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Research Productivity in Business and Economics: South Korea, 1990-2016*

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This paper ranks higher education in Korea based upon research productivity in business and economics disciplines. The number of SCI-level journal articles are tabulated using the Web of Science search engine, over the sample period from 1990 to 2016. The league table shows that many private universities dominate top-tier ranks, which is consistent with the school reputations most commonly cited by the general public in Korea. In contrast, many national universities appear in the second-tier, and their scanty performance in business and economics is in sharp contrast with our earlier findings in which national universities performed well in science and engineering fields (Jin and Kim, 2018). In addition, the ranking order in lower-ranked schools is found to be sensitive to a small change in publications, whereas the publication gap among top-tier schools is relatively large. Finally, unlike our general perception, the size of school does not matter for collaborative research. Some policy implications are discussed as a conclusion.

Keywords: Research Productivity, SCI-level Journal Publications, Higher Education, University Ranking, School Competitiveness

JEL Classification: A10, A14, A20

I. INTRODUCTION

Recently the competitiveness of Korean business schools and economics departments has been changed substantially, but the schools' reputation, which has traditionally been based on college entrance exams in Korea, seldom changes over time. More specifically,

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students, parents, and policy makers in government and business sectors heavily rely on survey-based rankings (e.g. Korean rankings by Joong-Ang Daily Newspaper; Asian rankings by Shanghai Jiao Tong University (ARWU), Times Higher Education (THE), and Quacquarelli Symonds (QS), among others). Such surveys are conducted on several groups of people, including top managers in the business sector and government officials, but the subjective methods of ranking generally have difficulty in avoiding biased perception on school rankings (Butler, 2007, 2010; Dobrota et al., 2016, among others). This bias is largely attributed to the public's reliance on the past fame of universities, so that the universities top-rated in the past seldom have their reputations altered (Jin and Yu, 2011; Jin and Kim, 2018).

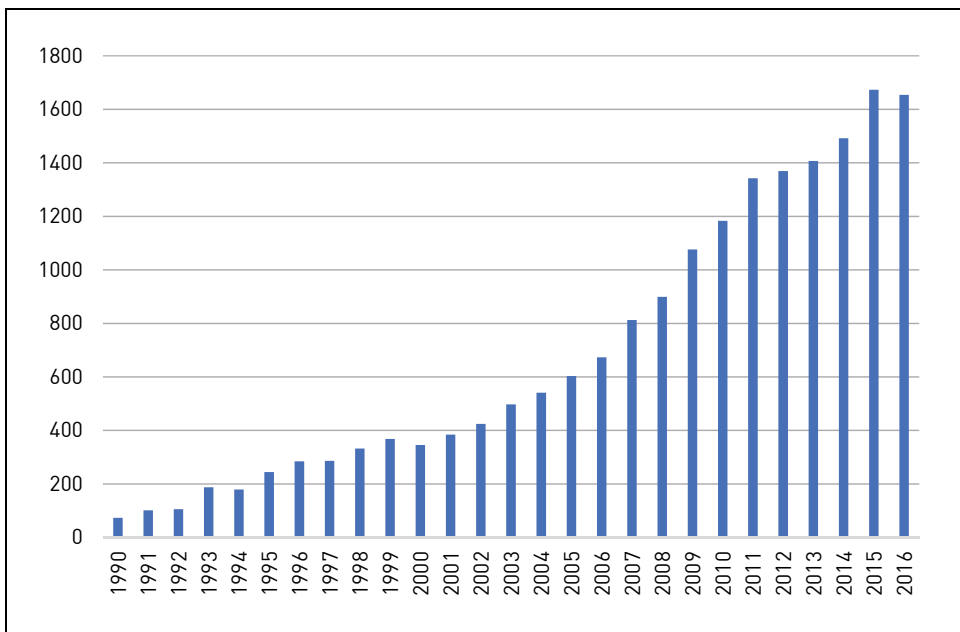
This paper thus aims to illuminate the most recent changes in school competitiveness in Korea based upon research productivity in the fields of business and economics. A sample of 100 universities is obtained from the league table of 148 universities in Korea (Appendix in Jin and Kim, 2018). In the 1970s and 1980s most Korean universities were regarded predominately as teaching schools that focused on education rather than research. Especially social science faculties published very little in academic journals until the early 1990s. When the Korean economy began to raise economic openness to world trade in the early 1990s, many business schools and economics departments were also noticed to publish in international refereed journals.¹ Although the simultaneous occurrence might have happened by accident, Korea officially embarked on globalization in the mid-1990s when the Korean government joined the WTO in 1995 and the OECD in 1996. Its peak time of globalization appeared to be in the early 2000s when the 2002 World Cup Games, jointly held in Korea and Japan, was the momentum to change the Korean society in many different aspects (Jin and Cho, 2015). One of the significant changes at the time was the international co-authorship in publications that has been common practice in Korea ever since. Many Korean scholars in the U.S. and European countries also returned to their home country Korea with sizeable publications accumulated overseas, and their spillover effect on academic research played an important role in the development of academic research in Korea as well (Jin, 2015).

Figure 1 shows publications in SCI-level journals over the period 1990-2016 for business and economics fields. Academic research appears to be very low in the early

¹ It should be noted that science and engineering faculties published in international refereed journals even earlier.

1990s, which is consistent with the findings in the first Asian ranking (Jin and Yau, 1999) in which Seoul National University, for example, was at the bottom of the ranking in Asian top-10. However, journal publications have increased noticeably since the early 2000s. In particular, many Korean universities tended to do more collaborative research with overseas scholars and increased publications in international refereed journals significantly in the 2010s. One small drop is observed for the year of 2000, which is largely ascribed to the Korea's financial crisis of 1997/98. This negative impact on higher education in 2000 well explains the 2-3 years of lag in academic publication.

Figure 1. Total Publications in Business and Economics: South Korea, 1990-2016



Note: The value on the vertical axis indicates the number of SSCI journal publications in business and economics nationwide. SSCI journal publications were obtained from the Web of Science (October 2017).

II. METHODOLOGY

Journal publications were counted for each university in Korea using the Web of Science (October 2017), one of the most widely recognized academic search engine. The Web of Science includes journal articles, books, book chapters, conference proceedings, and so forth. Among these, quality journals were selected that are cited in the following three indexes: *Science Citation Index Expanded (SCI)*, *Social Sciences Citation Index (SSCI)*, *Arts & Humanities Citation Index (A&HCI)*. Most business and economics related articles appeared in SSCI journals.²

There are 437 universities and colleges in South Korea (Wikipedia, 2017). To compile the list of quality universities, we first determined the best 100 universities as listed in Jin and Kim (2018). For each university, we searched for SCI-level publications over the period 1990-2016 for economics and business disciplines only. The business discipline includes four sub-fields: business finance, general business, management, and operation research (OR) management science. The general business area then subsequently includes marketing, international or global business, and accounting; management includes production management, personnel management, hotel management, and management information system (MIS); and the sub-fields of finance and OR management science are rather specific as their names explain.

Based on total SCI-level publications, we further computed per capita publications using the number of full-time faculty obtained from each school's website (as of November 2017). Many different faculty categories were found, e.g. adjunct faculties, part-time instructors or lecturers, emeritus professors, and so forth; all were not counted since they are not full-time. However, short-term visiting professors and scholars were counted here, since many of them are assigned to teach and research, and any research

² It would have been desirable to differentiate quality journals further using the 'impact factors' that were commonly used as quality weights in the literature (e.g. Laband and Piette, 1994 and Conroy et al., 1995, among others, for economics journals); the impact factors were originally designed to compute citations within a discipline, and hence unifying the journal quality measures across disciplines is a formidable task. In addition, the number of pages were not counted although the length of journal articles varied. For the case of multi-authors, each co-author's contribution was not discounted. More weights were not given to the first or corresponding authors either. If one paper was coauthored within the same university, the paper was counted as one publication for their affiliated university. But if coauthors were from different universities, each university deserved one publication each, as designed by the Web of Science.

publications conducted during her/his visit will be jointly affiliated with the schools that she/he currently visits. This ‘buy’ may have a non-trivial effect on the ranking of some schools in Korea.

One difficulty that was encountered in data collection was to determine the exact number of faculty members in business and economics, as business faculties were employed under newly named departments/schools especially in lower-ranked universities. It should also be noted that some business departments were included in the college of social sciences, and the rest of them were in business schools. Furthermore, some economists were affiliated with business schools. For example, the department of international trade consists of faculties in international economics and international business disciplines, so that the former is counted here as economists and the latter as a business field.³

Finally, branch campuses in Korea are independently operated and thus counted separately.

III. RESEARCH PRODUCTIVITY IN BUSINESS AND ECONOMICS

Table 1 shows SSCI journal publications for top-40 universities over the period 1990-2016, and the university ranking in this table is based upon research productivity per capita (column 3).⁴ The last column further computes the average productivity per capita per year. Using these criteria, KAIST ranks in the number one position. The KAIST Business School published a lot, especially in the sub-field of OR management science. Seoul National, Korea U, and Yonsei (the so-called SKY universities) follow in the second, third, and fourth rankings, respectively. These top-tier schools are largely consistent with the general perception on school reputations in Korea.

³ It is pity to find that several lower-ranked universities are in the process of closing down the economics department these days.

⁴ It should be, however, noted that the number of current faculty members (as of November 2017) was used as a proxy for the average number of faculty members over the past 27 years. Normally, most schools have been growing in terms of students and faculty over time, so that actual number of faculties would have been smaller in the past and thus per capita productivity must be greater than in Table 1. On the other hand, some schools might have inflated productivity because of a reduced faculty size in recent few years (perhaps due to financial/organizational crises). Except for these few changes, we presume that all schools have enlarged their faculty size more or less at a constant rate, and hence the school rankings reported in Table 1 would not change much. We also find little changes in the ranking of top-rated schools in Table 3 that uses total publications only.

Table 1. Research Productivity in Business and Economics: 1990-2016

Rank	School	SSCI Journal	# of Faculties	per capita Publications	per capita per year
1	KAIST	1623	70	23.19	0.859
2	Seoul National University	1631	102	15.99	0.592
3	Korea University	1628	129	12.62	0.467
4	Yonsei University	1106	104	10.63	0.394
5	Hanyang University	583	83	7.02	0.260
6	Kyung Hee University	583	87	6.70	0.248
7	Sungkyunkwan University	776	123	6.31	0.234
8	Sogang University	473	86	5.50	0.204
9	Ewha Womans University	330	60	5.50	0.204
10	Pusan National University	308	79	3.90	0.144
11	Chung-ang University	380	98	3.88	0.144
12	Ajou University	260	68	3.82	0.142
13	Inha University	228	61	3.74	0.138
14	Konkuk University	218	73	2.99	0.111
15	Pukyong National University	173	59	2.93	0.109
16	Chonnam National University	162	56	2.89	0.107
17	Dongguk University	175	61	2.87	0.106
18	Sungshin Women's University	48	17	2.82	0.105
19	Gyeongsang National University	98	36	2.72	0.101
20	Kyungpook National University	184	68	2.71	0.100
21	Hallym University	91	35	2.60	0.096
22	University of Seoul	153	62	2.47	0.091
23	Sejong University	175	74	2.36	0.088
24	Yeungnam University	179	78	2.29	0.085
25	Chungbuk National University	115	53	2.17	0.080
26	Far East University	43	20	2.15	0.080
27	University of Ulsan	101	47	2.15	0.080
28	Chungnam National University	109	51	2.14	0.079
29	Inje University	56	27	2.07	0.077
30	Sookmyung Women's University	80	39	2.05	0.076
31	Chonbuk National University	96	47	2.04	0.076
32	Hongik University	135	67	2.01	0.075
33	Kongju National University	41	21	1.95	0.072
34	Changwon National University	66	35	1.89	0.070
35	Kyungsung University	80	43	1.86	0.069
36	Kwangwoon University	56	31	1.81	0.067
37	Kangwon National University	95	53	1.79	0.066
38	Soongsil University	129	73	1.77	0.065
39	Incheon National University	90	51	1.76	0.065
40	Hoseo University	60	34	1.76	0.065

Note: SSCI journal publications were obtained from the Web of Science (October 2017). The number of full-time faculty members in business and economics disciplines were taken from each school's website (as of November 2017).

It is also interesting to find that many *private* universities dominate the top-tier ranks in Korea. KU (3rd), Yonsei (4th), Hanyang (5th), Kyunghee (6th), SKK (7th), Sogang (8th), Ewha (9th) are in this category. This also follows the conventional view of the school reputation most commonly cited in public discourse. In contrast, many *national* universities, except KAIST and SNU, appear in the second-tier, and their scanty performance in business and economics is in sharp contrast with the findings in Jin and Kim (2018) in which many national universities performed well in science and engineering fields. Another interesting result from this league table is that the ranking order of lower-ranked schools is found to be sensitive to small changes in publication, whereas the publication gap among top-tier schools is relatively large. In other words, school ranking would be changed noticeably if a star professor moved into a lower-ranked school; but one or two superstars may not be good enough to alter the ranking of top-tier schools.

It should be noted that the per capita ranking order used here is generally consistent with the one based on total publications (column 1). Large publications in total, which are mostly proportional to the large number of faculty members, normally rank high. A few exceptions are the small universities like Sungshin Women's University (18th), which are small but have strong business and economics departments. By contrast, large universities such as Hongik (32nd), Soongsil (38th), Kookmin (44th), Dankook (45th), and Keimyung (57th), among others, published a great deal in total but their per capita productivity appeared to be relatively low. The results appear to be at odds with our general perception that the large faculty size with diverse specialties may have a synergy effect that enhances collaborative research further.

IV. CONCENTRATION RATIOS

Table 2 computes the concentration ratios (CRs) based on total publications. The CRs show how much percentage of publications are concentrated by how many leading schools (Hirsch et al., 1984). The CR up to the k^{th} leading schools is computed as:

$$CR(k) = \text{sum of pub}_i / \text{total pub},$$

where $i = 1, 2, \dots, k$, and k = number of leading schools. Unlike per capita publications in Table 1, the school rankings based on total publications are slightly changed in order:

SNU(1st), KU(2nd), KAIST(3rd), Yonsei(4th), SKK(5th), Hanyang(6th), Kyung Hee(6th), Sogan(8th), Chung-ang(9th), Ewha(10th), and so forth (column 1 in Table 1). The concentration ratio only by SNU appears to be 11%. More importantly, about half of total publications are produced by top-5 leading schools (47%), about two-thirds by top-10 schools (64%), and about three-quarters by top-20 schools (78%). Accordingly, the CR increases at a decreasing rate, which is similar to a typical production function. In other words, top-tier schools dominate the publications in business and economics, and the increment of publications diminishes in lower-ranked schools.

Table 2. Publications among Leading Schools

Concentration Ratios	Percentage (%)
CR(1)	0.11
CR(5)	0.47
CR(10)	0.64
CR(20)	0.78

Note: The value in parentheses indicates the number of leading schools.

V. SCHOOL COMPETITIVENESS OVER TIME

Table 3 further shows total publications for sub-periods, in which changes in school competitiveness can be identified over time. Although the ranking of top-10 universities remains unaltered except for a few schools, many lower ranked schools are dramatically changed over time. For example, many national universities drop in the 2000s, while some private universities are rising up for the most recent decades (2007-2016). In addition, top-tier schools increased journal publications about 5 times in the 2000s as compared to their research outputs in the 1990s, and about double in the most recent ten years (2007-2016). The ratios tended to be even higher for lower-ranked schools since their initial publications in the 1990's were relatively small. For the most recent ten years, about half of the top-36 schools had more than two-hundred percent increase. The results suggest that, as Korea entered into the 21st century, universities became more aware of the importance of academic research. This is largely due to the sweep of globalization in higher education (e.g. Lindblad and Lindblad, 2009; Findlay

and Tierney, 2010), as well as the growth of the Korean economy (e.g. Jin and Cho, 2015).

Table 3. Total Publications in Sub-periods

School	1990-1999		2000-2009		2007-2016	
	Pub	Rank	Pub	Rank	Pub	Rank
KAIST	453	1	618	1	781	4
Seoul National University	104	2	548	2	1216	2
Korea University	89	3	482	3	1307	1
Yonsei University	55	4	406	4	922	3
Sungkyunkwan University	42	5	222	6	627	5
Kyung Hee University	39	6	145	7	497	6
Pusan National University	38	7	110	10	195	14
Hanyang University	35	8	224	5	437	7
Sogang University	22	9	121	8	401	8
Chung-ang University	19	10	95	11	324	9
Soongsil University	19	10	42	25	94	24
University of Ulsan	18	12	36	27	58	30
Chonnam National University	16	13	61	18	117	22
Hongik University	15	14	24	32	131	20
Chungnam National University	15	14	27	29	88	25
Chonbuk National University	15	14	45	23	62	29
Ewha Womans University	14	17	115	9	254	10
Inha University	13	18	64	16	207	12
Dongguk University	13	18	65	15	191	15
Kyungpook National University	13	18	46	21	152	17
Ajou University	10	21	66	14	232	11
Incheon National University	10	21	19	33	68	28
Yeungnam University	9	23	43	24	157	16
Kangwon National University	9	23	15	34	87	26
Pukyong National University	8	25	83	12	146	18
Chungbuk National University	7	26	47	20	97	23
Hallym University	7	26	50	19	55	32
University of Seoul	6	28	46	21	138	19
Changwon National University	6	28	26	30	48	34
Gyeongsang National University	5	30	38	26	80	27
Sookmyung Women's University	5	30	32	28	56	31
Sungshin Women's University	5	30	14	35	39	36
Konkuk University	4	33	64	16	197	13
Sejong University	4	33	78	13	123	21
Kwangwoon University	3	35	14	35	54	33
Inje University	3	35	25	31	41	35

Note: The school ordering in the first column is based on the ranking of the 1990s. Four schools are excluded because of their zero publication in the 1990s.

VI. RESEARCH PRODUCTIVITY IN ECONOMICS

Table 4 ranks the research productivity in economics only. Again, we started with the list of 100 universities (Jin and Kim, 2018). The number of faculty in economics includes all faculty members in the economics department, plus any economists who can publish in economics journals, e.g., the departments of international economics, agricultural economics, food and resource economics, international finance and investment, global banking, Asia-Pacific logistics, financial engineering, international studies, and so forth. To be included here, universities should have an independent economics department. KAIST, for example, has seven active economists in its business school and all of them published a great deal in economics, but the school does not have an economics department. On the other hand, many other economics departments in lower-ranked universities had no publications at all in SSCI journals. After deleting these many schools, the remaining 62 schools published at least one paper in SSCI journals over the entire sample period. Table 4 lists the best-30 schools in economics.

Korea University (KU) ranks atop with the highest productivity in economics. Their total publications are also greater than those of Seoul National University (SNU). In early studies, KU economics department also ranked first in Korea. Jin (2005), for example, counted all international journal articles in economics, and Jin and Hong (2008) counted top-36 economics journals, but the ranking order of KU (1st) and SNU (2nd) remained unaltered.

Apart from those, the ranking order has been changed significantly. First, private universities traditionally dominate the top-tier ranks. Compared to the earlier ranking in Jin (2005), Yonsei (3rd), SKK (5th), Kyunghee (6th), and Ewha (9th), among others, have improved research productivity after a decade, whereas the ranking of Sogang (7th), among others, has dropped significantly. Second, it is noticeable that many national universities, except SNU, are behind private universities, which is quite different from the university rankings that include science and engineering disciplines (Jin and Kim, 2018). Third, such universities as Ajou (10th), Dankook (13th), and Sungshin (14th) have a smaller number of faculty members in economics, and most faculties are evenly productive in research. This type of schools are more competitive over time than do the unevenly-distributed larger schools.

Table 4. Research Productivity in Economics: 1990-2016

Rank	School	SSCI Journal	# of Faculties	per capita Publications	per capita per year
1	Korea University	570	46	12.39	0.459
2	Seoul National University	516	46	11.22	0.415
3	Yonsei University	300	35	8.57	0.317
4	Chung-ang University	180	21	8.57	0.317
5	Sungkyunkwan University	284	34	8.35	0.309
6	Kyung Hee University	208	27	7.70	0.285
7	Sogang University	208	33	6.30	0.233
8	Hanyang University	138	26	5.31	0.197
9	Ewha Womans University	108	21	5.14	0.190
10	Ajou University	58	12	4.83	0.179
11	Konkuk University	79	19	4.16	0.154
12	Kookmin University	83	22	3.77	0.140
13	Dankook University	45	12	3.75	0.139
14	Sungshin Women's University	26	7	3.71	0.138
15	University of Seoul	60	17	3.53	0.131
16	Inha University	71	21	3.38	0.125
17	Myongji University	27	8	3.38	0.125
18	Chonnam National University	64	19	3.37	0.125
19	Kangwon National University	45	15	3.00	0.111
20	Hallym University	35	12	2.92	0.108
21	Kongju National University	29	10	2.90	0.107
22	Yeungnam University	55	20	2.75	0.102
23	Gachon University	24	9	2.67	0.099
24	Hongik University	28	11	2.55	0.094
25	Sunchon National University	10	4	2.50	0.093
26	Pusan National University	71	29	2.45	0.091
27	Soongsil University	61	25	2.44	0.090
28	Chungnam National University	26	11	2.36	0.088
29	Kyungpook National University	66	28	2.36	0.087
30	Sejong University	21	10	2.10	0.078

Note: The number of faculty in economics count all members in the economics department, plus any economists who can publish in economics journals, e.g., the departments of international economics, agricultural economics, food and resource economics, international finance and investment, global banking, Asia-Pacific logistics, financial engineering, international studies, and so forth.

VII. BUSINESS SCHOOL RANKINGS

Table 5 ranks business schools based on research productivity. Again, we employ the list of best-100 universities in Korea (Jin and Kim, 2018). Some universities are not included in the league table because they are science and engineering universities without a business school. Postech, for example, has published numerous papers in

Table 5. Research Productivity in Business Schools: 1990-2016

Rank	School	SSCI Journal	# of Faculties	per capita Publications	per capita per year
1	KAIST	1444	70	20.63	0.764
2	Seoul National University	1115	56	19.91	0.737
3	Korea University	1058	83	12.75	0.472
4	Yonsei University	806	69	11.68	0.433
5	Hanyang University	445	57	7.81	0.289
6	Kyung Hee University	375	60	6.25	0.231
7	Ewha Womans University	222	39	5.69	0.211
8	Sungkyunkwan University	492	89	5.53	0.205
9	Inje University	47	9	5.22	0.193
10	Sogang University	265	53	5.00	0.185
11	Pusan National University	237	50	4.74	0.176
12	Inha University	157	40	3.93	0.145
13	Pukyong National University	165	44	3.75	0.139
14	Ajou University	202	56	3.61	0.134
15	Dongguk University	138	40	3.45	0.128
16	Gyeongsang National University	88	26	3.38	0.125
17	Kyungpook National University	118	40	2.95	0.109
18	Chonnam National University	98	37	2.65	0.098
19	Chung-ang University	200	77	2.60	0.096
20	Konkuk University	139	54	2.57	0.095
21	Hallym University	56	23	2.43	0.090
22	Sejong University	154	64	2.41	0.089
23	Sookmyung Women's Univ	67	28	2.39	0.089
24	Chonbuk National University	76	33	2.30	0.085
25	Kyungsung University	62	27	2.30	0.085
26	Chungbuk National University	100	44	2.27	0.084
27	Sungshin Women's University	22	10	2.20	0.081
28	University of Ulsan	89	41	2.17	0.080
29	Yeungnam University	124	58	2.14	0.079
30	Chungnam National University	83	40	2.08	0.077

Note: See Table 1.

business-related SCI-level journals (257 papers in total), concentrating on OR management science (219 papers), but it does not have a business school.⁵ After deleting some business schools that have no publications in SCI-level journals, we found that the remaining 84 schools published at least one paper in SCI-level journals over time. Table 5 lists the best-30 business schools in Korea.

As expected, KAIST Business School published most, and placed first in Korea. The so-called SKY universities follow as the second, third, and fourth, respectively. Hanyang, Kyung Hee, Ewha, and SKK are the second group of top business schools. These top-tier school rankings are largely consistent with the general public's perception on school reputation in Korea. Similar to the economics ranking, national universities, in general, perform less than top-tier private universities.

Table 6 then ranks business schools based on total publications rather than per capita productivity. Again, KAIST ranks number one in this tally, and SKY universities follow. The top schools' ranking is similar to the ranking of per capita publications in Table 5. The business-related SCI-level journal publications are then divided into four sub-fields: finance, general business, management, and OR management science. Korea University is most productive in the sub-field of finance; Seoul National ranks number one in both general business and management; and KAIST publishes much more than other schools in OR management science.

Table 6. Total Publications in Business Schools: Four Sub-fields

Rank	School	Finance	Business	Mgt	OR Mgt	Total
1	KAIST	132	140	317	855	1444
2	Seoul National University	150	275	334	356	1115
3	Korea University	203	271	297	287	1058
4	Yonsei University	72	226	243	265	806
5	Sungkyunkwan University	102	123	126	141	492
6	Hanyang University	50	109	115	171	445
7	Kyung Hee University	47	78	123	127	375
8	Sogang University	58	82	68	57	265
9	POSTECH	5	8	25	219	257
10	Pusan National University	19	16	41	161	237
11	Ewha Womans University	31	67	55	69	222
12	Ajou University	16	35	49	102	202
13	Chung-ang University	58	39	44	59	200
14	Pukyong National University	4	10	18	133	165

⁵ Perhaps, management-related engineering faculties published in such OR journals.

Table 6. Continued

Rank	School	Finance	Business	Mgt	OR Mgt	Total
15	Inha University	11	31	50	65	157
16	Sejong University	8	23	82	41	154
17	Konkuk University	28	30	36	45	139
18	Dongguk University	20	44	37	37	138
19	Yeungnam University	6	27	31	60	124
20	Kyungpook National University	13	36	38	31	118
21	Hongik University	12	31	27	37	107
22	Chungbuk National University	4	17	18	61	100
23	Keimyung University	2	23	28	46	99
24	Chonnam National University	12	15	28	43	98
25	University of Seoul	26	17	17	33	93
26	University of Ulsan	1	7	27	54	89
27	Gyeongsang National University	2	6	12	68	88
28	Kookmin University	19	25	20	22	86
29	Chungnam National University	13	15	19	36	83
30	Dankook University	16	14	24	23	77

Note: See Table 1.

VIII. ALTERNATIVE ECONOMICS RANKING

For the robustness of the results, Table 7 further checks with the research productivity of top-10 economics departments, using an alternative methodology. In other words, the current faculty's research publications were collected for the best-10 economics departments in Korea. The list of current faculty members were obtained from each school website (as of December 2017). For each faculty, SSCI journal publications were collected from the Web of Science (December 2017).

Compared to Table 4 that counted publications for each school affiliated at the time of publication, the school ranking of Korea University (1st) and Seoul National (2nd) is unaltered. Their per capita productivity is also robust with a minimal variation across two different ranking methodologies. This suggests that the research productivity of the top-two schools is approximately evenly distributed. In other words, if one or two senior members retire or some research-active scholars move to another school, their research productivity is replaced by recruiting new faculties without much difficulty. The results also show that current faculty members in SKK (3rd), Kookmin (7th), and U of Seoul (10th) are noticed to be active in research, so that their research productivity and hence their school ranking has been improved a lot compared to the ones in Table 4.

Table 7. Alternative Ranking by Current Faculty Members in Top-10 Economics Departments

Rank	School	SSCI Journal	# of Faculties	per capita Publications
1	Korea U	394	32	12.31
2	Seoul National	448	39	11.49
3	SKK	329	34	9.68
4	Yonsei	308	35	8.80
5	Kyung Hee	172	23	7.48
6	Chung-ang	126	21	6.00
7	Kookmin	43	8	5.38
8	Sogang	149	33	4.52
9	Hanyang	100	23	4.35
10	U of Seoul	68	17	4.00

Note: Economics departments only (as of December 2017). The number of faculty members and SSCI journal publications differ from those in Table 4 since faculty members are counted here for the economics department only. Table 4, however, counted for all economists campus wide.

Table 8. Concentration Ratios

Concentration Ratios	Korea University (1st)	Seoul Nat'l University (2nd)	Hangyang University (9th)	University of Seoul (10th)
CR(1)	12.4%	10.7%	23.0%	16.2%
CR(5)	40.6%	41.9%	62.0%	57.4%
CR(10)	63.5%	61.6%	81.0%	91.2%
CR(20)	88.8%	83.7%	100.0%	100.0%

Note: The value in parentheses indicates the number of leading scholars within a department.

Table 8 further computes concentration ratios (CRs) to see the approximate distribution of researchers. CRs indicate how much publications are concentrated by how many leading scholars within a department. For the top-two universities, KU (1st) and SNU (2nd), concentration ratios are very similar to each other. The distribution pattern between research-active and inactive faculties is nearly identical in the top-two schools although the number of faculty members are slightly different. However, this distribution pattern differs from the one in lower-ranked universities. For Hanyang (9th) and U of Seoul (10th), best-5 faculty members dominate in departmental publications, and best-10 faculty members publish about 80-90% of departmental publications. This is a good indication that a small number of prolific faculties determine the lower-ranked schools, while top schools attribute their success to the efforts of many productive members.

IX. DISCUSSION

The research productivity that is adjusted for school size shows significant changes in school rankings. Especially, research schools that are dedicated to academic research are observed to rank relatively high. Their achievement is mainly attributed to a drive of selective recruitment exercises. More specifically, the universities like KAIST and Postech recruited research-active scholars from the very beginning, and hence the quality of research could be enhanced. Only prolific faculty could pass stringent tenure reviews and get promoted, so that the ‘publish or perish’ principle seemed to be rigorously applied (see also Jin and Kim, 2018). Their success story can be our role model for the future development of higher education in Korea.

In the league table, we also find that lower-ranked schools would be elastic with respect to a small change in publications, but top-tier schools are relatively inelastic even with a large increase in publications. In other words, if a productive scholar moves in, the school ranking may rise up significantly in lower ranks. However, first-tier schools may need to recruit several superstars to increase their ranking to one or two positions (see also Jin, 2015).

Another finding is that the research productivity of most schools in the first-tier is more or less evenly distributed across faculty members, so that the average productivity may not be significantly affected when one or two faculty members retire. However, some other schools have a skewed distribution toward a small number of prolific scholars, and hence if star professors move out, it may cause a large impact on the average productivity. A few cases were observed in the first-tier schools that were highly ranked a decade ago but dropped to the second-tier recently. To maintain the school reputation, it is thus important to keep the research productivity to be distributed evenly among faculty members.

In addition, we generally believed that big schools would facilitate more collaborative research. If there are more faculties with diverse specialties, more collaborations are expected to achieve in large schools. However, the results are different in reality. Larger schools not necessarily publish more. Unlike natural science and engineering schools, a smaller number of co-authorships were found in the social science disciplines including business and economics. In fact, we found many single-authored papers. Collaborative research may not be common practice in business and economics disciplines. Many big schools in our sample were found to rank downward because of

their large faculty size, whereas smaller schools with prolific scholars ranked in a higher position.

Finally, the inclusion of foreign scholars in the departments/schools will internationalize both students and faculties, so that the departments/schools will be more competitive in international educational markets. International collaboration would be active more than before. Foreign scholars also play an important role in upgrading to an international standard. For example, faculty is encouraged to publish in international refereed journals rather than in domestic Korean journals; tenure reviews and promotions may require more strict regulations than before. Faculties and students will also be globalized in many other aspects. This is similar to the case of foreign direct investment (FDI) that enhances domestic technology in developing countries. First few years may be awkward to domestic workers, but they learn foreign technology quickly and can be independent in a few years. The consequences are expected to be similar in academics.

These days, domestic sports teams in Korea recruit foreign players, as well as coaches from overseas; foreign entertainers often appear on domestic TV shows; domestic companies hire foreign talents regardless of race or color. Why not in academics? Why not opening up our job offerings equally to foreign candidates? We are not only talking about the recruitment of Korean-American or foreign-born Korean scholars, but we also refer to the recruitment of prolific foreigners from around the world. In this case, one problem we may confront would be the language barrier. For example, faculty meetings could be done in a bilingual as a first step. If faculty meetings are conducted in both English and Korean, it sounds like we may miss a full discussion of important agenda, but the meetings will soon be more formalized and upgraded to an international standard. Gains will be more than loss.

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