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THE EFFECTS OF LISTING AUTHORS IN
ALPHABETICAL ORDER: A SURVEY OF
THE EMPIRICAL EVIDENCE



The Effects of Listing Authors in Alphabetical Order: A survey of the Empirical Evidence

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Abstract

Each time researchers jointly write an article, a decision must be made about the order in which the authors are listed. There are two main norms for doing so. The vast majority of scientific disciplines use a contribution-based norm according to which authors who contributed the most are listed first. Very few disciplines, most notably economics, instead resort primarily to the norm of listing authors in alphabetical order. It has been argued that (i) this alphabetical norm gives an unfair advantage to researchers with last names starting with a letter early in the alphabet and that (ii) researchers are aware of this “alphabetical discrimination” and react strategically to it, for example through avoiding collaborations with multiple others. This article surveys the empirical literature on these two related topics. Overall, there is convincing evidence that alphabetical discrimination exists and that researchers react to it.

Keywords: Alphabetical discrimination; lexicographic order; contribution-based order; scientific publishing

1 Introduction

In most scientific disciplines, the order of authors on published articles depends on the relative contributions of these authors. The first author is the one who has contributed the most and other authors follow in descending order. An exception is the last position, which is often taken by the most senior author or the author with the overall coordination if there is one (for example the advisor in papers written jointly with graduate students or the head of the laboratory). However, some authors use a different ordering, intentionally choosing to order authors alphabetically (i.e. lexicographically).¹ Across all disciplines, such intentional alphabetical ordering applies to less than 4 percent of all publications (Waltman, 2012). These publications are not randomly distributed over all fields: There are very few fields in which alphabetical name ordering is the norm rather than the exception. The fields in which more than 50 percent of publications intentionally choose alphabetical name ordering are “Business and Finance”, “Economics”, “Mathematics”, and “Physics, Particles and Fields” (Waltman, 2012; Frandsen and Nicolaisen, 2010; the latter uses the specification of “High Energy Physics” instead of “Physics, Particles and Fields”).²

Ordering authors on a publication is necessary for the vast majority of scientific papers as the last decades have seen a sharp rise in the number of multi-authored publications. By now around 90 percent of all scientific publications have more than one author (the

¹ “Intentionally” chosen alphabetical ordering refers to the number of publications with alphabetical name ordering while correcting for the fact that, when the relative contribution-based rule is chosen, the author order is also sometimes alphabetical. How to calculate this is explained in more detail in Waltman (2012). The number of actual alphabetical orders is naturally higher than this number, but it can be at most twice as high (the number of intentionally alphabetically ordered papers can be interpreted as the excess of alphabetically ordered articles over the number arising from all authors choosing the contribution-based approach).

² In economics, the use of alphabetical name ordering increased slightly in the last two decades of the 20th century and slightly decreased again thereafter. In business and finance it increased in the end of the 20th century and then levelled off. In mathematics, it stayed constant at the end of the last century and later decreased, while in the aforementioned sub-field of physics its use stayed constant. For more detail, see Waltman (2012).

number of multi-authored publications in the few fields often using alphabetical name ordering is a bit lower, possibly due to the alphabetical name ordering norm; Abt, 1992; Frandsen and Nicolaisen, 2010; Hudson, 1996; Waltman, 2012). Note that it has been shown that multi-authored articles are more influential than single-authored articles (Wuchty et al., 2007; Gazni and Didegah, 2011).

The question of whether the particular name ordering norm currently in place matters to scientists and what the best name ordering norm is has received a considerable amount of attention in the last decades. Most of the discussions about this issue have probably not taken place in scientific journals, but there also the topic has been treated repeatedly (e.g. Zuckerman, 1968; Over and Smallman, 1973; Rudd, 1977; Tregenza, 1997; Shevlin and Davies, 1997; Stubbs, 1997; Garfield, 1997; many contributions are very recent and will be mentioned in the remainder of this survey). In such treatments, alphabetical name ordering has received a lot of criticism as many scientists consider it to give an unfair disadvantage to researchers with last names toward the end of the alphabet. The term “alphabetical discrimination” was coined for this matter.

There are multiple reasons why alphabetical name ordering can be considered unfair. Authors of articles with more than two authors disappear for example in the term “et al.”, because references in the text to such articles are often abbreviated as “*first author et al.*” (particularly in the social sciences). There is ample research in psychology and behavioral economics showing that visibility and recognition are important (e.g., Goldstein and Gigerenzer, 2002; Serwe and Frings, 2006). Thus, if the name order is alphabetical this would lead to an increased visibility of researchers whose last names begin with letters early in the alphabet. Ray and Robson (2016) illustrate this nicely: “To add insult to injury, one of us (Ray) had just been enthusiastically recommended a ‘wonderful paper’ by Banerjee *et al* (2001), on which he was a co-author”. A similar argument can be used for reference lists; when multiple references in a row start with the same author, it is likely that this author will be remembered as an expert in the field by those who see the

reference list. However, if authors are listed in alphabetical order, this means that mainly authors with a last name early in the alphabet will enjoy such recognition. Furthermore, if researchers in fields that mainly use alphabetical name ordering are not only evaluated and judged by researchers in their own field, authors who are listed often as first authors only due to their last names will be judged by the evaluators as performing better than authors who are not often first authors.³

These arguments seem convincing. However, one could also argue that these points do not matter in practice. One could even claim that alphabetical name ordering gives an advantage to people with last names at the end of the alphabet. If alphabetical name ordering is the norm, only authors with names at the end of the alphabet have the opportunity to signal particularly large contributions through deviating from the alphabetical norm; this is a possibility that authors at the beginning of the alphabet do not have, so the argument goes (see Engers et al., 1999).

Theoretical results on this question will always be driven by arguments as described above, which are reflected in the assumptions of the model.⁴ While one may find some of the arguments more and some less convincing, in the end the problem boils down to an empirical question. Do such arguments matter in practice? Are the disadvantages that authors toward the end of the alphabet have stronger or weaker than their advantages?

³ For arguments why alphabetical name ordering is unfair, see for example Einav and Yariv (2006), Efthymoulou (2008), van Praag and van Praag (2008), Maciejovsky et al. (2009), and Lake (2010). Furthermore, there are reasons to believe that alphabetical name ordering gives an unfair advantage to more senior authors (Lake, 2010) and that it contributes to discrimination against women or minorities (Sarsons, 2015); these arguments will not be discussed further in this survey.

⁴ Game theoretical models of the choice of author order and collaboration usually exclude any behavioural mechanisms by assumption, thus the points of visibility and recognition cannot play a role in these models. The same holds for being judged incorrectly by people from outside their own field. Signalling through first authorship can, however, play a role. For such theoretical models see for example Engers et al. (1999) or Ackerman and Brânzei (2012). Nevertheless, even the conclusions of these models are ambiguous with respect to the question of which way of ordering authors should be the norm.

If alphabetical discrimination plays a role, or is presumed to do so, it is interesting to know whether researchers react to it strategically. An alphabetical norm could for example lead researchers with last names late in the alphabet to cooperate less with more than one other researcher. As another example, some people may manipulate their last name if they have the opportunity, for instance by using only one out of two last names.

In this survey I review the empirical literature investigating these two closely related questions. The first is the question of whether and to which extent authors with a last name early in the alphabet have an advantage over authors with a name late in the alphabet under the alphabetical name ordering norm. The second is the question of whether and to which extent researchers react strategically to the convention of ordering author names alphabetically. The relevant studies on this topic focus almost exclusively on economics as the main field of alphabetical name ordering. This focus is naturally reflected in this survey, but the results are similarly relevant for other fields.

If alphabetical name ordering gives an advantage to some authors over others based on their names, it is clearly unfair. In addition, it can also be very inefficient. Such discrimination will not lead to the best people occupying the best positions. It is also inefficient if the norm of alphabetical name ordering leads to researchers not choosing the collaborators they would usually choose because they are afraid of not being credited appropriately.⁵

Previewing the results, there is clear evidence that alphabetical discrimination exists. Most of the reported findings are statistically significant. However, it is worth noting that also the direction of the non-significant findings almost always points toward alphabetical

⁵ One can argue that the absence of conflicts over first authorship is efficient when alphabetical ordering is the norm. However, given that contribution-based name ordering is the standard in the vast majority of fields and given that there is more and more interdisciplinary collaboration (e.g., Morillo et al., 2003) using alphabetical name ordering in a few fields will lead to conflicts over author orders in interdisciplinary research.

discrimination. As there is a wide variety of different outcomes examined, it is not surprising that the estimated quantities are very different. They reach from an estimated 5 percent increase in probability to receive tenure at a top-35 economics department in the US for researchers with an A-name as compared to a researcher with a Z-name up to an estimated 60–70 percent more downloads for top-1000 researchers on *RePEc* with an A-name as compared to such researchers with a Z-name. Evidence is also convincing that researchers perceive alphabetical discrimination to exist and react to an alphabetical norm strategically. This happens in various ways, from researchers with names at the end of the alphabet shying away from collaboration to researchers manipulating their last names.

The next section reviews the evidence on the existence and extent of alphabetical discrimination. Section 3 reviews the evidence on researchers' strategic reactions to an alphabetical name ordering norm. Section 4 concludes with a straightforward interpretation of the results and a recommendation based on the discussed evidence.

2 Are Authors with Last Names Early in the Alphabet Given an Advantage?

Multiple studies analyze whether authors whose last name starts with a letter at the beginning of the alphabet have an advantage over other authors in disciplines where author orders are determined by the alphabet instead of by relative contribution. More precisely, all of these studies investigate whether this is the case in economics, probably the most prominent field with alphabetical name ordering. These studies consider whether having a last name early in the alphabet yields to better outcomes according to a variety of different outcome measures. These outcome measures reach from receiving tenure at good universities over receiving a Nobel (memorial) prize to the numbers of downloads or citations that authors receive. Some of the studies concentrate on the top performers in a discipline as otherwise a pass-through effect could mask the effects of

alphabetical discrimination.⁶ However, concentrating on top performers is not the only possibility to identify alphabetical discrimination; other comparisons are possible, to some extent even experimental manipulation. Most studies carefully control for other effects that could potentially drive the results, such as the correlation between surname initials and ethnicity.

Whether the likelihood to work at top departments is influenced by surname initials is investigated by Einav and Yariv (2006) and Efthyvoulou (2008). The former examine whether authors with surnames early in the alphabet are more likely to receive tenure at top-economics departments in the US (looking at top-5, top-10, top-20, and top-35 departments). Einav and Yariv (2006) argue that if visibility and recognition play a role, these effects should be absent or very low at the beginning of academic careers but become more and more important thereafter. Therefore, if alphabetical discrimination exists, this should lead to tenured faculty having, as a whole, surnames earlier in the alphabet than untenured faculty. Indeed, this is what they find. The empirical distribution functions of surname initials of tenured faculty lie almost completely to the left of the ones of untenured faculty, no matter which level of top-departments is considered. In order to quantify the effects and to analyse whether these effects are statistically significant and robust, the authors report the results of multiple linear probability regressions (stating that probit estimates are virtually identical). Results are only statistically significant for top-5 and top-10 departments. Estimates are that the probability of receiving tenure at these departments are roughly 1 percentage point higher per letter earlier in the alphabet (slightly less at top-10 departments) accruing to a difference of around 26 percentage points between someone whose surname starts with

⁶ This pass-through is best explained with an extremely simple example. Assume that the best departments hire the best scholars with names early in the alphabet. Then the second best departments may still hire scholars whose last names do not reflect alphabetical discrimination, because the second best departments may hire the best scholars with names late in the alphabet and the second best scholars with names early in the alphabet.

an A compared to someone with a surname starting with Z. The authors conduct multiple robustness checks such as including controls for the origin of names or reducing the sample to include only faculty who obtained their Ph.D. between 1991 and 2000. The effects are robust. For top-20 and top-35 departments their findings are not statistically significant (the size of their point estimates hint at smaller effects here; they accrue to the probability of receiving tenure being about 5 percentage points higher for A-faculty as compared to Z-faculty). As a further control, the authors compare their results to the same analysis in the field of psychology, a field that has many similarities to economics but uses relative contribution-based name ordering. The patterns described above do not exist in psychology. The authors examine the time-trend of their findings arguing that, as much research in economics in earlier years was based on single-authored work, the bias found at the moment should be much weaker or absent a few decades ago. This is the case and thus reinforces the authors' view that their findings are driven by alphabetical discrimination.

The analysis of whether the probability to work at top departments is influenced by surname initials is extended by Efthyvoulou (2008). Instead of only looking at top departments, Efthyvoulou (2008) compares the probability to work at a top department with the probability of working at a low-ranked department instead. Using the top 17 and the bottom 51 departments in the US (according to a ranking based on Kalaitzidakis et al., 2003) he finds that earlier surname initials make it relatively more likely to work at a top department. His estimates for academic faculty at all ranks are that having a surname beginning with A makes it around 8 percent more likely that someone works at a top department than having a surname beginning with Z. Given that the effects of alphabetical discrimination are more likely to have an effect on older faculty, the same analysis is conducted for full professors only where the estimates are that it is around 20 percent more likely that someone is a full professor at a top department when the surname starts with A rather than Z. The results for faculty at all ranks are not statistically significant while the results for full professors are marginally significant. These results are

robust to controlling for nationality and name origin. The same relationships are then analyzed for the UK, albeit with a much smaller sample, using the top-6 and bottom-18 departments. Again the results point towards alphabetical discrimination, independently of whether nationality and name origin are included as controls or not. Having an A-surname rather than a Z-surname make it around 12 percent more likely to work at a top department for academics at all ranks and around 35–40 percent more likely to work at a top department as a professor or reader (these results are not statistically significant, which is not surprising given the much lower sample size).

Other measures of success that depend to a large extent on the perception of an economic researcher by others are becoming fellows of the Econometric Society, receiving a Clark Medal or receiving the Nobel Prize. Einav and Yariv (2006) examine how these outcomes are influenced by surname initials. The effects they report are that members of top-10 economics departments are more likely to become fellows of the Econometric Society. The advantage of A-surnames, as compared to Z-surnames, is around 20 percentage points. This effect is marginally statistically significant. When conducting the same analysis for top-35 departments, estimates become smaller (accruing to around 5 percent for an A–Z comparison) and statistically insignificant. The relationship between surname initials and receiving a Clark Medal or Nobel Prize point again in the direction of alphabetical discrimination (however, the number of such winners is very low and results are correspondingly not significant).

A very different, but clearly relevant, measure of success for researchers is the number of papers published in peer reviewed journals. Assuming that it is easier to publish for well-known researchers and for researchers working at well-respected institutions, alphabetical discrimination should lead to researchers with names early in the alphabet to be able to publish more papers than other authors (as, for example, visibility and recognition will lead to these researchers being relatively better-known and working at more respected institutions). This is examined by van Praag and van Praag (2008) who call

the number of publications “scientific weight” and the number of publications per year “productivity”. They consider data from 11 mainstream economics journals. As alphabetical name ordering takes time to have an effect, they consider both the sample of all authors and the sample of established authors by which they mean authors with at least 15 publications in refereed economics journals. In the sample of established authors they find a significant effect of the scientific weight of authors with names earlier in the alphabet being higher than other authors’ (they do not find an effect in the sample of all authors). Van Praag and van Praag (2008) find similar results for productivity. According to their results, “a Z-author would deserve a 16% premium on his observed weight compared with an A-author”. Their regressions, which include a number of covariates, are robust to using median regressions rather than ordinary least squares. Furthermore, they find that the growth of academic productivity increases faster for researchers with surnames early in the alphabet which can be expected if alphabetical discrimination plays a role via visibility and recognition.

Measures similar to publication output in peer-reviewed journals are the numbers of downloads and the number of page views researchers receive on research networks. Efthyvoulou (2008) investigates data from the top-1,000 authors according to downloads on *logec.repec.org* and from the top-1,000 authors according to abstract views. He finds that on average surname initials of the top-100 authors are earlier in the alphabet than average surname initials of the authors ranked between 200 and 300, etc. up to rank 600 after which surname initials stay roughly constant. This relationship holds for both downloads and abstract views and is in line with alphabetical discrimination.⁷ The author finds that being an A-author rather than a Z-author increases (the logarithm of) file downloads by 13 percent and abstract views by 11 percent. These findings are statistically significant and robust to removing outliers and to controlling for “output” and

⁷ As the discriminated authors that would otherwise be in the very top move down some ranks, one can expect that effects of surname initials are only visible in the top (and potentially in the bottom). For this argument see also Footnote 6.

“productivity” defined as the total number of publications and the average number of publications per year since the first publication, respectively (the author finds no effect of surname initials on output or productivity). Efthyvoulou (2008) furthermore conducts probit regressions regarding the likelihood to be among the highest ranked authors rather than among the lowest ranked authors. The effects are strongly significant and sizeable: The likelihood of being among the highest ranked authors in terms of downloads is almost 60 percent higher for an A-author than for a Z-author. For abstract views the corresponding increase in likelihood is almost 40 percent. When controlling for output or productivity the effect of the surname initial becomes even stronger, adding up to about 60–70 percent for downloads and to about 50 percent for abstract views.

Empirical evidence of a different kind is provided by Maciejovsky et al. (2009). They conduct a survey experiment among academics where these have to assign contribution credits. The subjects are shown different pairs of author groups made up of a list of common British names. Sometimes the order of the names is alphabetical sometimes it is not and comparisons can be between author groups of different sizes. The experimenters underline one author in each group (not necessarily placed at the same position) and ask subjects for their opinion on which of these authors has contributed more to the respective paper. They do this separately in the disciplines of economics (with alphabetical name ordering), psychology (with contribution-based name ordering) and marketing (a discipline heavily influenced by both and without a very strong norm on authorship order). Not surprisingly, researchers in psychology and marketing assign higher contribution credit to first authors independently of whether name orders are alphabetical or not. Notably, the same holds for economists. Even when name orderings are alphabetical, economists assign higher contribution credit to earlier authors.⁸ Although a strong norm

⁸ This occurs in the case of articles with two and three authors, while for articles with four authors economists give most contribution credit to the first author followed by the second author and then the last author and the third author in last place. This is a result which could stem from relative contribution-based author ordering where the last position can also play a special role (the “senior” author).

for alphabetical name ordering exists in economics, economists do differentiate their contribution credit assignment based on author position.⁹

3 Do Researchers React Strategically to an Alphabetical Author Ordering Norm?

The previous section described studies identifying and quantifying alphabetical discrimination. There are also studies investigating whether researchers perceive name ordering to be important when the name ordering convention is alphabetical. There are different ways for researchers to react strategically to the alphabetical name ordering convention. They reach from researchers with surname initials late in the alphabet being more likely to write single-authored papers, to researchers manipulating their last names in order to be listed as first authors more often.

Kadel and Walter (2015) investigate whether the fraction of single-authored articles in relation to all articles written by a given author is higher for authors with surname initials late in the alphabet. They also investigate for co-authored articles whether the fraction of two-authored articles is higher for authors with surname initials late in the alphabet (thus testing whether authors are afraid to disappear in the “et al.” or to be assigned less contribution credit for being listed in the back). They investigate this for economics and finance, separately. For economics they use data from 11 mainstream economics journals (the same as used by van Praag and van Praag, 2008). For finance they use a set of ten journals, based on Currie and Pandher (2011). Kadel and Walter (2015) restrict their sample to authors whose surname initials are in the range from A to E and to authors

⁹ In addition to the work described in this section, there is also evidence that is more difficult to interpret. For example Hilmer and Hilmer (2005) investigate the drives of salaries of agricultural economists. Agricultural economics is a special subfield of economics as it follows a contribution-based author ordering convention (possibly because of its proximity to other sciences). Their regressions, taking authorship into account, yield that there exists a wage premium for alphabetically ordered articles while there exists no wage premium for non-alphabetically ordered articles independently of whether the author under consideration is a first author or not.

whose surname initials are in the range from U to Z. They do not find a difference with respect to the fraction of single authored papers, in economics and finance alike. They do find a significant difference with respect to the number of two-authored articles (as a fraction of all co-authored articles) in economics. Authors with surname initials from A to E write 45 percent of all co-authored papers in teams of three or more, while only 42 percent of authors with surname initial from U to Z write their co-authored articles in teams of three or more. They do not find such an effect in finance.

Laband (2002) compares authorship in agricultural economics and other subfields of economics exploiting the fact that author ordering is usually contribution-based in agricultural economics while it is usually alphabetical in other economic subfields (whereas there is a lot of similarity concerning theoretical and empirical tools and the professional training authors received). He hypothesizes that if authors act strategically there should be more co-authorship in agricultural economics (this is in line with the argument that authors late in the alphabet avoid co-authorship in order to avoid alphabetical discrimination). He furthermore hypothesises that strategic behaviour on the side of authors should lead to author groups being larger in agricultural economics than in economics (which is in line with authors late in the alphabet avoiding large author groups in order to not be pushed too far back in the author list).¹⁰ The author considers data from three top journals in economics and from three top-field journals in agricultural economics in the years 1995–1999. The author finds that more articles are co-authored in agricultural economics than in general economics (77% in agricultural economics compared to 65% in general economics). This difference is statistically significant. Also the average number of authors per co-authored article is higher in agricultural economics (2.6 compared to 2.3 in general economics). Also this difference is statistically significant.

¹⁰ The exact argumentation by the author leading to these hypotheses is not precisely the possible argumentation stated here. The author's argumentation starts out from an "importance on priority". This notwithstanding, the empirical tests of the hypotheses are relevant for the purpose of this survey.

These findings support the claim that authors in economics strategically react to the alphabetical name ordering norm.¹¹

In a similar vein, Einav and Yariv (2006) consider publications from the top-5 economics journals from 1980 to 2002. They find that authors with surname initials late in the alphabet are less likely to cooperate in teams of four or five authors. More precisely, the average surname initials (coded from A=1 to Z=26; averages are taken so that the author order does not have to be controlled for) are lower for articles with one, two, or three authors than for articles with four or five authors (there are no sizeable differences between single-, two-, and three-authored articles). The average surname initial for articles with four or five authors is about half a standard deviation of the surname distribution of single-authored articles lower than that for articles with up to three authors.

Another way to check whether authors react to alphabetical name ordering is to see whether the likelihood to deviate from this norm is higher for authors late in the alphabet compared to authors early in the alphabet. Einav and Yariv (2006) investigate publications in the top-5 economics journals with respect to this question. Again coding last name initials from A=1 to Z=26, they find that articles deviating from alphabetical name ordering indeed have higher average surname initials than articles with alphabetical name ordering. The authors investigate this for two-, three-, and four-author articles and always find that this is indeed the case (the findings are only statistically significant for articles with three and four authors). If authors with surname initials later in the alphabet are not more likely to be greater contributors on average (which would be very surprising) the

¹¹ There are some points that can be brought up against these findings. The incidence of co-authorship observed in their particular sample does, for example, not necessary equal the likelihood that an individual will co-author with others. Furthermore, there could be other differences between agricultural economics and general economics driving the results. Nevertheless, their findings can be seen to provide some evidence for strategic decisions on scientific cooperation. For a study analyzing the relations between how intellectual collaboration takes place and authorship norms, see Laband and Tollison (2000).

only explanation that rests is that "authors perceive alphabetical discrimination to exist" (Einav and Yariv, 2006) and that they react strategically in response.

An analysis that is similar in spirit but more technical is conducted by van Praag and van Praag (2008). With their data from 11 mainstream economics journals, they investigate whether authors late in the alphabet are more likely to deviate from the alphabetical norm. They estimate the "hurdle" to deviate from alphabetical name ordering as a function of various characteristics with a main focus on authors' positions in the alphabet. Their results are that authors later in the alphabet on average employ a lower hurdle to deviate from alphabetical name ordering than authors early in the alphabet. These results are statistically significant.

A very different way to identify whether researchers react strategically to alphabetical discrimination is to look at manipulations of last names. Efthyvoulou (2008) considers different ways researchers can influence how their last names appear on published articles. First, he considers names with prefixes. Prefixes with D and V are particularly frequent (e.g. "de", "de la", "den", or "van", "van den", "von") and appear in very different positions of the alphabet. Researchers have some leeway in trying to include or exclude such prefixes from their last names, for example by writing them in capital or small letters, by putting them in brackets, by including them with the first name, or even by putting them behind the last name. The data for this investigation are multi-authored papers published in 2003 and 2004 taken from *EconLit*. Efthyvoulou (2008) restricts the data to articles with at least one author with a D- or V-prefix where the alphabetical position of such an author within the author group changes when the prefix is included as compared to when it is excluded. Probit regressions suggest that D-authors are 52 percent more likely to use their prefix as part of their last name than V-authors (this result stems from a regression where the number of co-authors is included as a covariate; without this control the estimate is 33%). The differences are statistically significant. Another group of authors who have some freedom in determining their last name listed on an article

consists of authors with two last names. Investigating publications from 11 mainstream economics journals from 1990 to 2006, Efthyvoulou (2008) finds that 53 percent of authors with two last names place the name coming earlier in the alphabet first. Probit regressions show that the likelihood to have the last name earlier in the alphabet as the first last name increases with the distance between the two last names in the alphabet. Having the maximum alphabetical distance between both names (one name beginning with A and one with Z) increases the likelihood to have the earlier last name as the first last name by more than 65 percent, compared to a distance of only one letter (e.g., one last name beginning with K and one with L). These differences are statistically significant. Looking at psychology as a comparison discipline without alphabetical name ordering convention, the author finds no such effects. The last possible name manipulations investigated by Efthyvoulou (2008) concern the transcription of Greek names into English. Some Greek letters have more than one version when the name is transcribed to English. The Greek letter Γ for example can be transcribed as G or as Y. 68 percent of authors in economics choose the transcription to English with the letter coming earlier in the alphabet compared to 66 percent in psychology. This hints at economists being aware of alphabetical discrimination. However, the differences are very small — other factors seem to play a more important role in such a decision (some letters may, for example, just look more natural to Greek people as transcriptions).

Another study dealing with strategical reactions to alphabetical author ordering is Ong et al. (2015). These authors analyse citation data from 1900 to 2000 from the top-23 economics journals and from the top-30 management journals from *Thomson Reuters Web of Science* (in these data, about 83% of the articles in economics exhibit alphabetical author ordering compared to about 48% of the articles in management). They find that citation ranks in economics are influenced by last name initials. This is not the case in management. The authors split the data into only single-authored papers, two-authored papers and multi-authored papers. They find that when considering only single-authored papers, articles written by researchers with surname initials late in the alphabet are cited

more often than articles written by researchers with surname initials early in the alphabet. The difference in citation rank amounts to a bit above 30 places out of 1,000 for an article written by a Z-author as compared to an article written by an A-author. When they look at papers with two authors they find exactly the opposite effect of about the same magnitude.¹² The authors conduct multiple robustness checks by including various control variables. Their results are robust to such controls and to restricting the data to the time frame of 1960 to 2000. They do not find any effects for papers with three or four authors. Overall, their results are in line with authors late in the alphabet writing better single-authored papers than authors early in the alphabet, due to selection into single-authorship by late authors when dealing with their best ideas. This interpretation seems particularly plausible as similar results are not found for management articles.

4 Concluding Remarks

I have surveyed the empirical literature on the effects of an alphabetical author ordering norm. Such a norm exists only in very few disciplines, most notably in economics, which is also the focus of the relevant work. The evidence provided in a variety of studies leaves no doubt that such an alphabetical norm disadvantages researchers with last names toward the end of the alphabet. The evidence furthermore shows that researchers are aware of this and that they react strategically to such alphabetical discrimination, for example with their choices of who to collaborate with.

The evidence presented in this survey suggests that the norm to order authors alphabetically is problematic. Given that only a few fields predominantly order author names alphabetically, it may be the easiest solution for these fields to abandon this special arrangement. Instead, the norm prevalent in the vast majority of disciplines may be followed according to which the relative contribution determines the order of author names on an article. This point is strengthened by the fact that inter-disciplinary

¹² Huang (2015) finds similar results for co-authored articles.

collaborations are increasing in importance (e.g., Morillo et al., 2003) where conflicts can arise as a result of different author ordering norms in different fields. The point is strengthened even further by the fact that in the fields with alphabetical norms these norms are not even necessarily unique (such as economics, where not the whole discipline follows the norm or physics, where only one subfield follows this norm).

An argument that can potentially be brought up in favor of an alphabetical ordering norm is that it supposedly makes it possible to contribute equally to an article while being assigned equal credit. As we have seen, this argument is wrong; credit is actually not equally assigned under such a norm. Furthermore, the problem of unequal credit assignment in case of equal contributions can be alleviated under a contribution-based rule. Author groups working together on multiple projects can, for example, alternate the author order. In addition to this, in cases where it is appropriate, I recommend inserting a footnote after some (or all) author names stating "These authors contributed equally to this work. The order of author names was randomly determined."

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