A comparative study of refereed journal articles published by native and foreign born faculty in the United States

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Abstract: One of the key features of American hegemonic power is the ability to attract talents from all over the world, especially in those shortage areas of science and technology. To explore what is behind the advanced American higher education system, this research compares native and foreign born faculty using four dimensions: demographics, field of specialty, achievement and institutional prestige to predict the number of refereed journal articles published by the faculty members in the four-year American universities. The study finds that foreign born faculty members outperform native born faculty in terms of research productivity in the light of the four measures used. These results suggest that the strength of American higher education, to a certain extent, is contributed by imported talents.

Key words: faculty; immigration; birth place; refereed journal article

1. Introduction

As measures of research productivity, faculty members normally provide book, book chapter, conference presentation, non-refereed journal article and refereed journal article as evidence of their research contributions. However, among these, peer-reviewed journal article represents one of the most important scholastic contributions that any university faculty can make (Green, Bellin & Baskind, 2002) despite of the fact that faculty productivity commonly includes teaching, research and service.

When exploring faculty publication in the United States, the authors naturally touch one of the core issues related to immigration. It is well known that immigrants have played pivotal roles in the process of American ascendancy in the last century (Zinn, 2003). However, the nature and character of those approaching the American shores have, over the last century, experienced dramatic changes. The earlier waves of 20th century immigrants were predominantly European and largely poor-educated at the time of their arrival (LIN, et al., 2009). In recent decades, however, Richmond (1988) has observed a growing demand for highly qualified immigrant talents, which has resulted in the phenomenon known as "brain drain"—intellectual talents flowing from those less developed to more advanced countries, especially to the United States.

To explain the flow of talented people and the functions of their contributions to the hegemonic power, Wallerstein's world system theory (Hopkins & Wallerstein, 1979; Wallerstein, 2004) is utilized. According to Wallerstein, the hegemonic powers in the world system has experienced the historical rotations through trading

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among countries in the core, periphery and semi-periphery. One of the significant consequences through exchanges of goods, services and human resources is to reinforce the hegemonic power. “Brain drain” towards the core could, at least partially, explained why the United States (core) has experienced a long period of sustainable growth.

This research tries to explore what is behind the advanced American higher education system through comparing the number of refereed journal articles published by native and foreign born faculty members. It is hypothesized that foreign born faculty members are likely to publish more refereed journal articles than native born faculty members, even after considering the control of variables such as demographics, field of specialty, personal achievement and institutional prestige.

1.1 Theoretical model

World system theory (Wallerstein, 2004) as a comprehensive theory will be narrowly used to explain the causes and consequences of the number of refereed journal articles by faculty members in the United States. Figure 1 shows that core (USA) and periphery are engaging in unequal exchanges of intellectual talents. For the periphery and semi-periphery countries, such exchange is called “brain drain”. It should be noted that the quantity of faculty publication is influenced by many factors. Nevertheless, demographics, field of specialty, personal achievement and institutional prestige occupy the core positions in this regard (see details in Figure 1). The ultimate research question here is “Do foreign born faculty perform better than native born faculty?”. If the answer to the question is a resounding “Yes”, then the conclusion would be “Advanced American higher education system, to a large extent, is contributed by imported talents”. Since higher education plays critical roles in modern states, the inference is that imported talents have further reinforced American hegemonic power.

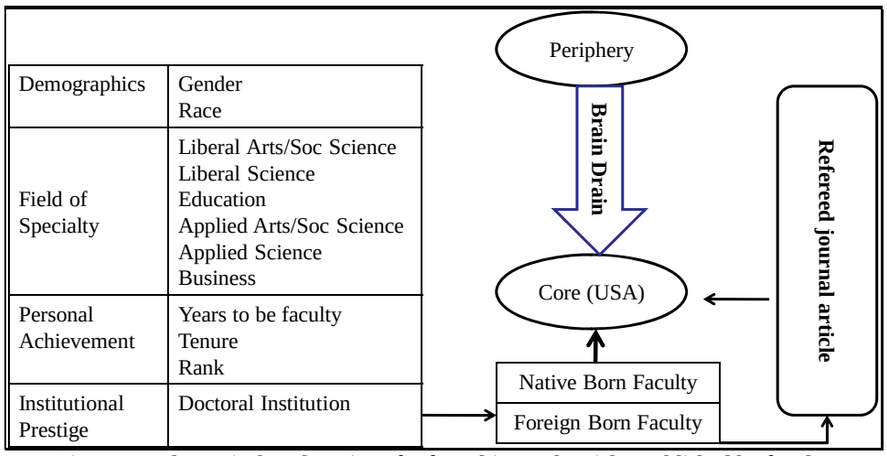

Figure 1 Theoretical explanation of refereed journal articles published by faculty in the United States: Native vs. foreign born faculty

1.2 Background

Discovery of new knowledge is absolutely crucial in the complicated and vulnerable world (Boyer, 1990). Obviously, higher education institutions have played important roles in these endeavors. To assess scholastic productivities of faculty in the processes of annual review, tenure and promotion, higher education institutions use a variety of indicators of publishing productivity, such as peer-reviewed journal article, book and book chapters as evidences (Green, Bellin & Baskind, 2002). However, articles published in refereed journals have emerged as the single most frequently used measure of faculty scholarship (Bloom & Klein, 1995; Seipel, 2003). The importance

of refereed journal articles justifies that the authors use the number of refereed journal articles as proxy scholastic productivities of faculty in the United States.

After defining the standard of measurement, “What factors influence faculty publication?” becomes the next important question. Literature shows that demographics, such as gender and ethnicity, are some of the most frequently mentioned factors in the literature. Schuster and Finkelstein (2006) revealed that men publish almost twice as much as women. However, the gender gap tends to become narrow in fields of health, social sciences and the fine arts where the proportion of women is much higher than in science, engineering and technology. In terms of ethnicity, Whites are more likely to publish than faculty of other colors. As an exception, however, it is reported that Asian faculty members can produce more publications or other permanent creative works than Whites and other minorities (Bradburn, Sikora & Zimbler, 2002).

Field of specialty is one of the significant factors in predicting the number of refereed journal articles published by faculty members (Bayer & Dutton, 1975). In general, faculty members in natural sciences and engineering publish more than those who are in education, arts and social sciences (Blackburn & Lawrence, 1995). Tenure and rank are two milestones in the ladder of faculty careers. LIN and GAO (2008) found that faculty who are tenured and have higher ranks tend to publish more peer-reviewed journal articles. Pellino, Boberg, Blackburn, and O’Connoll (1981) suggested that the place of employment in higher education is the single best predictor of faculty scholarly productivity. Faculty members in research universities, for instance, publish more journal articles than those who work elsewhere (Boyes, Altbach & Whitelaw, 1994).

In brief, four dimensions discussed above have more or less significant impact on faculty publications of peer-reviewed journal articles. However, scholarly productivity of foreign born faculty in four-year American institutions has yet to be explored in the context.

2. Research methods

2.1 Data sources

Data used in this research are from the NSOPF (National Study of Postsecondary Faculty, 2004), which was designed to provide nationally representative data on faculty and staff at two- and four-year degree-granting institutions in the United States. The survey included questions on the activities and instructional duties of postsecondary faculty and instructional staff during the 2003 Fall term. Faculty and instructional staff participating in the survey were asked a series of questions regarding their teaching, research, life and job situations, including salary, benefits, workload, job security, decision-making and job satisfaction (Cataldi, et al., 2005).

In this study, in order to explore the status and role of foreign born faculty, native born faculty will serve as a benchmark in the study. The variable “institution classification” is used to identify four-year institutions, while the variable “faculty status” is used to select faculty members. Since full-time and part-time faculty have different status on campus (Rajagopal & LIN, 1996), this study selects only full-time faculty at four-year colleges as research subjects. “Employed part-time or full-time” is used to select full-time faculty. The variable “born/not born in the United States” is used to distinguish foreign from native born faculty. The size of the selected sample, after normalized weighting is applied, is n=11,562 which represents 536,661 full-time faculty at four-year colleges in the United States.

In order to examine the number of articles published in refereed journals during career (Q52AA), four

dimensions (i.e., demographics, field of specialty, personal achievement and institutional prestige) are generally recognized as important indicators in predicting faculty publications. The similarities and differences of native and foreign born faculty explored in this study are based on these indicators.

2.2 Research questions

To provide some contrasts between the two groups of faculty, the authors explore the following five questions:

(1) What is the average number of refereed journal articles published by native and foreign born faculty?

(2) How do demographics affect publication of refereed journal articles, and to what extent it influences native born and foreign born faculty differently?

(3) How does the field of specialty influence publication of refereed journal articles, and to what extent it influences native born and foreign born faculty differently?

(4) How does personal achievement impact on publication of refereed journal articles, and to what extent it influences native born and foreign born faculty differently?

(5) How does institutional prestige impact on publication of refereed journal articles, and to what extent it influences native born and foreign born faculty differently?

2.3 Statistical analysis

Quantitative methods are used to provide both descriptive and inferential statistics in relation to the number of refereed journal articles published by full-time faculty members at four-year colleges and universities in the United States.

The first part of the data analysis describes the four dimensions compared between native and foreign born faculty. To systematically predict the number of refereed journal article published by faculty, two linear regressions that are introduced are related to native and foreign born faculty, respectively.

3. Results

The first research question, “What is the average number of refereed journal articles published by native and foreign born faculty?”, is answered as shown in Table 1. In general, foreign born faculty members on average publish almost 28 peer-reviewed journal articles while native born faculty members publish around 20 articles in their career. In other words, foreign born faculty members in their career publish 10 more articles than their counterpart. Table 1 also reveals that the mean difference between male and female is the largest among two demographic variables ($F=558$, $p<0.001$). With regard to gender, male faculty members publish 15 more journal articles than their female counterpart. It is interestingly noted that foreign born male faculty publish 11.3 more articles than native born male faculty while foreign born female faculty only publish 3.9 more journal articles than native born female faculty.

Significant differences can also be observed in ethnicity. Asian faculty members on average publish the most (25), followed by White (20), Latino (16) and Black faculty publish the least (9.4). When race split by birthplace, it can be found that foreign born White publish the most (31.4), followed by Asian (27.4) and foreign born African American faculty publish the least (15.3). In terms of differences within the same race divided by birthplace, the research reveals that foreign born Asian faculty members show the biggest difference (14.4) to their native born counterpart, followed by White (13.1) and African American faculty (8.3). American Indian faculty members demonstrate the least difference (5.4), and Black faculty stand in between (8.3).

In brief, Table 1 also provides the answers to the second question that demographics do significantly affect the publication of refereed journal articles where foreign born faculty outperform their native born counterpart.

Table 1 Comparing means of number of refereed journal articles by demographic dimension

Variable	Attribute	Native Born	Foreign born	Total	Difference
Gender	Male	22.3	33.6	25.0	11.3
	Female	9.3	13.2	10.0	3.9
	Total	17.5	27.7	19.7	10.3
Race	American Indian or Alaska Native	14.4	19.8	14.6	5.4
	Asian and/or Pacific Islander	12.9	27.4	25.0	14.4
	Black/African American non-Hispanic	7.1	15.3	9.4	8.3
	Hispanic White or Hispanic Black	13.0	18.7	16.1	5.7
	White, non-Hispanic	18.3	31.4	20.0	13.1

Notes: For gender, $F_{(1, N=11,561)}=558$, $p<0.01$; For race, $F(4, N=11,561)=24.1$, $p<0.01$.

Table 2 answers the third question related to the field of specialty. In general, faculty in liberal science published the most (43.6), followed by applied science (26.1), liberal arts and social science (18.5) and business (13.4). Faculty in education published the least (8.5), and faculty in applied arts and social science (10.1) are slightly better than education.

Two areas, liberal science and applied science, demonstrate that foreign born faculty members have outstanding performance in publishing journal articles than native born faculty. In liberal science, for example, foreign born faculty published almost 15 more refereed journal articles than native born faculty members. A similar pattern appears in applied science where foreign born faculty published over 12 more articles than native born faculty. These significant differences reveal that the US imported a great deal of talents in science and technology, while liberal arts and social sciences, applied arts and social science, and education are largely dominated by native born faculty. In these areas, the difference between foreign and native born faculty are much smaller. In brief, field of specialty is one of the most important predictors of faculty publication. Foreign born faculty outperformed native born faculty, especially in pure and applied sciences.

Table 2 Comparing means of the number of refereed journal articles by principal field of specialty

Field	Native	Foreign born	Total	Difference
Liberal arts/soc science	17.3	22.9	18.5	5.61
Liberal science	39.0	54.0	43.6	14.92
Education	8.1	11.6	8.5	3.47
Applied arts/soc science	10.0	10.9	10.1	0.96
Applied science	22.7	35.0	26.1	12.28
Business	12.5	15.8	13.4	3.30
Total *n*	17.6	28.0	19.9	10.40

Notes: $F_{(5, N=11,390)}=151.7$, $p<0.01$.

To answer the question of “How does personal achievement influence publication of refereed journal articles?”, Table 3 first reveals that years of service as faculty members show a clear linear relationship with the

numbers of refereed journal articles published. In contrast to native born faculty, foreign born faculty members accelerate the difference over the years they served as a faculty member. In the first five years or less, for example, foreign born faculty published 7.3 more journal articles than native born ones. When it is close to the end of their careers, foreign born faculty publish 23.7 more journal articles than their native born counterpart, widening the gap drastically.

Table 3 Comparing means of the number of refereed journal articles by personal achievement

Variable	Attribute	Native born	Foreign born	Total	Difference
Years since began first faculty job	5 years or less	5.7	12.9	7.8	7.3
	6-10 years	10.6	20.8	13.0	10.2
	11-15 years	17.0	30.4	20.1	13.4
	16-20 years	21.2	36.8	24.2	15.6
	21-25 years	22.6	39.9	26.0	17.2
	26-30 years	25.6	49.3	29.2	23.7
	31 and more years	31.1	54.9	34.6	23.7
Tenure status	Tenured	27.0	42.8	30.1	15.81
	On tenure track but not tenured	7.8	15.5	9.9	7.71
	Not on tenured track, although the institution has a tenure system	7.9	16.6	9.9	8.79
	No tenure system at this institution	7.7	17.0	9.7	9.28
Rank	Instructor or lecturer	4.5	11.3	5.9	6.8
	Assistant professor	6.1	13.3	8.0	7.2
	Associate professor	15.0	23.7	16.9	8.8
	Professor	35.1	58.0	39.5	22.9
Institution strata	Non-doctorial institution	7.5	11.3	8.1	3.8
	doctorial institution	25.3	34.4	27.7	9.1

Notes: For years since began the first faculty job, $F_{(6, N=11,561)}=160.3$, $p<0.01$; For tenure status, $F_{(3, N=11,560)}=384.1$, $p<0.01$; For rank, $F_{(3, N=11,492)}=788.8$, $p<0.01$; For institution strata, $F_{(1, N=11,561)}=1,039$, $p<0.01$.

Tenure status has a significant impact on the publication of refereed journal articles. Faculty who are tenured published three times more than those faculty who are not tenured. In contrast to tenured native born faculty, tenured foreign born faculty published almost 16 more journal articles in their career. Even those foreign born faculty, who are not tenured, are still outperforming their native born counterpart.

A linear relationship between rank and publication of journal articles is also found in Table 3. The difference between native born and foreign born faculty accelerated when rank ascended. For example, foreign born assistant professor only published 7 more articles than their native born counterpart while foreign born full professor published almost 23 more peer-reviewed journal articles than native born full professor.

To summarize the dimension of personal achievement, the authors find that years of service, tenure status and rank all support the thesis that foreign born faculty publish more articles than their native born counterpart. However, academic rank appears to have the most significant impact on faculty publication of journal articles ($F=789$, $p<0.01$) when contrasting to years of service as a faculty member ($F=163$, $p<0.01$) and tenure status ($F=384$, $p<0.01$).

To answer the last question related to institutional prestige, the authors find that faculty in doctoral institutions published the number of journal articles three times more than those who work in non-doctoral institutions (27.7 vs. 8.1). It is also observed that foreign born faculty who work in both types of institution publish more articles than native born. However, foreign born faculty members in doctoral institution perform much better than their native born counterpart when comparing to those who work in non-doctoral institutions. It appears that the most prestigious institutions imported more talented faculty from other countries compared to other institutions.

Descriptive analyses based on four dimensions (e.g., demographics, field of specialty, personal achievement and institutional prestige) demonstrate that foreign born faculty outperformed their native counterpart. The weakness of descriptive analysis is that the conclusions are normally not controlled by complicated factors in the real world. After adding all eleven variables in a same regression equation, the authors created a proxy of the real world that influences publication of peer-reviewed journal articles in spite of incompletion. In other words, the authors want to systematically examine the factors that predict the number of journal article published by native and foreign born faculty where two linear regressions were conducted.

Table 4 displays the results of two regression equations. First, it can be observed that all regression coefficients are consistent across the authors' models. That is, if the coefficient of B is positive in one model, it will be positive in another model. This consistency ensures that the variables are robust across different models. However, the significance levels of the individual variables are different. For native born faculty model, for instance, all independent variables are significant except education and applied arts/social science. For foreign born faculty model, nevertheless, the authors find that four variables (minority, liberal arts and social science, education and applied arts and social science) are insignificant. In addition, among all significant variables, the predictors for foreign born faculty members demonstrate stronger magnitudes in terms of predicting publication of refereed journal articles. Reinforcing the claim, the authors just made that regression model for foreign born faculty is stronger than the regression model for native born faculty. The foreign born faculty model can explain 26.6% variance while the native born faculty model explains only 18.8% of the variance. When analyzing the individual variables, Table 4 reveals that being a female faculty member has a negative impact on publications for both native and foreign born faculty sides. However, the impact is much stronger on foreign born female faculty side rather than on native born female side. The meaning is that US universities are more likely to import talented males rather than females. Being a minority member has a negative impact on publication on both sides. However, the negative impact is significant on native born faculty side rather than on foreign born faculty side. The significant difference on minority variable signals that imported minority helped American universities diversify their campuses without reducing the quality of faculty (LIN, et al., 2009).

All fields of specialty are recoded as dummy variables in the regressions where area of business is served as a reference group. In other words, magnitudes and significances of all regression coefficients of fields are calculated against the number of journal articles published by faculty in business. It is observed that liberal science and applied science are the most significant in all fields. The difference is that regression coefficients are much larger on foreign born faculty side rather than on native born faculty side. All personal achievement variables are significant in predicting publications of refereed journal articles on both sides, however, regression coefficients are larger in foreign born faculty side across all achievement variables. Finally, institutional prestige has the strongest impact on publication if it takes standardized regression coefficients as evidences (0.26 for native and 0.25 for foreign born faculty). This suggests that prestigious institutions account for the most talent importing.

Table 4 Linear regression results of published refereed journal articles in career controlling by faculty birthplace

	Native born faculty				Foreign born faculty			
Independent variables	B	se	Beta	t	B	se	Beta	t
Female	-5.04**	0.62	-0.08	-8.18	-10.84**	1.49	-0.12	-7.26
Minority	-4.63**	1.12	-0.04	-4.14	-1.09	1.34	-0.01	-0.82
Liberal arts/social science	2.45*	1.15	0.04	2.13	3.86	2.44	0.05	1.58
Liberal science	20.82**	1.63	0.15	12.76	32.40**	3.18	0.22	10.20
Education	0.61	1.38	0.01	0.44	2.30	4.01	0.01	0.57
Applied arts/social science	-1.62	1.30	-0.02	-1.24	-4.85	3.47	-0.03	-1.40
Applied science	7.04**	1.20	0.10	5.87	12.87**	2.47	0.15	5.22
Tenured	5.57**	0.80	0.09	6.92	6.10**	1.87	0.08	3.27
Rank	4.09**	0.27	0.19	15.15	5.33**	0.67	0.18	7.98
Years since began first faculty job	1.73**	0.16	0.12	10.49	4.62**	0.40	0.23	11.53
Doctorial institution	16.25**	0.59	0.26	27.60	22.24**	1.49	0.25	14.96
(Constant)	-20.83**	1.51		-13.77	-33.28**	3.63		-9.17

Notes: (1) Dependent variable: Q52AA, refereed journal articles published in career; (2) For variables, field of specialty, business served as a reference group; (3) For native born faculty, R=0.433, R^2=0.187, F=206.9, p<0.001; (4) For foreign born faculty, R=0.516, R^2=0.266, F=92.3, p<0.001; (5) Field of business is the reference group; (6) *p<0.05, **p<0.01.

4. Conclusion and discussion

The authors' entire investigation is based on a theoretical consideration of "brain drain" from periphery to core according to the world system theory. Based on four dimensions of essential components of faculty profession, a comparison between native and foreign born faculty in publishing refereed journal articles is conducted. Both descriptive and comprehensive statistical results inform that American universities primarily import male dominated foreign born faculty on the demographic dimension. Minority serves a function to diverse campuses with great quality of foreign born faculty. In terms of field of specialty, science and related fields attracted the most talents from other countries. Personal achievement reveals that foreign born faculty members accelerate their progress over the ascending career path. Lastly, the more prestige an institution has, the more likely it will attract more talented people over the world. For those non-doctoral institutions, native born faculty members are the predominant labor force, simply because America will employ native born people if they can do equally well on these jobs. One of the key features of American hegemonic power is to attract talents from all over the world, especially in the shortage areas of science and technology. When comparing native born to foreign born faculty, the authors find that foreign born faculty members, no matter what dimensions to be observed, outperform those native born faculty. This research concludes that the strength of American higher education, to a large extent, is contributed by the imported talents.

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