articles of their matched living laureates.

VII. Agency Citations and Research Quality

In this section, we analyze possible costs stemming from agency citations. While we cannot assess the trajectory that research would have taken had there not been a citation bias, we can estimate the level to which inefficient space allocation for potentially more-contributing articles in top-tier journals leads to a deadweight loss. We realize that agency citations could imply that research practices are of poorer quality because they are indicative of authors' inadequate citing practices. Therefore, a legitimate question is whether articles that are authored while using adverse citation practices are associated with only minor scientific contributions, even if published in top-tier journals.

To address this question, we needed to supplement our main sample with a new sample of articles. Namely, we collected articles published in the top four journals (JF, JFE, RFS, JFQA) in the post-2006 years, whereas the main sample includes only articles published prior to JB's discontinuation

(prior to 2007). We then partitioned these post-2006 published articles into the following two groups: those that are expected to cite JB articles but do not, and the rest of the articles. We conjecture that there are more articles driven by agency citation among those that are expected to cite JB articles, but do not, compared to all other articles. We pose the following question: Do articles that do not cite JB in the post-2006 years, conditional on their being expected to cite JB, have a predictive negligible value to the field? Common knowledge is that many articles receive almost no citations (e.g., Laband and Tollison 2003; Stern 2013). This can happen even though they are given the "prime real estate" of being published in a top finance journal. Thus, we analyze whether evidence of agency citing practices is predictive of having negligible influence. We do not argue for causality, as the experiment does not allow us to identify the reason for the lower influence; rather, the objective of this experiment is more modest, that is, to test whether articles that are subject to agency citations are also more often a deadweight loss to the publication process, making a negligible contribution to the field. The analysis consists of three parts that enable the identification of articles that are expected to cite JB articles but do not. First, we utilize our primary sample of pre-2007 published articles to analyze (within the sample) the characteristics that are associated with the propensity of an article to cite a JB article. These characteristics include the 11 author and article characteristics (app. A), as well as three additional variables that seem to be of particular importance when considering the likelihood that an article would cite a JB article. "Network" equals 1 if at least one of the authors published a JB article, or collaborated with an author who published a JB article, in the previous 3 years. "Major pool fraction" is the fraction of JB articles previously published (post-1994 articles) that fit the major classification of the article. "Secondary pool fraction" is the fraction of JB articles previously published that fit at least one classification indicator according to the secondary classification (app. A).[30] In appendix I, we include the results of this in-sample analysis of pre-2007 articles. It provides difference-of-means tests between articles that cite JB and those that do not. Second, it provides three models for analyzing how these various characteristics are useful (in-sample) for estimating whether an article cites a JB article or not.

Next, we use the in-sample analysis results to generate three different prediction models for whether an article j from the post-2006 sample of published articles should cite at least one JB article. Namely, the coefficients of the probit regression from the pre-2007 analysis are used in the

[30] This means that if a paper, e.g., is classified under two secondary classification indicators (e.g., topic 16 and topic 48), we calculate the fraction of JB articles (out of all JB articles published during the period from 1995 until $t - 1$) classified under either topic 16 or 48. It also means that a JB paper classified both under topic 16 and under topic 48 is double-counted because it is more fitting to be cited by this particular paper.

out-of-sample analysis to predict the probability that article j cites a JB article. If the predicted probability to cite a JB article is above .5 (i.e., based on coefficients estimated in the applied model, i.e., models 1, 2, or 3 of app. I), we consider article j as an article that is expected to cite a JB article.

Finally, utilizing this citation expectation analysis, we estimate the following regression model:

$$\text{Inf}_{i,t} = \beta_0 + \beta_1 \text{Inf}_{i,t-1} + \beta_2 \text{JB}_i + \beta_3 \text{CJB}_i + \varepsilon_{i,t}, \quad (6)$$

where $\text{Inf}_{i,t}$ is an indicator that equals 1 when the number of citations of the article in the given year is greater than zero, and zero otherwise. JB_i is an indicator that equals 1 if the article cites at least one JB article, and zero otherwise. CJB_i is an indicator that equals 1 if the article is expected to cite a JB article but does not cite one, and zero otherwise. We hypothesize that CJB is negatively correlated with an article's influence.[31]

The results of table 11, panel A, show that CJB is negatively correlated in 10 out of the 12 specifications. Note that citing JB (unconditionally) as reflected in the JB indicator is not always indicative of good practices; for example, it is usually indicative of high quality for RFS articles but indicative of low quality for JF articles. In panel B of the table, we further explore the difference between JB citers and nonciters, conditional on their being expected to cite a JB article (based on the predicted probability to cite being above .5). We provide difference-of-means tests across the 11 characteristics as well as the network variable. We find that the more authors a paper has, the higher the tendency to neglect citing JB. This may be due to an increased facilitation of agency behavior. With more authors, no author is truly responsible for verifying proper citing of references. There is a gradual increase in bad citing practices between one author, two authors, and more than two authors in this regard. Sole authors tend not to cite JB when they should only 30% of the time; when there are two authors, this occurrence happens 42.5% of the time; and this grows to 57.7% of the time when there are more than two authors.

VIII. Discussion: Additional Implications of the Results

In this section, we discuss implications driven by the parallels that exist between academic research and firm innovation. First, citations of patents

[31] Similar results are obtained if we use citation instead of the nonzero indicator. The tabulated specification captures the marginal effect of not citing when the conditional probability to cite is above .5 after controlling for possible benefits/costs of citing JB (captured by the JB indicator). In an alternative specification we include the predictive probability (of the parsimonious model 3 in app. I), an indicator for the article if it cites JB, an interaction term of the two, jointly with the other characteristics that are not in the parsimonious model. The interpretation of the results is qualitatively similar.

TABLE 11
TENDENCY TO CITE JB AND ARTICLE QUALITY

A. REGRESSION RESULTS

	JF	JFE	RFS	JFQA
Model 1 (of app. I) used for defining CJB:				
Nonzero indicator lagged	.106***	.153***	.183***	.249***
	(11.71)	(18.27)	(20.72)	(15.83)
JB indicator	−.019**	.019	.032***	.005
	(−2.27)	(.23)	(3.44)	(.32)
CJB indicator	−.027***	−.033***	−.023**	−.055***
	(−3.18)	(−3.76)	(−2.28)	(−2.88)
Observations	3,174	4,850	4,334	2,211
Pseudo-R^2	.123	.111	.141	.085
Model 2 (of app. I) used for defining CJB:				
Nonzero indicator lagged	.106***	.153***	.183***	.251***
	(11.73)	(18.18)	(20.74)	(15.98)
JB indicator	−.019**	.0005	.033***	.008
	(−2.26)	(.06)	(3.53)	(.46)
CJB indicator	−.026***	−.036***	−.022**	−.043**
	(−3.05)	(−4.15)	(−2.19)	(−2.27)
Observations	3,174	4,850	4,334	2,211
Pseudo-R^2	.123	.112	.141	.084
Model 3 (of app. I) used for defining CJB:				
Nonzero indicator lagged	.109***	.156***	.184***	.252***
	(11.92)	(18.48)	(20.82)	(16.09)
JB indicator	−.015*	.005	.035***	.010
	(−1.89)	(.57)	(3.72)	(.57)
CJB indicator	−.082	−.012	−.017*	−.046**
	(−.96)	(−1.31)	(−1.72)	(−2.22)
Observations	3,174	4,850	4,334	2,211
Pseudo-R^2	.117	.107	.140	.084

B. PERCENTAGE OF ARTICLES THAT DO NOT CITE JB WHEN THE PREDICTED PROBABILITY TO CITE IS ABOVE .5 (According to Model 1 of app. I)

Indicator = 1 Definition Group	0	1	Difference of Means
Author characteristics:			
Associate editor	.422	.434	.012
Editor	.424	.435	.011
Percentage US authors more than median	.438	.411	−.027
Top-20 authors	.412	.437	.024
Top-20 authors all	.421	.443	.022
Top-publication author	.461	.420	−.041
Article characteristics:			
Lead article	.417	.484	.074
Number of authors 2 (vs. 1 only)	.300	.425	.125**
Number of authors more than 2 (vs. 2 only)	.425	.577	.153***

TABLE 11 (*Continued*)

	B. Percentage of Articles That Do Not Cite JB When the Predicted Probability to Cite Is Above .5 (According to Model 1 of app. I)		
Number of pages more than median	.438	.410	−.029
Number of references (excluding JB) more than median	.502	.39	−.103***
Number of characters in title more than median	.460	.39	−.070**
Network	.421	.441	.021

Note.—Panels A and B provide analysis results for the quality of the top four journals' articles published between 2007 and 2016, conditional on their citing/not citing a JB article. Panel A provides regression results for each of the top four journals (JF, JFE, RFS, JFQA). Each journal is estimated separately using the following AR(1) probit model: $\text{Inf}_{i,t} = \beta_0 + \beta_1 \text{Inf}_{i,t-1} + \beta_2 \text{JB}_i + \beta_3 \text{CJB}_i + \varepsilon_{i,t}$, where $\text{Inf}_{i,t}$ is the nonzero indicator (defined in table 2). JB_i is an indicator that equals 1 if the article cites at least one JB article, and zero otherwise. CJB_i is an indicator that equals 1 if the article is expected to cite a JB article (i.e., the predicted probability based on the coefficients estimated in models 1, 2, or 3 of app. I is above .5) but does not cite one, and zero otherwise. Panel B provides difference-of-means tests for the percentage of articles that do not cite vs. those that do cite a JB article, conditional on a predicted propensity to cite (based on model 1 of app. I) of above .5. "Network" equals 1 if at least one of the authors published a JB article or collaborated with an author who published a JB article in the previous 3 years. Probit estimations (panel A) provide marginal coefficients and include an intercept.

* $p < .10$.
** $p < .05$.
*** $p < .01$.

may also be subject to strategic citations (of different sorts), which requires caution in inferences made in innovation studies. Second, we suggest that if authors of academic studies were to include more information on references cited (as done in patent applications), it could potentially benefit academic research and help reduce adverse citing practices.

The finance literature has recently seen a growth in studies devoted to innovation (Lerner and Seru 2017). Most researchers use two types of proxies to measure the innovation output of a company: the number of patents it is granted (e.g., in a given year) and the number of citations its granted patents receive following their approval.[32] The disadvantage of the former proxy is that not all patents are of similar quality, so the latter is widely considered the better proxy for the scientific contribution of

[32] Kogan et al. (2017) provide evidence that a measure of market reaction to patents is able to better explain economic growth stemming from the patent than citation counts (e.g., Abrams, Akcigit, and Popadak 2013; Moser, Ohmstedt, and Rhode 2018). One possibility for this is that strategic citations distort the citation count measure from reflecting a patent's scientific value.

the firm.[33] In the literature, patent citation counts are most often considered an (exogenous) outcome determined by the innovation of the firm or its CEO. However, citation counts of patents may be affected by strategic considerations of the firms citing them.

Consider, for example, the relation between the decision to go public and the firm's future innovation (Bernstein 2015; Acharya and Xu 2017). Once a firm becomes public, it is more visible, has more resources, and is likely to be serviced by more competent attorneys. It is possible that these facts may lead its competitors to cite the public firm's patents more often (compared to its pre-IPO period), because after its IPO, the company is more likely to be capable of suing others for violating its intellectual property rights. Hence, if the researcher observes a higher level of citation counts in the post-IPO period, it may be due to not only a higher level of innovation in the post-IPO period but also to a change in the citing behavior of its competitors. Similarly, citing practices may change after a merger not only because of synergies (Bena and Li 2014) but also because former rivals become cooperators, which may alter the strategic citing behavior. There is also evidence that patents of firms with overconfident CEOs obtain more citations (Hirshleifer, Low, and Teoh 2012). It would be interesting to learn the extent to which the citations differ due to these CEOs' preference to engage in risky innovations and the extent to which competing firms change their citing behavior because they are more wary of overconfident CEOs' aggressiveness, which may lead to prosecution in courts.

The strategic citing behavior that we uncover seems to be facilitated by the difficulty associated with monitoring it, as more trivial, easy-to-monitor, agency-related citations, as in the case of citing editors' papers, do not seem to be pervasive in the data (see the analysis in app. B). As such, adverse citing practices of top-tier publications can benefit by borrowing from the higher level of resolution in information that currently exists in patent applications. References of patents are classified as either provided by the inventor (firm) or by the examiner of the patent. If one wants to follow the knowledge trail of the innovation process, only the inventors' citations matter, because the examiners' citations are added only ex post,

[33] Note that in academic research, the number of publications (analogous to the number of patents) is often perceived as a poor measure of an author's contribution, and measures such as h-10 (Google Scholar) ignore publications with no citations. This raises the question of whether the benefits of having two measures for robustness, as commonly done in the innovation literature, outweigh the costs of a noisy measure that can yield different results. In fact, one could use the differences between the two measures for a better identification of the strategic aspects of the innovation process. For example, it is known that firms may issue a patent not to open a new field (which tends to lead to future citations) but rather as a boundary of scope to prevent others from pursuing inventions in a certain area. The difference between the two measures could potentially proxy for such a tendency.

after the patent was actually filed (Alcacer and Gittelman 2006). In academic research, the situation is similar in that cited references are not equally important for a given study. Some of the cited papers are building blocks for arguments, some yield similar conclusions, and some provide opposing interpretations. Most importantly, some papers overturn a previous result because of a possible mistake or an overlooked fact stated in that previously published paper. Similarly to patent citation categorization, it could be helpful if academic authors were required to classify their references in terms of the way they were used in their research. A recent paper by Catalini, Lacetera, and Oettl (2015) suggests that even a simple characterization of references in terms of whether they are cited based on their contributions or flaws can increase the field's understanding of the merits of research articles. It is possible that if authors were to indicate their perception of their references' categories, the relevance of the cited work would become clearer and, consequently, the academic research process would improve. A reference categorization process should reduce the tendency of authors to engage in agency citations, and monitoring of the classification may become one of the important tasks of referees. Related to this, it may be worthwhile to provide some descriptive information about the references, such as the fraction of top-tier articles in the list (a high fraction may be indicative of adverse citing practices) and the number of cases in which a reference is a sole contributor to a particular point (possible evidence of negligence of others). Finally, based on our findings of increased agency citations as the number of authors increase, it may be beneficial to require the identification of the author who is responsible for the integrity of the reference list so that it relates to the appropriate previous work. For example, it may be stated that the corresponding author is the responsible entity for this issue.

IX. Concluding Remarks

This paper has shown that there is a systematic bias in referencing previous scientific work. Authors tend to be fixated on referencing top-tier journals, and the high impact of articles published in those journals is partially due to strategic practices. These findings have important implications for the progress of research.

The process by which journals accept articles is commonly known to have errors. For example, the following quotation is attributed to the well-known macroeconomist Gregory Mankiw: "The editorial process is highly imperfect. The bad news is that some of your best articles may end up getting rejected from the top journals. The good news is that you may get lucky, and some of your so-so articles may end up published in top journals simply because they hit the editor's desk when he is in a good mood."

While this variation in acceptance may balance out for an author, the evidence presented in this research shows that the scientific implications are different. Academic scholars not only strive to publish in the top journals but also are fixated on referring to articles that appear in those journals, often neglecting an article's true relevance. The results of the current paper show that, in essence, the exact same article with the exact same accreditation by reviewers is considered significantly more valuable when the outlet is in the "most-desired journals to publish in" list compared to the period in which that is no longer the case. Evidently, the important process of unbiased and neutral referencing of relevant work is lacking.

Novels would probably not lose popularity if their publication company ceased to exist; the social impact of Mark Twain's *The Adventures of Tom Sawyer* was not reduced when the American Publishing Company was closed. However, in academia, the situation is different and has a potentially significant effect on the progress of research. This state of affairs should alarm editors and researchers who have a sincere desire to advance scientific progress. This research shows that the high impact of top journals is, to a significant degree, due to authors' fixation on journals and not necessarily due to the articles' quality. To paraphrase the quote above, "The bad news is that some of the best articles will not make an impact, but the good news is that some of the so-so articles may end up making an impact."

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