Empirical Regularities in the Market for Real Estate Research Output

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Abstract. **This study examines whether any regularity exists in the publication pattern among real estate researchers. Identifying an empirical regularity in research output is useful since it helps assess both the likelihood of multiple publications and the degree of author concentration among different journals. The empirical results reveal that a strong bibliometric regularity exists in the real estate literature: the number of authors publishing n papers is approximately $1/n^c$ of those publishing one paper. It is shown that the real estate literature conforms very well to the model with $c = 2.446$ if data are taken from a large collection of journals. When applied to individual journals, the result shows that values of c range from 2.321 to 3.835.**

Introduction

The phenomenon of 'superstars,' wherein a relatively few people tend to dominate the activities in which they are engaged, is widespread in many human activities. For instance, a disproportionately large number of points is scored by a relatively small number of the best players in most National Football League (NFL) and National Basketball Association (NBA) games. Only a few first-rate performers dominate the market for live-performance and commercial recording in both the popular and classical music worlds. Sales of introductory textbooks in most academic fields are concentrated on a group of best sellers, although there is a large number of very good and highly substitutable alternatives in the textbook market.

Lotka's Law of scientific productivity is a bibliometric example of such empirical observations. Lotka [6] proposes an inverse square law relating authors of scientific papers to the number of papers written by each author. Using data in the decennial index of *Chemical Abstracts* and in the name index of Auerbach's *Geschichtstafeln der Physik*, Lotka plots the number of authors against the number of contributions made by each author on a logarithmic scale. Lotka finds that the points are closely scattered around a straight line having a slope of approximately negative two. On the basis of this empirical observation, Lotka suggests the following equation as a description of the pattern of research output among authors:

$$a_n = a_1/n^2,\ n = 1,2,3,\ldots; \tag{1}$$

where a_n is the number of authors publishing n papers and a_1 is the number of authors publishing one paper.

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Earlier, Smith and Greenwade [14] and Webb, Albert and Wong [16] examine the relative quality of real estate journals. Smith and Greenwade investigate the perceived rankings of real estate publications and their impact in satisfying the tenure requirements at AACSB member schools. In a similar vein, Webb et al. study the perception of real estate journals held by mainstream finance faculty. On the other hand, Albert and Chandy [1] present the rankings of real estate journals, and identify the articles, individuals, and institutions that are perceived to have made significant contributions to the discipline.

None of these studies, however, have examined whether the pattern of productivity in the real estate literature conforms to an empirical regularity, such as Lotka's Law, which has been observed in the literature of other academic disciplines.[1] The purpose of this article is to examine whether bibliometric regularity, such as Lotka's inverse square law and its variants, exists in the real estate literature. We believe that identification of such empirical regularity is useful since it helps assess both the likelihood of multiple publications in the real estate literature and the degree of author concentration among different real estate journals.

The article is organized as follows. The next section presents a brief review of the theory of the bibliometric distributions. The following section describes the data. Then the following two sections present empirical findings on Lotka's Law and compare the degrees of author concentration among real estate journals. The final section contains a summary and concluding remarks.

Theory of Bibliometric Distributions

Given the ubiquity of bibliometric distributions and the quantity of literature discussing them, some studies have attempted to discover why such distributions occur in the first place and what their important analytical properties are. Deterministic theorization of bibliometric distributions has been presented by Mandelbrot [7] and Bookstein [2]. Stochastic theorization has been offered by Simon [13] and Price [9], among others.

Using a model of word storage in the human mind and information theoretic considerations. Mandelbrot [7] suggests that the number of papers of the rth ranking author, $f(r)$, is proportional to $1/(1+\beta r)\tau$ where β and τ are constants. Bookstein [2], taking a very different route, suggests that the number of authors publishing n papers is proportional to $1/n^c$, where c is a constant. Note that, for $\tau = 1$ or $c = 2$, these distributions are simplified to Lotka's Law.[2] Thus, Lotka's Law is a special case of the forms derived by Mandelbrot and Bookstein on theoretical grounds.

Simon [13] proposes a stochastic model which, among other things, implies that the number of authors with n publications is proportional to $1/[n(n+1)(n+2) \ldots (n+k-1)]$ for some integer k, or more generally, to $\Gamma(n)/\Gamma(n+c)$ where c is a constant. Note that if n is much larger than c, $\Gamma(n)/\Gamma(n+c) \approx 1/n^c$, which is the same result as Bookstein's.

Finally, Price [9] suggests that the 'Cumulative Advantage Distribution,' which can be derived from a modification of the Polya Urn model, provides a sound conceptual basis for the statistical modelling of the situation in which 'success breeds success.' The Polya Urn model supposes that fate has in storage an urn containing red and black balls and, at regular intervals, a ball is drawn at random. At each drawing the number of balls of the color drawn is increased while that of the other color remains unchanged. Therefore, each occurrence of a red or of a black increases the probability of a further such occurrence, i.e.,

success (i.e., a red ball) is rewarded by an increased chance of further success, but failure (i.e., a black ball) is punished by an increased chance of further failure (see Feller [5]). The Cumulative Advantage Distribution differs from the Polya Urn model in that success increases the chance of further success, but failure has no subsequent effect in changing the probability of failure. Price shows that such a stochastic law is governed by the *beta* function which can be approximated by a skewed or hyperbolic distribution of the type that is widespread in bibliometric and diverse social science phenomena. In particular, this is shown to be an appropriate underlying probability theory for Lotka's Law of scientific productivity.

In sum, it seems that Lotka's Law and its variants not only have an empirical validity, but also theoretical robustness since they can be derived from different sets of assumptions. The primary purpose of this paper is to examine whether Lotka's Law and its variants are applicable to the real estate literature. Specifically, we wish to test the following equation:

$$a_n = a_1/n^c,\ n = 1,2,3,\ldots; \tag{2}$$

where a_n is the number of authors publishing n papers, a_1 is the number of authors publishing one paper, and c is a constant.

Data

Data for the present study come from seventeen journals that primarily publish academic real estate research. These seventeen journals are selected from lists of real estate journals presented in Albert and Chandy [1], Smith and Greenwade [14], and Webb et al. [16]. Authorship for all contributions as reported in the table of contents is compiled for each of the seventeen journals for the last twenty-one years, 1970 (or inaugural year) through 1990.[3] We select this time period since most of our sample journals are created after 1970. The list of journals used and their abbreviations are presented in Exhibit 1.

Exhibit 2 presents the summary of the data set which shows the number of contributions in each journal, the number of authors who contributed to each journal, and the proportion of authors by the number of publications.[4] The magnitude of the database and the voluminous contributions of the seventeen journals are reflected in the exhibit. In total, these journals published 7,765 papers over the last twenty-one years, and a total of 6,000 authors contributed to the journals.

The exhibit shows, among other things, the difficulty of repeated publications in real estate journals. Among 6,000 authors, the majority of authors (73.4%) publish only once, and only 4% of authors contribute more than five times. One-time authors are common among each of the seventeen journals. For instance, 72.3% of all *AREUEA* authors appear only once. Percentages of one-time authors range from 71.3 for the *Journal of Urban Economics* to 92.0 for the *Journal of Real Estate Finance and Economics*.

Noticeably large percentages of one-time authors for the *Journal of Real Estate Finance and Economics* (92.0%) and the *Property Tax Journal* (88.1%) may reflect the fact that these journals are relatively new, and thus few authors have had the opportunity to have multiple publications in these journals. On the other hand, *Appraisal Journal, AREUEA, The Journal of Real Estate Research, Journal of Real Estate Taxation, Journal of Urban Economics, Real Estate Appraiser and Analyst*, and *Real Estate Review* have higher

Exhibit 1
List of Journals Used and Their Abbreviations

Journal (Beginning Study Period)[a]	Abbreviation
Appraisal Journal (1970)	*AJ*
AREUEA Journal (1973)	*AREU*
Appraisal Review Journal (1978)	*ARJ*
Commercial Investment Real Estate Journal (1982)	*CIJ*
Housing Finance Review (1982)	*HFR*
Journal of the American Planning Assoc. (1970)	*JAPA*
Journal of Property Management (1970)	*JPM*
Journal of Real Estate Finance and Economics (1988)	*JREFE*
Journal of Real Estate Issues (1976)	*JREI*
Journal of Real Estate Research (1986)	*JRER*
Journal of Real Estate Taxation (1973)	*JRET*
Journal of Urban Economcis (1974)	*JUE*
Land Economics (1970)	*LE*
Property Tax Journal (1982)	*PTJ*
Real Estate Appraiser and Analyst (1970)	*REAA*
Real Estate Finance (1984)	*REF*
Real Estate Review (1971)	*RER*

[a] Ending study period is 1990 for all journals.

Exhibit 2
Frequency Distribution of Authors by Number of Publications for the Period 1970–1990

Journal	Number of Papers	Number of Authors	Frequency Distribution in Percent									
			1	2	3	4	5	6	7	8	9	>9
AJ	923	778	76.0	12.9	5.3	2.4	1.7	0.9	0.3	0.3	0.1	0.3
AREU	448	462	72.3	14.1	6.9	3.9	0.9	1.1	0.2	0.0	0.4	0.2
ARJ	259	255	85.5	11.0	2.0	0.0	0.4	0.4	0.8	0.0	0.0	0.0
CIJ	347	344	82.8	13.7	1.5	0.9	0.3	0.0	0.6	0.3	0.0	0.0
HFR	144	182	82.4	11.0	3.8	0.5	0.5	1.1	0.0	0.5	0.0	0.0
JAPA	543	606	81.0	13.5	3.6	0.8	0.2	0.7	0.0	0.2	0.0	0.0
JPM	955	806	82.8	10.7	2.6	2.1	0.2	0.4	0.2	0.4	0.1	0.5
JREFE	55	75	92.0	6.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JREI	266	257	80.9	11.3	4.3	1.2	0.8	0.8	0.0	0.4	0.0	0.4
JRER	86	120	75.8	15.0	5.8	2.5	0.0	0.0	0.8	0.0	0.0	0.0
JRET	231	212	74.1	17.0	4.2	1.9	0.9	1.4	0.0	0.0	0.5	0.0
JUE	623	533	71.3	14.1	6.2	3.2	2.4	1.3	0.4	0.2	0.6	0.4
LE	656	880	86.0	10.7	2.0	0.8	0.2	0.0	0.2	0.0	0.0	0.0
PTJ	153	193	88.1	10.9	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0
REAA	865	660	72.9	14.4	5.0	2.9	1.5	1.2	1.1	0.6	0.0	0.5
REF	159	173	84.4	11.6	2.9	0.0	1.2	0.0	0.0	0.0	0.0	0.0
RER	1,052	892	76.5	14.2	3.8	2.9	1.3	0.3	0.3	0.3	0.1	0.1
All Journals	7,765	6,000	73.4	14.0	4.7	2.6	1.4	1.0	0.7	0.5	0.3	1.5
Lotka's Law[a]			60.8	15.2	6.8	3.8	2.4	1.7	1.2	0.9	0.8	6.4

[a] This row gives the proportions of authors predicted by Lotka's Law. Lotka's Law states that the number of authors publishing n papers is $1/n^2$ of those publishing one paper.

concentrations among their contributors than other journals. That is, the average percentage of authors with more than one publication in these journals is 25.9% whereas the average percentage of multiple publications for all other journals is 15.4%. This may reflect the fact that, with the exception of *The Journal of Real Estate Research*, these journals have existed for a longer period as compared to other journals, and thus many authors have had the opportunity to publish more than once. Or, perhaps, this may indicate that the phenomenon 'success breeds success' is more common in higher quality publications.[5] Finally, the higher average percentage (80.3) of a single publication for individual journals compared to that (73.4) of all seventeen journals as a whole reflects that authors tend to publish in more than one journal.

Lotka's Law: Tests and Findings

For the case of Lotka's Law (i.e., $c=2$ in equation (2)), the theoretical frequency distribution can be determined as follows. First note that:

$$\Sigma a_i = a_i \Sigma(1/i^2), \tag{3}$$

where Σ denotes the summation over $i=1$ to ∞.

In order to evaluate $\Gamma(1/i^2)$, note that the Fourier series for the periodic function $f(t)$, where $f(t)=0$ when $-\pi<t<0$ and $f(t)=t$ when $0<t<\pi$, is expressed as (see Niles and Haborak [8, pp. 493–4]):

$$\begin{aligned} f(t) &= \pi^2/6 - 2[\cos t - (1/4)\cos 2t + (1/9)\cos 3t - \ldots] \\ &+ [\{(\pi^2-4)/\pi\}\sin t - (\pi/2)\sin 2t + \{(9\pi^2-4)/27\pi\}\sin 3t + \ldots]. \end{aligned} \tag{4}$$

Next, notice that if $t=\pi$, all the sine terms will vanish and the cosine terms will be either $+1$ or -1, and $f(\pi)=\pi^2/2$. Hence, the equation (4) becomes

$$\pi^2/2 = \pi^2/6 - 2[-1-(1/2^2)-(1/3^2)-(1/4^2)-\ldots]. \tag{5}$$

Finally, a rearrangement of (5) yields:

$$\Sigma(1/i^2) = \pi^2/6. \tag{6}$$

Therefore, the proportion of all contributors publishing a single paper should be:

$$a_1/\{a_1\Sigma(1/i^2)\} = 6/\pi^2 = 0.6079. \tag{7}$$

Likewise, the proportions of authors publishing two, three, ..., and n papers should be:

$$a_2/\{a_1\Sigma(1/i^2)\} = (6/\pi^2)(1/2^2) = 0.152, \tag{8}$$

$$a_3/\{a_1\Sigma(1/i^2)\} = (6/\pi^2)(1/3^2) = 0.0675, \text{ and} \tag{9}$$

$$a_n/\{a_1\Sigma(1/i^2)\} = (6/\pi^2)(1/n^2). \tag{10}$$

The last two rows in Exhibit 2 compare the theoretical and actual frequency distributions of publication for all seventeen journals as a whole. The exhibit shows that the theoretical (i.e., Lotka's) frequency tends to be too low for $n=1$ and too high for $n \geq 2$, indicating that the value of the exponent (i.e., c) is larger than the value predicted by Lotka's Law (i.e., two). In order to test whether or not Lotka's Law applies to the observed data, we performed the *chi*-squared goodness-of-fit test. The computed *chi*-square statistic is 328.66 whereas the critical value with $\alpha=1\%$ from the *chi*-square table is 23.2.[6] Thus, Lotka's Law does not describe the frequency distribution of the publications in the real estate literature as a whole. It tends to overestimate the proportion of authors with multiple publications and to underestimate the proportion of one-time authors.

When applied to individual journals, the results show that Lotka's Law is a poor predictor of the pattern of publications. Exhibit 3 presents the results of the *chi*-square test for each journal. Among the seventeen journals, only three journals (i.e., *The Journal of Real Estate Research, Journal of Real Estate Taxation*, and *Journal of Urban Economics*) conform to Lotka's Law at the 1% significance level. This result is consistent with the findings of Radhakrishnan and Kernizan [10], Chung and Cox [3], and Cox and Chung [4] that Lotka's Law, when applied to individual journal data, does not adequately describe the empirical distribution in the computer science, finance, and economics literature, respectively.

Exhibit 3
Testing Lotka's and the Generalized Lotka's Laws for Individual Journals

Journal	*Chi*-square Statistics for Lotka's Law	Generalized Lotka's Law $\log(a_n/a_1)=\alpha+\beta\log(n)+e$		
		Fitted α (t-value)	Fitted β^a (t-value)	Adj. R^2
AJ	57.31	0.240 (0.943)	−2.808 (−18.496**)	0.974
AREU	23.10	0.133 (0.355)	−2.551 (−11.056**)	0.938
ARJ	45.04	−0.260 (−0.486)	−2.763 (−7.078**)	0.908
CIJ	56.62	−0.309 (−0.557)	−2.780 (−7.161**)	0.893
HFR	26.11	−0.335 (−0.589)	2.551 (−6.285**)	0.865
JAPA	87.03	0.066 (0.119)	−3.135 (−7.919**)	0.911
JPM	142.05	−0.162 (−0.436)	−2.846 (−12.726**)	0.947
JREFE	18.87	0.011 (0.312)	−3.847 (−80.068**)	0.999
JREI	29.65	−0.374 (−1.095)	−2.363 (−10.806**)	0.943
JRER	4.62*	−0.013 (−0.169)	−2.350 (−36.177**)	0.997
JRET	12.53*	−0.081 (−0.295)	−2.371 (−12.294**)	0.962
JUE	19.61*	0.233 (0.638)	−2.571 (−11.721**)	0.938
LE	182.47	−0.019 (−0.055)	−3.307 (−12.438**)	0.969
PTJ	42.59	0.060 (0.160)	−3.416 (−10.248**)	0.972
REAA	30.20	0.150 (0.625)	−2.507 (−17.694**)	0.972
REF	24.36	−0.092 (−0.416)	2.730 (−12.767**)	0.982
RER	81.68	−1.025 (−1.589)	−1.863 (−5.583**)	0.770
All Journals	328.66	0.012 (0.237)	−2.453 (−78.960**)	0.999

[a]Note that β is the estimate of $-c$.
*consistent with Lotka's Law at $\alpha=1\%$
**statistically significant at the 1% level

Generalized Lotka's Law and Author Concentration

In this section we test whether the generalized Lotka's Law (i.e., $a_n = a_1/n^c$) is an adequate description of the empirical distribution of research output. For this, note first from equation (2) that:

$$a_n/a_1 = 1/n^c. \tag{11}$$

Taking the log of both sides of (11), we obtain:

$$\log(a_n/a_1) = -c\log(n). \tag{12}$$

The generalized Lotka's Law can be tested by running the following regression with a constant term α using the empirical frequency distribution shown in Exhibit 2.

$$\log(a_n/a_1) = \alpha + \beta\log(n) + e. \tag{13}$$

If the generalized Lotka's Law is valid, the intercept α in equation (13) will be zero. Thus a direct test of the generalized Lotka's Law can be performed by estimating equation (13) for each journal and for all journals as a whole and testing whether α is significantly different from zero.

The regression results are presented in Exhibit 3. The exhibit presents fitted values of α and β with their respective t-values and coefficients of determination for each individual journal and for all journals as a whole. The explanatory power of equation (13) is very high for both individual journals and all seventeen journals as a whole. For the majority of journals, the generalized Lotka's Law provides an excellent fit. For fourteen out of seventeen journals, the generalized Lotka's Law explains more than 90% of the empirical distribution of publication patterns. Notice also that the model gives almost a perfect fit ($R^2 = 0.999$) when it is applied to all journals as a whole. It is an impressive result considering that we are using a very simple model with only one parameter. Furthermore, all of the estimated intercept terms are not statistically different from zero at the 1% significance level. In sum, it can be said that the generalized version of Lotka's Law, i.e., $a_n = a_1/n^c$, is an excellent description of the empirical distribution of the patterns of research output in the real estate literature.

Finally, since the intercept term in equation (13) is not significantly different from zero, better estimates of the exponent c are obtained by estimating the regression equation forcing the intercept term to be zero.

$$\log(a_n/a_1) = \beta\log(n) + e. \tag{14}$$

The results are presented in Exhibit 4. For all seventeen journals as a whole, the estimated exponent is 2.446. Earlier, Chung and Cox [3] and Cox and Chung [4] reported that the best empirical estimates of the exponent are 2.00 and 1.84, respectively, for the finance and economics literature. The lower author concentration in the real estate field as compared to that in the finance and economics fields may be, in part, attributable to the relatively younger age of most real estate journals. For individual journals, the estimated exponents range from 2.321 for the *Real Estate Review* to 3.835 for the *Journal of Real Estate Finance and Economics*. As in Exhibit 3, the generalized Lotka's Law provides

Exhibit 4
Generalized Lotka's Law and Author Concentration Ranking

Journal	Generalized Lotka's Law $\log(a_n/a_1) = \beta\log(n) + e$ Fitted β (t-value)	Adj. R^2	Ranking of Author Concen.
AJ	−2.678 (−42.097**)	0.994	8
AREU	−2.477 (−25.731**)	0.987	6
ARJ	−2.928 (−16.406**)	0.978	11
CIJ	−2.970 (−17.160**)	0.977	13
HFR	−2.762 (−15.364**)	0.971	9
JAPA	−3.094 (−18.219**)	0.979	14
JPM	2.935 (−32.892**)	0.991	12
JREFE	−3.835 (−178.159**)	0.999	17
JREI	−2.575 (−25.002**)	0.987	7
JRER	−2.359 (−77.510**)	0.999	2
JRET	−2.421 (−28.607**)	0.992	3
JUE	−2.444 (−27.565**)	0.987	5
LE	−3.320 (−28.291**)	0.993	15
PTJ	−3.372 (−21.809**)	0.992	16
REAA	−2.427 (−41.791**)	0.994	4
REF	−2.803 (−27.063**)	0.995	10
RER	−2.321 (−12.724**)	0.942	1
All Journals	−2.446 (−199.017**)	0.999	

**statistically significant at the 1% level

almost a perfect fit for the majority of journals—the R^2 values range from 0.942 to 0.999. Also, all journals have exponents greater than two, indicating that the degree of author concentration for individual journals is less than that predicted by the original Lotka's Law (i.e., two). The degree of author concentration for all seventeen journals as a whole is also less than that predicted by the original Lotka's Law. The ranking of author concentration based upon estimated exponents (i.e., the larger c indicates the lower rank) confirms our earlier observation that the journals with the highest concentrations among their contributors are the *Real Estate Review, Journal of Real Estate Research, Journal of Real Estate Taxation, Real Estate Appraiser and Analyst, Journal of Urban Economics*, and *AREUEA*. As discussed above, this may reflect the fact that most of these journals have existed for longer periods than other journals and thus many writers have had the opportunity to publish more than once; or, perhaps, that the phenomenon 'success breeds success' is more common in higher quality publications.[7]

On the other hand, the authors publishing in the *Journal of Real Estate Finance and Economics* and the *Property Tax Journal* are least concentrated. This may reflect the youth of these journals; i.e., these journals began publication only in 1988 and 1982, respectively. Because of such a short period of existence, few authors have had the chance to have multiple publication in these journals. The low author concentration ranking for *Land Economics* may be attributable to the fact that this journal publishes articles on a wide range of topics and draws submissions from authors with diverse backgrounds, ranging from real estate and economics to geography and planning.

Summary and Concluding Remarks

This study examines whether any bibliometric regularity exists in the real estate literature. Our empirical results strongly suggest that there is one: the number of authors publishing n papers is about $1/n^c$ of those publishing one paper. We find that the value of the exponent (i.e., c) is 2.446 if data are taken from a large collection of journals. For individual journals, we find that the best fitted values of the exponent range from 2.321 to 3.835. The findings of this study provide some useful insight into the patterns of academic research output in the real estate literature. For example, this study predicts that less than 5% of all publishing real estate researchers are likely to publish six or more papers in these journals for the next twenty years, and less than 2% are likely to publish ten or more papers.

Since much of the uniqueness of our findings in the real estate literature (e.g., the lower author concentration than other related fields) may be due to the youth of the field, it will be interesting to see whether the extent of author concentration becomes greater as the field ages. Also, the measure of academic output (i.e., the number of articles) employed in this study may not reflect the true contribution of individuals. The type and quality of articles published in different journals may be different. For that matter, even the articles published in the same journal may have different qualities and make different contributions to the literature. Since this study made no attempt to assess the quality or length of articles or their contribution to the real estate literature, our measurement of academic output has certain limitations. Since an alternative (and perhaps better) measure of research output is citation counts, it may be an interesting extension of this study to use citation counts as the measure of research output, and to see if there exist empirical regularities in the pattern of research output.

Notes

[1]Since the publication of Lotka's paper, numerous authors have attempted to apply Lotka's Law to the literature of various disciplines. While in some studies Lotka's inverse square law holds (e.g., Schorr [12] in map librarianship and Chung and Cox [3] in finance), in others it does not. Voos [15] finds that for the information science literature an exponent of 3.5 gives the best fit with empirical data. Schorr [11] finds that Lotka's inverse square law is not applicable to the literature of library science and proposes an inverse quadruple law whereby for each 100 contributors of a single article, about six will contribute two papers, about one will contribute three papers, etc. Worthen [17] reports that Lotka's Law does not fit the literature in medicine. Most recently, Cox and Chung [4] find that an exponent of 1.84 gives the best fit in the economics literature.

[2]See Bookstein [2] for the proof.

[3]All articles listed in the table of contents of these journals are included in the database. These include main articles, notes, and specialized articles. Book reviews, reports, comments, and rejoinders are omitted.

[4]In the case of multiple authorship, we use the 'normal count,' i.e., each author of an article receives full credit. We aggregate the data for $n \geq 10$ for succinctness and also for some statistical reason. The *chi*-square test, which we perform later, requires that the expected (i.e., theoretical) number of observations in each category should be at least five. Detailed data for each journal for the case $n \geq 10$ are available from the authors upon request.

[5]Albert and Chandy [1], Smith and Greenwade [14], and Webb et al. [16] report that the *Appraisal Journal, AREUEA, The Journal of Real Estate Research, Journal of Urban Economics, Real Estate Appraiser and Analyst*, and *Real Estate Review* are among the better real estate journals.

[6]Since Lotka's Law has repeatedly been hypothesized and tested in other academic fields, and since we wish to examine whether it is *also* applicable to the real estate literature, we treat Lotka's Law as the null hypothesis. We use a small (i.e., 1%) significance level since we wish not to erroneously reject Lotka's Law (which has been shown to hold in some other academic fields) when it is valid in the real estate field.

[7]The reputation of these journals is well known (see Note 5 above).

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