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Academic honors and performance

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HIGHLIGHTS

- We examine how prestigious academic awards affect winners' performance.
- The synthetic control method is used as an identification strategy.
- We find statistically significant performance differences in the post-award period.
- Winners are more productive and their previous publications draw more citations.
- Explanations for the results and the study's limitations are discussed.

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ABSTRACT

Despite the social importance of awards, they have been largely disregarded by academic research in economics. This paper investigates whether receiving prestigious academic awards—the John Bates Clark Medal and the Fellowship of the Econometric Society—is associated with higher subsequent research productivity and status compared to a synthetic control group of non-recipient scholars with similar previous research performance. Our results suggest statistically significant positive publication and citation differences after award receipt.

1. Introduction

The use of awards as both incentives and rewards is universal. Government systems, from monarchies to republics, democracies to dictatorships, bestow awards to honor outstanding people. Besides well-known orders (such as the Victoria Cross or the Most Noble Order of the Garter), there are many other honors, decorations and medals (House of Commons, 2004; Phillips, 2004). Beyond politics, awards also assume a central role in the arts, culture, sports, and the media (Levy, 1987; Holden, 1993; Ginsburgh and van Ours, 2003). Even in the corporate sector, where the only valid currency is supposedly money, great importance is attached to titles, such as "Manager of the Year" (Wade et al., 2006; Malmendier and Tate, 2009), and many companies use formal recognition programs to honor their most valued employees (see, e.g., Magnus, 1981; Nelson, 2005).

Academies and scientific institutions equally rely on a differentiated and extensive system of awards, with titles such as honorary doctor or senator. Most renowned are the Nobel Prizes (see Mazloumian et al., 2011) and the Fields Medal in mathematics (see Borjas and Doran, 2013). Many prestigious fellowships exist in scientific societies, such as the British Academy, the Australian Academy of Science, or the

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Econometric Society (Hamermesh and Schmidt, 2003). Scientific institutions also frequently recognize Best Paper Awards for papers presented at conferences.

The John Bates Clark Medal is a prestigious award that is given to a scholar in the United States under the age of 40 “who is judged to have made the most significant contribution to economic thought and knowledge.” The American Economic Association (AEA) awarded the medal biennially from 1947 to 2009, and annually from 2010 onwards. Many of its recipients go on to become Nobel Laureates. Of the 35 scholars who have been honored with the medal, 12 have subsequently won the Nobel Prize (as of March 2014). In contrast to the Nobel Prize, which is given to researchers of advanced age, the John Bates Clark Medalists are of similar age and are expected to have a long future academic life, allowing us to study the possible effects of the award across an extended period of time.

As a second example of a prestigious award, the election to Econometric Society Fellowship is investigated. Econometric Society Fellows have been shown to be more successful in publications than other researchers (Hamermesh and Schmidt, 2003: 402). The choice of who becomes a Fellow is based on a vote among currently active members of the Econometric Society. In contrast, a small jury of prominent economists chooses the winners of the John Bates Clark Medal.

The social importance of prestigious awards notwithstanding, academic research (outside the field of history or the sociology or economics of science) has largely disregarded them; partly, perhaps, because their infungibility raises doubts about their motivational efficacy compared to such superior incentives as monetary compensation (Baker et al., 1988; Holmström and Milgrom, 1994). Likewise, the fact that they cannot be consumed might make them of little interest to recipients, which would imply that they do not actually lead to superior performance. Another possible reason for the neglect of awards is that they could be valued merely for the increased future earnings they induce. For example, in the entertainment industry, Oscar recipients profit from large increases in their subsequent incomes (Nelson et al., 2001). However, there is research suggesting that the value of awards goes over and above the monetary benefits. Just as “money buys little well-being” (Oswald, 1997: 1828), it is not the sole incentive motivating people. As has been shown, individuals value status and are willing to give up financial gain to obtain it (Huberman et al., 2004). Hence, awards could be valued in their function as producers of status.

The paper explores the implications of receiving an important award (the John Bates Clark Medal or Econometric Society Fellowship) for economics scholars' subsequent publications and citations. It compares award recipients (the treatment group) to a control group of non-recipient scholars with similar previous research performance. The study analyzes whether winning the award raises research activity and benefits the recipient via increased professional status. We therefore measure publications *after* the bestowal of the award, and citations to papers that had been published *before* the conferral. By constructing a synthetic control group of economists, we are able to distinguish whether the bestowal of the Clark Medal or the election as an Econometric Society Fellow simply reflects the past activity of particularly gifted economists, or whether the awards actually also raise productivity thereafter.

We find that receiving the John Bates Clark Medal is related to increased future productivity (measured by publications) as well as higher status (reflected in citations). Five years after award receipt, the number of weighted publications has risen by 13% compared to the counterfactual scenario of no award receipt; the number of citations to papers published before award conferral has increased by 50% compared to the counterfactual. After ten years, the increases amount to over 15% and 78%, respectively. In the case of Econometric Society Fellowship, we also observe long-lasting post-election increases in Fellows' productivity and citation counts, above and beyond what would have been their performance levels had they not become Econometric Society Fellows. The analysis reveals that five years after the award, Fellows have produced 15% more publications than the control group. The citations to previously published articles are raised by 37% compared to the counterfactual of no award receipt. Ten years after the election, the difference amounts to 19% and 58%, respectively. Both studies indicate statistically significant positive publication and citation differences between award recipients and non-recipients.

The results suggest that receiving a prestigious academic honor may induce winners to work harder. Besides the potential motivation-enhancing effect, awards raise the likelihood of getting grants, teaching releases, and better students and co-authors, and can thereby increase productivity. Awards also heighten the visibility of their recipients' work, including their previous publications. This result is in line with Mazloumian et al. (2011), who find that groundbreaking discoveries of famous scientists (e.g., Nobel Laureates) attract attention to their work and boost citation rates also to their previous publications. Our paper can be interpreted in terms of a motivational effect of awards, but also in terms of the “Matthew” effect—the phenomenon that success breeds success—referenced in Merton's observation of an “accruing of greater increments of recognition for particular scientific contributions to scientists of considerable repute” (Merton, 1973: 445–446).

An important possible concern about our identification strategy is that the award-giving committee may have information at its disposal that we cannot observe and integrate into the matching procedure. While we do control for scholars' work in the pipeline, the committee might be better able to assess candidates' future performance potential. We explicitly address this possible criticism. Firstly, the jury's supposedly superior insights about a candidate's future performance can only apply to expected future publications. The argument does not hold for *citations to papers published before receiving the award*. Secondly, we provide results on two prestigious awards based on vastly different selection mechanisms. While Clark Medalists are chosen by a small jury where careful deliberations may inform the selection, Econometric Society Fellowship is awarded based on a general election among active Fellows, currently numbering 470. It is quite unlikely that such a large number of scholars voting from geographically dispersed locations will consistently base their evaluation of the candidates on measures other than the most observable ones, which we use in the matching procedure (in particular, past publications and citations).

The remainder of the paper is organized as follows: Section 2 discusses the existing literature on awards. Section 3 outlines the empirical research strategy. Focusing first on the case of the John Bates Clark Medal, Section 4 describes the data and the construction of the synthetic control group of non-recipient economists. Section 5 then reports the econometric estimates on the implications of receiving the Clark Medal. Section 6 provides further evidence supporting the performance-enhancing implications of prestigious academic awards by replicating the study for Econometric Society Fellowships. Section 7 presents various robustness checks. Section 8 discusses limitations of this study and the last section presents our concluding remarks.

2. Literature on honors

The existing literature on awards is extensive (see Frey, 2005). However, most of it takes a *descriptive* approach to particular honors, for instance the British Order of the Garter (Begent and Chesshyre, 1999) or the Order of Merit (Martin, 2007). Phillips (2004) and the Report of the House of Commons (2004) provide ample discussion and some data on orders in the United Kingdom. Specific aspects of awards in the arts and culture are analyzed in Ginsburgh (2003, 2005) and Simonton (2004), dealing for instance with the Academy Awards (“Oscars”) in film, the Booker Prize in literature, and the Eurovision

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Song Contest. Glejser and Heyndels (2001) and Ginsburgh and van Ours (2003) study the Queen Elisabeth Music Contest, one of the most important international competitions in classical music. Whereas most studies on awards in the cultural sector find positive effects, such as increased box office sales, a study on prestigious book awards by Kovács and Sharkey (2014) surprisingly finds a negative impact of the awards on the evaluation of prize-winning books compared to non-winning finalists.

In the field of science, Coupé (2013) analyzes best paper prizes given by economics and finance journals. Hamermesh and Schmidt (2003) study the determinants of Econometric Society Fellowship elections. Assessments of the more general phenomenon of awards can be found in sociology (e.g., Bourdieu, 1979; Elster, 1983; Walzer, 1983; Braudy, 1986).

With the exception of the path-breaking contribution by Hansen and Weisbrod (1972) and the few studies referenced above, economists have largely neglected awards as a research topic. Among the few who have since followed suit are Besley (2005), Gavrila et al. (2005), Frey (2006, 2007), Malmendier and Tate (2009), Kosfeld and Neckermann (2011), Neckermann et al. (2014), and Frey and Gallus (2014). Some economists have studied related issues—examples are Akerlof (1976) on reputation; Brennan and Pettit (2004) on esteem; Frank (1985), Frank and Cook (1995), and Scitovsky (1976) on positional goods; Nalebuff and Stiglitz (2001) on incentives; and Auriol and Renault (2008) on social status.

3. Empirical strategy

The central aims of this paper are to assess the implications of receiving a prestigious academic honor like the Clark Medal or Econometric Society Fellowship for scholars' future productivity and citation success. The flow of citations serves as a metric for status effects (Azoulay et al., 2013). The John Bates Clark Medal, specifically, provides early recognition and status that can enhance self-confidence and thus post-award publication performance. Merton for example refers to Thomas Henry Huxley's apparent doubts about his own capacities: “the only use of honours is as an antidote to such fits of the ‘blue devils’ […] there are times when grave doubts overshadow my mind, and then such testimony as this restores my self-confidence” (Merton, 1973: 437).

More recent studies use experimental approaches to study awards as incentive mechanisms in order to handle causality issues. Kosfeld and Neckermann (2011), for example, gauge the effect of symbolic awards on performance by studying the work performance of students hired by an international non-governmental organization for a data-entry job. Introducing a non-monetary award to be given to the best performing students on average increases the work performance of the treatment group by 12% compared to that of the control group where no such award is announced. By using students, a relatively homogeneous group of subjects, the authors are able to show that symbolic awards provide an incentive to exert more work effort. In a similar vein, Neckermann et al. (2014) use work performance rating data on 155 credit card service call center agents to assess the effect of a non-performance based award on winners' ex-post performance. They find that the award produces a short-term performance enhancement on the part of its winners.

In our study, identifying causal effects is difficult since we are dealing with a quasi-natural experiment where John Bates Clark Medalists (and later Econometric Society Fellows) have been assigned into the treatment group on the grounds of their previous academic performance. That is, award recipients are a highly selected group of scholars judged to be high-performers. The non-random assignment of the treatment group raises the issue of treatment/control group comparability. To build a comparison group of non-recipient researchers with similar profiles (i.e., similar publication and citation performance and comparable time-invariant academic characteristics), we employ the data-driven statistical method developed by Abadie and Gardeazabal (2003).[1] The authors used the method to construct a synthetic control region that would allow estimating the economic costs of the terrorist conflict in Spain's Basque Country. In their model, the counterfactuality is a weighted combination of other Spanish regions whose relevant economic variables are closest to those of the Basque Country before the onset of terrorist activity. Since then, other studies have used the synthetic control method to assess the effects of policy interventions or economic shocks. Abadie et al. (2010), for example, analyze the effect of a tobacco control program on tobacco consumption in California by using other states to create a “synthetic California.” Campos and Kinoshita (2010) and Sanso-Navarro (2011) adopt the same technique to investigate, respectively, what would have been the level of foreign direct investment inflows into Russia and Argentina had they implemented structural reform, and into the United Kingdom had it adopted the euro. Cavallo et al. (2013) apply the method in a cross-country study to estimate the average causal effect of natural disasters on economic growth, while others employ the method for example to assess the impact of terrorist attacks on democratic election outcomes in Spain (Montalvo, 2011), the economic costs of organized crime in Southern Italy (Pinotti, 2012), or the economic benefits of a counter-insurgency strategy in the Indian state of Andhra Pradesh (Singhal and Nilakantan, 2012). Further studies use the synthetic control method to investigate the effects of macro-policy interventions on economic growth (e.g., Nannicini and Billmeier, 2011; Liou and Musgrave, 2012; Abadie et al., 2014).

We exploit the synthetic control method to construct a suitable comparison group for the award recipients (i.e., Clark Medalists, and later Econometric Society Fellows) so as to assess the implications of the respective award for its recipients' research productivity and status. The aim is to build a counterfactual group based on weighted combinations of non-recipient economists who share similar time-invariant academic characteristics and a similar ex-ante research output (i.e., before the winners receive the award). To this end, we first derive the individual academic lifecycle performance for all researchers across both publications and citations. We then use the synthetic control method to choose a group of researchers such that their weighted combination is as close as possible to the ex-ante performance of award recipients. We first focus on the John Bates Clark Medalists (JBCM). In Section 6 we report results of our estimations on the Fellows of the Econometric Society (ES Fellows).

4. Synthetic group: data and construction

4.1. Publication and citation data

We use the publication and citation lifecycle profiles of researchers to create a dataset of elite economists and choose the most similar control group possible for the JBCM. Publication content data of the top 23 economics and finance journals listed on the *Web of Science* are used as a basis (see Tables A1 and A2 in the Appendix). The selection of journals is informed by the journal rankings given in Liebowitz and Palmer (1984), Kalaitzidakis et al. (2003, 2011), Palacios-Huerta and Volij (2004), Kodrzycki and Yu (2006), Ritzberger (2008), and Koczy and Strobel (2010). Each journal selected appears at least once in the top 10 positions of any ranking (see Table A3 in the Appendix). The average ranking value of all the journals' reported rankings serves as a quality adjustment index (see Table A4 in the Appendix).

To capture all publications by both the JBCM and the potential control group, we record the publication and yearly citation information

[1] The productivity of Clark Medalists is also investigated in a recent working paper by Bricongne (2014). The author uses a control group of economists who have won other prizes than the Clark Medal (the Nobel Prize, the Frisch Medal and the IZA award) to perform difference-in-differences estimations with individual and time fixed effects.

on articles available in the selected journals up until December 2011.[2] The resulting dataset consists of 26,523 unique researchers and 59,690 journal articles, of which 1321 are published by the 34 JBCM (as of May 2012). Correctly identifying all publications for a unique researcher, however, is challenging,[3] so we also conducted a search on the scholars' academic backgrounds. One important criterion for constructing a suitable comparison group for JBCM is to control for the quality of the education received. Therefore, the rankings of economics departments cited in Coupé (2003) are used to identify economists who received their doctoral degrees at institutions similar to, or the same as, those of the JBCM. These data are obtained from various sources: *ProQuest Dissertations & Theses* (PQDT), researchers' curricula vitae, university records, and Google searches. When limiting the analysis by using the PhD ranking information, the number of researchers is reduced to 10,093. On the one hand, imposing this limitation effectively excludes most researchers who are based outside the US and who might have a similar publication profile as the JBCM. On the other hand, introducing the PhD ranking criterion increases the comparability between the treatment and control groups. Hence, we follow the rule that we always impose the PhD ranking criterion unless there is no substantial improvement in the fitting on pre-treatment variables.

4.2. Academic performance proxies

The proxies for researchers' productivity (i.e., number and quality of publications) and for the quality of their work (i.e., citations) are widely employed as tools for evaluating academic performance (e.g., Cole and Cole, 1973; Hansen et al., 1978; Hamermesh et al., 1982; Sutter and Kocher, 2001; Johnston et al., 2013). Nevertheless, using citations as a proxy for quality is not without problems (for recent discussions, see Coupé et al., 2010; Torgler and Piatti, 2013). For example, fields with a larger research population attract more citations (Cole and Cole, 1971; Arrow et al., 2011), and citations can be driven by fashion (van Dalen and Klamer, 2005). Nevertheless, there is evidence that citations are highly correlated with the assessed quality of papers (Lindsey, 1980), and with peer ratings of eminence or perceived scientific significance (Albert, 1975). As already mentioned, they also serve as a valuable metric for evaluating the effects of status (Azoulay et al., 2013).

We evaluate researcher productivity based on the number of publications (quality adjusted) and professional recognition and status based on citations per publication, controlling for the quality of the publication (obtained by dividing the cumulative citations by the cumulative number of pre-award publications). To control for co-author influence, we divide both the publication and citation counts by the number of authors for each article (for a discussion, see Lindsey, 1980; Long and McGinnis, 1982; Hollis, 2001).

The list of the 34 JBCM (as of May 2012) is obtained from the AEA's website. All of their publications are identified in the dataset. On average, based on the list of top journals, a JBCM has published a total of 17.7 articles the year before announcement of the award. The average length of time from the medalists' first publishing year (hereafter called debut year) to the year of award receipt (award year) is 12.53 years. The average length of time from the year they received their PhD (PhD year) to the award year is 11.24 years (except for Kenneth E. Boulding, who did not earn a doctorate). Three JBCM received their doctoral degrees from universities outside the US, two from the UK (Oxford University and London School of Economics), and one from the University of Amsterdam. The average age at which a scholar receives the Clark Medal is 37.6. In our analysis, we focus on the first 27 JBCM (i.e., up to 2001) in order to have a sufficient timespan for assessing post-award performance. The list of the medalists is presented in Table A5 in the Appendix.

4.3. Construction of the synthetic control group

The ideal method for assessing the effect of a prestigious academic award on its recipients' performance is to compare the winners' output after award receipt to the counterfactual scenario had they not won the award. We therefore create a group of synthetic counterfactuals using a weighted combination of researchers that best resemble the academic lifecycle of the corresponding medalist before receiving the award. First, the potential "donor" pool for the synthetic group is limited to researchers with an academic background similar to that of the respective JBCM. For each JBCM, only those researchers whose debuts are no more than five years apart from the medalist's debut are considered. For example, according to the database used, Gary S. Becker published his first article, "A Note on Multi-Country Trade," in 1952. Hence, in constructing his synthetic counterfactual, researchers who published their first article in one of the selected journals before 1947 or after 1957 are excluded. This exclusion criterion accounts for potential cohort effects. Second, a limitation based on the quality of the institution at which the PhD was earned is imposed, excluding researchers who received their doctoral degrees from institutions that are more than five ranking positions away (above or below) from that of the JBCM in terms of the ranking developed by Coupé (2003).[4] Lastly, we define two sets of potential donor pools for each medalist. In the first pool, we also include researchers who later become John Bates Clark Medalists, thereby avoiding a selection based on individual characteristics from ex-post information. Yet, if awards lead to an increase in productivity and status, the inclusion of researchers who later become Clark Medalists could result in lower-bound estimates. We therefore develop a second donor pool that excludes all JBCM. This approach may, however, produce an upward bias since we compare the medalists' performance with that of researchers never awarded the medal.

If J_i is the number of non-award winning potential donors of the synthetic group for JBCM $i \in 1, \ldots, 27$, then a $J_i \times 1$ weight vector $\boldsymbol{W_i} = (w_1, \ldots, w_{J_i})'$ defines the contribution of each researcher in constructing the synthetic non-medalist. To ensure no extrapolation, all weights are non-negative and sum to one; that is, $w_j \geq 0$ and $w_1 + \ldots + w_{J_i} = 1$. We obtain $\boldsymbol{W_i^*}$, such that

$$\boldsymbol{W_i^*} = \underset{w}{\operatorname{argmin}} \left(\boldsymbol{X_{\mathrm{JBC},i}} - \boldsymbol{X_{\mathrm{SC},i}}\, \boldsymbol{W_i}\right)' \left(\boldsymbol{X_{\mathrm{JBC},i}} - \boldsymbol{X_{\mathrm{SC},i}}\, \boldsymbol{W_i}\right),$$

where $\boldsymbol{X_{\mathrm{JBC},i}}$ is a $T \times 1$ vector of medalist i's pre-award values of academic performance predictors (i.e., pre-award publication and citation measures), $\boldsymbol{X_{\mathrm{SC},i}}$ is a $T \times J_i$ matrix of the same measures for the J corresponding potential donors, and T is the length of the matching period. The two vectors $\boldsymbol{X_{\mathrm{JBC},i}}$ and $\boldsymbol{X_{\mathrm{SC},i}}$ are matched based on the same phase in their academic lifecycle, such that T refers to the performance of JBCM ten years before the year of award conferral. To account for the possibility that the award committee may have information on forthcoming articles, we include the publication performance of the two years after the award conferral in the matching process.

[2] These data were obtained between February and May 2012, and exclude publication and citation records after December 2011. The publication information dataset includes title, volume, issue, beginning and ending page numbers, the list of authors, their corresponding author position, and the type of publication. We do not exclude self-citations, but we do exclude book reviews and conference and proceedings papers, as well as post-publication activities such as comments, replies, and corrections. The proportion of self-citations in relation to all citations for all the pre-award publications is quite small (0.47% for JBCM vs. 1.26% for the synthetic control group). Medoff (2006) studied 418 articles from eight top economics journals and found a small effect of self-citations that appear in prestigious high-impact economics journals on a subsequent article's total citation count.

[3] This difficulty depends on the commonness of the researcher's name and the consistency of his or her publication name across journals over time. We unify a researcher's publication names by the similarity of the author's first and middle names (e.g., same initials, allowing for spelling mistakes) in entries that share the same surname. To avoid false unification, we carefully separate two distinct researchers if they share the same surname but are linked to two distinct publication distributions more than ten years apart. We also verify manually whether the two groups of articles were written by two researchers under the same name or whether the researcher shortened his or her first name (e.g., Ben and Benjamin, Dave and David).

[4] For Kenneth E. Boulding, we impose no limitations on his educational background.

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Our method differs from that used by Abadie and Gardeazabal (2003) in that they include predictors other than the outcome variables and impose a data-driven matrix $\boldsymbol{V}$ in the minimization equation that assigns weights to each predictor such that the outcome variable has the closest match. In our matching procedure, in contrast, we focus solely on the outcome variables in the pre-treatment period and use specific variables to pre-select researchers into the donor pool; namely, the debut year in the top journals, the year the PhD was obtained, and the quality of the PhD institution.

5. Econometric estimates and discussion

We present the findings in a set of graphs that compare the average performance of the medalists, $\overline{Y}_{\text{JBC}} = \sum_{i=1}^{I} \frac{Y_{\text{JBC},i}}{I}$, with that of the synthetic control group, $\overline{Y}_{\text{SC}} = \sum_{i=1}^{I} \frac{Y_{\text{SC},i}}{I}$, where $Y_{\text{SC},i} = \sum w_{ij} Y_{ij}$ for $j = 1, \ldots, J$ for each medalist $i \in 1, \ldots, 27$. The timeline is adjusted so that year 0 is the award year (indicated with a vertical line) for all medalists. First we show the performance from 15 years before, and 14 years after, the award year. Starting the window of analysis 15 years before the award bestowal means that we consider subjects' research output from the date when they were around 25 years old. The choice of post-award years is driven by the fact that 12 JBCM have also been awarded the Nobel Prize; most notably, Kenneth J. Arrow, who won the Nobel Prize 15 years after being awarded the Clark Medal. In those cases where we extend the post-award period (citation analysis), observations are not excluded from the analysis if the JBCM won the Nobel Prize during the time frame of observation.

5.1. Cumulative publication counts

Fig. 1 compares the average cumulative publication trajectory for JBCM versus the two synthetic control groups.[5] The dashed line (Synthetic Control Group 1) represents the synthetic control group from the donor pool that includes researchers who later become JBCM, while the dotted line (Synthetic Control Group 2) shows the performance of the control group that excludes any JBCM. Both approaches produce a similar gap between the synthetic group and the JBCM. For simplicity, we report the values of the former control group (Synthetic Control Group 1), where the inclusion of JBCM in the donor pool may lead to lower-bound estimates of the performance differential. It should be noted that, in the present analysis, the synthetic control method uses 4.74 researchers on average (SD = 2.35) to construct the control group for a medalist. Table B1 in the Appendix lists the names and the corresponding weights for each researcher. In Figs. B1 and B2 (Appendix) we show the publication and citation performance of every Clark Medalist together with the corresponding synthetic control group. Fig. B1 reports that there is a substantial pre-award publication gap between Franklin Fisher and his corresponding synthetic control group. At the time of the award, Fisher already had 5.49 more weighted publications than his synthetic counterpart. Similarly, although to a lesser extent, for Martin Feldstein and Paul Samuelson there are also substantial pre-award differences when compared with the control group. Thus, it seems that no appropriate control group could be found for these three people. We therefore leave them out of the analysis of publication performance.

[5] The control groups are chosen in such a way that the pre-award cumulative number of publications and the debut year are closest to the respective medalist's statistics. We impose no limitation on PhD rankings because relaxing it produces more closely matched pre-award publication counts between the treatment and control groups. For more recent Clark medalists—for example, 2001 winner Matthew Rabin—we observe only ten years of post-award performance (2001–2011), and only compare the medalist's performance with that of the corresponding control group if both have the same number of observable years.

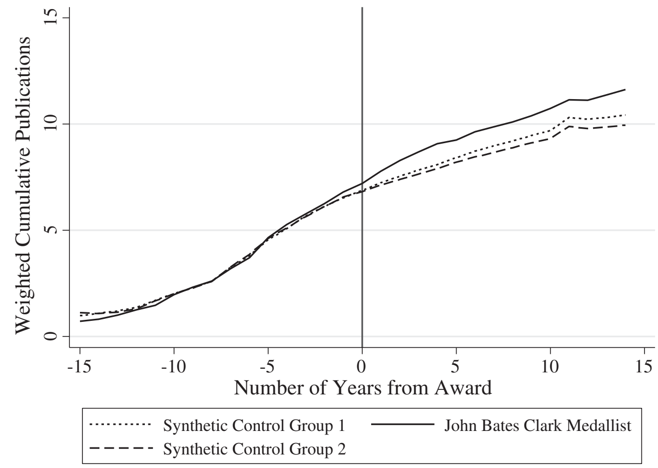

Fig. 1. Number of publications, Clark Medalists.

In the post-award period considered, medalists publish on average 0.32 weighted articles per year, which is 1.42 times more than the synthetic control group (0.23). Five years after the award, JBCM on average achieve 9.26 weighted publications, which is 1.05 more than the synthetic control group's 8.21 weighted publications. This is an increase of about 13%. The difference between the treatment and control groups grows to 1.42 weighted publications ten years after award conferral, when JBCM and the synthetic control group have on average published 10.75 and 9.32 weighted articles, respectively. This is an increase of more than 15%.

At first glance, our results seem to contradict the recent findings in Borjas and Doran (2013), whose study of the Fields Medal (the top mathematics prize for scholars under the age of 40) indicates that its recipients' publication rate subsequently declines compared to that of non-winning contenders. This result may be explained by the fact that the Fields Medal is the highest honor a mathematician can attain (American Mathematical Society, 2006: 1037). It is the very peak in a mathematician's career, especially as there is no Nobel Prize in mathematics. Fields Medalists' excellence has been so well established that they are not forced to pursue the normal course of research as reflected in measures conventionally used to judge performance (i.e., publications). Rather, they are free to turn their attention to new and possibly more risky topics attracting their current interest. Supporting this argument, as Borjas and Doran (2013: 3) put it: "[Fields Medalists] are now free to 'play the field' and pursue topics in different areas of mathematics (or even outside mathematics) that they may find interesting or worthwhile and have a high consumption value." In contrast, Clark Medalists have a good chance of receiving the Nobel Prize in the future. The Clark Medal may encourage them to concentrate on doing research (instead of taking on administrative tasks, for example), and their institutions are likely to encourage them in this direction.

The question of whether the increase in post-award publications is due to increased effort or to a higher facility for JBCM to move past referees and editors is open for debate. The latter possibility would correspond to the Matthew effect, whereby the "rich get richer" merely because of the higher status they have reached. Such a dynamic is more likely to arise in the case of lower-ranked journals, which benefit disproportionately from publishing articles written by reputable researchers. Higher-ranked journals are likely to be less prone to succumb to the reputation effect of the John Bates Clark Medal. Fig. 2 differentiates between higher and lower quality journals. It contrasts articles published in the top 10 journals with those published in journals ranked 11 to 23. The figure shows that the publication gap between medalists and the control group is substantially larger in the case of the lower tier journals. A t-test indicates that variation between these relative differences is statistically significant. Five years after the award, JBCM have

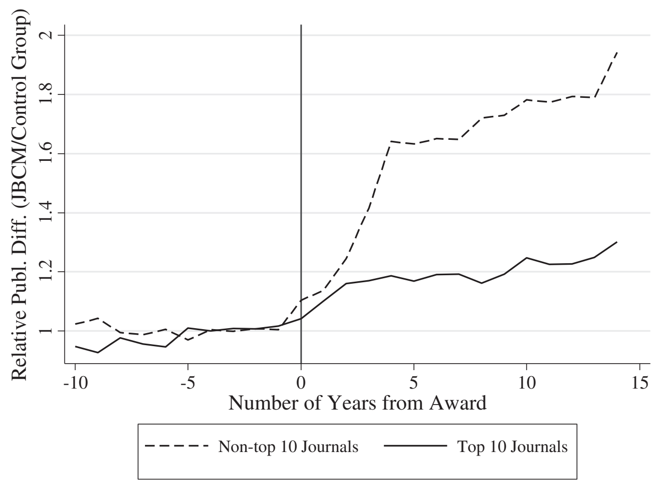

Fig. 2. Relative publication difference between Clark Medalists and the control group by journal quality.

accumulated on average 1.70 times more weighted non-top 10 journal publications than the synthetic control group, while the relative difference for top 10 journal publications is 1.10.

5.2. Citation counts per publication

In this section, we examine the consequences of receiving the John Bates Clark Medal for citation success as a proxy for professional recognition received. In line with Azoulay et al. (2013), we assess whether there is a significant difference between the treatment and control groups in post-award citation counts per publication for articles published *before* the award was received. Exploring only articles published before the award conferral allows us to isolate a potential Matthew effect. The quality of the article remains unchanged and we can explore whether the status shock as such, which is induced by the award, leads to an increment in recognition for Clark Medalists' work not enjoyed by closely comparable work of similar researchers whose status is unchanged. By using citation counts per publication, we can assess the average impact of a scholar's work. To construct the synthetic control group based on publication quality, we use the pre-award number of journal pages and the citations per pre-award publication as performance predictors, together with the debut year, PhD year, and PhD ranking of the researcher.

Fig. 3 shows the average citation counts for articles published before the medal was received. As expected, the work by Clark Medalists draws

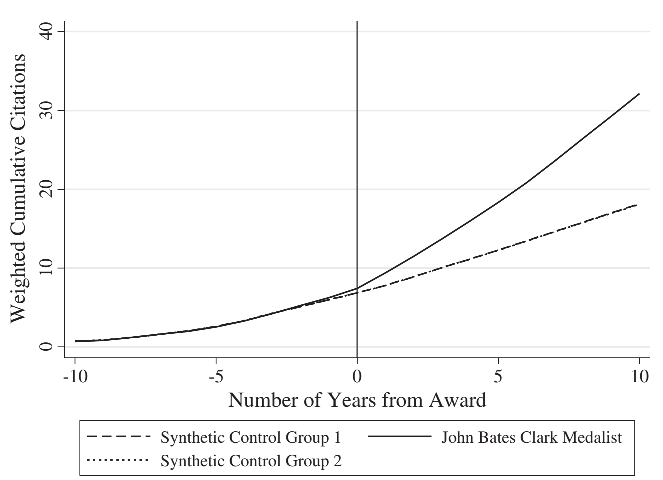

Fig. 3. Citations per publication, Clark Medalists.

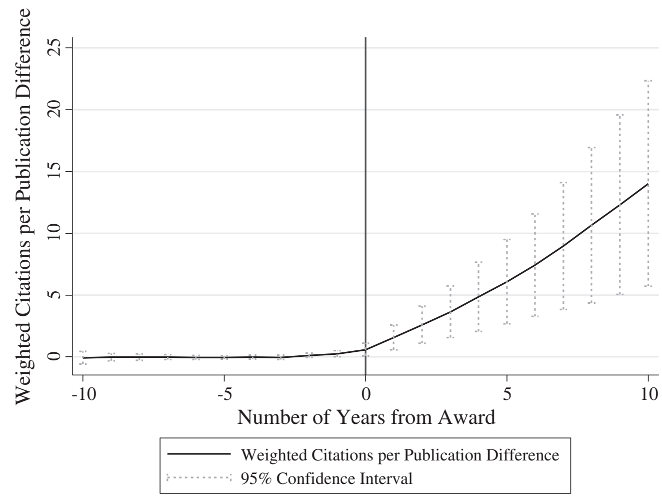

Fig. 4. Difference in citations per publication. JBCM vs. synthetic control group.

significantly more citations than that of the synthetic counterfactuals. Figs. 3 and 4 show that the citation paths evolve similarly for both groups and the difference between the groups is close to zero in the pre-award period, indicating a close match in the pre-award quality measure. The citation paths then diverge once JBCM experience the status change in year 0. On average, JBCM have received 18.36 citations for each pre-award publication five years after award conferral, and 32.12 after ten years. The synthetic control group has only received 12.27 and 18.1 citations by then, respectively. In other words, compared to the synthetic control group, five and ten years after the award bestowal, medalists have received 6.09 and 14.03 more citations, respectively, for any article they had published before receiving the award. The respective increases amount to 50% and 78%.

Fig. 4 shows the individual differences between JBCM and the synthetic control group[6] from ten years before to ten years after the award year. The dotted line shows the 95% confidence interval of the differences between groups. As can be seen in Fig. 4, the divergence rate function of the two curves is relatively linear, with an average post-award slope of 1.39 after being horizontal beforehand. This means that, on average, the gap between the citations received by JBCM and the synthetic control group grows by 1.39 weighted citations per post-award year.

Looking at the post-award citation rates over a longer time horizon than ten years shows that the differentials persist and even become more pronounced. Table 1 presents an overview. Extending the post-award period reduces the number of medalists that can be included in the analysis. In every year, from year 11 to year 20 after award bestowal, the difference between the control group and the treatment group is statistically significant. The gap between both groups grows when exploring later post-award years, reaching the largest relative difference 20 years after the award (3.07 times more citations for JBCM). These numbers are a strong indicator of a status or Matthew effect. The estimates in Table 1 include the potential post-Nobel Prize years. However, we also conduct robustness tests excluding JBCM with their corresponding synthetic groups once they receive the Nobel Prize as the analysis could be criticized if the citation pattern was distorted by the status change induced by the Nobel Prize. The results remain statistically significant.

The attention-conferring of awards could be crucial in explaining the stark contrast we find between treatment and control groups. Academia is faced with a “battle for attention” due to the great number of papers produced each year. Since the sheer number of researchers and articles

[6] Since the difference between synthetic control group 1 and synthetic control group 2 is not statistically significant, we only report synthetic control group 1 from here onwards ($t = 0.02$). For example, the cumulative citation counts ten years after the award conferral are equal to 18.09 and 18.14, respectively.

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Table 1
Differences in post-award citations per publication, Clark Medalists.

Post-award years	JBCM	SC	Value diff.	t-Statistics	Relative diff.	N
11	31.16	18.24	12.92***	3.54	1.94	26
12	33.58	19.28	14.30***	3.54	1.95	26
13	34.16	18.77	15.39***	3.25	2.03	25
14	36.74	19.76	16.98***	3.22	2.11	25
15	37.32	20.47	16.86***	2.90	2.13	24
16	39.88	21.40	18.48***	2.87	2.15	24
17	42.14	21.93	20.21**	2.73	2.25	23
18	45.11	22.72	22.39**	2.72	2.35	23
19	48.43	21.92	26.51**	2.78	2.70	22
20	51.98	22.59	29.39**	2.73	3.07	22
Average			19.34		2.27	

SC = synthetic control group.
*** $p < 0.01$.
** $p < 0.05$.

make it difficult to assess quality, awards can assume an important signaling function (Frey and Gallus, 2014). The copious output could lead scholars to rely on simple heuristics for information gathering and might explain why economists are attracted by the fame of prestigious awards.

6. Fellowship of the Econometric Society

In order to analyze whether prestigious awards are positively related to future performance we additionally consider a quite different type of honor in academia, namely, being appointed Fellow of the Econometric Society (ES). ES Fellowship is taken to be a great distinction and is highly regarded among economists. Over 900 individuals have so far been awarded an ES Fellowship (for an earlier overview, see Chan and Torgler, 2012).

The undisputed intention is that ES Fellows be chosen on the basis of their merit. As the selection is not randomly performed, the treatment effect of the Fellowship on performance cannot be identified with conventional methods. Moreover, the shortlists of possible Fellows are not publicly available. The synthetic control method allows us again to construct a control group of unelected scholars whose publication and citation records closely mirror the Fellows' records prior to election.

The analysis only considers Fellows elected between 5 and 25 years after the year that their first publication appears in the dataset, and the elections have to fall into the time period between 1945 and 1990 to be considered for inclusion. Since the construction of the control group requires a close treatment-control group match in pre-election publication and citation performance, the first limitation ensures sufficient pre-treatment observations for the matching process. The second criterion enables examination of the status effect through comparison of post-treatment publication activity for at least 15 years. Of the 463 Fellows elected during the 1945–1990 period, 88 are excluded because of the first restriction, leaving a sample size of 375. The homogeneity of the group of ES Fellows is an advantage for our analysis. As summarized by Gordon (1997: 1447): "To be eligible for nomination as a Fellow, a person must have published original contributions to economic theory or to such statistical, mathematical, or accounting analyses as have a definite bearing on problems in economic theory."

The donor pool for the synthetic control group also includes researchers who later became Fellows, thereby avoiding a selection based on individual characteristics extracted from ex-post information. However, if awards lead to an increase in productivity and status, the inclusion of researchers who later became Fellows could result in lower-bound estimates.

The analysis of Fellows of the Econometric Society yields similar results to the study of the John Bates Clark Medalists, except that the performance differences between award winners and their synthetic counterfactuals are smaller. We outline publication output and citations in graphs to depict the success of the group of ES Fellows versus the synthetic non-Fellow group and compare their scholarly performance in the post-award period. On average, each Fellow has 5.63 and 9.39 researchers in the synthetic groups for publication ($n = 372$) and citation performance ($n = 370$), respectively, with standard deviations of 4.77 and 7.22.

Fig. 5 plots the cumulative publication counts for ES Fellows and the synthetic control group. In the pre-award period, both ES Fellows and the synthetic control group share a similar publication performance; a t-test indicates that the difference in pre-award publication performance between the treatment and control groups is not statistically significant ($p = 0.62$). After the election, however, the two paths diverge markedly, indicating an increase in productivity levels that is attributable to the Fellowship. For Fellows, the total weighted publications are 5.02 and 5.89, respectively, at five and ten years after election, whereas for the synthetic control group they are 4.38 and 4.93, respectively. This post-award publication performance difference is statistically significant at the 1% level of significance ($p < 0.01$). Five years after the election, Fellows have published 1.17 times more than the synthetic control group, and the difference increases over time.

Several reasons can be adduced to explain this publication increase. It seems sensible to assume that an average researcher is not aware of who is an ES Fellow and who is not. Thus, a well-founded explanation has to begin with factors relevant for the individual Fellow. First, the honor received may have a positive motivational effect (e.g., due to increased enthusiasm). Second, being elected a Fellow may bolster self-confidence, which in general enhances motivation (Bénabou and Tirole, 2002) and can thus increase productivity. Research on the effects of positive feedback provides further support for this assumption (see, e.g., Deci, 1975; Deci et al., 1999). Third, the newly elected Fellows may take other ES Fellows as a reference group and accordingly make an effort to keep up with them. Although "outsiders" might on average not be aware of who is an ES Fellow, Fellows themselves are likely to compare themselves to their peers. Given that many ES Fellows sit on editorial boards of journals, this might also affect the chances of a Fellow to be accepted or invited for publication in the respective journal. Moreover, the formation of productive research collaborations might be enhanced since Fellowship status can serve as a signal of high quality towards other researchers—be they Fellows themselves or not. By the same signaling mechanism, the award may also make available more financial resources, such as research grants.

Fig. 6 illustrates the weighted cumulative citations per publication for articles published before award conferral, comparing the work of Fellows with that of their corresponding synthetic control group. Assuming that article quality was revealed in the pre-award time frame, it follows that both the treatment and control groups' work has the

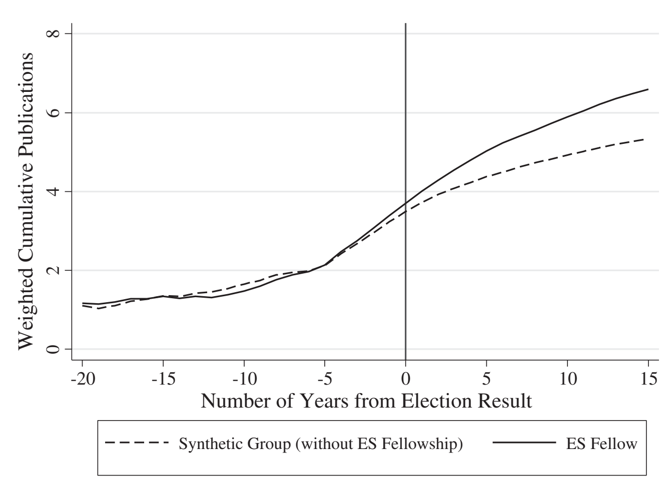

Fig. 5. Publication counts, ES Fellows.

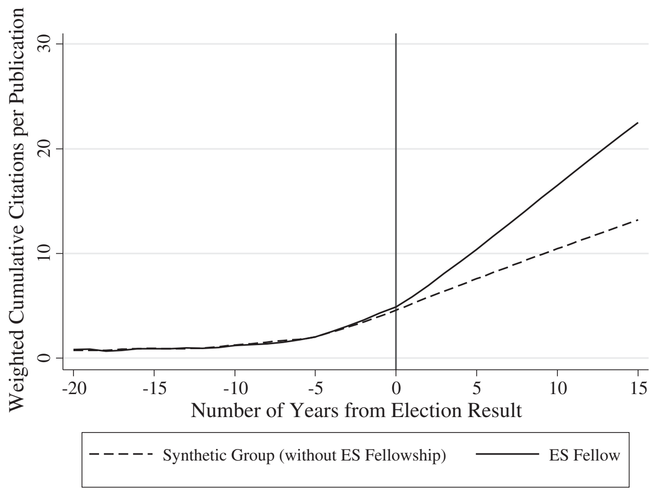

Fig. 6. Citations per publication, ES Fellows.

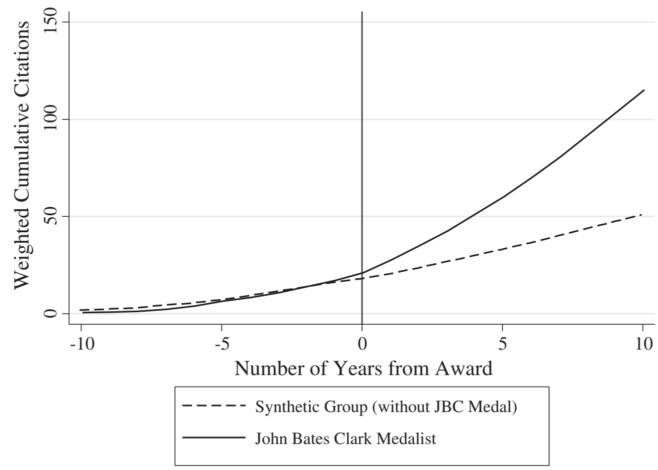

Fig. 7. Matching on high quality publications, Clark Medalists.

same or similar ex-ante quality. Any ex-post difference in citation performance thus reflects the status effect of becoming a Fellow. Like the productivity measures, the citations per publication paths evolve similarly for both the treatment and control groups until the announcement of the election result (p-value = 0.18), after which citation differences indicate an immediate status effect. That is, becoming an ES Fellow is accompanied by an increase in citations to articles published before the election.

Five and ten years after the election, Fellows have on average received a total of 10.4 and 16.52 (quality adjusted) citations for each article published before announcement of the election result. The synthetic counterfactuals, in contrast, have only received 7.58 and 10.45 citations per publication by then, respectively. This means that, five years after the election, ES Fellows have received 37% more citations per pre-award publication than had they not become Fellows. After another five years, this difference has risen to 58% (all estimates being statistically significant at the 1% level). This suggests that an increase in fame enhances citation success. At least some researchers become aware of the newly elected Fellow's work and hence start to cite it. An alternative—or supplementary—explanation suggests that Fellows who vote on candidates' accession to Fellowship tend to identify work that has previously been under-cited.

7. Robustness checks

The credibility of the findings reported above depends on the quality of our control group. We perform four different robustness checks for the analysis of the Clark Medal (for robustness checks referring to the study of ES Fellows, see Appendix D). We explore what happens if we choose an alternative matching method. Firstly, we match the pre-award profile based on top publications. The rationale is that the award committee's decision could be driven by a desire to identify researchers who have made one or two outstanding contributions that may even be worthy of a more prestigious award in the future, namely, the Nobel Prize. In this case it would make sense to only match the researcher's best papers. Thus, we provide a narrower matching strategy, looking at the three most-cited papers published before the award. The papers are selected on the basis of their overall citation performance up until December 2011, assuming that committee members are able to evaluate the quality of the papers as judged by their future citation trajectories. Fig. 7 reports the corresponding citation patterns of JBCM and the synthetic control group.

Alternatively, the top three papers can be determined based on the number of citations reached by the time the award is bestowed (Fig. 8, dotted line). The previously obtained results remain robust. The alternative matching approaches based on high quality publications (Fig. 8, dashed line and dotted line) produce an even larger difference between JBCM and the synthetic control group than our original procedure based on all publications (Fig. 8, solid line). Five years after the award conferral, the citation difference for the top three publications (all time) equals about 27; considering the three publications with most citations by the year of the award bestowal, the difference amounts to about 13 citations. The approach used in this paper, which includes all publications, produces a difference of only about 6 citations. This shows that the results based on our main approach are lower-bound estimates of the citation differentials.

As a second robustness test, we use the weighted number of journal pages as the measure of productivity instead of the number of articles published. We find that the relative page difference between the synthetic control group and the treatment group over the post-award period is similar to the reported relative publication performance. For instance, ten years after the award receipt, JBCM have published 1.33 times more pages and produced 1.25 times more publications than the control group.

Next, we limit the control group to only ES Fellows. All Clark Medalists have been elected Fellows of the Econometric Society (except Kenneth E. Boulding and Emmanuel Saez). Most JBCM have been appointed ES Fellows before obtaining the Medal. We are able to use

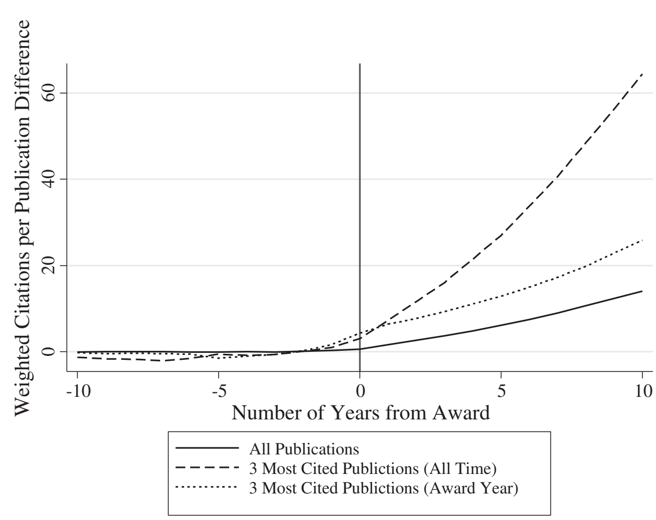

Fig. 8. Citation differences for alternative matching approaches, JBCM vs. synthetic control group.

data on 858 ES Fellows to build the synthetic control group. The construction of the control group relies solely on the debut year and the pre-treatment citation and publication performance; we do not control for the quality of the education received. The results using both measurements (cumulative publication counts and citations per publication) are reported in Appendix C. Compared to the previous results, we observe a smaller gap between the JBCM and the synthetic control group made up of ES Fellows. For example, ten years after the award, the difference in the number of publications between the synthetic control group composed of ES Fellows and the JBCM is 0.88 (weighted) articles instead of 1.42 (previous synthetic group). A small reduction in the gap can also be found for citations per publication (from 14.03 to 10.1).

Finally, we use three different weighting methods to assess authors' contributions. Firstly, we consider a non-linear weight by dividing the performance measure by the square root of the number of authors. Secondly, we do not impose any weighting. We find that, ten years after the award, the relative publication difference is 1.28 (first approach) and 1.30 (second approach) compared to 1.25 obtained in the main analysis. The relative citation differences are 1.82 and 1.83, compared to 1.91 in the main analysis. Thirdly, we match the performance on the entire time period before JBCM received their award. We find that the relative publication (citation) difference ten years after the award conferral equals 1.39 (2.12) using this approach.

8. Limitations

Our methodological approach provides a way of better analyzing the consequences of receiving awards. Yet, as Stephan (2012) points out, “[i]t is virtually impossible to determine what portion of success comes from having the right stuff and what portion can be attributed to state dependence” (2012: 32). A concern related to our methodology is that the award-giving committee could have information at its disposal that we cannot identify and integrate into the matching procedure. While we control for candidates' work in the pipeline, the committee might be able to assess their potential future performance based on other, non-observable determinants.

However, this claim only applies to expected future publications. It does not hold for citations to work published before receiving the award. It would be a fluke if the past work of scholars was suddenly cited more often, coincidentally after receiving the Clark Medal or being elected ES Fellow. It is more plausible to attribute this belated citation surge to getting one of these much-esteemed awards.

The case of ES Fellowship provides another argument why the jury's supposedly superior insights regarding candidates' future performance are insufficient to fully explain the performance differentials we observe. It is quite unlikely that the 470 Fellows who are presently allowed to vote on new Fellows are able to come to a shared opinion about a scholar's future performance above and beyond the candidate's past publications and citations. This general election process goes far beyond the private deliberations in a small jury setting which might have informed the choice of Clark Medalists.

Ideally, we would have also presented estimates based on a comparison of award recipients with shortlisted candidates. Hamermesh and Schmidt (2003) study the fairness of the election process of ES Fellowship using data provided by the Econometric Society. Due to special circumstances, the authors dispose the list of all candidates. Such information is normally not publicly disclosed. Data on award nominees are meant to be kept confidential, a consideration we wish to comply with.

It could be suggested that productivity after winning the Clark Medal is driven by the hope of getting the Nobel Prize. However, the observed influence on pre-award publication citations is not affected by any surge in publications. Moreover, it is highly unlikely that the observed productivity increase after becoming ES Fellow can be explained by this hope, as the subject pool is very large.

Another possible limitation is that using economists from different fields may bias the citation and publication patterns in the post-award period. The construction of the synthetic control group could be more nuanced by identifying each economist's subfield. Research has shown that citation trends differ between subfields within a single field (Diamond and Haurin, 1995; Dolfsma and Leydesdorff, 2010; Pautasso, 2012) and depending on the type of study (Johnston et al., 2013). However, subfields are not uniquely identifiable since articles are usually attributed multiple JEL codes. Most economists are active in various subfields.

9. Conclusion

Awarding prizes, medals, and trophies has a long history. Academia, along with many other institutions, has developed a system to allocate rewards to those who excel. Where awards are based on excellence, however, causality is fundamentally difficult to prove. Our paper approaches this issue by investigating what are the implications of prestigious awards for their recipients' subsequent research activity and citation-based status. For the purpose of this analysis, a group of synthetic counterfactuals (control group) to the award winners (treatment group) is constructed using a weighted combination of non-recipient researchers that best resemble the pre-award academic life cycle of the corresponding award winners. This allows us to distinguish whether receiving an award merely reflects the activity of particularly gifted academics or whether it actually raises scholarly productivity and status. However, the results should be interpreted with caution because we do not know the true control group since it is not public knowledge who are the candidates considered for the awards.

For the case of the highly-esteemed John Bates Clark Medal given by the American Economic Association, our analysis reveals that after five years, the number of weighted publications of medalists is 13% higher than in the counterfactual scenario of no medal receipt; the number of citations received has been augmented by 50% compared to the counterfactual. After ten years, the respective productivity and citation differentials amount to 15% and 78%. Assuming that at the time of medal conferral, recipients and the control group had the same number of publications (about 18), after five years, a medalist on average has accumulated 325 citations for these publications, i.e., 50% more than the synthetic control group with 217 citations. Ten years after conferral of the medal, recipients have 569 citations on those same publications, compared to 320 citations for the synthetic control group. This amounts to a difference of no less than 78%. The difference increases when we use a narrower matching strategy and match on high quality publications only.

Taking elections to Econometric Society Fellowship as a second case of a prestigious academic award, we again observe long-lasting post-election productivity and status differentials between Fellows and their counterfactuals. The results indicate that ten years after the election, Fellows' publications have been augmented by 19% compared to the counterfactual scenario of no award receipt. They have by then received 58% more citations to their pre-award publications than had they not become Fellow of the Econometric Society.

Generalizing these results, the study suggests a performance and status enhancing effect of awards. However, awards must be kept scarce, otherwise they will lose their incentivizing and attention conferring effects. A specific award must not be distributed too liberally so as to preserve its character as a positional good.

Receiving a prestigious award may induce winners to work harder. It also tends to raise the likelihood of getting grants, teaching releases, better students, new and productive co-authors, thereby also increasing productivity. The increased attention received from other scholars positively affects the winners' status. Future research could provide better knowledge of, and possibly explanations for, the mechanisms that produce the differences in publications and citations reported in this study. It might draw on interviews with economists from both groups, award winners (Clark Medalists and Econometric Society Fellows) and

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researchers who missed the award, to understand how they evaluate the influence of the award on their research performance.

Based on our empirical findings covering two different awards by two different academic societies, we argue that prestigious academic awards tend to raise productivity in terms of publications, and attract more attention as reflected in an increased number of citations.

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Appendix A

Table A1
Journal rankings and associated quality adjustment index.

Journal	KY (2006)	KMS1 (2011)	KMS2 (2012)	LP (1984)	PHV (2004)	Ritzberger (2008)	KS (2010)	Avg.	# of appearances in top 10 ranking
American Economic Review	1	1	1	1	0.759	0.361	0.964	0.869	7
Econometrica	0.799	0.968	0.448	0.64	1	1	0.993	0.835	7
Journal of Economic Theory	0.421	0.588	0.225	0.226	0.344	0.346	0.934	0.441	7
Journal of Political Economy	0.746	0.652	0.414	0.809	0.669	0.513	1	0.686	7
Review of Economic Studies	0.404	0.452	0.327	0.225	0.643	0.530	0.961	0.506	7
Quarterly Journal of Economics	0.884	0.581	0.596	0.001	0.988	0.724	0.982	0.679	6
Journal of Monetary Economics	0.333	0.364	0.278	0.23	0.461	0.379	0.857	0.415	5
Journal of Econometrics	0.359	0.549	0.162	0.16	0.212	0.260	0.840	0.363	4
Journal of Finance	0.987	.	.	0.174	.	0.383	.	0.515	3
Games and Economic Behavior	0.226	0.355	0.120	.	0.326	0.212	0.609	0.308	2
Journal of Financial Economics	0.787	0.099	0.157	.	0.150	0.310	0.930	0.406	2
RAND Journal of Economics	0.205	0.114	0.130	.	0.201	0.141	0.913	0.284	2
Brookings Papers on Economic Activity	0.135	.	0.051	.	.	.	0.939	0.375	1
Econometric Theory	0.115	0.459	0.036	0.118	0.564	0.161		0.242	1
Economic Journal	0.248	0.207	0.208	0.168	0.858	0.119	0.096	0.272	1
International Economic Review	0.266	0.23	0.124	0.394	0.856	0.156	0.190	0.317	1
Journal of Business & Economic Statistics	0.176	0.384	0.069	0.177	0.786	.	.	0.318	1
Journal of Economic Literature	0.354	0.188	0.183	.	0.864	0.786	.	0.475	1
Journal of Economic Perspectives	0.318	0.343	0.192	.	0.894	.	.	0.437	1
Journal of Law and Economics	0.056	0.039	0.035	0.112	0.913	.	.	0.231	1
Journal of Public Economics	0.247	0.198	0.222	0.171	0.753	0.163	0.121	0.268	1
Review of Economics and Statistics	0.315	0.28	0.242	0.201	0.911	0.163	0.115	0.318	1
Review of Financial Studies	0.480	.	.	0.304	.	.	.	0.392	1

Notes: List of abbreviations: KY (Kodrzycki and Yu, 2006), KMS1 (Kalaitzidakis et al., 2003), KMS2 (Kalaitzidakis et al., 2011), LP (Liebowitz and Palmer, 1984), PHV (Palacios-Huerta and Volij, 2004), Ritzberger (Ritzberger, 2008) and KS (Koczy and Strobel, 2010). We standardize the indices by dividing all values by the highest score (Palacios-Huerta and Volij, 2004; Koczy and Strobel, 2010) so that the highest quality journal receives a value of 1. *Avg.* is the mean adjustment index of the seven indices. Besides missing records for the first few years of certain journals, *Web of Science* has no records for the *International Economic Review* for 1966 to 1976. We also exclude *American Economic Review Papers and Proceedings*. For a description of the ranking method, see Chan et al. (2013).

Table A2
Journal content.

Journal	Year established (first year available)	Number of articles	Number of unique authors	Number of articles per available year	Number of authors per available year
American Economic Review	1911	6313	5580	61.89	54.71
Brookings Papers on Economic Activity	1970	3388	2645	42.35	33.06
Econometric Theory	1985 (1988)	3535	2643	80.34	60.07
Econometrica	1933	4737	3794	41.55	33.28
Economic Journal	1900	2706	2406	34.25	30.46
Games and Economic Behavior	1989 (1991)	3892	3258	34.14	28.58
International Economic Review	1960	1928	1845	52.11	49.86
Journal of Business & Economic Statistics	1983 (1985)	2894	2599	87.70	78.76
Journal of Econometrics	1973 (1980)	4480	4010	66.87	59.85
Journal of Economic Literature	1963 (1969)	1689	1753	73.43	76.22
Journal of Economic Perspectives	1987 (1988)	1922	2131	51.95	57.59
Journal of Economic Theory	1969	1633	1716	39.83	41.85
Journal of Finance	1946	640	559	15.24	13.31
Journal of Financial Economics	1974 (1976)	1284	942	51.36	37.68
Journal of Law and Economics	1958	4237	3682	37.50	32.58
Journal of Monetary Economics	1976	1958	2210	46.62	52.62
Journal of Political Economy	1892 (1899)	1171	1620	41.82	57.86
Journal of Public Economics	1976	624	717	14.18	16.30
Quarterly Journal of Economics	1886 (1899)	1132	1281	45.28	51.24
RAND Journal of Economics	1970	1113	1235	20.61	22.87
Review of Economic Studies	1933	2820	2989	76.22	80.78
Review of Economics and Statistics	1919	4410	4705	67.85	72.38
Review of Financial Studies	1988 (1990)	1184	1545	51.48	67.17

Note: Besides the missing records for the first few years of certain journals, *Web of Science* does not have records for *International Economic Review* for the period between 1966 and 1976. Additionally, we exclude *American Economic Review Papers and Proceedings*. These missing data do create some problems in our analysis. For example, one John Bates Clark Medalist, Daniel L. McFadden, the recipient in 1975, has two articles in the *Journal of Public Economics* in 1974 that are not recorded in our dataset, which might give a false reflection of the medalist's true quality, and therefore create an inaccurate synthetic control group.

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Table A3
Journal rankings and associated quality adjustment index.

Journal	KY (2006)	KMS (2011)	KMS (2003)	LP (1984)	PHV (2004)	Ritzberger (2008)	KS (2010)	Simple average	# of appearances in top 10 ranking
American Economic Review	1	1	1	1	0.759	0.361	0.964	0.869	7
Econometrica	0.799	0.448	0.968	0.64	1	1	0.993	0.835	7
Journal of Economic Theory	0.421	0.225	0.588	0.226	0.344	0.346	0.934	0.441	7
Journal of Political Economy	0.746	0.414	0.652	0.809	0.669	0.513	1	0.686	7
Review of Economic Studies	0.404	0.327	0.452	0.225	0.643	0.530	0.961	0.506	7
Quarterly Journal of Economics	0.884	0.596	0.581	0.001	0.988	0.724	0.982	0.679	6
Journal of Monetary Economics	0.333	0.278	0.364	0.23	0.461	0.379	0.857	0.415	5
Journal of Econometrics	0.359	0.162	0.549	0.16	0.212	0.260	0.840	0.363	4
Journal of Finance	0.987	.	.	0.174	.	0.383	.	0.515	3
Games and Economic Behavior	0.226	0.120	0.355	.	0.326	0.212	0.609	0.308	2
Journal of Financial Economics	0.787	0.157	0.099	.	0.150	0.310	0.930	0.406	2
RAND Journal of Economics	0.205	0.130	0.114	.	0.201	0.141	0.913	0.284	2
Brookings Papers on Economic Activity	0.135	0.051	.	.	.	.	0.939	0.375	1
Econometric Theory	0.115	0.036	0.459	0.118	0.564	0.161		0.242	1
Economic Journal	0.248	0.208	0.207	0.168	0.858	0.119	0.096	0.272	1
International Economic Review	0.266	0.124	0.230	0.394	0.856	0.156	0.190	0.317	1
Journal of Business & Economic Statistics	0.176	0.069	0.384	0.177	0.786	.	.	0.318	1
Journal of Economic Literature	0.354	0.183	0.188	.	0.864	0.786	.	0.475	1
Journal of Economic Perspectives	0.318	0.192	0.343	.	0.894	.	.	0.437	1
Journal of Law and Economics	0.056	0.035	0.039	0.112	0.913	.	.	0.231	1
Journal of Public Economics	0.247	0.222	0.198	0.171	0.753	0.163	0.121	0.268	1
Review of Economics and Statistics	0.315	0.242	0.280	0.201	0.911	0.163	0.115	0.318	1
Review of Financial Studies	0.480	.	.	0.304	.	.	.	0.392	1

Note: We standardize the indices by dividing all values by the highest score (see Palacios-Huerta and Volij, 2004; Koczy and Strobel, 2010), so that the highest-quality journal receives a value of 1.

Table A4
Ranking methods.

Ranking	Index reference	Index title
LP method		
Kodrzycki and Yu (2006)	p. 22–27, Table 2, column 1	Within Economics Impact
Kalaitzidakis et al. (2003)	p. 1349, Table 1, column 5	Impact, Age, and Self-Citations Adjusted per Number of Pages
Kalaitzidakis et al. (2011)	p. 1530, Table 1, column 2	Citation/Article Index
Liebowitz and Palmer (1984)	p. 80–81, Table 1, column 3	Rankings Based on Impact Adjusted Citations to Articles Published 1975–1979
Invariant method		
Palacios-Huerta and Volij (2004)	p. 972, Table 1, column 1	Invariant Method
Ritzberger (2008)	p. 413–418, Table 1, column 1	Value
Tournament method		
Koczy and Strobel (2010)	p. 13–19, Table 1	

Table A5
John Bates Clark Medalists.

John Bates Clark Medalists	Year awarded	Year of birth
Paul A. Samuelson	1947	1915
Kenneth E. Boulding	1949	1910
Milton Friedman	1951	1912
James Tobin	1955	1918
Kenneth J. Arrow	1957	1921
Lawrence R. Klein	1959	1920
Robert M. Solow	1961	1924
Hendrik S. Houthakker	1963	1924
Zvi Griliches	1965	1930
Gary S. Becker	1967	1930
Marc Nerlove	1969	1933
Dale W. Jorgenson	1971	1933
Franklin M. Fisher	1973	1934
Daniel L. McFadden	1975	1937
Martin S. Feldstein	1977	1939
Joseph E. Stiglitz	1979	1943
A. Michael Spence	1981	1943
James J. Heckman	1983	1944
Jerry A. Hausman	1985	1946
Sanford J. Grossman	1987	1953
David M. Kreps	1989	1950
Paul R. Krugman	1991	1953
Lawrence H. Summers	1993	1954
David Card	1995	1956
Kevin M. Murphy	1997	1958
Andrei Shleifer	1999	1961
Matthew Rabin	2001	1963

Notes: The list of all the John Bates Clark Medalists is provided by the American Economic Association, see http://www.aeaweb.org/honors_awards/clark_medal.php.

Appendix B

Table B1
Synthetic control group members for all the JBCM.

Paul A. Samuelson 1947 Gerhard Tintner (1)	**Kenneth E. Boulding 1949** Earl J. Hamilton (0.427) Rene Roy (0.287) Edwin Bidwell Wilson (0.222) Mordecai Ezekiel (0.038) Charles P. Kindleberger (0.014) Joe S. Bain (0.013)	**Milton Friedman 1951** E. M. Bernstein (0.534) Edwin Bidwell Wilson (0.466)	**James Tobin 1955** Irving Bernstein (0.444) Roy L. Reierson (0.255) Tibor Scitovsky (0.125) Kurt W. Rothschild (0.078) Franco Modigliani (0.04) Charles P. Kindleberger (0.035)
Kenneth J. Arrow 1957 Ralph Turvey (0.497) James N. Morgan (0.263) Rendigs Fels (0.214) Harry G. Johnson (0.026)	**Lawrence R. Klein 1959** Martin Bronfenbrenner (1)	**Robert M. Solow 1961** Martin J. Bailey (0.363) Hans Brems (0.279) Michio Morishima (0.228) Warren L. Smith (0.077) Lionel W. McKenzie (0.053)	**Hendrik Samuel Houthakker 1963** Robert H. Strotz (0.646) Ken Ichi Inada (0.141) Alfred William Bob Coats (0.125) Franz Gehrels (0.052) Thomas Mayer (0.036)
Zvi Griliches 1965 William Moore Gorman (0.355) Alan A. Walters (0.228) Hirofumi Uzawa (0.194) Edmund S. Phelps (0.15) Michio Morishima (0.074)	**Gary S. Becker 1967** Armen A. Alchian (0.38) Richard E. Quandt (0.268) Robert Charles Oliver Matthews (0.206) Alvin L. Marty (0.075) Ivor F. Pearce (0.071)	**Marc Nerlove 1969** Akira Takayama (0.234) Gregory C. Chow (0.228) Michael Michaely (0.206) Leif Johansen (0.084) Leland B. Yeager (0.081) Robert Z. Aliber (0.079) Tong Hun Lee (0.068) Bela Balassa (0.021)	**Dale Weldeau Jorgenson 1971** Pranab K. Bardhan (0.312) Yoram Barzel (0.297) David Levhari (0.188) Vernon L. Smith (0.099) Bela Balassa (0.078) Gregory C. Chow (0.025)
Franklin M. Fisher 1973 Mordechai E. Kreinin (0.789) Vernon L. Smith (0.211)	**Daniel L. McFadden 1975** Rubin Saposnik (0.327) Athanasios Asimakopulos (0.235) Ephraim Kleiman (0.221) Arthur Benavie (0.149) Thomas H. Naylor (0.068)	**Martin S. Feldstein 1977** Peter C. Fishburn (0.642) Stephen J. Turnovsky (0.358)	**Joseph E. Stiglitz 1979** Peter C. Fishburn (1)
A. Michael Spence 1981 Elhanan Helpman (0.584) Raveendra Batra (0.316) Andreu Mas-Colell (0.101)	**James J. Heckman 1983** Michael L. Wachter (0.378) Michael Hoel (0.358) Charles R. Nelson (0.258) Robert H. Frank (0.007)	**Jerry A. Hausman 1985** Jennifer F. Reinganum (0.37) Oliver D. Hart (0.279) Boyan Jovanovic (0.094) Frederic S. Mishkin (0.072) Elhanan Helpman (0.066) Michael L. Katz (0.051) Richard Schmalensee (0.041) Alan J. Auerbach (0.022) Andreu Mas-Colell (0.006)	**Sanford Jay Grossman 1987** Carlos Alfredo Rodriguez (0.317) Jean Tirole (0.255) Elhanan Helpman (0.238) Andreu Mas-Colell (0.101) Frederic S. Mishkin (0.061) Guillermo A. Calvo (0.016) Alvin E. Roth (0.012)
David M. Kreps 1989 Laurence J. Kotlikoff (0.355) Sudipto Bhattacharyya (0.193) Roger Guesnerie (0.151) Edgar K. Browning (0.109) Kenneth I. Wolpin (0.078) John Bryant (0.057) Guy Laroque (0.039) Michael R. Darby (0.018)	**Paul R. Krugman 1991** Donald Hartwell Fullerton (0.347) Arthur J. Robson (0.22) Edward N. Wolff (0.189) Paul L. Joskow (0.15) Lawrence E. Blume (0.094)	**Lawrence H. Summers 1993** Larry G. Epstein (0.559) Jean Tirole (0.334) Hal R. Varian (0.107)	**David Card 1995** Eric S. Maskin (0.46) Russell Cooper (0.339) Bernard Saffran (0.11) John D. Wilson (0.058) Raaj Kumar Sah (0.018) Paul Evans (0.015)
Kevin M. Murphy 1997 Richard H. Thaler (0.354) Gary Gorton (0.32) Robert Forsythe (0.151) Esfandiar Maasoumi (0.135) John Hardman Moore (0.039)	**Andrei Shleifer 1999** N. Gregory Mankiw (0.255) Jean Tirole (0.196) Kenneth S. Rogoff (0.195) Donald W. K. Andrews (0.129) Julio Jacobo Rotemberg (0.108) R. Preston McAfee (0.087) Carl Shapiro (0.03)	**Matthew Rabin 2001** Scott John Freeman (0.443) Bong Soo Lee (0.35) Shyam Sunder (0.207)	

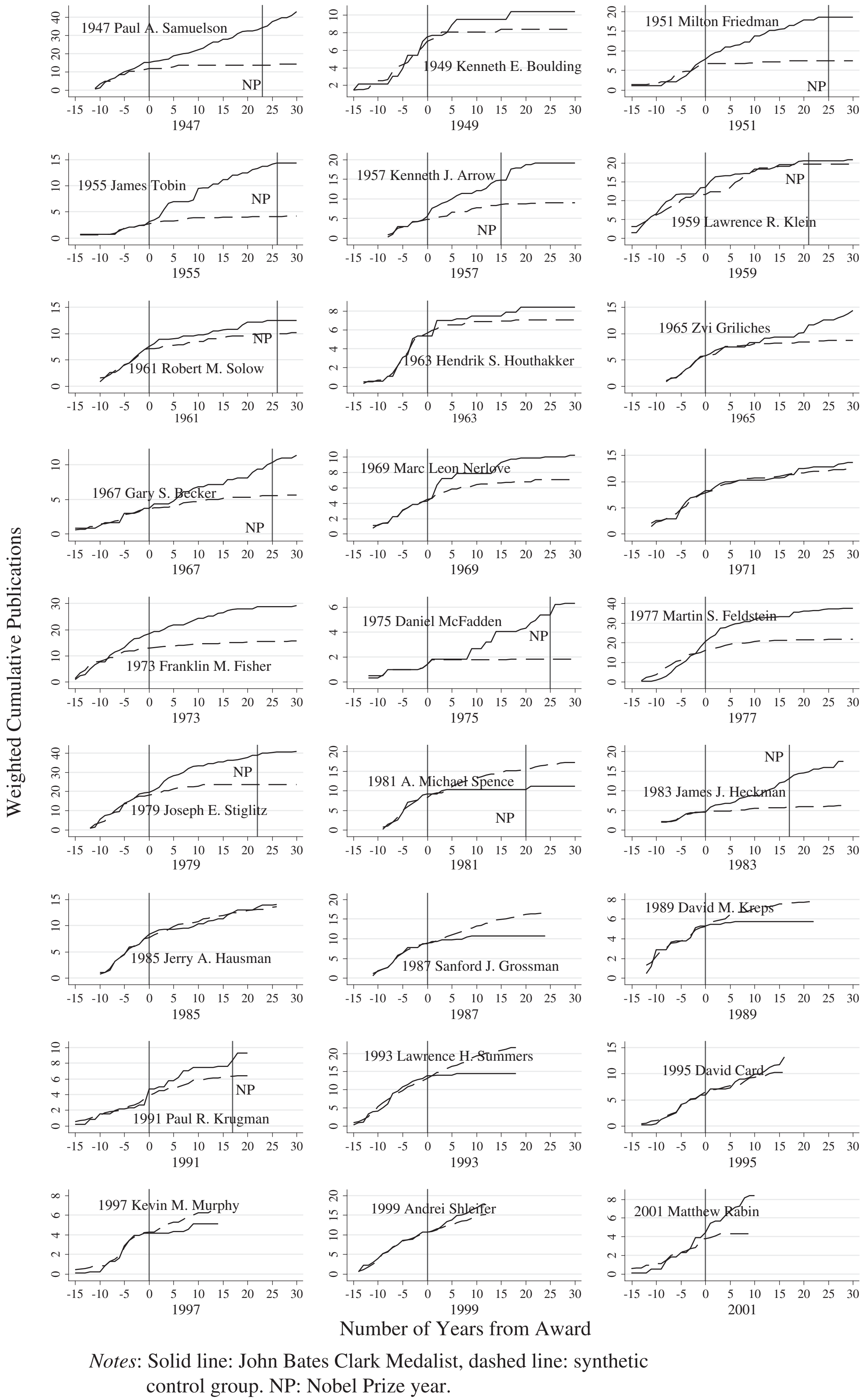


Fig. B1. Publications—synthetic control unit for each single JBCM. *Notes*: Solid line: John Bates Clark Medalist, dashed line: synthetic control group. NP: Nobel Prize year.

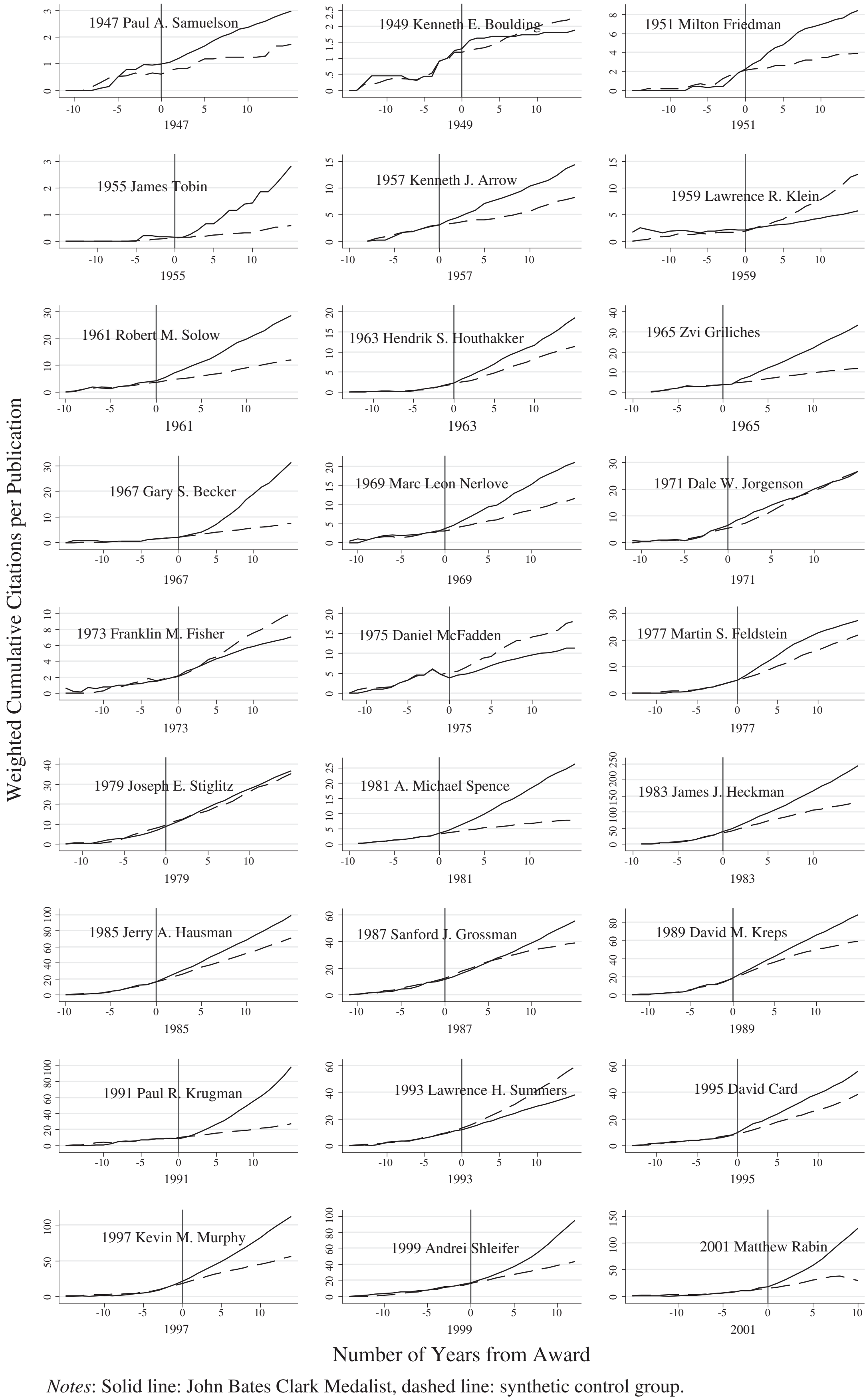
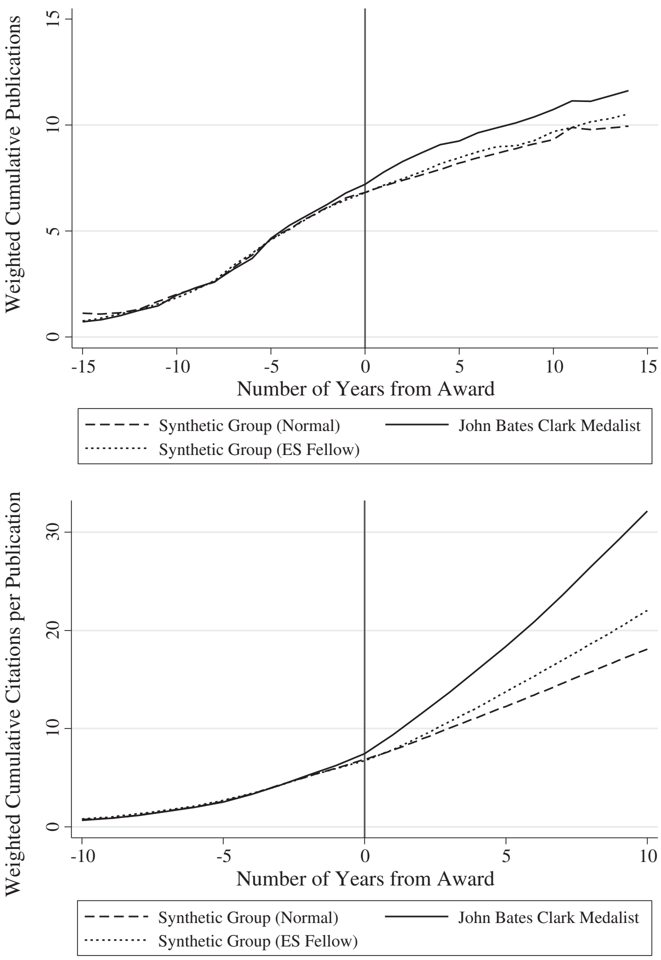


Fig. B2. Citations—synthetic control unit for each single JBCM. *Notes*: Solid line: John Bates Clark Medalist, dashed line: synthetic control group.

Appendix C

Figures on the number of publications and on citations per publication.

FIGURES ON THE NUMBER OF PUBLICATIONS AND ON CITATIONS PER PUBLICATION



Appendix D

Robustness checks, Econometric Society Fellows.

Several robustness checks allow us to assess the validity of the analysis of ES Fellowship. Table D1 presents (for all the robustness tests) the relative publication and citation differences between the treatment group and the synthetic control group at 15 years after award conferral. Firstly, once an individual within the synthetic control group becomes a Fellow, the treatment and control group pairs (Fellow and corresponding synthetic counterpart) are excluded from the panel. Thus, at year 15, the sample size of Fellows drops to 280 for the publication and 227 for the citation analysis. Secondly, in the matching process, all researchers who were later elected ES Fellows are excluded from the potential donor pool. This allows us to compare Fellows' performance with that of researchers never awarded ES Fellowship. However, such an approach has the disadvantage that it may induce an upward bias due to a skewed selection (selection bias). Thirdly, both pre-award publication and citation records are included in the matching process to construct the synthetic control group, such that $\boldsymbol{X}_i^{fellow}$ and $\boldsymbol{X}_{ij}^{donor}$ contain both pre-award publication and citation counts. Following Abadie and Gardeazabal (2003), the donors' weights are determined by a diagonal matrix $\boldsymbol{V}$ with nonnegative elements that reflect the relative importance of the publications and citations as predictors in the minimization $\boldsymbol{W}_{\boldsymbol{i}}^* = \underset{w}{\operatorname{argmin}} \left(\boldsymbol{X}_i^{fellow} - \boldsymbol{X}_{ij}^{donor} \boldsymbol{W}_{\boldsymbol{i}}\right)' \boldsymbol{V} \left(\boldsymbol{X}_i^{fellow} - \boldsymbol{X}_{ij}^{donor} \boldsymbol{W}_{\boldsymbol{i}}\right)$. $\boldsymbol{V}$ is chosen such that the outcome variable is best reproduced by the synthetic control unit. Fourthly, using the standard method employed in this analysis, Fellows are matched with other researchers based on the same first year of publication. This allows us to compare each Fellow with a group of researchers who were equally good across all years before the Fellowship award and who had the same duration of work experience as the Fellow (same publication career length)—but who did not receive a Fellowship at the same time. The disadvantage of such an approach is that it reduces the donor pool and hence also the possibility of finding a proper synthetic control group for Fellows. Fifthly, instead of dividing by the number of authors when weighting individual contributions, in one case either non-linearity is introduced in the weighting process (dividing the measures by the square-root of the number of authors) or no weighting is employed at all. Sixthly, T is set equal to the number of years, such that the entire pre-election performance is included in the matching process. This takes into account that for a young and promising Fellow the last five years before the election matter more than the last five years for a Fellow with a longer pre-award career length—although it should be noted that the cumulative performance is considered for matching. Seventhly, a different productivity proxy, weighted article length, is used; keeping in mind that this factor is driven by publishers' preferences and is subject to change over time (Torgler and Piatti, 2013). Eighthly, the limit on the number of potential donors J (up to 20 previously) is relaxed, such that the synthetic control groups are composed by more non-Fellow researchers. Such synthetic counterfactuals may be less valid. However, given the reduced dependence on single researchers, this approach could mitigate the potential bias from unobserved variables due to the large number of researchers within the control group. On average, the synthetic control groups for publications and citations contain 12.1 and 30.92 researchers, respectively. Lastly, we compare Fellows who have academic affiliations with those who are affiliated with government or private institutions at the time of the election.[7] Fellows with academic, government, and industry affiliations are likely to have different publishing behaviors due to their job descriptions and incentives. A mean comparison t-test shows that the difference between the group of academics and the group of government and private sector employees is not statistically significant.

Overall, the results reported in Table D1 show similar or even substantially larger gaps between Fellows and the synthetic control group (see fourth robustness check, for instance). Only few of the robustness checks performed indicate smaller gaps when compared to the previously reported main results.

[7] The information is listed under *Election of New Fellows* in the journal *Econometrica*.

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Table D1
Robustness checks, ES Fellows.

	15 years after the award	Publication		Citation	
		Relative diff.	N	Relative diff.	N
	Main results	**1.31**	372	**2.04**	370
	Robustness tests				
1	Drop post-award pairs once a donor becomes Fellow	**1.33**	280	**1.99**	227
2	Exclude future Fellows in donor pool	**1.44*****	**372**	**2.21*****	**369**
3	SCM with both publication and citation counts	**1.34****	**372**	**1.87****	**369**
4	Same year of first publication (same publication career length)	**1.86*****	**363**	**3.03****	**360**
5.1	Author weight $= \sqrt{au_{i_{jt}}}$	**1.31**	**372**	**2.04**	**369**
5.2	No author weight (no division)	**1.34**	**372**	**2.05**	**369**
6	$T =$ all pre-election years	**1.41*****	**372**	**2.22****	**369**
7	Productivity proxy = journal pages	**1.4****	**372**	.	.
8	No limit on the potential donor pool	**1.29**	**372**	**1.86****	**369**
9	Academia vs. government/industry	**1.31**	**$N_A = 359$**	**2.04**	**$N_A = 359$**
		1.09	**$N_{G/I} = 13$**	**2.24**	**$N_{G/I} = 10$**

*** $p < 0.01$.
** $p < 0.05$.

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