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The Micro-Geography of Academic Research: How Distinctive is Economics?

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Abstract

This study examines micro-geographic clustering of academic research, focusing on economics. Three U.S. ZIP codes are associated with articles in the top five economics journals that garnered one-half of all citations to the articles published in these journals over 2000 to 2015. This remarkable degree of micro-geographic concentration is not apparent in any other discipline. Outside of economics the top three ZIP codes are associated with just 12% of citations to their top five journals, on average. Concentration of citations to economics articles whose authors are associated with a few key ZIP codes has strengthened over time, even as it has weakened for other disciplines. This distinctively high level of spatial concentration in economics research is not consistent with hypotheses about disciplinary differences stemming from market forces or from reliance on research infrastructure located in specific locations.

Keywords

citations
economics
micro-geography
scientometrics
spatial concentration

JEL Codes

A12, R12

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1. Introduction

The degree of insularity, the strength of internal hierarchy, and the concentration of research outputs and recognition differ markedly between academic disciplines. The focus of this paper is on economics, which is often seen as insular and hierarchical and is highly concentrated in terms of authors, journals, institutions, and regions (Gloetzl and Aigner 2017). In terms of insularity, there is a much higher rate of within-discipline citation than for other social sciences, with the rate that a flagship journal cites top journals in other social sciences only one-fifth of that for political science and one-eighth of that for sociology (Fourcade *et al.* 2015). A possible distain for other disciplines may underlie this asymmetry. In the classic account of *Life Among the Econ* it is noted that 'their young are bought up to feel contempt for the softer living in the warmer lands of their neighbours, such as the Polyscis and Sociogs' (Leijonhufvud 1973: 327). An opinion survey of academics shows a similar pattern; a minority of surveyed economists agree that interdisciplinary knowledge is better than knowledge from a single discipline yet large majorities of academics in other disciplines agreed with this proposition (Fourcade *et al.* 2015).

In terms of hierarchy, several studies show aspects of control over the discipline wielded by economists at a few elite U.S. universities. Hodgson and Rothman (1999) study the editors and authors of 30 top economics journals and conclude that an oligopoly of US institutions dominates these journals and thereby dominates economics research more broadly. It is economists at Harvard and the University of Chicago especially in this elite position; a study of articles in eight top economics journals that controls for author and journal quality and article attributes finds those by authors at Harvard or Chicago received far higher peer recognition (Medoff 2006). Part of this dominance may reflect home bias, with three of the eight top journals edited at these two universities; Wu (2007) finds high numbers of in-house authors at the *Journal of Political Economy* (*JPE*) and *Quarterly Journal of Economics* (*QJE*), while Fourcade *et al.* (2015) find that this is even greater in terms of where authors earned their PhD. Yet, there was no similar home bias for the flagship journal in sociology. A somewhat circular and self-perpetuating process of elite benefit may occur: these are the best institutions, since their economists publish in the best journals, and these are the best journals, since the best economists publish in them.

The hierarchy in economics publishing also extends to the labor market and to professional organization. A study of hiring in seven disciplines shows that rankings have the strongest effect on placement in economics; students are hired from departments of higher or similar rank to that of the employing department (Han 2003). For professional organization, of the 120 presidents of the American Economic Association (AEA), almost 60% of them (n=68) have been from just six institutions: Harvard (23), Chicago (13), Princeton (10), Yale (9), MIT (7), and Stanford (6). This hierarchy contrasts with other social sciences. For example, Fourcade *et al.* (2015) report that from one-third to one-half of elected executives of the American Sociological Association and the American Political Science Association are from

unranked departments, and 20-30% are from places ranked from 21-100, while the AEA has no non-appointed officers from any departments ranked below 20th, and, instead, 72% are from the top five departments.

The insularity and hierarchy within academic economics leads to geographic and institutional concentration. Gloetzl and Aigner (2017), for example, study 3.4 million citations to 380,000 articles published in 440 economics journals between 1980 and 2014 and find that three-quarters of citations accrued to researchers from North America, whose share of the articles was 49%. The issue of American domination in economics was also apparent in earlier studies of top journals (Kocher and Sutter 2001) and eminent economists (Frey and Pommerehne 1988). Yet studies of the concentration of research that only consider geography at the national level miss an important point. The production and recognition of research is even more concentrated within countries. While nations may formulate science policy, such as for performance-based university research funding systems (Hicks 2012), it is at very local levels that research is actually done.

This paper provides evidence on concentration in economics at the micro-geographic level. The production of articles, and recognition of research in the form of citations, is studied at the level of U.S. ZIP codes, of which there are over 30,000. Yet just three of these ZIP codes: 02138, 60637, and 94305 are associated with articles in the top five economics journals – *American Economic Review* (*AER*), *Econometrica, Journal of Political Economy* (*JPE*), *Quarterly Journal of Economics* (*QJE*) and the *Review of Economic Studies* – that garnered one-half of all citations to the articles published in these journals over 2000 to 2015. This remarkable degree of micro-geographic concentration is not apparent in the five comparator disciplines; on average just over 12% of citations accrue to their top three ZIP codes, in terms of where the contributors to their respective top five journals are affiliated.

This extreme degree of micro-geographic concentration highlights that even economists in the leading country may be, effectively, on the outer of the discipline if they have no links into these top ZIP codes. For example, one is hardly any closer to the epicenter of economic research if located in, say, Moscow, Idaho, at the University of Idaho (ZIP 83844) compared to being in Moscow, Russia. In fact, one may be even further away; amongst almost 3,800 author-affiliations for articles in top journals in economics studied here, only one is from Idaho but five are from Russia. Moreover, there are at least eight U.S. states that have no links to the research in these top journals, in the sense that they contribute zero author-affiliations.

Typically, a university will have its own ZIP code so it is worth justifying what insight comes from using this level of disaggregation rather than the typical institution-level analysis. First, by using ZIP codes it emphasizes the spatial heterogeneity within countries. Second, clusters of geographically proximate groups of inter-linked individuals and organizations (Catini *et al.* 2015) may be observed with the aid of ZIP code maps. For example, the ZIP code for the Massachusetts Institute of Technology (MIT, 02139) borders that for Harvard (02138)

and there are multiple linkages between the two universities, such as joint seminars. Finally, a ZIP code may have two research institutions, such as 02138 with both Harvard and the National Bureau of Economic Research (NBER). While the NBER has only a small physical footprint, it has an outsized impact on economics, and has been described by Krugman (2013) as 'the old-boy network of economics made flesh'. This impact is much greater than for other virtual research institutes that also run meetings and issue working papers, partly due to the exclusive nature of being an NBER affiliate (for example, the NBER meetings are by invitation only). As Krugman (2013) notes: 'if you're associated with the Bureau, you can get research out quickly in a place everyone will see, whereas if you aren't in the magic circle, getting noticed can be much harder.'

The location of the NBER also highlights a key issue in spatial economics that underpins the micro-geographic clustering of research. A theme in popular commentary from recent periods of technological change is that falling costs of engaging in activities across space have led to the 'death of distance' (Cairncross 1997). With this interpretation, being on the geographic periphery becomes less of a handicap and so something like the NBER could locate somewhere cheap and central, like Kansas. Yet even as costs of transmitting goods and information across space have fallen, spatial transactions costs have risen because with better information technologies the quantity, variety, and complexity of the knowledge that is communicated rises; since much of this is of a non-standardized and tacit nature, it increases the premium on face-to-face communication (McCann 2008). Thus, being located in Cambridge, Massachusetts provides an enduring benefit. Indeed, studies suggest that while policy makers may be able to temporarily disperse research, by funding new research universities or by making research expenditures more equally distributed, long-run institutional mobility is limited and so the research institutions (and locations) at the top of the hierarchy tend to stay there over many decades (Brint and Carr 2017).

The extreme concentration in economics matters for at least two reasons. First, systemic risk may increase because ideas that challenge the views of the spatially concentrated disciplinary elite may be ignored. By suppressing new perspectives, an intellectual 'lock-in' (Hodgson and Rothman 1999) may retard the value of economics in helping society be prepared for future crises. In presenting a view from the outer, from ZIP code 88003 (although still in the leading country), Adkisson (2010: 18) notes how this concentration could stunt the discipline:

> Still, what if, frustrated by lack of publishing outlets, thousands of bright, well-trained economists would give up the idea of searching for new knowledge and understanding and telling others what they had found. Would they simply have to accept the knowledge created from above (top economists in top journals) and passively deliver this knowledge on to their students? Would they, rather than participating in the scientific quest and encouraging their students to do the same, simply become the mouthpiece of the elite?

This risk is heightened by other disciplines increasingly citing economists. For example, *Web of Science* data on citations between 17 disciplines from 1970 to 2015 show economics as the most influential (or equal-most) social science for nine disciplines, with a growing influence in most (Angrist *et al.* 2017). It is especially empirical work by economists that receives attention from elsewhere; this contrasts with earlier 'economic imperialism' (Lazear, 2000) that focused on the implications of maximization, equilibrium and efficiency to occupy intellectual territory formerly outside the discipline's realm. If the highly cited empirical work is produced in just a few places there is a danger that other disciplines might gain a skewed understanding, given variation over space in the style of empirical research. For example, the so-called 'credibility revolution' from increased use of randomized trials and quasi-experimental research designs (Angist and Pischke 2010) is especially associated with MIT. Yet the doubts raised about this approach (for example, Keane 2010, Deaton 2010, and Deaton and Cartwright 2018) may be downplayed or missed entirely due to the extreme concentration in economics citations.

A second reason why concentration in economics versus other disciplines matters is that countries and research institutions often try to incentivize academics to publish in the top journals in their discipline. The growth in performance-based university funding systems is both a cause and a symptom of this type of rankings focus. With such a high proportion of the space in the top journals in economics – and even more so for the citations to articles in these journals – taken up by researchers based in just a few small areas, there is much less opportunity for the economists who are located outside these favored areas to break into the top journals than is the case for their colleagues in other, more open, academic disciplines.

The rest of the paper is as follows: Section 2 has a brief review of previous studies of concentration in economics that use scientometric approaches. The data and methods used in this study are described in Section 3, while Section 4 has the results and Section 5 concludes.

2. Previous Literature

Several recent papers have analyzed quantitative data on the top five journals in economics (*AER, Econometrica, JPE, QJE,* and *Review of Economic Studies*). In a study of one aspect of insularity, Aistleitner *et al.* (2017) examine citation patterns for the top five journals and compare them with the patterns for the top five journals in other disciplines. The focus is on what the authors call 'self-referentiality', which is the proportion of references for articles in the top five journals over the period 2009 to 2013 that cite the same group of journals. For economics, 28% of references are to other articles in the same group of journals. For the comparison disciplines the average rate of self-referentiality is just 12%. From these findings, and other scientometric analyses, the authors conclude that economics is a self-referential intellectual project, largely inaccessible to outsiders; in other words, it is quite insular.

There are also studies of the top journals in economics that do not use comparison disciplines. Card and DellaVigna (2013) examine trends in the top five journals from 1970 to 2012, in terms of the changes in rankings between them, the changes in their acceptance rates, in article lengths and co-authorship, and the changing composition of the fields that are represented. An analysis of *Google Scholar* citations shows longer papers are cited more and this is claimed to be evidence of authors responding to the heightened competition to get into the top journals by improving the quality of their papers, and this process has made them longer. A related analysis by Hamermesh (2013) looks at articles in the *AER*, *JPE* and *QJE* from one year in each decade from the 1960s to the 2010s in order to establish long-term trends. There has been a rise in the share of empirical studies based on laboratory or field experiments and other forms of data that are collected by investigators, at the expense of theory studies and empirical studies that borrow data from elsewhere (such as government statistics). Investigator-collected data needs more research infrastructure, such as dedicated experimental economics laboratories, so this change in empirical methods could contribute to a rise in the micro-geographic concentration of research.

A larger analysis is based on 3.5 million citations to 450,000 research items published from 1956 to 2016 (or from when a journal was first included in *Web of Science*) for 675 economics journals (Gloetzl and Aigner, 2017). Over one-quarter (28%) of these citations were to articles in the top five journals (*AER*, *JPE*, *QJE*, *Econometrica*, and the *Review of Economic Studies*) even though these journals were home to only 8% of all articles. The top five journals published 71% of the 100 most-cited articles and this share was stable over time even as the number of journals increased from 40 in 1956 to 675 in 2016; this is indicative of rising concentration over time for citations in economics. In addition to concentration in terms of journals, economics is also highly concentrated by institution, with the top five institutions accounting for 19% of all citations, in terms of where authors are affiliated (Gloetzl and Aigner 2017).

Moreover, the degree of concentration amongst elite departments is even stronger for where economists get their PhD, rather than for where they are employed. While one-fifth of authors of the articles published in 1995 in a group of top 30 economics journals were from 12 elite U.S. universities, more than half of the authors of articles in these journals received their PhD at these universities (Hodgson and Rothman 1999). In an update of this study, for 2014 articles in three top journals – the *AER*, *JPE*, and *QJE* – over one third (38%) of the authors were affiliated with the 12 elite universities while 55% of the authors had received their PhD from this group of universities (Aistleitner *et al.* 2017). This suggests that studying micro-geographic concentration in terms of author affiliations will provide a lower bound on the extent of spatial heterogeneity in economics since the locations where highly ranked economists received their doctoral training may be even more spatially concentrated than are their employing institutions.

3. Data and Methods

In order to assess if economics research is unusually concentrated at the micro-geographic level, five comparator disciplines are used. This need for more than one comparator reflects an analysis by Hudson (2017) of journal article titles from the 2014 Research Excellence Framework (REF) in the UK, which suggests that most of economics does not link closely with any other discipline. Each of the five comparators has attributes relevant to possible reasons for why economics may be distinctive. The first two, sociology and psychology, are thought of as social sciences, with one relying mainly on observational data while a mix of observational and experimental data is used in psychology – as in economics. Psychology is also like economics in being hard to categorize under typical intra-university divisions, since it may be found in an Arts faculty or a Science faculty (or teaching into degrees offered by those faculties), while economics could be in either of those and also in a Business or Commerce faculty.

In comparison to other social scientists, academic economists are usually paid more and one reason for this may be their better outside options, such as in the finance sector. These outside options could induce a spatial concentration in research; universities in major financial centers may pay their economists more, to match the local market, and so productive researchers may congregate in those locations rather than in more remote areas that lack a finance sector. This process should also apply for a business discipline like marketing, since marketing academics also have skills demanded in the private sector and that demand is spatially concentrated. It is therefore expected that the spatial concentration in economics will be like that in marketing.

A discipline like philosophy offers a complete contrast, since there are few non-academic options for philosophers. Therefore, any university system with fairly centralized salary setting (for example, professors are paid roughly the same irrespective of discipline) will tend to attract very good philosophers (and will tend to be relatively weak in disciplines like finance that offer highly paid outside options). Evidence for this hypothesized pattern is provided by Boyle (2008), using the scores by discipline in a national research assessment in a country with fairly centralized salaries. This salary effect will tend to disperse academic talent in philosophy and so the micro-geography of philosophy research is expected to be the least concentrated of the disciplines studied here. Moreover, much of the scholarly discourse in philosophy takes place in books rather than in journals, and this gives a further reason to expect the philosophy research that is published in top journals to come from more spatially dispersed authors.

The final hypothesized pattern is that bench sciences should have more spatially concentrated production of research because of the need for researchers to have access to key infrastructure, such as specialized laboratories, and this will lead talented scientists to congregate in particular locations. While laboratories are also used in experimental economics, the cost of setting up one of these is typically less than $30,000 and so that is a much lower

barrier to entry that should not create pressure for the concentration of research at particular locations. I use chemistry as the exemplar of a bench science in the analysis below.

To summarize the hypothesized patterns, it is expected that research will be more spatially concentrated in economics than it is in philosophy or sociology because of the effects of market forces on academic salaries, which in turn affect the location decisions of talented academics. However, economics research should be less spatially concentrated than in chemistry because there is no reason for talented economists to cluster around some particular laboratory that has some specialized equipment, unlike for chemists. The similar mix of data used in psychology and economics, and the similar usefulness to the private sector that raises non-academic options, as for marketing, suggests that the micro-geographic research concentration for marketing and psychology may be most like that seen in economics.

The top five journals in economics have already been discussed above. For the two other social sciences I use the top five journals identified in each discipline by Aistleitner *et al.* (2017). These were the *American Psychologist, Annual Review of Psychology, Journal of Abnormal Psychology, Psychological Bulletin, and Psychological Review,* while for Sociology they were the *American Journal of Sociology, American Sociological Review, Annual Review of Sociology, Social Networks,* and *Sociology of Health and Illness.* For marketing I use five journals from the *Financial Times* top 50 journals used in business school research rankings: *Journal of Marketing, Journal of Marketing Research, Journal of Consumer Research, Journal of Consumer Psychology,* and *Marketing Science.* The top five general philosophy journals are *Philosophical Review, Journal of Philosophy, Mind, Nous,* and *Philosophy & Phenomenological Research* according to a poll of philosophers.[1] For Chemistry I use three (of the 44) journals published by the American Chemical Society: *Journal of the American Chemical Society, Chemical Reviews* and *Accounts of Chemical Research*. The other two journals are *Angewandte Chemie* (published by Wiley) and *Chemical Science* (published by the Royal Society of Chemistry). All of these journals fall within the multidisciplinary chemistry category of the Journal Citation Reports and have some of the highest impact factors.

The data on articles published in these journals, and the citations to these articles, are from *Web of Science*, and these data were extracted in November, 2017. Some of the records available are not original research contributions, so to remove such items anything whose title had any of the terms in the following list were excluded: 'annual report' 'comment', 'correction', 'errata', erratum', 'letter', 'reprinted', 'response' and 'reply'. The exclusions removed about one percent of the items. In order to study changes over time, the *Web of Science* data were obtained for articles published in the top five journals in each discipline in 2000, 2005, 2010, and 2015. This enables trends over almost two decades to be studied.

[1] Details are here: http://leiterreports.typepad.com/blog/2013/07/top-philosophy-journals-without-regard-to-area.html

For each published article, the number of authors and the number of author-affiliations were calculated; author-affiliations exceed the number of authors in situations where an author may be affiliated at two (or more) research institutions. It is possible that the first listed affiliation is the main one for an author but there is no guarantee that this is true; sometimes a research foundation that an author affiliates with may stipulate that it be listed first if the foundation funds the page charges or any other costs associated with the research. The approach taken here is that each of the affiliations has some meaning, and there is a cost (at least implicitly) in having too many affiliations. This is why most authors have just one, or maybe two affiliations, whereas if it was costless to add more it would be normal to see many more affiliations listed.[2] Therefore, each affiliation is treated equally in the analysis.

4. Results

The dataset based on the top five journals for each discipline comprises almost 25,000 articles published in either 2000, 2005, 2010 or 2015, and these articles have almost 100,000 author-affiliations, and 1.9 million citations (as of November, 2017). The details for each discipline are provided in Table 1. The disciplines from social sciences or business – economics, sociology, psychology, and marketing – have several similarities, with between 700 to 1500 articles in their top five journals over the four years studied, with averages of just over two authors per article, and mean (median) citations per article of 50 to 100 (19 to 25). The total author-affiliations range from 1500 (sociology) to 3800 (economics), and between one-half to two-thirds of these are from the United States. The affiliations in the US map to anywhere from 180 to 380 ZIP codes. These broad descriptive statistics do not indicate anything distinctive about economics, compared to the other social science or business disciplines.

Table 1: Overview of the Data on Articles in Top Five Journals in Each of Six Disciplines, Their Authors and Their Citations

		Mean authors	Citations per article		Author-affiliations		# of US ZIP Codes
	# of articles	per article	Mean	Median	Total	% from USA	Represented
Economics	1492	2.1	65.6	23	3766	65.8%	259
excluding *AER* P&P	1095	2.1	79.9	34	2743	62.3%	189
Sociology	688	2.1	52.6	19	1464	48.7%	184
Psychology	1339	2.6	99.8	24	3165	56.5%	380
Marketing	905	2.5	59.2	25	2244	63.9%	242
Philosophy	695	1.1	12.4	5	794	63.1%	142
Chemistry	19638	4.9	78.3	40	88216	17.1%	874

Note: The list of journals for each discipline is given in the text. Articles are from 2000, 2005, 2010, 2015. The citations data are as of November, 2017.

The other two comparator disciplines – philosophy and chemistry – are quite distinctive, in their own ways. The articles in philosophy journals are almost all sole-authored, with affiliations predominantly from the US (and located in just 140 ZIP codes) and garner very few citations. In contrast, the top five chemistry journals have far more articles – almost 20,000 – and they come from larger teams that average five authors per article. While the mean citations

[2] For economics, about half of the articles have more author-affiliations than authors, but even for that sub-sample the average number of author-affiliations is just 0.4 higher than the average number of authors.

per article are less than for psychology and not so different to economics, the median citations are much higher. The biggest difference in chemistry, however, is that the authorship is much less US-centric, with just 17% of author-affiliations from the US, despite the fact that three of the top five journals are published by the American Chemical Society (the same share of top five economics journals that are edited in the US). Moreover, even with the far smaller fraction of author-affiliations from the US, the chemistry authors are based in a far wider range of US locations, with 874 ZIP codes represented, which is over three times as many as for economics.

Within economics there is debate about whether the May issue of the *AER*, which is a *Papers and Proceedings* issue, should be counted since these invited papers do not go through the usual review process (Synder and Zidar 2011). The citation details are as for a regular issue of the *AER* and *Web of Science* treats it as such. However, in some economics journal rankings the May issue gets a reduced weight, although most rankings still weight it the same as other *AER* issues. The salary payoff from publishing in the *Papers and Proceedings* issue is equivalent to about 60% of that for a regular *AER* (Gibson *et al.* 2014), so ignoring these articles in the May issue seems unwarranted. However, to ensure that the results are robust, I also create an analysis sample without the *Papers and Proceedings* issue, which reduces the number of articles by about 400, the number of author-affiliations by about 1000, and also results in about 70 fewer ZIP codes being represented (Table 1). The *Papers and Proceedings* issue is slightly more US-centric than the other *AER* issues, so cutting these articles also results in economics switching from being the most US-centric discipline to the third most.

The US share, and the number of ZIP codes where authors in the top five economics journals have affiliations, do not differ much from that seen in a business discipline like marketing. While somewhat more US-centric than the two social sciences in Table 1, the number of ZIP codes for the economics authors is within the range for sociology and psychology. But if attention switches from totals to a measure of concentration – the contribution of the top ZIP codes – economics is very distinctive. One-fifth of all US-based author-affiliations for articles in the top five economics journals are to a single ZIP code: 02138, while the top three ZIP codes (02138, 60637 and 94305) account for 30% of all affiliations. No other discipline has a ZIP code contribute even five percent of author-affiliations, and the share for the top three ZIP codes ranges from 7.3% to 11.8% and averages just ten percent – one third the level of concentration in economics (Table 2).

Table 2: Share of Affiliations and Articles in Top 5 Journals and Citations, for the Top 3 ZIP Codes from Six Disciplines

		Author-Affiliation Level, 2000, 2005, 2010, 2015			Article Level, 2000-2015	
ZIP Code	Institutions	Share of total	Highest Rank	Lowest Rank	Share of articles	Share of citations
Economics						
02138	Harvard, NBER	19.6%	1st	1st	26.9%	31.1%
60637	U Chicago	5.7%	2nd	4th	8.4%	10.0%
94305	Stanford	4.8%	2nd	4th	7.1%	8.8%
Sum		30.1%			42.4%	49.9%
Sociology						
94305	Stanford	4.5%	1st	6th	3.9%	10.9%
02138	Harvard	3.9%	1st	10th	3.6%	7.5%
10027	Columbia	3.4%	1st	14th	2.9%	4.8%
Sum		11.8%			10.5%	23.2%
Psychology						
02138	Harvard	3.0%	1st	5th	3.5%	2.6%
53706	Wisconsin	2.3%	2nd	39th	2.6%	5.3%
19104	U Penn	2.0%	2nd	11th	2.1%	5.6%
Sum		7.3%			8.2%	13.5%
Marketing						
48109	Michigan	3.7%	1st	9th	5.1%	5.7%
19104	U Penn	3.5%	1st	5th	4.5%	3.3%
60208	Northwestern	3.3%	2nd	28th	5.0%	3.8%
Sum		10.5%			14.6%	12.7%
Philosophy						
08544	Princeton	3.2%	3rd	8th	2.2%	3.5%
78712	UT Austin	3.2%	1st	32nd	2.2%	0.8%
94305	Stanford	3.2%	2nd	32nd	2.2%	1.2%
Sum		9.6%			6.6%	5.5%
Chemistry						
94720	UC Berkeley	4.9%	1st	3rd	2.1%	2.8%
60208	Northwestern	3.6%	2nd	4th	1.6%	1.9%
92037	Scripps Institute	3.3%	1st	7th	1.4%	1.8%
Sum		11.8%			5.1%	6.5%

Notes: The author-affiliation shares are calculated excluding the non-US author-affiliations (see Table 1 for the proportion of these). The shares of total affiliations, and of articles and of citations are for the pooled sample for publications in 2000, 2005, 2010, and 2015. The highest rank and lowest rank are for the share of affiliations in top 5 journals due to the particular zip code, in 2000 or 2005, or 2010, or 2015. The share of articles and share of citations is based on having at least one author of the article with an affiliation within the specified zip code and the denominator is all articles or all citations, irrespective of author locations (i.e., including non-US locations). The citations are as of November 2017, from Web of Science Core Collection, BIOSIS, SciELO, and the Chinese Science, Russian Science and Data Citation Indexes.

This micro-geographic concentration appears to be a stable feature of economics. When the top three ZIP codes are calculated for each year of 2000, 2005, 2010 and 2015, 02138 is always ranked first and 60637 and 94305 always rank between 2nd and 4th. In contrast, every other discipline has bigger changes in the ranks each year, with no single ZIP code always ranked first and in some years a ZIP code that is in the top three over the sum of the four years falls as far as being ranked 28th or lower (for marketing, psychology and philosophy). In other words, the other disciplines appear to be more open for authors not based in their leading ZIP codes to publish in their top journals than is the case for economics. Moreover, outside of

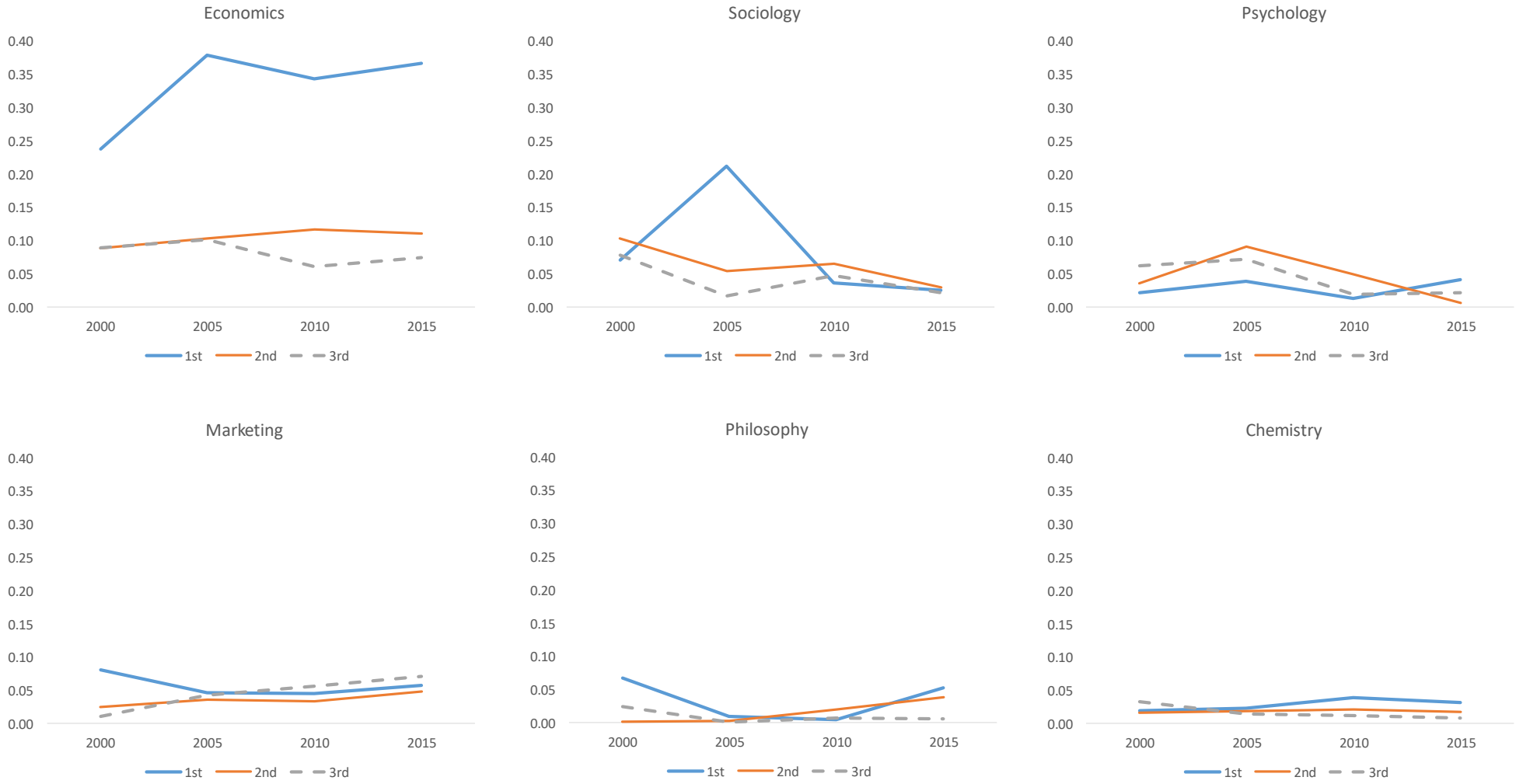
economics, these other ZIP codes that are not at the top overall can be near the top of the ranks in certain years even if they cannot maintain that position over time.

Outside of economics, patterns of author-affiliation concentration and stability or volatility of the ranks are generally consistent with the hypotheses discussed in Section 3. A bench science like chemistry, where access to key labs might create spatial clustering, has a higher share of the author-affiliations to articles in top journals associated with a few ZIP codes, and more stability in the ranks of the top ZIP codes. Conversely, a discipline like philosophy should have top researchers more dispersed over space, given the limited non-academic demand. Consistent with this, the philosophy journals show one of the lowest rates of micro-geographic concentration and the ZIP code ranks are the least stable over time.

The last two columns in Table 2 switch from an author-affiliation analysis that is restricted to the US affiliations, to an article-level analysis that considers authors no matter which country they are based in. Over one-quarter of all articles in the top five economics journals have at least one author with a link to the 02138 ZIP code. The highest share in any other discipline is 5.1%, and in fact even the third most highly ranked ZIP code for economics - 94305 - has a larger share of articles than the top ZIP code in every other discipline. When attention turns to citations to the articles in these top five journals, the level of micro-geographic concentration in economics is even more remarkable. The top three ZIP codes, in terms of contributors to articles in the top five journals, garnered one-half of all the citations to the articles published in these journals. In contrast, for the comparator disciplines, their top three ZIP codes garnered just over 12% of citations. Indeed, but for citations to articles that have Stanford sociologists as (co-)authors, even the third ranked ZIP code in economics has a bigger share of citations than the leading ZIP code for every other discipline in Table 2. The recognition of the economics research that is published in the top journals is much more concentrated, with authors in a few locations being disproportionately cited, than is the case for any other discipline.

The concentration of citations to economics articles whose authors are associated with a few key ZIP codes appears to have strengthened over time. Figure 1 shows the share of citations that are garnered by the top three ZIP codes in 2000, 2005, 2010 and 2015. It is clear that the share of citations in economics for the 02138 ZIP code is rising, from 24% in 2000 to 37% in 2015. There is also a slight rise, from 9% to 11%, for the second ranked ZIP code: 60637. In contrast, for sociology the citations share of the top ZIP codes has fallen over time; the top three went from having one-quarter of the citations to articles published in 2000 to just 7.8% of the citations to the articles published in 2015. For a discipline like chemistry, where citations accumulate more rapidly, there is also a slight decline in the share of the top three ZIP codes, falling from 7% for articles published in 2000 to 5.7% for articles published in 2015. Thus, the distinctive nature of economics, in terms of the micro-geographic concentration of research recognition, appears to be doubly distinctive in the sense that this concentration is strengthening over time.

Figure 1: Share of the Citations to Articles Published in the Top 5 Journals in Each Discipline in 2000, 2005, 2010, and 2015 that are for Articles with an Author(s) from the Top 3 ZIP Codes per Discipline



Note: The top 5 journals for each discipline are listed in the text and the top 3 ZIP codes per discipline are listed in Table 2. These shares are relative to all articles, including those with authors from non-US locations.
The citations are as of November 2017, from Web of Science Core Collection, BIOSIS, SciELO, and the Chinese Science, Russian Science and Data Citation Indexes.

The results in Table 2 and Figure 1 use all articles in the top five economics journals, which includes the *Papers and Proceedings* issue of the *AER*. In panel A of Table 3 the results without the *Papers and Proceedings* issue are shown. The degree of micro-geographic concentration is almost the same, with or without the *Papers and Proceedings* issue; a slightly higher share of the author-affiliations go to the top three ZIP codes and they garner a fractionally lower share of the citations, when the *Papers and Proceedings* issue is ignored. However, the key findings, that about one-third of all US-based author-affiliations and one-half of citations to all articles in the top five journals (irrespective of country of author affiliation) go to authors associated with just three ZIP codes, still hold.

Table 3: Sensitivity Analyses for Shares of Affiliations, Articles and Citations, for the Top ZIP Codes in Economics

		Author-Affiliation Level, 2000, 2005, 2010, 2015			Article Level, 2000-2015	
ZIP Code	Institutions	Share of total	Highest Rank	Lowest Rank	Share of articles	Share of citations
Panel A: Excluding AER Papers and Proceedings						
02138	Harvard, NBER	20.0%	1st	1st	26.2%	30.4%
60637	U Chicago	5.9%	2nd	3rd	8.3%	10.4%
94305	Stanford	5.1%	2nd	5th	7.0%	8.8%
Sum		31.0%			41.5%	49.6%
Panel B: Excluding NBER affiliations						
02138	Harvard	8.8%	1st	1st	11.2%	14.4%
60637	U Chicago	6.4%	2nd	4th	8.4%	10.0%
94305	Stanford	5.5%	2nd	4th	7.1%	8.8%
Sum		20.7%			26.7%	33.3%
Panel C: Using clusters of highly-ranked neighboring ZIP codes						
02138/9	Harvard, NBER, MIT	24.5%	1st	1st	30.8%	36.2%
60637	U Chicago	5.7%	2nd	4th	8.4%	10.0%
94305	Stanford	4.8%	2nd	4th	7.1%	8.8%
Sum		35.0%			46.3%	55.1%

Notes: The author-affiliation shares are calculated excluding the non-US author-affiliations (see Table 1 for the proportion of these). The shares of total affiliations, and of articles and of citations are for the pooled sample for publications in 2000, 2005, 2010, and 2015. The highest rank and lowest rank are for the share of affiliations in top 5 journals due to the particular zip code, in 2000 or 2005, or 2010, or 2015. The share of articles and share of citations is based on having at least one author of the article with an affiliation within the specified zip code and the denominator is all articles or all citations, irrespective of author locations (i.e., including non-US locations). The citations are as of November 2017, from Web of Science Core Collection, BIOSIS, SciELO, and the Chinese Science, Russian Science and Data Citation Indexes.

The second sensitivity analysis reported in Table 3 considers the impact of the NBER. Since some NBER affiliates are not physically located in the 02138 ZIP code, counting affiliations to this address may seem to overstate the micro-geographic concentration in economics. Of course, other research centers have authors affiliate with them even when they are not physically in that location – in economics as in other disciplines – and having the NBER in 02138 rather than somewhere central and cheap, like Kansas, is in and of itself of interest.

It turns out that ignoring all NBER affiliations and recalculating the top ZIP codes does not remove the high degree of micro-geographic concentration in economics. With no NBER, 02138 is still the top ranked ZIP code, and accounts for nine percent of US-based affiliations,

and is represented on 11% of all articles (including those authored from outside the US). Moreover, these articles garner 14% of the citations. The shares for 60637 and 94305 also rise a little, since there are fewer author-affiliations being counted, so the top three ZIP codes in economics still garner one-third of the citations in the top journals, even with the NBER affiliations ignored. This is about three times as large as the average citations share for the top three ZIP codes for the other disciplines in Table 2.[3] Thus, the micro-geographic concentration of research in economics is still distinctive even if the NBER is ignored.

The third sensitivity analysis considers micro-geographic clustering, by looking for any ZIP code that is adjacent to a top three ZIP code and that itself ranks in the next ten ZIP codes in terms of the number of author-affiliations. While this exercise is carried out for each of the six disciplines, it only affects the results for economics, where the ZIP code for MIT (02139) borders that for 02138. This combined area in Cambridge, Massachusetts accounts for one-quarter of all of the US-based author-affiliations, and is represented on 31% of all articles in the top five journals and these articles get 36% of the citations. Treating 02138 and 02139 as a single cluster, the top three micro-geographic clusters (which includes 60637 and 94305) are represented on articles that gain 55% of all citations to articles in the top five economics journals, which is an extremely concentrated degree of research recognition.

The micro-geographic research concentration can also be studied with the Gini coefficient: $G = \sum_i \sum_j \frac{|x_i - x_j|}{2N^2 \mu}$, where x_i is the number of articles (or citations) for the *i*th ZIP code, μ is the mean number of articles (or citations) per ZIP code and N is the total number of ZIP codes. In order to create ZIP code-level totals that account for multiple authors and multiple affiliations, the articles (and the citations to them) are pro-rated. For example, if an article has two authors, each with a single affiliation, then their respective ZIP codes each get half of an article and half of the citations to the article. While there are other ways to treat co-authorship (and multiple affiliations), the pro-rating approach is the only efficient way to count research output that does not lead to incentives for 'phantom' authors whose name is added to the author list at no cost to the other authors (Liebowitz, 2014). The shares of articles and of the citations to those articles are then added up for each ZIP code; this exercise only considers the inequality amongst areas in the United States, with the shares of articles and citations going to authors based at non-US locations ignored in the calculations.

The Gini coefficient ranges from zero for the absence of inequality (each ZIP code has an equal share of research) to one for complete inequality (all of the research is produced by authors in a single ZIP code). The Gini coefficient also has an intuitive graphical interpretation, based on the Lorenz curve which plots the cumulative percentage of ordered ZIP codes (from

[3] To the extent that other disciplines have institutions like the NBER, the gap between them and economics, in terms of the average citation shares for the top ZIP codes, is understated since no adjustment is made for other disciplines in the way that the NBER adjustment is made for economics.

those that are associated with the fewest articles or citations to those associated with the most) onto the cumulative percentage of articles or citations. The difference between the area under the line of perfect equality (where each ZIP code has an equal number of articles or of citations) and the area under the Lorenz curve, when expressed as a ratio to the area under the line of perfect equality, gives the Gini coefficient.

Figure 2 gives an example, comparing the Lorenz curves for articles and citations (across all four years) for economics and marketing. From the figure, one can see that the bottom 50% of ZIP codes (amongst those that have any author-affiliations) account for 9.6% of articles by US-based authors in the top five marketing journals and 5.6% for economics. In terms of citations, one-half of citations to articles by US-based authors in the top five marketing journals are attributed to the top 10% of ZIP codes, while for economics that same share of citations is attributed to the top 3% of ZIP codes. Since the Lorenz curves for economics are more convex than those for marketing, that is, they are further away from the line of equality, the Gini coefficient for economics is higher; it is 0.85 for citations and 0.77 for articles, while for marketing the values are 0.70 and 0.63. Using the tests for differences in Lorenz curves provided by Jann (2016), economics has significantly higher inequality than marketing, in terms of articles, at every percentile, while for citations it is significantly more unequal everywhere except between the 2nd and 9th percentile of ZIP codes.

Figure 2: Lorenz Curves for Economics and Marketing

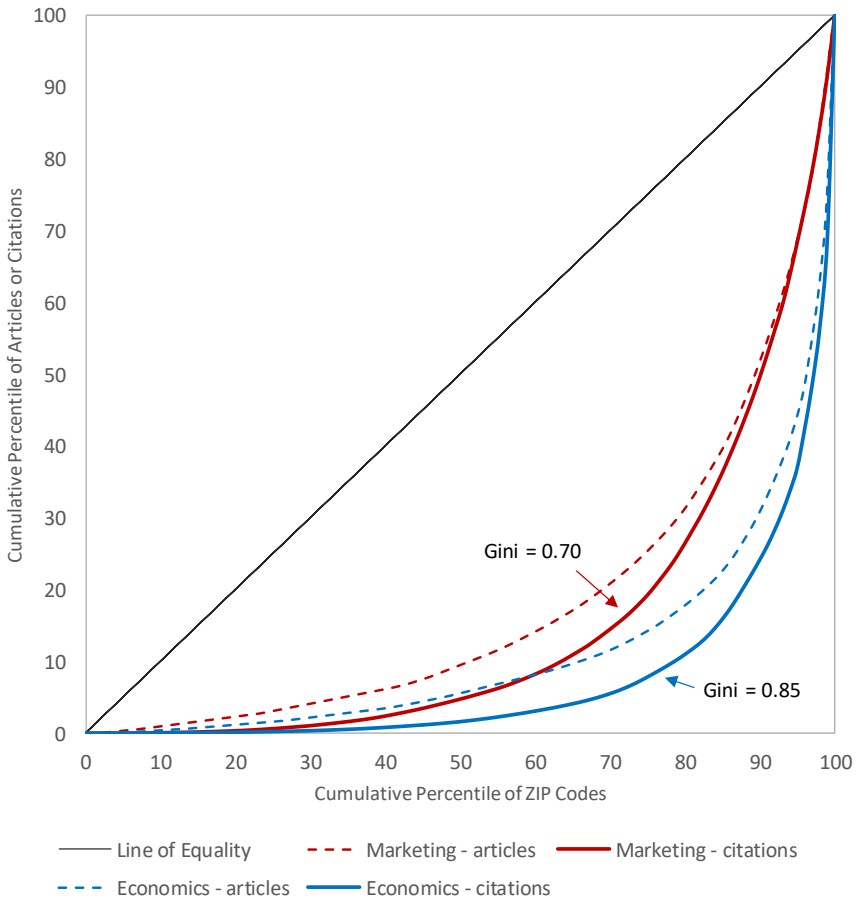
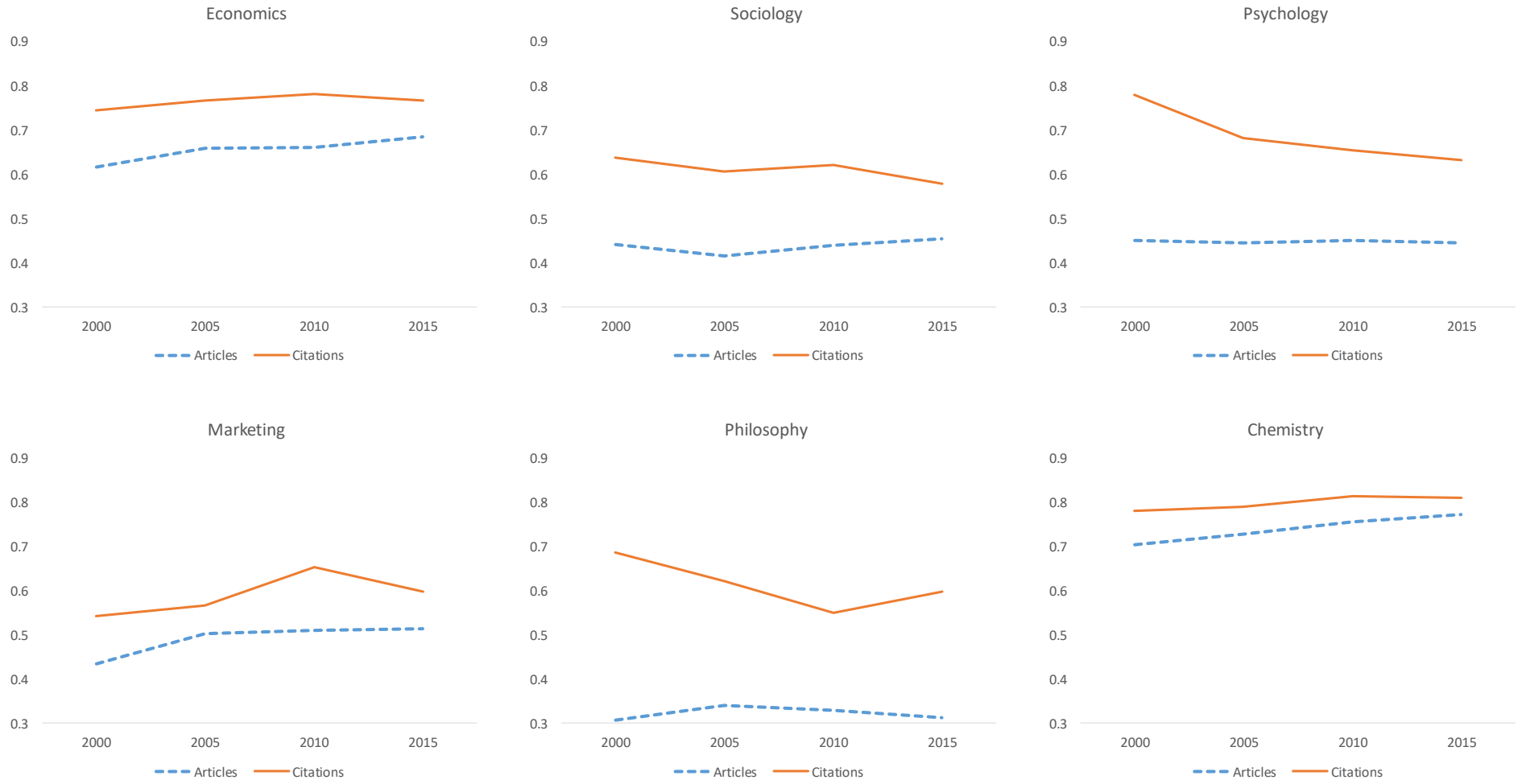


Figure 3: Trends in Gini Index for Shares of Articles in Top 5 Journals and Citations to those Articles, By ZIP Code (Articles are Pro-rated for Multiple Author-Affiliations for all United States Author-Affiliations)



Note: Top 5 journals for each discipline are listed in text. Articles with multiple author-affiliations are pro-rated and the article shares (and share of citations) are summed for each ZIP code. Non-US affiliations are not used in the calculations. The citations are as of November 2017, from Web of Science Core Collection, BIOSIS, SciELO, and the Chinese Science, Russian Science and Data Citation Indexes.

The trends in the Gini coefficients for articles and citations are shown in Figure 3. All disciplines have more inequality in citations than in articles, with the gap between these measures of research production and research recognition smallest in economics and chemistry. These two disciplines are also notable for having the highest level of overall inequality, and for showing a rise in inequality over time. In contrast, the inequality between ZIP codes in the citations attributed to the (fractional) articles published by authors affiliated with these areas is generally falling for sociology, philosophy and is especially falling for psychology.

In terms of the overall patterns in Figure 3, economics is distinctive from the other social sciences and from marketing and philosophy. The closest discipline, in terms of overall inequality in the micro-geography of research production and recognition is chemistry. This similarity may seem surprising, since the concentration at the top ranks was quite different for these two disciplines in the Table 2 results, with economics being at least three times as concentrated for the top ZIP codes. Comparing the Lorenz curves for citations, from the 6th percentile to the 97th percentile, the Lorenz curve for economics is slightly closer to the line of equality but from the 98th percentile and above there is more inequality in economics than in chemistry, which is consistent with the Table 2 results. However, there is no statistically significant difference in the two Lorenz curves, at any percentile, and so even though the Gini coefficient for chemistry is slightly above that for economics (0.88 versus 0.85) the confidence interval around the difference in the Gini coefficients includes zero. Thus, contrary to the hypothesis that chemistry will be more spatially concentrated than economics, these two disciplines have a similar degree of overall spatial inequality within the United States (but top chemistry journals are less US-centric) but for the very top ZIP codes economics is more unequal than is chemistry.

5. Discussion and Conclusions

In terms of the question posed in the title of this paper, economics has a distinctively high level of micro-geographic concentration of research production and research recognition. If the focus is on the very top areas, with the most affiliations for articles in the top journals, economics is about three times as concentrated as chemistry, and more so for citations. This concentration at the top has risen over time, unlike for chemistry. For overall spatial inequality within the United States, based on a ZIP code-level analysis with Lorenz curves and Gini coefficients, economics is more like chemistry and shows much more inequality than other social science or business disciplines. This distinctively highly level of spatial inequality persists even if NBER affiliations are ignored; these increase representation of the 02138 ZIP code, but even without them that ZIP code has a far higher share of affiliations, and is represented on a higher share of articles and citations than is the leading ZIP code in any other discipline. Indeed, even the third-ranked ZIP code in economics is represented on a higher share of articles than the leading ZIP code in every other discipline. If clusters of adjacent ZIP codes are studied, the combination of 02138 and 02139 in Cambridge, Massachusetts is represented on 31% of all articles in the top five economics journals and these articles garner 36% of the citations to articles in the top journals. In contrast, the top cluster in other disciplines is represented on just five percent of citations, on average.

While previous studies have considered aspects of concentration in economics, especially in terms of journals and institutions, prior geographical analysis is just at the national level. As such, these studies miss an important point, which is that the production and recognition of research is even more concentrated at the micro-geographic level within countries. A consequence of this spatial heterogeneity is that even researchers in the leading country can be on the outer, if they have no links into these top areas. The novelty of the current analysis has been to describe this spatial inequality, at the ZIP code level, and compare economics with several other disciplines. It is understandable that bench sciences like chemistry may be highly concentrated over space, since key laboratories and other research infrastructure has to be placed in particular locations, but there is less reason for similar clustering in economics. Moreover, factors such as market forces that may lead to micro-geographic concentration in economics should also apply to a business discipline like marketing. Yet economics shows far greater spatial inequality in research production and recognition than is apparent in marketing or in any of the social sciences.

There may be a benign explanation for academic economics having a distinctively high level of micro-geographic concentration. Since economists study resource allocation, they may have a professional advantage in organizing their discipline so as to concentrate talent in a few locations, such as the 02138, 60637 and 94305 ZIP codes. It is less clear how professional study of resource allocation enables the editors of the top journals in economics to consistently recognize quality research at a higher rate than the editors in other disciplines, which is what is required of any efficiency explanation for why citations in economics are so much more heavily concentrated on the top journals, compared to the situation in other disciplines (Aistleitner *et al.* 2017). A less benign interpretation is that this micro-geographic concentration reflects the hierarchy within academic economics; what Hodgson and Rothman (1999) labeled as an oligopoly of elite U.S. institutions. With this view, having such a large proportion of widely recognized economic research coming from a narrow range of small areas may constitute a risk, in reducing the diversity of research that is published and subsequently cited.

This micro-geographic concentration has been a long-term feature of economics, and appears to have strengthened over time. It is therefore unclear what may be done to change this, for any parties interested in research policy and concerned by the level of spatial concentration in economics. At the very least, by documenting how distinctive is economics, and how unexpected is this spatial concentration when considering factors such as market forces and whether a discipline needs physical infrastructure like key laboratories, this paper may contribute to a debate about whether economics is internally organized in the most socially optimal manner.

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