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CO-AUTHORSHIP TRENDS IN THE FIELD OF MANAGEMENT:

FACTS AND PERCEPTIONS

Chengwei Liu (Warwick Business School, UK)

Christopher Olivola (Carnegie Mellon University, UK)

Balazs Kovacs (Yale University, USA)

ABSTRACT

This paper explores the perceptions, preferences, and motivations that contribute to a widely recognized phenomenon: the continuous rise of co-authorship within the field of management. Using data from Web of Science, we first confirm that the average number of authors on published papers has steadily and continuously increased over the last four decades, and compare this trend across subfields and journals. We also conducted a survey, asking management researchers about their perceptions of co-authorship trends and their reactions to specific authorship scenarios. Comparing the "facts" and the "perceptions" of co-authorship, we suggest that increasing co-authorship in management reflects not only quality considerations and the need for collaborations but also instrumental motivations. We conclude by discussing the implications of our findings for the processes of peer evaluation and education in management.

**CO-AUTHORSHIP TRENDS IN THE FIELD OF MANAGEMENT:
FACTS AND PERCEPTIONS**

INTRODUCTION

Many academic fields witnessed a gradual increase, over time, in the average number of authors per publication (Babchuk, Keith, & Peters, 1999; Milojević, 2014; Wuchty, Jones, & Uzzi, 2007). This trend has been widely reported in the natural and physical sciences (Clarke, 1964; Laband & Tollison, 2000; Papatheodorou, Trikalinos, & Ioannidis, 2008; Weeks, Wallace, & Kimberly, 2004), as well as the social sciences (Barnett, Ault, & Kaserman, 1988; Fisher, Cobane, Vander Ven, & Cullen, 1998; Hunter & Leahey, 2008; Laband & Tollison, 2000; Mendenhall, Oddou, & Franck, 1984; Sigelman, 2009; White, Dalgleish, & Arnold, 1982). Recent studies show that the field of management is no stranger to this trend (Acedo, Barroso, Casanueva, & Galán, 2006; Manton & English, 2007; Smucker & Grappendorf, 2004). Yet, despite its prevalence, there has been scant attention paid to management researchers' perceptions and preferences concerning co-authorship (cf. Floyd, Schroeder, & Finn, 1994), or how these might affect co-authorship trends in management. This paper aims to contribute to this literature by empirically examining, and contrasting, the facts and the perceptions concerning co-authorship trends among management researchers.

Studying co-authorship trends, and how researchers perceive them, has important implications for education in management. For example, how should management researchers advise their PhD students when it comes to the question of whether to invite additional authors for particular projects? On the one hand, they might highlight the benefits of having (more) co-authors: the expanding stock of knowledge and increasing specialization in research require researchers from varying disciplines to collaborate in order to achieve intellectual diversity and innovation (Barnett et al., 1988; Katz & Martin, 1997; McDowell & Melvin, 1983; Terjesen &

Politis, 2015). Moreover, the advancement of communication technology has greatly facilitated research collaborations among previously unconnected scholars (Katz & Martin, 1997; Laband & Tollison, 2000; Moody, 2004; Newman, 2004). Finally, given that management researchers widely perceive upward trends in co-authorship (as our survey results indicate), adding additional authors to a project may be considered increasingly legitimate.

On the other hand, PhD students should also be made aware of the possible negative side-effects of having (many) co-authors. For example, junior researchers need to be recognized by their peers for their unique contributions to a field. Publishing a couple of co-authored papers in a top journal is a more ambiguous signal of independent research viability than publishing one single-authored paper in that same journal. As such, co-authoring may not only call into question junior scholars' ability to produce high-quality research on their own, but also hinder them in establishing a unique scientific identity. Thus, even if having more co-authors is considered increasingly legitimate, striking a balance and keeping both eyes "on the dual prize of disciplinary legitimacy and innovative distinctiveness" (Bailey, 2013: 113) is crucial for junior scholars to succeed. Moreover, having additional co-authors can lead to unintended consequences. Co-authors usually have complementary skillsets, which is essential for achieving intellectual diversity. But this also means that they do not necessarily have the skills to reliably evaluate the other co-authors' inputs. It only takes one careless (or unethical) co-author to ruin a research project. Indeed, papers are regularly retracted because of the misconduct of one co-author[1]. For these reasons, junior researchers also need to be informed about the less desirable

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[1] The website retractionwatch.com documents all retracted papers in recent years as well as the reasons for retraction. A recent example is the case of Holger Ernst, who was reprimanded for "having not sufficiently reviewed his [co-author's] work for mistakes" after several of his co-authored papers with Ulrich Lichtenthaler were found to have "data irregularities" and had to be retracted. For details, see http://retractionwatch.com/2015/09/29/german-department-head-reprimanded-for-not-catching-mistakes-of-co-author/

side-effects of co-authoring so they can properly tradeoff its potential risks and benefits, in order to make informed decisions that will serve their career development.

The purpose of this paper is to document the continuous growths in co-authorship within management (i.e., the "facts"), examine how these co-authorship trends are viewed (i.e., the "perceptions"), investigate the motivations that help drive these trends, and highlight some of their potential risks, for both current and future generations of management researchers. To be clear, we are not arguing that co-authorship is purely detrimental. Indeed, the right kind of co-authorship makes certain research projects possible and improves the quality of others. We strongly encourage co-authorship when it is driven by these genuine collaboration needs that benefit the quality of the research (and not just the authors' careers). We believe the best way to encourage the right kind of co-authorship, and deter the wrong kind (e.g., "free-rider" co-authors who contribute little to a project's quality), is to be explicit about some of the possible negative side-effects that are often neglected. In doing so, we aim to help management scholars become more aware of these risks and consequently make better informed co-authorship decisions. In sum, this paper examines not only co-authorship trends but also researchers' perceptions of these trends and their motivations for adding co-authors to their papers.

To examine the facts about co-authorship trends, we collected macro-level authorship data from articles published in the last four decades, both within the field of management and its neighboring fields, and we analyzed and predicted these trends at the level of subfields and journals. In line with previous studies (Acedo et al., 2006; Manton & English, 2007; Smucker & Grappendorf, 2004), we confirm that the proportion of multi-authored papers and the average number of authors per publication have both been steadily increasing in management. To model and predict the changes in co-authorship patterns, we used a zero-truncated negative binomial regression that provided a good fit to the author count data. The rank correlations between our in-

sample predictions and the actual data range from $r = .78$ to $r = .89$. We also use this modeling approach to evaluate inter-field differences (between management and other disciplines), as well as intra-field differences (between various subfields of management), in co-authorship trends. Among other findings, we predict that co-authorship will further increase in most subfields of management, especially entrepreneurship. And, while currently the modal article in management is solo-authored, our model predicts that in ten years the mode will shift to articles with two authors.

To examine the perceptions concerning co-authorship trends, we surveyed a sample of management researchers ($N = 261$) about their views and expectations regarding these trends, as well as their preferences concerning the inclusion of additional authors under various scenarios. Our results reveal several interesting patterns: (a) we find that management researchers accurately perceive these upward macro-level trends in co-authoring; (b) we find that they expect the trends to continue in the future; and (c) we find that scholars think that increases in co-authorship affect other subfields in management more than it affects their own subfields. We thus provide one of the first reports on how management researchers perceive co-authorship trends across the field of management as a whole and within their respective subfields. Next, we examine preferences regarding collaboration among management researchers. Our survey reveals that a number of factors influence their willingness to seek co-authors, including the number of existing co-authors on a manuscript, their specific subfield, and a mix of laudable and instrumental reasons.

The structure of the paper is as follows. We first provide a brief overview of prior studies on co-authorship trends and discuss why studying this phenomenon is important for the field of management. Next, we introduce the data and methods we use for our study, for both the macro-level publication data analyses and the micro-level survey data analyses. We then report the

results of both analyses. Finally, we conclude by discussing the implications of our findings for research ethics, academic evaluations, and the training of management scholars. We hope that our paper will serve as a stepping-stone for future research on this topic and encourage more researchers to study and reflect on the processes that govern co-authorship dynamics and their potential impacts on the field of management.

Prior Research on Co-Authorship Trends

Prior research has pointed to at least three, partly related reasons for the increasing numbers of authors per paper. The first is a productivity related explanation (Barnett et al., 1988; Katz & Martin, 1997; McDowell & Melvin, 1983; Terjesen & Politis, 2015). For example, the growing number of co-authors may reflect the increasing complexity of research topics (Weeks et al., 2004) and that the training of academics has become more specialized over time (Terjesen & Politis, 2015). It is becoming more common for papers to consist of multi-method data (e.g., observational and experimental) or multi-site data and also for these papers to contain larger and more complex datasets. By dividing up work among co-authors with diversified skill-sets, a research team can better address complex research questions (Barnett et al., 1988). Mentoring is another reason for co-authoring (Floyd et al., 1994). Senior scholars' research experience and skills are valuable resources, but their time is limited. Co-authorship offers are more likely to gain their attention and commitment to a project (Barnett et al., 1988; Hagen, 2010). The first explanation thus suggests that the increasing co-authorship trend is driven by a genuine need for research collaboration to enhance the quality of output.

The second explanation relates to the expanding networks within academia and the advancement of communication technology (Katz & Martin, 1997; Laband & Tollison, 2000;

Moody, 2004; Newman, 2004)[2]. The growing size of academia implies that there are more researchers to interact and collaborate with today; the increase in human life expectancy means that successful research partnerships now have longer windows of opportunity to be productive; the improvement in communication and file-sharing technologies (e.g., virtual meetings, cloud-based file sharing, etc.) enable collaborations among geographically separated researchers. Thus, the growth in co-authorship could be driven by these various contextual factors that facilitate research collaboration.

The third explanation focuses on the strategic reasons for increasing co-authorship; namely those unrelated to research quality per se but still helpful for one's career and reputation (Baum, 2011; Cronin, 2001; Merton, 1968). For example, it has been shown, in the field of political science, that multi-authored papers are more likely to be accepted for publication and are cited more often than those with fewer authors (Sigelman, 2009). The "publish or perish" culture in academia (Certo, Sirmon, & Brymer, 2010) may pressure some people to be more generous in offering and exchanging co-authorships to boost their publication counts (Miller, Taylor, & Bedeian, 2011). Sometimes senior co-authors are added to papers not because they make genuine contributions but because of power imbalances or field norms (Floyd et al., 1994). For example, female researchers may be more likely to seek senior, male co-authors to counteract the fact that papers with female lead authors are more likely to be rejected (Budden et al., 2008) and less likely to be cited (Brown & Goh, 2016; Sugimoto et al., 2013). The third explanation suggests that the upward trend in co-authoring may reflect not only a genuine need for collaborations as a means to increase quality, but also possible collusion as a means to increase output (Papatheodorou et al., 2008).

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[2] A reviewer pointed out that this distinction among the reasons for co-authoring relates to Bourdieu's (1986)'s distinction between cultural capital (first explanation) and social capital (second and third explanations).

Authorship Practices and Trends within Management: Why it Matters

Although the papers discussed above mostly analyze authorship trends in the physical sciences, life sciences, and the core social sciences, the same three explanations for the growth in co-authorship are all just as applicable to the field of management. Prior studies suggest that management as a field has grown continuously in terms of the numbers of business schools (i.e., hiring departments), faculty members, and students (Augier, March, & Ni Sullivan, 2005). Another indicator of its growth is the steady increase in attendance, over the past decades, at the annual meeting of Academy of Management (http://aom.org/Member-Services/Member-Statistics.aspx). This affords more scope for interactions and collaborations, as the network explanation suggests. Another genuine driver of increased research collaboration in management is its growing demand for interdisciplinary research. On one hand, management researchers are trained to be increasingly specialized (Terjesen & Politis, 2015). On the other hand, to be of interest to management practitioners, the research questions have to be broad and they need to integrate knowledge from multiple subfields of management (Van De Ven, 2007). For example, most funding bodies in management encourage collaborations via explicit calls for interdisciplinary research. All of this implies that research collaboration in management is necessary to engage and satisfy the needs of key stakeholders such as MBA students, funding bodies, and business leaders. Unfortunately, the third, strategic explanation applies to the field of management as well, so that increases in co-authoring may partly reflect less noble motivations. For example, some management researchers may believe that having famous co-authors increases their chances of having their manuscripts accepted by journals (see Simcoe & Waguespack, 2011, and our survey results, below). These researchers may therefore add senior co-authors simply to boost their publication prospects. Consequently, the field of management may face some of the

same challenges, when it comes to academic evaluations, as other fields that experienced

significant growths in co-authorship.

This strategic explanation could be more prevalent and detrimental than we might like to

believe. There are many cases in which researchers "added each other's names" to their papers to

enhance their career prospects (see, for example, *The Ethicist Blog*[3]). Some schools even have

explicit norms to never send their doctoral students to the job market without a top publication

(and these publications are often coauthored). Such practices may pose a number of serious

ethical challenges, some of which may also hinder the accuracy of academic evaluations (Wray,

2006). The growing number of authors associated with a research project diminishes the relative

contribution made by each person, which threatens individual motivation (Wray, 2006) and

increases the temptation to "free ride" on the work of others (Manton & English, 2007).

Furthermore, as the number of collaborators grows, it becomes harder to deter, detect, and

prevent unethical research practices before they occur, or to determine responsibility for such

actions once they have occurred (Wray, 2006). To the extent that different subfields of

management vary in their authorship norms and trends, this complicates the process of evaluating

and comparing the quality of management scholars across these subfields. For example, how

should we compare the CVs of two management scholars if one works in a subfield in which co-

authorship is generously inclusive and publication numbers are (therefore) high, while the other

works in a subfield in which authorship is highly exclusive and publications are (as a result)

much less frequent? Finally, recruiters who may not hire the candidates with the highest potential

– instead, those who end up being hired may increasingly be the ones who had the most

'strategically generous' advisors.

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[3] http://ethicist.aom.org/2014/10/twenty-questions-ethical-research-dilemmas-for-phd-students-phd-students-and-research-ethics-part-a/ (retrieved on 8th May 2015)

In light of these considerations, the main goal of this paper is to first document the rate at which co-authorship is increasing in management, and to determine in which subfields this increase has been the strongest. Our second goal is to explore some of the possible motivations behind the increases we observe. Among these motivations, we consider instrumental reasons for adding co-authors that may be detrimental to the field, yet contribute to the observed growth in co-authorship. While we are certainly not de facto opposed to upward co-authorship trends, we believe a healthy, robust co-authorship practice requires a better understanding of the facts, perceptions, and motivations that underlie these trends. Our intention is not to judge existing practices (this is *not* primarily a discussion of ethical issues); rather, we want to provide a descriptive, "lay of the land" assessment of the practices in the field (and subfields) of management. Only a few papers have previously studied co-authorship patterns in the field of management. Acedo et al. (2006) conducted exploratory analyses of co-authorship trends in management and demonstrated an increase in the average number of authors per paper. Relatedly, Smucker and Grappendorf (2008) demonstrated an increase in the proportion of articles in sports management journals with more than one author. Finally, Manton and English (2007) documented a similar trend within three management journals. However, these prior studies of co-authorship trends within management focused mostly on macro-level patterns (Acedo et al., 2006; Manton & English, 2007; Smucker & Grappendorf, 2004) and less on micro-level perceptions and decisions[4] (Floyd et al., 1994). Yet, both levels of data analysis are necessary to fully understand the causes and consequences of co-authorship patterns. To address this missing micro-macro link, we surveyed management researchers ($N = 261$) about their perceptions of co-

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[4] A few studies have examined micro-level perceptions and preferences regarding collaboration and co-authorship in fields other than management (Birnholtz, 2007; Bozeman & Corley, 2004; Lewis, Ross, & Holden, 2012; Melin, 2000).

authorship trends and their preferences concerning the granting of co-authorship under a variety of scenarios.

In what follows, we present the methodologies of our two studies and describe the resulting data, before presenting our findings, and finally discussion their implications. Our approach enables us (a) to examine the macro-level facts concerning co-authorship trends in the field of management and (b) to examine micro-level perceptions of these trends and management researchers' attitudes toward different co-authorship situations.

DATA AND METHOD

To examine the facts and perceptions about co-authorship trends in the field of management, we collected two types of data: publication records and survey responses. First, using Web of Science (which is managed by Thompson Reuters), we collected and analyzed publication data for 251 journals (403,312 articles in total) in management and adjacent fields. We empirically document how the average number of authors increased from 1970 to 2012, and how this pattern differs across management journals and management subfields.

We selected the 251 journals from the journal list developed by the Association of Business Schools (ABS list, Version 4 published in 2010), which includes most of the journals that business school faculty and researchers tend to publish in. The ABS list also includes discipline journals in adjacent fields such as economics, sociology and psychology[5]. The adjacent fields and management subfields that we included in our analyses are listed in Figure 1 – Figure 1A shows the four social science fields that were included in addition to management; Figure 1B shows the five subfields in management that were analyzed. Our categorization of journals into fields follows the system used by Web of Science.

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[5] A full list of journals and their fields according to the ABS list is available upon request.

Insert Figure 1 about here

To examine management researchers' perceptions of co-authorship trends and their preferences regarding co-authoring, in July 2014 we conducted an online survey among subscribers to the Academy of Management mailing lists. We posted an invitation to participate (along with the link to the survey) to the ten largest Academy of Management-hosted list-serves[6]. The survey asked participants about their perceptions regarding co-authorship trends in their own subfield of management and in the field of management as a whole, as well as their preferences regarding co-authorship in different contexts. We also asked about seniority and the Academy of Management division they were primarily affiliated with. The specific survey questions are available upon request.

A total of 261 management researchers completed our survey. While we do not claim that this sample is perfectly representative of the management community, we note that our respondents represented a diverse set of scholars. We received answers from respondents spanning more than 30 countries[7]. The survey respondents were 62% male and 36% female (2% did not report their gender), with the majority (72%) between the age of 31 and 60. Most respondents were assistant professors (31%), full professors (22%), associate professors (20%), and PhD students (17%). The most represented sections (in terms of respondents' primary affiliation/identification) within the Academy of Management (AoM) were Organizational Behavior (19%), Entrepreneurship (17%), Business Policy and Strategy (16%), Organization and Management Theory (10%), and International Management (9%); the remaining AoM sections each represented less than 5% of the sample. The survey sample is roughly representative of the

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[6] The ten lists are: BPS-NET, OMT, TIM, ENTREP, IMD-L, MG-ED-DV, STUDENT-L, COGNET, EMONET-L, OB.

[7] The most frequently represented countries were: the U.S. (54%), the U.K. (7%), Canada (7%), Australia (5%), Germany (4%), and the Netherlands (2%).

membership composition of the Academy of Management (membership statistics are available at http://apps.aom.org/MemberDirectoryNew/main.asp), except that the International Management division is slightly overrepresented in our sample. Moreover, AoM is composed of roughly 40% female and 60% male members, so our sample is quite representative in terms of gender.

MACRO-LEVEL TRENDS IN CO-AUTHORSHIP: REALITY & PERCEPTIONS

Authorship Trends in Management and Adjacent Fields

Figure 1 documents the general trends of average co-author count in management and adjacent fields. In particular, Figure 1A compares the trend in management[8] with those in four other social science fields, while Figure 1B compares the trends in five subfields of management. The solid lines are based on the data collected from Web of Science, for articles published between 1970 and 2012 (we grouped observations before 1982 because of the small sample sizes in those earlier periods. Our observation period ends in 2012 because later data are not available to us). As Figure 1A shows, all five fields examined showed a continuous increase, over the past forty years, in the average number of authors per publication, and all of these upward trends are statistically significant (all p-values < .001). In particular, the average number of authors in management articles increased from 1.25 before 1982 to 2.18 in 2012. This increase is weaker than in psychology, but stronger than in sociology and political science.

We also examined how these data predict future trends in co-authorship. We fit a cubic smoothing spline to the data and then extrapolated the trends based on the best-fitted parameters. Specifically, we aimed to minimize the spline objective function:

$$\mathcal{L}(m, \lambda) = \frac{1}{n}\sum_{i=1}^{n}(y_i - m(x_i))^2 + \lambda \int dx(m''(x))^2$$

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[8] The trend line for management publications in Figure 1A aggregates the results of the five subfields shown in Figure 1B (i.e., the five colored lines in Figure 1B are a decomposition of the black line representing 'Management' in Figure 1A).

After obtaining the best-fitted spline functions[9] for each trend (not plotted in Figure 1, but available upon request), we extrapolated and examined how the trends can be expected to evolve from 2013 to 2020. These extrapolations are represented by the dashed lines in Figure 1.

As Figure 1A shows, our cubic spline analyses predict a continued increase in co-authorship for all fields, including management, over the next few years. However, the extent of this increase varies across fields. In particular, despite having the largest average number of co-authors per publication in 2012, the field of psychology may already be surpassed by management. The results of our survey (described in the next section) show that management researchers' predictions concerning co-authorship trends seem to broadly mirror these model predictions.

Now, we turn our focus to five subfields in management. As Figure 1B demonstrates, all five subfields witnessed a continuous increase in the average number of authors per publication over the past forty years. Again, these upward trends are all statistically significant (all p-values < .001). Note that there is a sharp increase in the average number of co-authors in and around the year 1990 in the subfield of entrepreneurship. We also examined the extrapolations of future trends for these subfields, using the same cubic spline function approach. The results (dashed lines in Figure 1B) predict an increase in the average number of authors per publication in all subfields, except management science. The subfield of entrepreneurship shows the strongest predicted upward trend, followed by organizational behavior (see Figure 1A).

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[9] The first term in the spline objective function is the mean squared error produced by using the curve $m(x)$ to predict y, where x is the publication year and y is the average article author count in a given field. The second term is a penalty function of the curvature of function $m(x)$ weighted by λ. The second derivative of m with respect to x, m'', would be zero if m is linear, and be greater or smaller than zero if the m is convex or concave. Since we care about how curved m is on average, we integrate the squared term of m'' over all x. The weight λ regulates the extent to which we penalize the curvature of $m(x)$. When λ approaches infinity, only linear functions are allowed. When λ approaches zero, the curvature is maximized and the function will pass through every data point. To find an optimal value of λ that minimizes the spline objective function, that is, $\hat{r}_\lambda = argmin\ \mathcal{L}(m, \lambda)$, we apply a cross validation method in Matlab.

Overall, our analyses show that the average number of authors per publication has increased continuously over the past four decades. For most of the fields we examined, these trends are likely to continue, but there are also important variations among them. To further explore these variations, we compare the entire distribution of author counts across fields and journals.

The Distribution of Author Counts across Fields

Figure 2 documents how single-authored versus multi-authored publications evolved in management and entrepreneurship[10], and compares these to four adjacent fields (economics, psychology, sociology, and political science). As this figure shows, whereas single-authored articles represented 80% of management publications (excluding entrepreneurship) before 1983, this proportion dropped to 40% after 2007. In fact, although single-authorship in management articles remained more frequent than any other *specific* authorship counts up until 2012, the proportion of single-authored publications nonetheless dropped below 50% from the year 2000 onward, thus shifting from majority status to (dominant) minority. As we previously indicated, the pattern is slightly different for entrepreneurship, an emerging research field whose popularity grew in the 1990s. Consistent with the pattern shown in Figure 1B, the proportion of multi-authored articles in entrepreneurship saw a unique surge in the late 80s and early 90s, after which dual-authored articles became the majority.

The co-authorship patterns in management reveal interesting similarities with, and differences from, the four adjacent fields. The co-authorship trend in management is similar to those observed in sociology and political science, where a continuous growth of author counts exists but multi-authored articles were never the majority. This is in contrast to the significant

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[10] We separate the field of entrepreneurship from management because it is a relatively new field and the contrast is therefore informative.

peaks of dual-authored articles in entrepreneurship, which more closely resembles what we observe in economics and psychology, particularly in recent years (2003-2012). Taken together, these results suggest that the underlying mechanisms governing co-authorship dynamics may differ substantially across fields.

Insert Figure 2 About Here

The Distribution of Author Counts across Management Journals

Figure 3 documents the distribution of author counts in nine management journals[11]: *Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Management Science, Strategic Management Journal, Organization Science, Journal of Business Venturing, Journal of International Business Studies, and Organizational Behavior and Human Decision Processes (OBHDP)*. Multi-authored articles became the norm in all of these journals except *Administrative Science Quarterly*, whose pattern resembles the one in sociology (see Figure 2). All nine journals witnessed strong upward trends in co-authorship over the past forty years. However, some of these journals showed stronger upward trends than others, such as the *Academy of Management Journal, Management Science*, and *OBHDP*, whose single-authored articles represented less than 20% of contributions in 2003-2012.

Insert Figure 3 About Here

Figures 2 and 3 show the changes in authorship count distributions in the past four decades for selected journals and fields. These data also enable us to predict how these trends are going to evolve in the future. More specifically, one can estimate the best-fitting model of the

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[11] The first six journals are leading general management journals (as measured by their Impact Factors). The last three are the leading journals (i.e., have the highest impact factors) in three subfields of management (entrepreneurship, international management, and organizational behavior). These three subfields were selected because most of our AoM survey respondents are affiliated with one of these three subfields.

yearly author count distribution for each journal (or field). We fitted zero-truncated negative

binomial distributions[12] to the yearly authorship count data, for each of the 251 journals in our

sample and for every year between 1970 and 2012, and we estimated the parameters (m for mean

and v for variance).

The second step is examining how good our estimations are. We estimated and predicted

the trends based on the best-fitted parameters (m and v) acquired in the previous step for each

journal. Then we can use the predicted values of m and v to extrapolate the author count

distribution by feeding these parameter values back into a zero-truncated negative binomial

distribution. Specifically, we estimated the m and v parameters with a quadratic function, using

data up to 2011. Then we predicted the values of m and v for the year 2012. We then applied

these predicted values to a zero-truncated negative binomial distribution to derive the predicted

frequency for each author count. Doing so allows us to evaluate our estimations by comparing the

predicted author count frequency with the actual data in 2012.

To examine the effectiveness of our approach, we computed the rank correlations, across

journals, between predicted and actual author count frequency data for 2012. If our approach is

effective, these rank correlations should approach one. That is, we should be able to predict

which author count (i.e., single-authored, dual-authored, etc.) is the most common, the second

most common, and so on, for each journal.

The results suggest that our approach predicts the distribution of author counts quite well.

The average rank correlation between predicted author count frequencies (based on the estimated

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[12] Past research suggests that the Poisson distribution is suitable for fitting discrete count data, such as bibliographical data (Ajiferuke, 1991; Rousseau, 1994). Our Web of Science data often produce skewed distributions (as shown in Figures 2 and 3) and therefore violate a key assumption of the Poisson distribution – that the mean and variance are equal. The negative binomial distribution is a generalization of the Poisson distribution, and thus a better candidate for fitting our count data. Nevertheless, our data are censored at zero (since every article has one or more authors), and would thus bias standard negative binomial estimations that would try to predict the frequency of "zero-authored" papers. We address this issue by using a zero-truncated negative binomial distribution to model our data.

values using data from 1972 to 2011) and actual author count frequencies (based on the data in 2012) for the nine management journals included in Figure 3 is $r = .89$. The average rank correlation for all 251 journals in our data is $r = .78$. This suggests that the zero-truncated negative binomial distribution is a good fit to the author count data we collected and that our approach captures some of the key descriptive aspects of co-authorship trends.

Using the above model, we can predict how future author count trends will evolve. For example, our analyses (based on 110 management journals in our dataset) predict that by 2026, the modal number of authors in management articles will shift from 1 to 2 (i.e., that dual-authored publications will become the most frequent type of author count). For many of the organizational behavior journals (e.g., *Academy of Management Journal, Journal of Applied Psychology,* and *OBHDP*), however, the analyses predict that the modal number of authors per paper will shift from 2 to 3 by that same year. Next, we can ask how many of leading management journals will be dominated by multi-authored, rather than single-authored, papers in the next few years. Our analyses focus on the nine journals included in Figure 3 and the results suggest that dual-authored papers will become the dominant type in all of these journals by 2020. This prediction has implications for how research output is evaluated. Should funding bodies value single-authored papers even more when most research outputs are multi-authored? If so, our prediction could become self-defeating to the extent that changes in the relative incentives associated with single- vs. multi-authorship end up deterring co-authorship.

Perceptions of the Macro Trends in Co-Authoring

Next, our survey enables us to examine whether management researchers accurately perceive these upward macro-level trends in co-authoring. We asked the management researchers in our sample whether they thought the average number of authors per article had increased or decreased over time (past trend) and whether they thought it would increase or decrease going

forward (future trend), both within the field of management as a whole and within the specific

subfield (AoM division) they are most closely affiliated with. They answered each question by

selecting one of five response categories, which we recoded into a 5-point scale: "It [has/will]

decrease(d) significantly" = 1; "It [has/will] decrease(d) slightly" = 2; "It [has/will] stay(ed)

about the same" = 3; "It [has/will] increase(d) slightly" = 4; "It [has/will] increase(d)

significantly" = 5. The results, presented in Figure 4, reveal a general perception, among

management researchers, that the average number of authors in management articles has been

increasing and will continue to do so, both within their primary subfield field and management as

a whole (all mean ratings are significantly greater than the midpoint of "3" at the $p < .0001$ level).

Fewer than 11% of respondents believed that the number of authors in management articles had

either decreased or remained constant up to now, while fewer than 21% of them believed it would

decrease or remain constant going forward. Similarly, fewer than 18% of respondents believed

their primary subfield of management had experienced co-authorship deflation or stagnation in

the past, while fewer than 26% of them believed it would do so in the future. Respondents'

perceptions are thus broadly consistent with reality (Figures 1-3): most of them are aware that

there has been an increase in co-authoring within management journals and they also realize the

average number of authors in management articles is likely to continue growing for the

foreseeable future.

Insert Figure 4 about here

At the same time, our results show that management researchers also believe that this

increase in co-authoring will be weaker in the future ($M = 4.00$) than it has been in the past ($M =$

4.32) for the field of management as a whole (within-subject t-test: $t(260) = 5.95, p < .0001$). The

same pattern was found when researchers were asked to evaluate past and future increases in co-

authoring within their primary subfields (see Figure 4), and this difference was significant for four of the five most represented subfields in our sample (p-values $< .03$, except for entrepreneurship researchers who showed a non-significant trend in the same direction). Interestingly, most management researchers seem to believe that their primary subfield has been, and will continue to be, less susceptible to co-authorship growth than the field of management as a whole. Specifically, the average respondent judged that his/her own subfield had experienced a smaller increase in co-authoring in the past ($M = 4.14$) than the field of management as a whole ($M = 4.32$; within-subject t-test: $t(260) = 3.90$, $p = .0001$), and would also experience a smaller increase in co-authoring in the future ($M = 3.90$) than the field of management as a whole ($M = 4.00$; within-subject t-test: $t(260) = 2.89$, $p = .0042$).

To summarize, we find that most management researchers are well aware of the past increases in co-authoring within their field and they predict further increases in the future. These findings are important because such expectations could produce self-fulfilling prophecies: management researchers might reason that if their peers are collaborating with an increasing number of co-authors then they should follow suit in order to keep up with publication counts, resulting in even more co-authored papers. At the same time, most management researchers seem to believe that the increase in co-authoring will be weaker going forward and that their own subfield is less susceptible to it than other subfields of management.

An important question, then, concerns the underlying preferences, perceptions, and reasons that contribute to the observed co-authorship trends in management. In the next section, we explore the micro-level factors that contribute to co-authorship decisions.

MICRO-LEVEL CO-AUTHORSHIP DYNAMICS

The co-authorship trends in management are influenced by micro-decisions about whether and when to invite (additional) co-authors. Depending on the context, such as the number of

existing authors and her authorship position, a management researcher might be more or less

willing to invite additional collaborators. Moreover, underlying these decisions are preferences

concerning the kinds of collaborators that a management researcher seeks and her motivations for

doing so. A researcher might prefer to collaborate with colleagues who are more senior, less

senior, or of the same seniority, and this preference likely depends on her reasons for seeking

collaborators (e.g., their unique skills, their reputation, etc.). This section explores some of the

factors that influence authorship decisions, which ultimately contribute to co-authorship trends.

Willingness to Invite Additional Co-Authors: Preferences and Perceptions

First, we evaluated respondents' willingness to invite more co-authors on a manuscript,

and examined whether this depends on the existing number of authors and/or their authorship

position. Specifically, we asked the management researchers in our sample to consider 10

different authorship scenarios, in which the number of existing authors varied from 1 to 4, and

their own authorship position varied from 1st author to 4th author. For each scenario, respondents

indicated how willing they would be to invite more co-authors using a five-category scale

(recoded into a 1-5 rating): "Strongly opposed" = 1; "Mildly opposed" = 2; "Indifferent" = 3;

"Mildly in favor" = 4; "Strongly in favor" = 5. Respondents were next asked to indicate how

willing they thought most management researchers would be to invite more co-authors in each of

these 10 scenarios, using the same five-category scale. The results, presented in Figure 5, reveal

several interesting features about the determinants of co-authorship attitudes and how these relate

to perceptions of others' attitudes. Overall, the management researchers in our sample are not in

favor of inviting more co-authors: In none of the 10 scenarios did willingness to invite additional

co-authors significantly exceed the "indifferent" category (i.e., the midpoint of "3" on the 1-5

scale).

Insert Figure 5 about here

Moreover, their preference for adding co-authors depends more on the existing number of authors than on their own authorship position[13]. In particular, we see a significant drop in their willingness when the context shifts from two to three existing authors ($M = 3.02$ vs. 2.62; within-subject t-test: $t(260) = 7.31$, $p < .0001$), and another drop from three to four existing authors ($M = 2.62$ vs. 2.34; within-subject t-test: $t(260) = 6.86$, $p < .0001$). By contrast, there is no significant drop from single- to dual-authorship ($M = 3.10$ vs. 3.02; within-subject t-test: $t(260) = 1.05$, $p = .293$). One possible explanation for this pattern might be that researchers evaluate the appropriate or desirable number of co-authors in a relative way, by comparing the prospect of having a given number of authors on their manuscript with the typical numbers they observe within their field (Olivola & Sagara, 2009; Stewart, Chater, & Brown, 2006). Single-authored, dual-authored, and tri-authored papers are all fairly common within the field of management (within our dataset, they represent, respectively, 42%, 31%, and 18% of the management articles published between 2003 and 2012), so having up to three authors on a manuscript may not seem like a particularly unusual or large number. By contrast, four-author papers are quite infrequent (they represent less than 5% of management articles published in the same time period), so having three co-authors may seem like an unusually large number. Five-author papers are even less frequent (they represent less than 1% of management articles published in the same time period), so researchers might be even more loath to invite additional co-authors once there are already four authors on a manuscript.

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[13] A repeated-measures ANOVA with number of authors crossed with authorship position revealed a significant main effect of author count ($F(3, 780) = 48.94$, uncorrected $p < .0001$, Huynh–Feldt corrected $p < .0001$), a marginally significant effect of author position ($F(3, 780) = 2.57$, uncorrected $p = .053$, Huynh–Feldt corrected $p = .085$), and an interaction between these two variables ($F(3, 780) = 3.78$, uncorrected $p = .010$, Box's conservatively corrected $p = .053$). However, given that author count and authorship position are not fully crossed factors (since the latter is necessarily constrained by the former), these ANOVA results need to be interpreted with some caution.

Although authorship position had less influence than the number of existing authors, it did matter in one case: Within the context of a manuscript with two existing authors, we found a significant drop in willingness to invite additional co-authors when authorship position shifted from being first to second author ($M = 3.10$ vs. 2.95; within-subject t-test: $t(260) = 3.12$, $p = .002$). By contrast, authorship position did not significantly influence this willingness once there were three or four existing authors on the manuscript (both repeated-measures ANOVA p-values > .3). It is also worth noting that being lead author on a single- or dual-authored manuscript made no difference to our respondents: they reported an *identical* willingness to invite additional co-authors in both cases ($M = 3.10$). Taken together, these results suggest a discontinuity in authorship attitudes around the situation in which one is second-author on a dual-authored manuscript.

Why is willingness to invite additional co-authors only sensitive to authorship position in the special case of dual-authored manuscripts? One intriguing possibility is that co-authorship preferences are influenced, to some extent, by the citations rules that many journals have set (Simcoe & Waguespack, 2011). In most management journals, the citation rules require that all authors be listed whenever a single- or dual-authored publication is cited, but that only the first author be listed (followed by "et al.") from the second citation onward for publications with more than two authors. This somewhat arbitrary norm creates a discontinuity in the recognition that second authors receive: those on dual-authored publications see their names cited as frequently as the first author, while those on publications with additional co-authors see their name appear just once for a given publication, before disappearing behind a cloak of "et al.", only to make one final appearance in the references section. As a result, second authors on dual-authored manuscripts may be particularly motivated to oppose inviting additional co-authors in order to avoid falling into the "et al." precipice. By contrast, lead authors on dual-authored manuscripts

have much less to lose by inviting additional co-authors[14], since their authorship position means their name will not be absorbed into the "et al." void, while second authors on manuscripts with three or more authors have no more to lose by inviting additional co-authors than third or fourth authors, since they are all (equally) "condemned" to "et al." obscurity.

As a final examination of the potential factors influencing these preferences, we regressed personal willingness to invite additional co-authors onto both the contextual variables (number of existing authors and authorship position) and respondents' characteristics (tenure status, primary subfield[15], gender, age category, whether they reside in the US, and whether they reside in Europe), with all variables simultaneously entered and using clustered standard errors (at the respondent level to model the repeated measures). Only the number of existing authors significantly (and negatively) predicted willingness to invite additional co-authors ($b = -.28$, $p <$ .001). Thus, willingness to invite additional co-authors seems to depend more on the number of existing authors than on any other variables that we measured.

While the management researchers in our sample are not keen to invite co-authors, they perceive that their peers are even less in favor of doing so, particularly with single- or dual-authored manuscripts (within-subject t-tests comparing personal and perceived preferences were significant at the $p < .0001$ level for every single- and dual-author context). Once the number of existing authors exceeds two, however, they seem to believe that their personal preferences align with those of most other management researchers (none of the within-subject t-tests comparing personal and perceived preferences were significant for any of the three-author or four-author

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[14] One could even argue that lead authors may actually have something to *gain* (in terms of recognition and reputation) from doing so, since their names will become more prominent as a result (i.e., once the second author's name disappears into "et al." from the second citation onward, leaving only the first author's name visible to readers).

[15] We included one dummy (indicator) variable for each of the five most frequently represented AoM divisions in our survey sample (Business Policy and Strategy, Entrepreneurship, International Management, Organization and Management Theory, and Organizational Behavior). The remaining AoM sections were aggregated to form the reference category.

contexts). To the extent that our sample of respondents is sufficiently representative of most

management researchers, these results suggest an asymmetry between what management

researchers prefer and what they believe others prefer when it comes to inviting additional co-

authors on a single- or dual-authored manuscript. In particular, they seem to underestimate

others' willingness relative to their own – a form of pluralistic ignorance (Allport, 1924; Korte,

1972; Prentice & Miller, 1993).

In sum, management researchers (at least the ones in our sample) are indifferent about

inviting additional co-authors when they are lead authors on a single- or dual-authored

manuscript, yet they believe most of their peers in the same position would generally oppose

inviting additional co-authors. When they are not lead authors or once they already have two co-

authors, however, their willingness to invite additional collaborators decreases significantly and

they believe most of their peers would be similarly opposed in these situations. Although we

speculated above about some possible drivers and implications of these results, more research is

clearly needed.

Does Willingness to Invite Additional Co-Authors Vary Across Subfields?

The marked differences we observed, across subfields of management, in the average

number of authors per publication (Figure 1B) and the distribution of author counts (Figure 3)

suggests that these subfields may hold different norms about the value and appropriateness of

adding (additional) co-authors to a project. Although our earlier regression analysis did not find

that management subfields significantly predicted willingness to invite additional co-authors

when these were simultaneously entered as predictors (along with a variety of other variables),

that approach is not ideal for detecting differences *between* fields, and the results depended on the

reference category that we selected in our regression (which was a mixture of various subfields –

see Footnote 5). As a more direct test of potential subfield differences in willingness to invite

additional co-authors, we used a mixed-factorial ANOVA analysis approach, with the number of

existing authors as the within-subject factor and management subfield as the between-subjects

factor. Moreover, we focused on contexts in which the respondent imagined being the first author

on an ongoing project[16]. Limiting our analyses to the five most represented AoM divisions in our

survey sample (see Footnote 6), and excluding respondents from the remaining subfields, we

replicate the main effect of existing author count ($F(3, 543) = 29.16$, uncorrected $p < .0001$,

Huynh–Feldt corrected $p < .0001$), and we also find a main effect of subfield ($F(4, 543) = 2.47$, p

$= .046$), but no interaction between these two variables ($F(12, 543) < .4$). Thus, preferences

concerning the addition of co-authors to a project vary across subfields of management. To see

how these preferences differ between subfields, Figure 6 plots the cumulative likelihoods with

which respondents in each subfield indicated an increasing willingness to invite additional co-

authors (aggregating responses across all 10 authorship scenarios). This figure shows that

Entrepreneurship researchers and Organizational Behavior researchers are generally more likely

to favor (and less likely to oppose) inviting additional co-authors than their peers in other

subfields of management, as evidenced by the fact that the cumulative response curve is less

steep for Entrepreneurship and Organizational Behavior than it is for other subfields. Indeed, a 4

(author count) by 2 (subfield grouping: (i) Entrepreneurship and Organizational Behavior vs. (ii)

all other subfields) mixed-factorial ANOVA focusing on the lead authorship scenarios confirmed

that Entrepreneurship and Organizational Behavior researchers are significantly more willing to

invite co-authors than researchers in other subfields of management (main effect of subfield

grouping: $F(1, 777) = 6.49$, $p = .011$), and this greater willingness does not depend on the number

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[16] We limit our analyses to this context for two reasons. First, the lead author is often the person who decides whether or not to invite (additional) co-authors. Second, it allows us to examine the effects of varying the number of existing co-authors from one to four (note that our previous analyses indicated that the number of existing co-authors was generally more important in determining willingness to invite additional co-authors than one's authorship position).

of existing authors (interaction with author count: $F(3, 777) < .4$). By contrast, there were no significant differences between Entrepreneurship researchers and Organizational Behavior researchers ($F(1, 276) < .5$), nor between researchers in the other subfields ($F(3, 489) < 1$). In sum, preferences for adding co-authors do vary across subfields of management. In particular, we find that researchers in Entrepreneurship and Organizational Behavior are significantly more willing to invite additional authors than are researchers in other management subfields. This may help explain why the average numbers of authors per publication in Entrepreneurship and Organizational Behavior are larger than in many other subfields of management (Figures 1B and 3).

Insert Figure 6 about here

Why and With Whom Management Researchers Prefer to Collaborate

To further examine the factors that contribute to co-authorship preferences, we asked the management researchers in our sample to indicate the reasons that motivate them to collaborate on multi-authored papers. Specifically, we presented them with a list of six different reasons (see Table 1) and they selected all those (if any) that contributed to their willingness to collaborate. As Table 1 shows, the most popular reasons for collaborating with other researchers had to do with the skills they could bring to a project and the increased motivation that comes with having collaborators (as opposed to working alone). At the same time, many respondents ($> 40\%$) were motivated to collaborate because they believed it would make it easier to publish their research. Thus, while most management researchers seek out collaborators to enhance the quality of their research (e.g., because they expand the skillset and motivate productivity), many also do so for purely instrumental reasons that have little to do with the research process.

Insert Table 1 about here

We also asked our respondents whether they preferred to collaborate with people who were less senior than them, more senior than them, or about the same level. They were nearly three times as likely to prefer working with more senior collaborators than less senior ones (38% vs. 14%), though the largest share (48%) preferred collaborators who were at about the same level as them. If we exclude the most junior researchers (i.e., Masters and PhD students) for whom it would be difficult to find less senior collaborators, and the most senior ones (i.e., full and emeritus professors) for whom it would be difficult to find more senior collaborators, the pattern does not change fundamentally: the majority (54%) preferred to collaborate with someone of the same level, while the remainder were much more likely to prefer working with more senior collaborators than less senior ones (41% vs. 5%).

To examine the drivers of this preference, we conducted a multinomial logistic regression in which we regressed their preferences for collaborator seniority (with equal seniority as the reference category) onto their individual characteristics (tenure status, primary subfield, gender, age category, whether they resided in the US, and whether they resided in Europe) and their reasons for collaborating on multi-authored papers (entered as six dummy variables). The regression revealed that several factors predicted preferences regarding collaborator seniority: tenured management researchers were more likely to prefer collaborating with less senior colleagues ($z = 2.10$, $p = .036$) and less likely to prefer collaborating with more senior colleagues ($z = -3.70$, $p < .001$); organization and management theory researchers were less likely to prefer collaborating with more senior colleagues ($z = -2.26$, $p = .024$); respondents who were 41-50 years old were less likely to prefer collaborating with more senior colleagues ($z = -2.39$, $p = .017$); finally, respondents who stated that it "is easier to get published if one has well-known co-

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authors" as a motivation for seeking co-authors were (unsurprisingly) less likely to prefer collaborating with less senior colleagues ($z = -2.03$, $p = .043$). None of the other variables in the regression significantly predicted preferences regarding collaborator seniority.

In sum, although most management researchers (in our sample) are motivated to collaborate because it enhances the quality of their research, many also do so for purely instrumental reasons – namely to boost their chances of publication. These researchers also prefer to work with equally or more senior collaborators, whereas very few of them have a particular desire to collaborate with more junior colleagues. Although the desire to seek out more senior collaborators could just as plausibly be motivated by the expertise (i.e., skills) they can contribute to a project or the reputation they can bring to a paper, our regression analysis suggests the latter, purely instrumental reason, may be the main driver.

DISCUSSION

Management researchers have a tradition of reflecting on the development of their discipline (e.g., Adler & Harzing, 2009; Augier & March, 2011; Certo et al., 2010) and they have investigated the causes and consequences of business schools rankings, journal rankings, and citation rates (e.g., Baum, 2011; Gioia & Corley, 2002; Pfeffer & Fong, 2002). We contribute to this line of research with an examination of the continuous and robust increase in the average number of authors per publication over time in the field of management. Our analyses, among other aspects, goes beyond prior research by analyzing co-authorship trends not only in the field of management as a whole but also in its subfields separately. Our analyses of the macro-level data confirm the existence of clear upward trends in the average number of authors per publication in management and adjacent fields (Acedo et al., 2006; Manton & English, 2007; Smucker & Grappendorf, 2004). We documented the distribution of author counts in nine leading management journals, and found that all of them witnessed strong upward trends in co-authorship

over the past forty years. Moreover, we found that some of these journals showed stronger upward trends than others, such as the *Academy of Management Journal, Management Science*, and *OBHDP*. One possible reason for the stronger upward trends exhibited by these three journals may be related to the norms in their associated subfields. For example, it may be that in certain subfields (e.g., Entrepreneurship and Organizational Behavior), the threshold for adding co-authors is lower and/or that hiring and tenure evaluations penalize many-authored publications to a lesser extent than in other subfields.

Our paper also contributes to the literature on co-authorship trends by analyzing the micro-level factors that govern co-authorship dynamics in management. Specifically, we conducted a survey of the perceptions and motivations behind co-authorship decisions. We found that management scholars are generally aware of the past growth in co-authoring and, furthermore, that they predict its continued increase into the future. We also found that preferences for adding co-authors to a paper depend on the number of authors currently on that paper, whereas one's authorship position seems to matter less, except in the unique case of a dual-authored paper: there we found that being second author significantly decreases willingness to add co-authors (relative to being first author). Finally, we observed significant variance across subfields in the willingness to add co-authors. Specifically, we found that researchers in Entrepreneurship and Organizational Behavior are significantly more open to adding co-authors to an existing manuscript than their peers in other subfields of management.

The steady increase in the number of co-authors in management may partly be due to the productivity explanation (growing complexity of research) and the network explanation (increasing ease of collaborating) that we described in the introduction. However, our results suggest that the strategic explanation (motivations unrelated to research quality) also contributes to this trend. Specifically, we found that while respondents in our survey do list increasing

research efficiency and bringing in new skills as main reasons for collaborating, many of them also mentioned purely instrumental reasons for co-authoring, such as increasing the likelihood of having their manuscripts accepted for publication. Yet another instrumental reason (which we did not examine) might include adding someone to a manuscript as a favor that may later be reciprocated, thereby increasing the publication counts for both parties.

Our results further suggest that a self-fulfilling prophecy dynamic could also be contributing to this trend. In particular, the shared perception that co-authorship is becoming more common may add legitimacy to this practice and push researchers to co-author more frequently as a means to remain competitive in terms of publication output, which would further drive the growth in co-authorship. We believe this possibility deserves greater attention from researchers interested in understanding the evolution of academic collaborations, productivity, evaluations, and mentorship. We found that management scholars are generally aware of the past growth in co-authoring and they also anticipate its continued increase into the future. As we explained above, this perception, that co-authorship is increasingly the norm, could pressure them to conform by being more willing to exchange co-authorship opportunities with their colleagues and offer more co-authorship opportunities to their students. The increase in co-authoring is likely to persist to the extent that people neglect or underweight co-authorship inflation when they evaluate scholarly productivity. For example, prior studies show that people fail to adjust for grade inflation when they evaluate academic performance, leading them to more favorably evaluate individuals with higher grades, even though these grades reflect semi-arbitrary institutional norms rather than individual ability (Moore, Swift, Sharek, & Gino, 2010; Swift, Moore, Sharek, & Gino, 2013).

Limitations and Future Research

Naturally, our results are not without limitations. A primary limitation of our studies is that they did not allow us to directly differentiate between competing explanations for the growth in co-authorship within management. Our findings, particularly the continued growth in co-authorship over time and the survey results regarding perceptions of co-authorship provide some preliminary evidence for a possible self-reinforcing process. However, to fully examine this explanation, one would need longitudinal data on how these perceptions evolved over time, in order to document whether (and how) these perceptions emerged and diffused. Needless to say, this would be a challenging dataset to amass. The survey we conducted also had some other limitations; namely, a possible response bias: although we sent it out to thousands of management researchers (members of AoM), only 261 completed our survey. As such, we cannot make strong claims about the representativeness of our sample (that said, we did receive responses from nearly every division of AoM, from every seniority level, from many different countries, and from a representative composition of male and female respondents). Researchers interested in conducting similar surveys might consider one or more strategies for increasing response rates, such as providing incentives for completion (e.g., offering gift certificates to a randomly selected subset of respondents) or administering surveys in person (e.g., at the annual AoM conference). Another limitation of the survey is that it did not ask about the actual research output and publication record of the respondents. Yet another limitation is that we cannot control for the actual quality of the papers. Future research should investigate how authorship counts relate to the quality of the articles. This is hard to test because, for example, it is not easy to obtain data on rejected articles, and this omission could result in sampling bias to the extent that rejection rates are related to authorship counts. There is also the possibility of reverse causality: if one were to find, for example, that co-authored articles receive more citations, it is hard to tell if the relationship between co-author counts and citation counts is due to the fact that higher quality

authors are more likely to co-author or because co-authored papers are of higher quality. To

address these issues, future research could assemble panel data and directly model the

endogenous co-authorship selection choices. Finally, future research should investigate how co-

authoring practices and perceptions vary with the actual publication record of academics.

Collecting these data may help disentangle some causality issues that our paper could not address.

For example, are researchers who are more willing to add co-authors more successful as a result

of this practice, or is it that they are more willing to add co-authors because they are successful?

Answering such questions would also require a longitudinal research design.

Implications

These limitations notwithstanding, our results suggest several implications for educating

junior scholars regarding the ways in which increasing co-authorship can impact the evaluation of

publication outputs, and how this effect might be partly driven by their perceptions. For example,

the widely shared perceptions of upward co-authorship trends may be interpreted by many as the

result of an ongoing publication "arms race." Researchers may, correctly or erroneously, come to

believe that their potential evaluators, such as deans, colleagues, grant boards, or tenure

committees, will assess them primarily according to their publication volume and their citation

counts. This belief would then motivate them to increase both of these indices by engaging in

more co-authoring. As more authors engage in co-authoring, a significant problem emerges for

the evaluators of academic productivity. They now have to judge quality by counting publications

(and citations) because carefully reading every publication in a researcher's CV becomes

infeasible as this output increases, and also because of the difficulties in judging individual

contributions in multi-authored papers. The original belief could thus become self-fulfilling, and

even researchers who previously did not share the belief that publication (and citation) counts

matter a great deal could eventually find themselves under pressure to conform and thus increase

their own publication output, so as to avoid being disadvantaged in evaluations. This spreading

pressure to increase output quantity would then further boost the already increasing trend in co-

authoring. In sum, as with all self-fulfilling prophecies, an initial belief leads people to act based

on that belief (increasing their publication output by increasing co-authorship) and reinforce it

(other researchers respond by also increasing both their own and their students' publication

outputs) to such an extent that it becomes reality (evaluators who can no longer feasibly carefully

evaluate papers individually, due to their sheer numbers, are now forced to rely on publication

and citation counts as major indices of academic performance). This self-fulfilling prophecy

explanation is related to, and further unpacks, the strategic explanation by elaborating how a

"publish or perish" culture (Certo et al., 2010) can emerge and diffuse among academics,

evaluators, and other stakeholders. This could have detrimental impacts on the processes of

evaluation and education in management by creating arms races and adverse selection (Denrell &

Liu, 2012). Once these beliefs become generally accepted management academics and job market

candidates have to build even longer CVs to stay competitive and later to gain tenure. This

intense competition can lead to suboptimal outcomes: evaluators may not consistently promote

the highest quality scholars; instead, those being promoted may often be the most connected and

calculating ones.

So, what can be done to attenuate this potentially negative side-effect of co-authorship

inflation? First, evaluators, such as business school deans, can change the ways research outputs

are evaluated and rewarded, in order to attenuate this arms race in co-authoring. If everyone to be

evaluated worked in the same field with the same norms, then the number of publications would

be a less noisy indicator of quality. However, this is not the case. Management research groups

often contain a mix of researchers from subfields that tend to value articles with fewer authors

and researchers from subfields that do not share these values. To the extent that evaluators

underweight this heterogeneity in co-authorship norms, faculty members with more publications may receive more favorable evaluations, even if their contributions are diluted by many co-authors[17]. This issue is highlighted by the results of a recent survey of business school deans, which revealed that they do not consider the increase in co-authoring to be a serious problem (Manton & English, 2007, 2011). However, it matters in the field of management because it hurts evaluation quality in the long-run. Publication quantity may trump quality and selection processes therefore risk overlooking many high-quality candidates. As a result, the genuine (i.e., quality-based) need for collaboration may be overwhelmed by incentives for collusion. One possible solution would be to make public the number of times a published article is used for evaluations and promotion decisions (across all of its authors). This may attenuate the incentive to have a long CV with mostly multi-authored publications. Or consider two specific examples of policies that were actually implemented, which illustrate other ways that evaluators can fight the increasing co-authorship trend. The first is how the UK Research Evaluation Framework (REF) sets an upper bound on the number of publications per researcher that contribute to the evaluation process, in order to attenuate the motivation to substitute quantity for quality when evaluating academic outputs by UK universities. Specifically, each university researcher being evaluated can submit at most four publications during the evaluation process. Moreover, each publication can only count toward one of the author's evaluation (i.e., the same publication cannot contribute to the evaluation of several of its authors). These requirements effectively decrease the motivation to co-author purely as a means to improve evaluations. The second example is how the deans of many European business schools, which offered bonuses to researchers who published in top journals, changed the incentives for collaboration to demotivate collusion. Specifically, some of

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[17] While multiple approaches have been proposed to adjust evaluations in ways that account for multi-authorship (e.g., Hagen, 2010; Lukovits & Vinkler, 1995; Schreiber, 2009), these are rarely implemented.

these schools explicitly stipulate that co-authors from the same institution will have to divide these bonuses amongst themselves[18]. The design of this incentive mechanism suggests that these schools recognize the potential for their faculty members to collaborate for non-quality reasons[19]. While these examples are illustrative, there are surely many other ways to discourage collusive collaborations.

Co-authorship trends also have implications for female academics. Research has documented widespread evidence of gender biases in academia (Brown & Goh, 2016; Quiñones-Vidal, Loźpez-García, Peñaranda-Ortega, & Tortosa-Gil, 2004). For example, Budden et al. (2008) analyzed papers that were submitted to the journal *Behavioral Biology,* and compared the outcome of editorial decisions pre-2001 and post-2001. The journal in 2001 introduced a blind review process, and Budden et al. (2008) found that articles by female first authors were much more likely to be rejected prior to 2001 than after 2001. Research also shows that women are less likely to be in the most prestigious author positions (Caplar, Tacchella, & Birrer, 2016; Lariviere, Ni, Gingras, Cronin, & Sugimoto, 2013; West, Jacquet, King, Correll, & Bergstrom, 2013) and that papers with female lead authors are less likely to be cited (Brown & Goh, 2016; Quiñones-Vidal et al., 2004). Most recently, Sarsons (2015) found that female authors receive less credit for published work than their male co-authors on the same paper. These findings pose a serious dilemma for female authors: on one hand, they may want to invite co-authors (especially male co-authors; see McDowell & Smith, 1992) to counteract a gender bias that seems to penalize papers authored by women (Brown & Goh, 2016; Budden et al., 2008; Caplar et al., 2016; Lariviere et al., 2013), in order to increase their chances of publishing and being cited. On the

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[18] We thank the editor and reviewers for pointing this out. For a specific example, see the bonus system of the Finance Initiative at the Norwegian School of Economics (https://www.nbim.no/globalassets/documents/nfi/annual-nfi-report-2015.pdf).

[19] Such policies may also have the unintended, and possibly harmful, side-effect of dis-incentivizing fruitful collaborations. Future research is needed to explore the exact effect of such policies.

other hand, they risk receiving less credit for their work if male co-authors are added (Sarsons, 2015; West et al., 2013). This latter concern may discourage female first-authors from inviting (or allowing) co-authors to join a research project. To examine this possibility, we ran an additional analysis comparing, on the sample of management journals, the average numbers of authors on papers with female versus male lead authors. We used U.S. Social Security data on the distributions of first names across genders (e.g., 99% of individuals called "Peter" in the U.S. are male) to identify first names that were especially likely to belong to men and those especially likely to belong to women. We then matched this name-gender likelihood information to the names of the authors in our dataset, and limited our analyses to articles whose first authors had distinctly male or female first names (i.e., lead authors were categorized as male when their first name had a greater than ninety percent probability of belonging to a man, and female when that probability was less than ten percent)[20]. After controlling for the year and journal in which the paper was published, we found no significant differences (based on a sample of management articles in which we could unambiguously identify the gender of the first author)[21]. Similarly, we did not find significant gender differences in the willingness to add co-authors when we looked at our survey data. These 'null' findings concerning gender may reflect the dilemma facing female authors, which pits a desire to publish and be cited (and thus to add male co-authors as a means to counter the gender bias) against a desire to receive proper credit for their published research (and thus to avoid adding male co-authors).

As we discussed in the introduction, our findings have important consequences for both research ethics and research evaluations (Papatheodorou et al., 2008; Wray, 2006). The continued

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[20] Note that by using a US-based gender disambiguation dictionary, we cannot identify authors with first names that are not used in the US, and therefore we excluded articles with non-US first author names from our analyses.
[21] Interestingly, we found that papers with female first-authors tended to have more co-authors *when not controlling for the journal.* This indicates that female authors tend to publish in domains where co-authorship is more prevalent.

growth in the average number of authors per publication highlights two important implications for research ethics. First, with this increase in co-authorship, researchers are exposing themselves to greater risks of misconduct by co-authors, such as manipulating data and statistical analyses to achieve desired results. But given the clear co-authorship trends in the past and their expected trajectories in the future (revealed by our analyses), the field of management needs to prepare itself for a likely increase in the number of academic fraud cases characterized by ambiguous blame attributions. Second, as co-authorship increases, there is an increased need to communicate and coordinate on research norms and styles. This is particularly relevant for an interdisciplinary field such as management. Researchers from different subfields working together may have different expectations about co-authorship. For example, our data suggest that an organizational behavior researcher may be more generous in offering co-authorship opportunities than an organizational theory researcher. Conflicts may arise if these expectations are not well communicated.

Finally, it is important to emphasize that our findings point to a number of implications for the education of future management scholars. Research is of core importance for future scholars, and co-authoring choices are crucial in their academic (and often personal) lives. It is therefore essential to make aware future scholars about the benefits and pitfalls of co-authoring, and to call their attention to reasons one should or should not co-author in their research. Our personal experience is that graduate students and junior scholars are especially exposed to the "publication count" pressure. Therefore, to attenuate this potential "arms race" and the resulting increase in the tendency to co-author due to instrumental reasons, social influence, and/or competitive pressures, our study on the facts and perceptions of co-authorship trends is essential for educating the next generation management. After all, awareness of the relevant risks and benefits in any decision is the necessary first step toward making informed choices.

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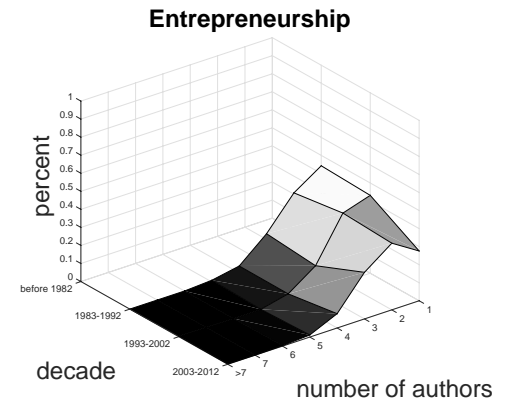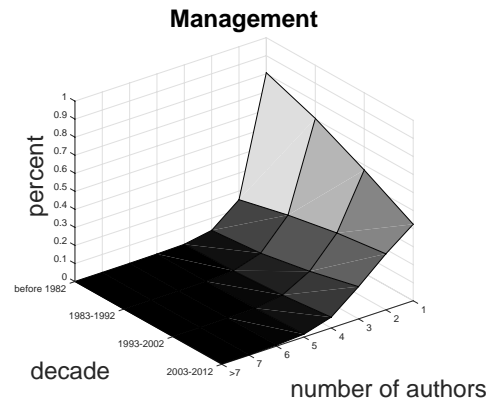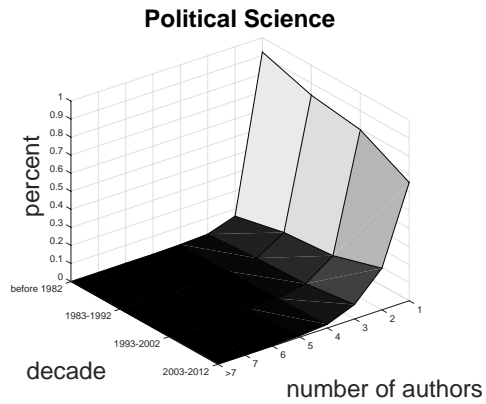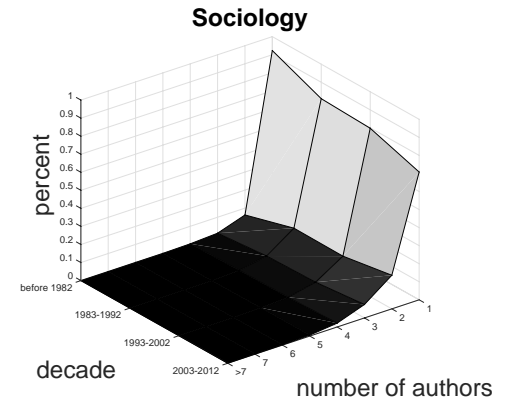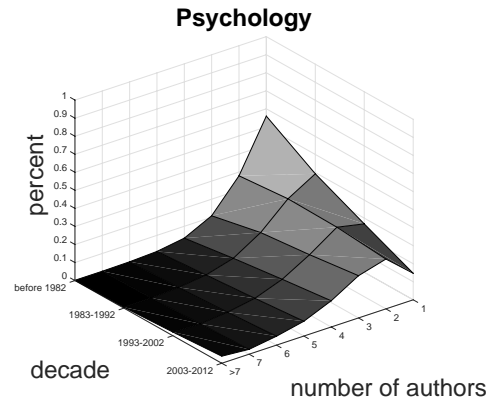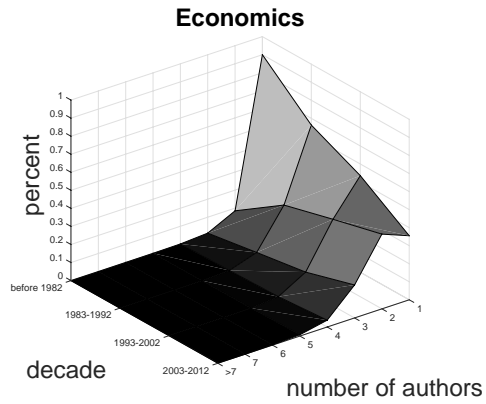
FIGURES

Figure 1. Changes in the average number of authors per publication over the past four decades and going forward, in the field of management and in adjacent fields. Figure 1A presents the trends for management and four adjacent fields in the social sciences. Figure 1B presents the trends for five subfields of management. The first data point in each trend line represents aggregated data from all years prior to 1982. Solid lines represent the existing data (from Web of Science), while dashed lines represent extrapolations of future trends based on best-fitting smooth spline functions.
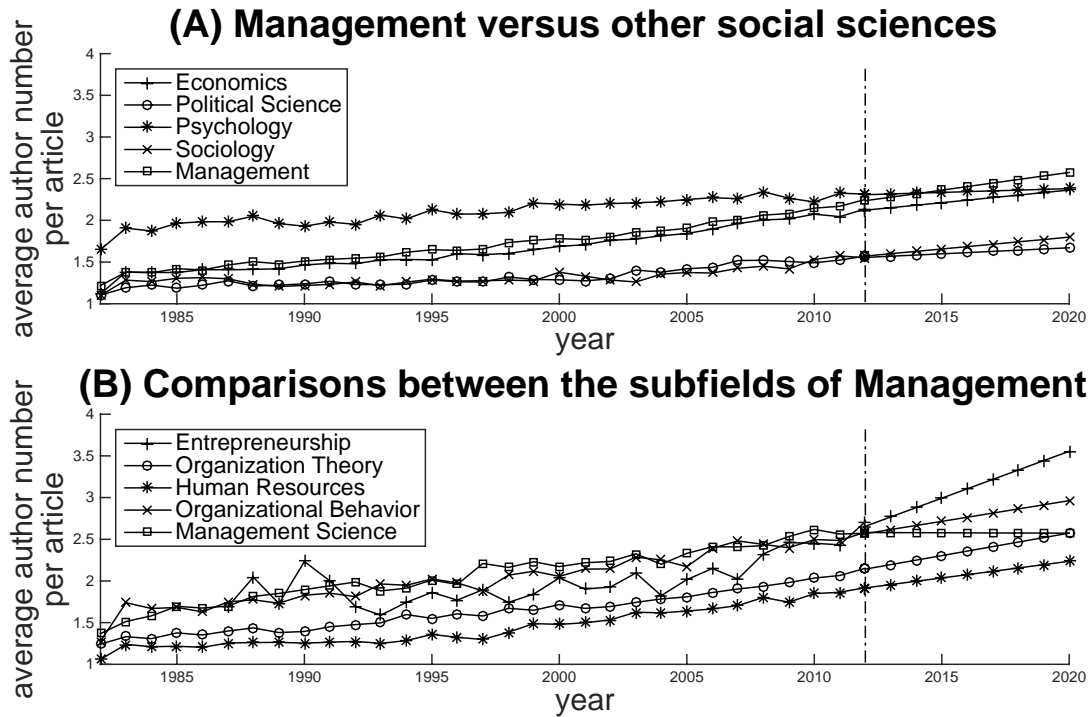
Figure 2. Authorship trends in six fields. Each graph presents the proportion of published papers with a given number of authors across four previous decades, for a particular field.

Figure 3. Authorship trends in nine leading management journals. Each graph presents the proportion of published papers with a given number of authors across four previous decades, for a particular management journal.
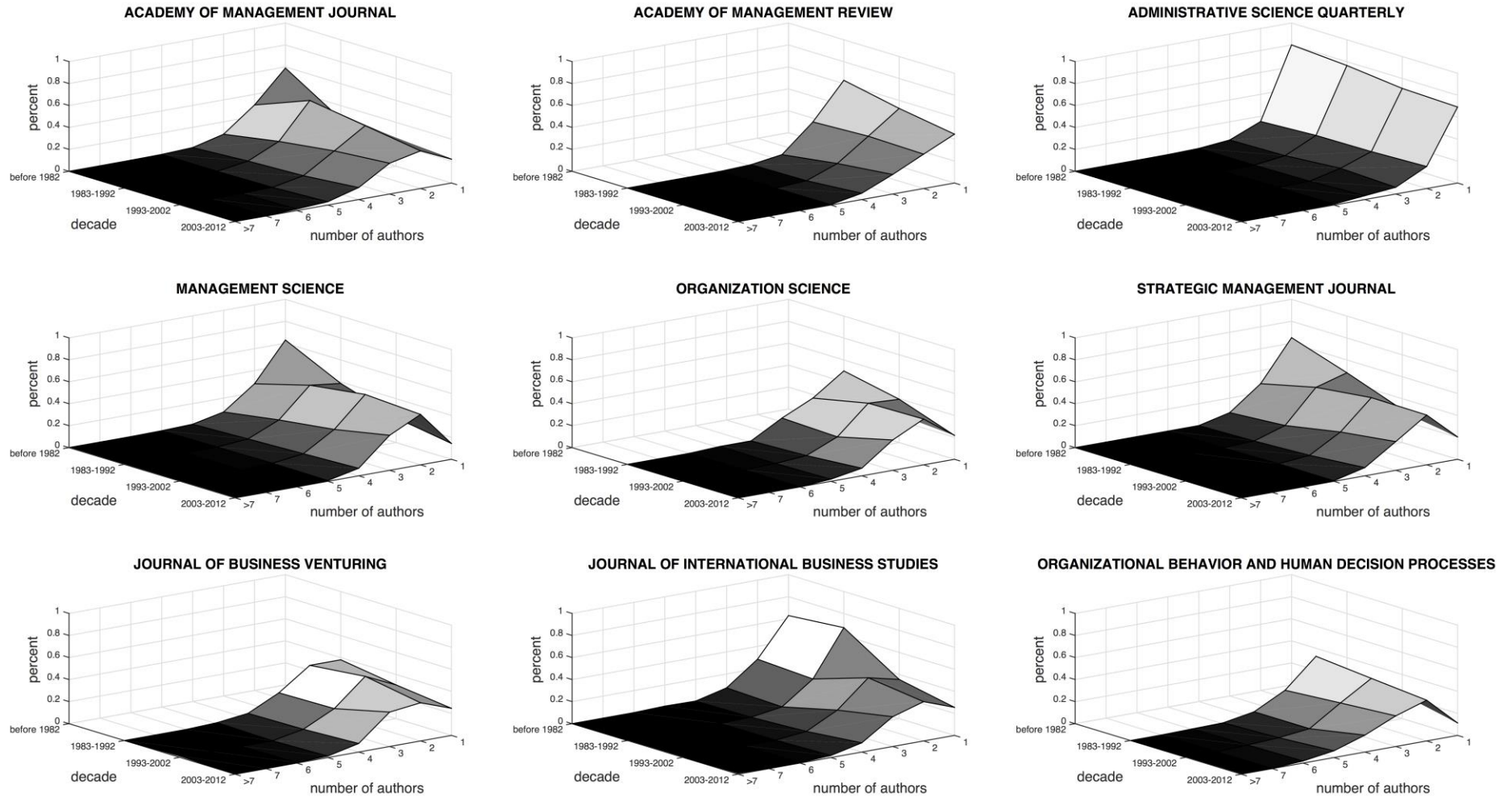
Figure 4. Perceptions of authorship inflation trends in the past (grey bars) and the future (black bars). The top two bars present the average perceptions for the field of management as a whole. Bars below the legend present the perceptions for researchers' primary subfield. Error bars are standard errors of the mean.
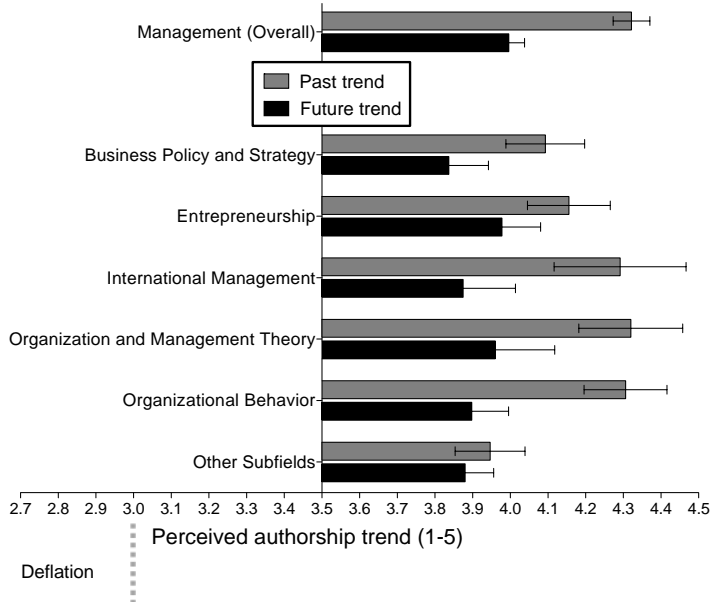

Figure 5. Willingness to invite additional co-authors as a function of the number of existing authors and one's authorship position. The lines on the left present management researchers' personal preferences, while the lines on the right present their perceptions of other management researchers' preferences. Error bars are standard errors of the mean.
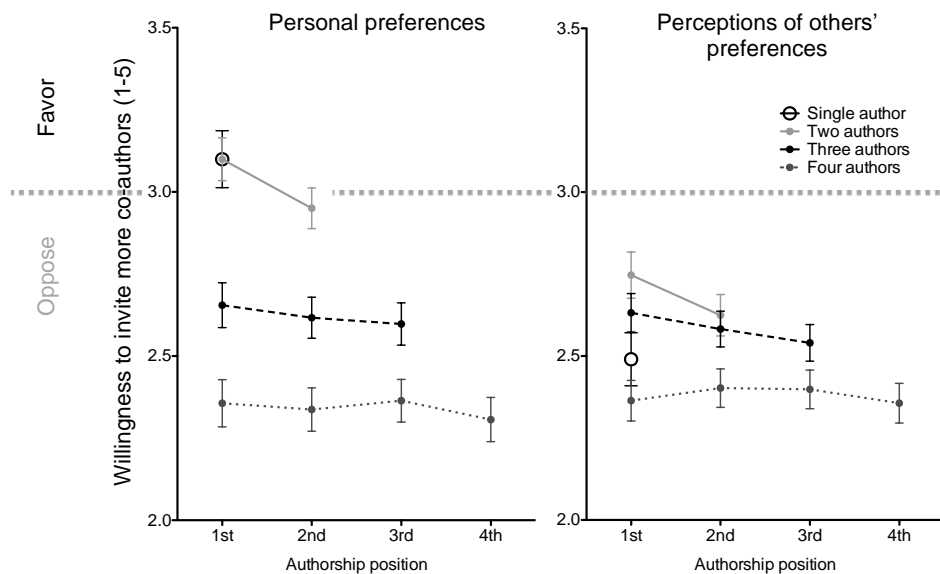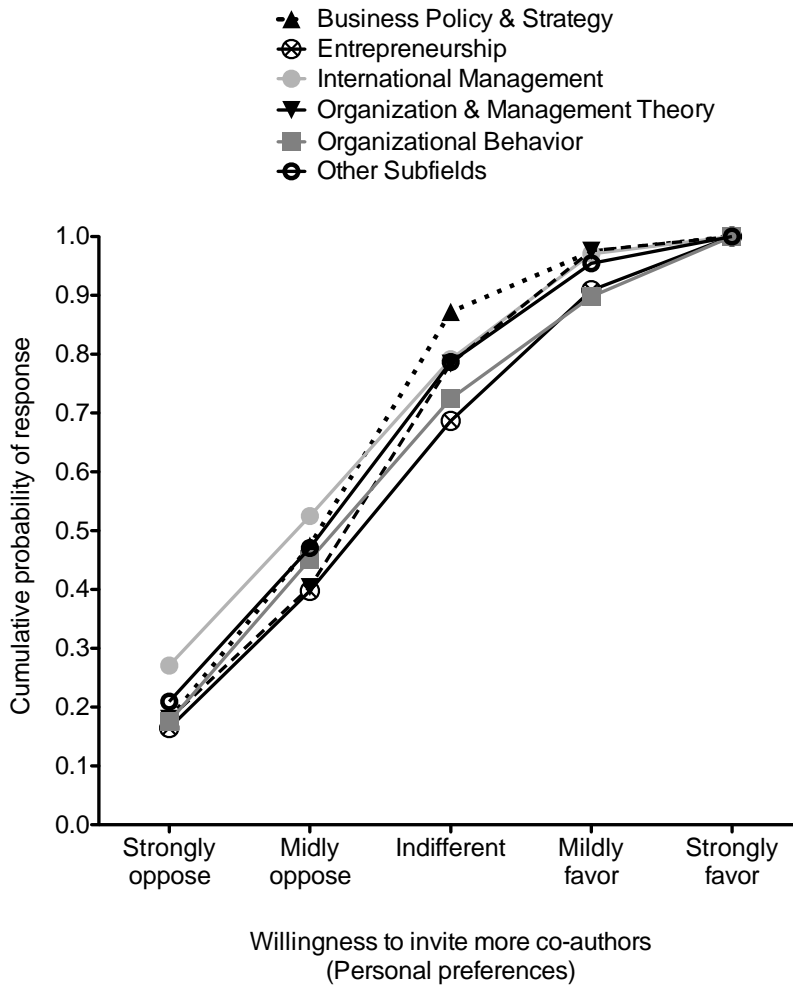
Figure 6. Cumulative probability (across respondents and across all 10 scenarios) of responses to questions about personal willingness to invite additional co-authors, for different subfields of management.

Legend:
- Business Policy & Strategy
- Entrepreneurship
- International Management
- Organization & Management Theory
- Organizational Behavior
- Other Subfields

Y-axis: Cumulative probability of response

X-axis: Strongly oppose, Midly oppose, Indifferent, Mildly favor, Strongly favor

Willingness to invite more co-authors
(Personal preferences)

TABLES

Table 1. Self-reported reasons for collaboration, ordered by frequency

The reasons I collaborate on multi-author papers are:	Proportion of respondents
Co-authors bring to the project skills that I don't have	95%
Having co-authors motivates me and keeps the project going	67%
I don't like working alone	34%
It is easier to get published if one has well-known co-authors	33%
It's better for everyone involved	32%
It is easier to get published if one has multiple co-authors	16%