How does the culture of doctoral education influence research productivity? A cross-national study of returnee scholars in Chinese business schools

Shiyu Wang* and Julian Yan Zhang†

January 2022

Abstract

In this paper, we study how the culture of doctoral education of scholars influences the research productivity in their later career. Focusing on the comprehensive sample of returnee scholars hired by top-50 Chinese business schools, we find significant heterogeneity in multiple measures of research productivity cross cultures. In the mechanism analysis, we further confirm corresponding heterogeneity in collaboration style and connection to top-journal editors cross cultures. Specifically, scholars graduated from Hong Kong and Singapore publish more in top-journals than North America graduates. They also shows stronger pattern of cross-culture collaboration with coauthors and connection to the editors.

*Soochow Unviersity. Email: sywang@suda.edu.cn

†Loyola Marymount University. Email: julian.zhang@lmu.edu

1 Introduction

Research productivity constantly receives attention from academia, industry, and policy makers. This interest is due to the fact that not only researchers contributes directly to economic growth (Stephan, 1996), but also the internal social and rewarding structure of researchers can spillover to other sectors of the society to create further growth (Merton, 1973). There is thus a growing literature studying the inside-academia determinants of research output, including life cycle (Becker, 1962; Cole, 1979; Levin and Stephan, 1991; Gonzalez-Brambila and Veloso, 2007), gender of both the scholar and the advisor (Gaule and Piacentini, 2018; Card et al. 2020), home country linkage (Baruffaldi and Landoni, 2012), international ties (Jonkers and Cruz-Castro, 2013), career type (Lee, Miozzo, and Laredo, 2010), changing of post-doctoral institutions (Bäker, 2015), and self-selection (Müller, Cowan, and Barnard, 2018; Groger and Hanson, 2013, 2015).

However, there is a crucial yet rarely studied question in this literature: how does the culture of an education system, or more broadly the culture of the country behind its education system, influence the scholar's productivity in her later career? As Jarome Bruner (1996) put it, "education is not an island, but part of the continent of culture", and "educational systems are themselves highly institutionalized, in the grip of their own values". This implies that an education system reflects the general culture of the its country or civilization, and assists those receiving training in that system to find an identity within that culture. Similarly, Nisbett (2003) argues that culture is about values, and all science is part of a given culture. Therefore, the culture of a education system can not only influence the research skill sets the scholars, but also shape the fundamental value of them, both playing important roles in their research productivity.

In this paper, we investigate the relationship between the culture of education system and researcher productivity by comparing the output of PhD graduates from different countries worldwide. Specifically, our study focuses on business school scholars whose both pre-graduate education and post-doctoral placement are in China. There are several reasons this research design may build a direct link between the culture of different education system and researcher productivity: first, different countries have different education systems, and the country of the PhD program serves a good approximation for its general educational culture; second, the discipline areas of business school, as subfields of social science, are more likely to be influenced

by the local culture compared with natural science; third, our sample controls for self-selection of both hidden ability and preference related to working place (see detailed discussion in the literature review).

We find scholars from different education culture show heterogeneity in terms of multiple measures research productivity, after controlling for their characteristics and self-selections. On average, while the UK-Australia-New Zealand scholars have the highest number of total publications and the EU scholars are among the highest level of citations per paper, the North America and HK-Singapore scholars publish significantly more top-ranked papers than the other groups. Importantly, the HK-Singapore scholars not only publish more top-ranked papers than the North American scholars, but they also have the highest impact factor per paper among all groups.

We then study the mechanism through which the culture background influence the scholar's productivity by comparing the collaboration styles across different culture groups. We find heterogeneity in collaboration styles across different culture groups: (1) while the North America scholars rely more on home-culture coauthors and work in relatively smaller groups, the EU scholars are quite the opposite; (2) the UK-Austria-New Zealand scholars are balanced with both home and cross-culture collaborations; (3) the HK-Singapore scholars work more closely with cross-culture coauthors and have significantly more coauthors in a paper than all the other groups.

Finally, to further analyze the top-ranked publications, we focus on the comparison between the North America and HK-Singapore groups and examine their connection to the editors of the top-ranked journals through multiple measures of connection. For the direct coauthorship with editors, North America and HK-Singapore scholars are at the same level. More importantly, there is also no difference between these two groups in terms of coauthoring with editors from the North America, but the HK-Singapore scholars coauthors significantly more with the HK-Singapore editors. For the indirect coauthorship with editors through a common coauthor, these patterns are exactly the same for the two culture groups. Lastly, the North America scholars are more likely to graduate from the editor's department than the HK-Singapore scholars.

Our research suggests that the HK-Singapore culture is the most successful in helping its scholar to publish in top-ranked journals in their later career, followed by the North America culture. However, these two cultures implies fundamentally different collaboration and connection styles: while the North American scholars tend to mainly collaborate with with home-culture coauthors and rely more on the PhD program to build their connections to editors, the HK-

Singapore scholars work closely with both the home-culture and cross-culture coauthors and excel at connecting with cross-culture editors.

This paper provides novice contribution to the literature of research productivity by examining a fundamental but rarely studied characteristic of a scholar: the culture of her education background. To the best of our knowledge, this work is the first cross-national study on how education culture influence research productivity for all business majors. Particularly, by focusing on all the returnee scholars graduated from all over the world hired by top-50 Chinese business schools, this study provides a comprehensive analysis of returnee scholar across their PhD countries.

Second, this paper shed light on how to become a more successful scholar. Our finding of the better performance of HK-Singapore scholars is to some extent surprising given the general consensus in China that returnee scholars from the US are more popular then those from other countries, as suggested by both the higher average ranking for the US universities by Chinese education systems as well as the fact the US returnees are more welcomed in the high-end academic job market.[1] We conduct further analyses exploring factors that may contribute to such over-performance of the scholars receiving their PhD from HK-Singapore. It turns out these HK-Singapore scholars are better at collaborating at several levels: (1) they collaborate closely with home-culture editors and coauthors; (2) they have more authors in a paper; and (3) they excel at reaching out and connecting with cross-culture editors and coauthors. These advanced skills are consistent with the general findings in the literature of collaboration and connection styles and research performance (Baruffaldi and Landoni, 2012; Pezzoni, Sterzi, and Lissoni, 2012; Li, Liao, and Yen, 2013).

This paper also contributes to the growing literature of the recent education system reform of Chinese universities, which have been through dramatic change since the new millennium. On the national level, the central government have enacted a set of multiple reform policies to improve the research productivity. Studies have confirmed improved research output after that such policy shocks, including the 985 projects (Zhang, Patton, and Kenny, 2013), Chang Jiang Scholars (Li, Miao, and Yang, 2015), National Natural Science Foundation fund program update (Hu, 2020), merger between universities (Kang and Liu, 2021). On the scholar level, while the returnee scholars (or locally referred to as "*Haigui*" in China) are generally considered

[1]Statistics suggested that the proportion of the US returnees takes about 70% positions for the most extinguished national-level 1000-talents plans by Chinese government, which is disproportionally higher than the general percentage of students who went aboard for higher education from China.

to contribute positively to the local research communities, the dynamic relationship between the China's higher education system and its returnees, especially considering these scholars' research life-cycle, remains largely unclear and worth to be further explored. Preliminary studies suggest that the returnee scholars and domestic scholars benefit from fundamentally different structure of network forged by their past education background (Lu and McInerney, 2016) and returnee scholars have stronger positive spillover effect to the domestic scholars when the returnee density of the department or the inter-departmental collaboration level is high (Liang, Gu, and Nyland 2022). However, there is not yet a systematic analysis which look into the returnee group to examine how the heterogeneous training background of them affect their future productivity, networking, and collaborating style. Our paper thus contributes to this literature by not only being the first work in this field to examine this important question, but also the first which provides the comprehensive returnee data and analysis results for the whole area of business schools in China.

Finally, this paper provides insights to better facilities the allocation of talents for both sides for the B-school PhD market: the demander and the suppliers. We fully admit that human capital is perhaps not the only factor that decides the mechanism of clearance of this high-end labor market – Chinese universities are well-known for shopping for the signals and their counter-parties are also not naive about it (Spencer, 1973). The new findings of this paper will help to reduce the asymmetric information between the foreign PhD program and Chinese universities, so both sides can update their strategy more efficiently.

2 Literature review and hypothesis

The central aim of this study is to investigate how the culture of a country's education system influence the research productivity. To empirically explore this question, we compare the research output of the comprehensive sample of the Chinese scholars graduated from foreign business schools and hired by Chinese universities. There are three main features of this research design which help to build a validated link between the culture of education system and the scholar productivity.

To being with, we consider the country of the PhD serves a natural approximation for the culture of the education system of its country. On the macro perspective, the culture of the education system is a reflection of the culture of its country. To some extent, the former *is* the

latter itself – "how one conceives of education is a function of how one conceives the culture and its aims" – as Bruner (1996) put it. From a historical point of view, the most prominent factor that influence culture is civilization, and the different culture can be actually considered to be separated by the border of different civilizations (Huntington, 1996). Furthermore, the higher education system is embedded inside the nation as it is funded by the nation and serves national duties (Clark, 1978), and the research system differs at the national level in terms of research priority, evaluation of performance, and allocation of rewards (Whitley, 2003). Therefore, the culture difference between two education system should be to largely explained by the fixed effects of these two countries. On the micro perspective, existing literature shows that the training style and model of PhD program, which can be considered as the exemplification of education culture, differs by countries. By comparing biomedical PhD programs through questionnaires, Barnett, Harris, and Mulvany (2017) show that there are considerable differences regarding the structure of PhD programs, mentoring, and assessment of PhD theses between Europe and North America. Williams et al. (2019) further compares the PhD training in biomedicine and medicine, and suggest that UK PhD programs focus on teaching PhD students to do research, while in Scandinavia the focus is on managing projects and publishing papers. Comparing the discussion section of Turkish and American PhD dissertations in the field of educational technologies, Karsli et al. (2018) demonstrate that American PhDs are significantly more likely to mention their contribution to literature. Not only the national culture heterogeneity exists at the supply side of the PhD labor market, but there is also evidence consistent with its prevalence at the demand side. Reymert, Jungblut, and Borlaug (2020) study the evaluation criteria of post-PhD research position in universities in Denmark, the Netherlands, Norway, Sweden, and the UK, and find significant difference in evaluative cultures across nations beyond the scope of the difference between research fields.

Second, compared with natural science, social science (and therefore most majors in b-schools) is more likely to be influenced by the general culture of the country behind its education system. To begin with, there is a long discussion regrading the distinction between social and natural science in multiple fields, and at the fundamental level sits the philosophy and anthropology literature. Van de Walle (1933) suggests that the proposition of social science is always built on human beliefs, while "any true proposition from natural science never includes any such reference to belief". Loflin and Winogrond (1976) further define a culture as "a set of beliefs". Therefore, if a culture is based on the aggregated beliefs of the members of the

group, which is also supported by Tylor (1871), then social science is more likely to reflect the culture of its country and society than natural science. This contention is also confirmed by the literature of sociology and statistics, starting from the work of Parsons (1949, 1951) and Merton (1957, 1968), which studies the normative aspects of the rewarding system of all fields of science in terms of scientific progress and innovation. Kuhn (1970) provides a theoretical framework to compare scientific fields with the concept of paradigm, and a higher level of paradigm should be less influenced by the general beliefs from the outside of the scientific community. Lodahl and Gordon (1972) approximate the paradigm of a scientific field by a set of measurement including teaching style, research collaboration, and relation between advisor and PhD students, they show that the developed level of paradigm natural science (chemistry and physics) is significantly higher than social science (sociology and political science). Similarly, Cole (1983) divides the structure of the knowledge of a field into the "core" (the universally accepted ideas which serve as the starting points for graduate education) and the "frontier" (all research currently being conducted) and admits that the core of natural science is stable and substantially different from the "very small core" of social science. Using a measure of graph use in research articles, Cleveland (1984) documents that natural science journals tend to have higher graphic fraction area than social science journals. His argument that graphs mainly contains quantitative and categorical information is highly consistent with the definition of "hard information" (as opposed to the contextual "soft" information) by Liberti and Petersen (2019). Overall, the above theoretical and empirical works implies that, while the core knowledge of natural science tends to be more quantitative, less dependent on local context (and even beliefs), and more consentingly accepted internationally, the study of social science (and its subfields – b-school majors and economics) is relatively on the contrary and more likely to be influenced by beliefs of the local research community and thereafter the general culture of its country. An anecdote evidence of this remark is that social scientists find it is more difficult to handle literature from foreign language compared with natural scientists (Ellen, 1979), suggesting a higher language barrier between social scientists from different cultural background.

Third, our setting also controls for the self-selection bias from the hidden ability and preference of the scholars, which sits in the center of the labor economics literature. When there is asymmetric information between the supply and demand sides of the labor market regarding the true ability (and other hidden characteristics) of the candidates, this unobserved information of candidates could potentially result in sub-optimal choice as signaling (Spencer, 1973) or

sabotaging casual inferences (Angrist and Krueger, 1991; Acemoglu and Angrist, 2000; Abadie, Angrist, and Imbens, 2002). Grogger and Hanson (2013) studies selectivity of foreign-born PhD students majored in science and engineering (S&E) in the US. They use the education level of the father of the PhD as the measure of the hidden ability and document that fathers of the US PhD's are 15 times more likely to have a BA degree than their contemporaries. Not only the self-selection can be driven by the hidden ability of the PhD, it could also be related to the hidden preferences of research style or environment of the PhD. Sauermann and Roach (2010) studies the self-selection of S&E PhD into industry after graduation rather than staying in academia. They measure the hidden preference of the PhD, the "taste for science", through survey data and show that that S&E PhD with higher level of "taste for science" (preferences for upstream research, for freedom in choosing research projects, publishing, and interactions with the scientific community) are more likely to stay in academia. Sauermann and Roach (2014) further suggest that S&E PhD with strong preferences for salary and weak preferences for publishing tends to self-select into industry positions. In this paper, we apply controlling mechanism for the possible selection bias on both the hidden ability of the PhD and the hidden preference of research style or environment. Specifically, our sample focus on the PhD's whose undergraduate degree are earned in China and their post-PhD placement are also in China to control for the general cultural and socioeconomic background and hidden research/working style related to geographic location. We further approximate the PhD's hidden ability by both his undergraduate school and PhD school ranking.[2] Finally, our sample of business school PhD who choose to stay in academia automatically controls for the self-selection of Chinese S&E PhD of returning to China due to the raised limit of working visa for industry positions in the US (Kahn and MacGarvie, 2020), since the business school PhD would be exempt from drafting working visas, if they had decided to stay in US universities.

Given above three reasons supporting our choice of country as the approximation for the general culture of its education system and the sample of international business-school returnee scholar in China, we hypothesize:

H1: Returnee scholars in Chinese business schools graduated from different country have different level of productivity, after controlling for their characteristics and self-selection.

[2]We consider our measure of undergraduate school ranking more relevant than the measure extracted from information from the master's degree as in Müller,Cowana, and Barnard (2018) for two reasons: first, it is generally believed in China that the undergraduate school's ranking is directly related to the IQ and ability of a student, given the authority and rigour of the college entrance exam of China (Gao and Yang 2019); second, business school doesn't require a master degree and not all PhD report their master information in our sample.

If H1 holds, then a following and crucial question will be what is the implication of culture to scholars and through which channel and mechanism this culture influences the scholar's research productivity. It is long believed in the psychology literature that culture shapes human behaviors (Segall, 1986) and interpersonal communication (Gudykunst, Ting-Toomey, and Chua, 1988). Therefore, the culture can influence the scholar's productivity through shaping their values and style of communication and collaboration when they do research. To interpret the culture difference with different communication and collaboration styles, we further hypothesize:

H2: Returnee scholars in Chinese business schools graduated from different country have different communication and collaboration style, after controlling for their characteristics and self-selection.

3 Data and Methodology

3.1 Data collection

We first collect our data of universities by selecting the top 50 from QS Mainland China University Rankings. We also add universities whose business major are ranked in the top 50 in the QS Mainland China Business School Ranking. Since the QS ranking doesn't include the Chinese-foreign Cooperative universities and independent business schools, we manually include the following seven institutions: Xi'an Jiaotong-Liverpool University, University of Nottingham Ningbo China, Kean University-Wenzhou, New York University Shanghai, Cheung Kong Graduate School of Business, and Shenzhen Finance Institute. Many universities in our sample have separate economics school and business school, so we count them separately. In total, our data includes 91 schools from 65 universities.

We collect 9463 scholars with valid Curriculum Vitae (CV) on the website of the 91 business (economics) schools of our data. We manually checked their education background in their CV and confirmed 2802 scholars are graduated from a foreign PhD program. We use Python program to search the name and the institution of the scholar on the Web of Science and limit the publication date between 1991 and 2021 in the fields of business and economics labelled by the Social Sciences Citation Index (SSCI). We then search the following matched information given a publication of the scholar: title, journal, publication date, author institution, impact factor, and total number of citation. In total, there are 10930 publications from 1863 returnee scholars in our sample, indicating 939 scholars (33.5%) don't have a single SSCI publication.

3.2 Summary statistics

Table 1 reports the name and corresponding description of variables used in our tests, and Table 2 reports the size of subsamples based on the value of some of these variables. To start with, we split the PhD countries into 5 regions based on general public perception of heterogeneous education system: (1) the UK, Australia, and New Zealand (UK-AU-NZ); (2) Hong Kong and Singapore (HK-Singapore); (3) other countries of the Europe Union except the UK (EU); (4) the US and Canada (North America); (5) other regions of Asia except for Hong Kong and Singapore (Asia). Out of the total sample of 2802 scholars, most of them are graduated from North America (56.4%), followed by UK-AU-NZ (15.0%), EU (12.0%), HK-Singapore (9.8%), and Asia (6.8%).

For the dependant variables, the measure of scholar productivity in the terms of both quantity and quality, we use the following the variables: (1) the total number of publications of the scholar (*Total_Publication*); (2) the average impact factor of the scholar's publication (*Impact_Factor*); (3) the average citations of the scholar's publication (*Citation*), and (4) the total number of publications in the Financial Times 50 (FT50) journals list (*FT50_publication*). We choose the FT50 list to approximate top-ranked journals for the scholar, since most Chinese business schools are using these two lists as the standard for the "A-leveled" journal in the contract of the returnee scholars. Given the fact that most Chinese universities don't usually give the real tenure benefits ("*Bianzhi*") to the returnees[3] and the positions of associate professor or full professor for the external track returnee are solely on contract basis, it is reasonable to argue that all of the returnee, regardless of their positions, are motivated to publish in the top-ranked journals given their job contract. To measure the weight of contribution of the scholar to the publication, we count the total number of publications in which the scholar is the corresponding author, as an approximation for being the leader of the team.

For the control variables, consistent with previous literature of characteristics of scholars influencing their productivity, we include the PhD earned year (*PhD_Year*) to control scholar

[3]There are two tracks of scholar benefits of the Chinese university: internal track and external track. The internal track is usually closed to the returnee scholars and mainly available for PhD graduated in Chinese universities. The internal track scholar has the privilege of not getting fired by the university, since the position, or so-called "*Bianzhi*", of this track is entitled from the Chinese central government, whereas the external scholar position is entirely based on the contract. Although it is generally considered that the external scholar takes higher salary, the internal track scholar enjoys hidden benefits such as annual bonus and gratuity for teaching. Most importantly, the standard of promotion between two tracks are different: while the external track scholar need to meet the requirement in their contract to publish certain number of A-leveled publications to be considered to secure their current position or to be promoted, the internal track scholar has a different standard of publication requirement which is often limited to Chinese journals and national funding projects.

life cycles (Becker, 1962; Cole, 1979; Levin and Stephan, 1991; Gonzalez-Brambila and Veloso, 2007), the number of faculty of the current department of the scholar (Dep_Size) to control for the department size effect (Jordan, Meador and Walters, 1988; Bäker, 2015; Liang, Gu and Nyland, 2022). We also include gender of the scholar (female: 1172; male: 1630) and current position of the scholar (full professor: 730; associate professor: 976; assistant professor: 1064; post-doc position: 32).

One of the most concerned confounding factors in the literature of education output is the self-selection bias (Spencer, 1973; Angrist and Krueger, 1991), which is a result of the hidden ability or preference of the high-type candidates. To control for such hidden ability of the scholars, not only we limit our sample to the scholars who are both from China and placed in Chinese universities, but we also consider the ranking of both their undergraduate and PhD school levels. Given the high level of selectivity of the Chinese college entrance exam, it is generally perceived in China that the undergraduate school ranking is a reliable indicator of the ability and socioeconomic background of a student; the PhD program for business school allover the world is also considered to be selective. For the undergraduate school ranking (*Undergraduate*), we split our sample into 3 subsets based on the quality and location of the universities: (1) 985 university of China (48.9% of the total 2808 observations of our sample); (2) other University of China (42.8%); (3) abroad (8.3%).[4] Therefore, the majority of our returnee scholar sample (91.7%) receive their undergraduate degree from 2 tiers of Chinese universities (985 and others), and the rest of the sample receive their undergraduate education from oversea universities. We also apply the measures of the ranking of PhD programs: the world wide university ranking based on the major of business and economics released by the Nanyang Technological University of Singapore (*PhD_Ranking*). In our sample, there are 2313 observations matched with *PhD_Ranking*.

Table 3 reports the summary statistics of variables based on scholars. For the total number of 2802 scholars in our sample, the average number of publication is 3.9 and the median is 2. For the top-ranked FT50 journals, the 75th percentile of *FT50_Count* is 0. Given the comprehensiveness of our hand-collected sample, these number suggests that most of the returnee scholars top-50 business schools in China currently don't publish in the top-ranked journals. It is also worth notifying that 33.5% them don't have any publications in SSCI journals (the actual number is 84.6% as later shown in Table 5). The total numbers of publications in FT50 list in our sample for the top-50 Chinese business schools is 841. Given the maximum of this variable is

[4]In China, 985 universities are considered to be the top-tier universities, and other universities (net of the 985 members) are considered to be the second tier of universities, as the Ivy League schools in the US as an analogy.

13, this pattern suggests that top-tier publications are mainly from a small number of "star" scholars. It thus raises a question that whether it is practical and strategically optimal for most of the Chinese business schools to require more than one top-ranked publications in the term contract for the returnee scholars while it is clear that most of them will fail such high standard requirement.

Consistent with the above notion of publication being concentrated to the "stars", the average citation (6.01) and impact factor (2.66) of the sample are both higher than the median citation (1.5) and impact factor (2.43), showing that both variables are skewed to the right. For the number of total coauthor per paper (*Coauthor/Paper*), it is more normally distributed: the average team size is 2.11 and the median is 2.5 with standard deviation of 1.71. However, given that at the 25th percentile of this variable is 0, the average team size, 2.5, is thus an underestimation of the average number of coauthors of a published paper in our sample. This finding is consistent with the notion of increased number of coauthors of a publication over time (Hudson, 1996; Hamermesh, 2013) and suggests that today it is not a rare case for a paper to have more than 3 coauthors in the field of business and economics given that most of our sample are published in the past 10 years. For other measures of collaboration styles, the average total number of coauthors from the PhD country (*Home-Culture*) is 1.36 and the average total number of coauthors outside the PhD country (*Across-Culture*) is 0.95. This pattern suggests that in general scholars are more likely to collaborate with coauthors with the same PhD culture background.

Table 4 reports the means of variables for each PhD country groups. Overall, the EU PhD's have the highest total number of publications (4.16), followed by North America (4.04), UK-AU-NZ (3.95), Asia (3.31), and Hong Kong and Singapore (3.14). However, when it comes to the top-journal FT50 publications, North America (0.39) and Hong Kong-Singapore (0.35) performs much better than the rest of the regions (between 0.09 and 0.17). For the impact factor, the EU and HK-Singapore are among the highest level between 2.78 and 2.8, followed by UK-AU-NZ and North America at the same level between 2.63 and 2.66, and Asia has the lowest value of 2.40. For the citation of publications, the North America has the highest average value (6.51), followed by the EU (5.92), Asia (5.51), and UK-AU-NZ (5.31). Hong Kong-Singapore (4.62) is at the lower bound of all of the groups, which is 1.9 citations per paper below North America and 0.7 below UK-AU-NZ. Together, these preliminary data demonstrates that the publication of the North America PhD is of the highest level in all 2 dimensions: top-journal publication

and citation. While the HK-Singapore scholars have the same level of top-journal publications as North America scholars, both the total publication number and citation of their publications are at the low end of the whole distribution of our sample. This seemingly contradictory finding, especially given that the average total publication and citation per paper of the Hong Kong-Singapore scholars is the lowest among all 5 groups but their top-ranked publication is the second-highest, may imply that the HK-Singapore scholars focus on publishing on top-journals and their publications are relatively newer. This conjecture is consistent with the mean of graduation year for HK-Singapore scholars (2014), which is lowest among five groups. For the average UTD score of PhD program (*PhD_Ranking*), the HK-Singapore is at the highest average of 62.4 and outperform the rest of the groups.

For the collaboration style variables, the EU group has the highest average of total number of coauthors (7.68), followed by the North America and UK-AU-NZ, while HK-Singapore has the lowest average (6.14). At the paper level, the EU group has the highest average number of coauthors per paper (2.25), followed by HK-Singapore (2.17). Particularly, the HK-Singapore group has the highest average number of cross-culture coauthors per paper (*Cross-Culture/Paper*) and the second highest number of home-culture coauthors per paper (*Home-Culture/Paper*), while the North America group has the highest average of *Home-Culture/Paper* but the lowest average of *Cross-Culture/Paper* at the same time.

Overall, we can observe preliminary patterns of heterogeneity for both productivity and collaboration of the five groups. While the HK-Singapore and North America target more on top-ranked journals, the EU and UK-AU-NZ focus more on the other journals and impact factors. Between the HK-Singapore and North America, they are quite different in several aspects. While both of them have highest level of top-ranked journal publication and NTU rankings of their PhD programs, the North America publish more in the non-top journals than HK-Singapore. The North America group tends to collaborate more with scholars from the same culture, but the HK-Singapore group doesn't have such preference. Furthermore, the HK-Singapore group tends to collaborate with a small group of coauthors, but with large number of these coauthors in a paper at the same time. However, all these preliminary findings, based on summary of averages, need further scrutiny under the regression framework which allows for controlling multivariate variables at the same time and provides statistical inferences.

3.3 Top-ranked publication analysis: HK-Singapore vs North America

Table 5 reports the distribution of the number of FT50 publications per scholar across culture groups. This table only reports data for scholars who have published in the FT50 list. The North America group has the highest number (298) of scholars who have published in the FT50 list, followed by HK-Singapore (55), the EU (38), the UK-AU-NZ (33), and Asia (7). Together, the top two groups takes 81.9% of the total 431 observations in this table. For the distribution of scholars across the FT50 numbers, the majority of them (338 out of 431, or 78.4%) have published one or two FT50 papers, and there are only 17 scholars in total who have published more than 5 FT50 papers in our entire database. Compared with the total number of 2802 scholars in Table 4, the total observation of 431 in Table 5 indicates 88.2% of our entire collection of returnee scholars currently hired by Chinese business schools don't have top (FT50) publications. Overall, the distribution of FT50 publications are skewed by a small number of "stars" who publish multiple papers who are mainly from the North America group (which takes 92.8% of scholars who publish more than five FT50 papers). This finding again renders the high standard of Chinese business schools tenureship unrealistic, given the total number who can meet the general requirement of at least 3 FT50 publications in our same is only 93 (195 if the requirement is two FT50 papers). Furthermore, given our sample includes scholars of all ranks (assistant, associate, and full), this finding further suggests that the high standard of Chinese business schools are biased against giving tenure to assistant professors. Therefore, one natural question worth further study is whether the Chinese business schools consider these young returnee scholars long-term human capital asset or actually short-term lottery of publications on contract basis.

Table 6 presents the summary statistics of FT50 publications per scholar across culture groups, conditioning on they have FT50 publication. For the discussion, we first tease out the outlier group of Asia (7 observations in total). The average number of FT50 publication of the North American scholars is 2.09, higher than the average of HK-Singapore, 1.76, followed by UK-AU-NZ and the EU. Among the four groups, the North American group has the highest standard deviation and second highest skewness, and the HK-Singapore group has the lowest standard deviation as well as the skewness. This implies that the distribution of the number of FT publication across the north America scholars are more skewed to the right than the HK-Singapore scholars. Furthermore, 81.15% of the North American scholars, 80.0% of the HK-Singapore scholars, 88.66% of the EU scholars, 92.1% of the UK-AU-NZ scholars, and 96.34% of

the Asia scholars are not included in this table (these numbers are less than the overall non-FT50 rate of 88.2% of the total sample), suggesting they don't have a single FT50 publication.

One of the important feature from Table 4 is that, while North America and HK-Singapore stand on two separate tails of the distribution of number of scholars (60.1% vs 10.5%) and average publications (4.04 vs 3.14), they are both among the highest level of average top-ranked publications: the average number of FT50 publication per scholar for these two groups is 0.3737, while it is 0.1337 for the other 3 groups. Given that North America and HK-Singapore takes the majority of our total sample of scholars (70.6%) and FT50 publication (84.4%) and the proportion of FT50-scholars for these two groups (20% and 18.85%) are approximately twice as much as the rest three groups (11.34%, 7.86%, and 3.66%) as shown in Table 6, we further separate Hong Kong-Singapore vs North America from the rest of the sample and focus on the top-ranked FT50 publication for the rest of the analysis, since the top-ranked publication is the most crucial requirement of the Chinese business schools for returnee scholars.

Previous literature in finance and economics (Brogaard, Engelberg, and Parsons, 2014; Colussi, 2018) documents that connection with editors of a journal will significantly improve the probability of publishing in top journals. To further compare the difference in mechanism of collaboration between North American and HK-Singapore scholars, we measure each scholar's connection to the FT50 editors. We define three types of connections between a scholar and a editor: the first type is built when the scholar and a editor have coauthored in the same paper (Type I connection); the second type is built if the scholar graduated from the same department where the editor was working at (Type II connection); and the third type is built if the scholar and the editor share at least one common coauthor (Type III connection).

We first create the whole list of editors (including associate editors) of each of the FT50 journals. We then collect all their SSCI publications between 1991 and 2021 on the Web of Science by searching their name and current institution. We gather the following information for each paper: title, journal, date and institution of publication, and coauthor names and institutions. We remove all the publications which are not on the FT50 lists to assure the efficiency of our measures of connections and accuracy of matching by names. There are in total 631 FT50 editors in our data, related to 959 institutions, 2474 FT50 publications, and 3685 non-repetitive coauthors. For the editors, 75% of them have only records of North America institutions, 3% of them have only records of HK-Singapore institutions, and 3.7% of them have records of both North America and HK-Singapore institutions. For their coauthors, 67.3% of

them have only records of North America institutions, 4.4% of them have only records of HK-Singapore institutions, and 0.5% of them have records of both North America and HK-Singapore institutions.

4 Results

4.1 Culture difference and productivity

To explore how different cultural backgrounds of PhD education influences the research productivity, we apply the following regression equation Eq(1):

$$Y_i = \beta_0 + \beta_1 \times D_{UK,AU,NZ} + \beta_2 \times D_{HK,SG} + \beta_3 \times D_{EU} + \beta_4 \times D_{US,CA} + \boldsymbol{\gamma' X_i'} + \boldsymbol{\pi' Z_i'} + \varepsilon_i \quad (1)$$

where Y_i denotes the productivity measures of the scholar i including number of total publications, average citation per paper, average impact factor per paper, and number of top publications (in the FT50 list); X_i' is the list of characteristic variables of scholar i, including gender, major(finance/accounting/economics/management/management science), current university, size of department, rank (full/associate/assistant/post-doc), the year of PhD graduation. measures of the self-selection (the category of undergraduate school and NTU ranking of PhD program); Z_i' measures self-selection of the scholar, including both the category of undergraduate school (985 Chinese/regular Chinese/oversea) and NTU ranking of the PhD program.

Table 7 displays the regression results that include four dependent variables in Eq(1). In column (1), we use the total number of publication of the scholar as the dependent variable. Among the four country-group dummies, the coefficient of the UK-AU-NZ is the highest, suggesting scholars from the UK, Australia, and New Zealand have the highest total publication, after controlling for the scholar's characteristics. Followed is the groups of HK-SG, North America, and the EU. All of the coefficient being positive implies the Asia group, which is the omitted dummy, has the lowest regression adjusted total publication per scholar. The finding of this column is different with the raw statistics in Table 4, where the order of total publication per scholar ranked from largest to smallest is the EU, North America, UK-AU-NZ, Asia, and HK-SG. This discrepancy indicates that it is crucial to add the scholar characteristics to the consideration when we compare scholar productivity across different education cultures.

Column (2) reports the results of the same regression of column (1) after adding the self-

selection measures of the scholars. The order and the level of significance of the culture groups remain the same as in column (1), suggesting that our previous finding is robust to the self-selection of the scholars. Notably, the coefficient of the accounting is the lowest (-2.91) among all of the majors, followed by finance (-2.34), management (-1.99), and economics (-1.24). This pattern indicates that scholars from the management science major have the highest level of total publications, and it is the opposite for the accounting major. One surprising finding is that the coefficient NTU ranking of the PhD program is insignificant, after we control for the culture background, scholar characteristics, and the bachelor school rankings. One can interpret this finding as that the contribution of the ranking of the PhD program to a scholar's research productivity can be fully explained by her PhD country and her undergraduate university ranking, alongside with other characteristics in our regression models.

From column (3) to (6) of Table 7, we report the regression results with average citation and average impact factor as the dependent variable separately for both short (without self-selection) and long (with self-selection) models. The short and long results are consistent with same sign of coefficients and similar level of significance. For the average citation, the North American group has the highest coefficient, flowed by the EU. The coefficients of the rest 2 group-dummies are insignificant, illustrating that the HK-SG, the UK-AU-NZ and Asia groups are at the same level in terms of average citation per paper of the scholar. For the average impact factor, the pattern is quite different: the HK-SG and the UK-AU-AZ are the only two groups have positive significant coefficients for their dummy variables and they are at the same level. The regression-adjusted comparison of both average citation and impact factor are inconsistent with the raw statistics of from Table 4: the UK group is the second highest in average citation; similarly, the EU is the highest in impact factor. However, after controlling for scholar characteristics and self-selection, their advantage disappears.

For the total number of top-ranked FT50 publications, both results of regression in columns (7) and (8) of Table 7 and raw statistics in Table 4 show consistently that the North America and HK-SG are significantly higher the rest of the groups: while for the raw statistics both North America and HK-SG are about 3 times the level of the rest of the group, in the regression they are the only two groups with positive and significant coefficient for their dummies. However, after adding the controlling variables in the regression, the order between the North America and HK-SG flips. In column (8) of Table 7, the coefficient of HK-SG is 19.1, which is about 30% higher than the coefficient of the North America, 14.7. Therefore, the advantage of the

North America over HK-SG in the raw number of top-publication per scholar can be largely contributed to their characteristics and self-selection. Particularly, both coefficients of the HK-SG and North America dummies decrease after adding the self-selection controls from column (7) to (8), suggesting that the self-selection does explains partially the culture effect and it is crucial to keep them in the analysis.

For the fixed effect of different majors on the FT50 publications, the order of their coefficient in column (8) is completely different from column (2). The management major has the highest regression-adjusted FT50 publications with significantly positive coefficient, followed by management science and accounting, which either is the omitted dummy or has insignificant coefficient, respectively. The finance and economics have significantly negative coefficients, showing they publish the least numbers of FT50 papers. This finding, which is based on after controlling for scholar characteristics and self-selections, may indicate the existence of a pecking order in terms of competitiveness of publishing in top journals across different majors, where it is with the most difficulty to publish in the top economics journals. Compared with column (2) where the gender dummy is significantly negative, the coefficient of the gender dummy is insignificant in column (8). This result further suggests that the female scholars publish significantly less in lower-ranked journals and there is no difference between genders when publishing in top journals.

In sum, we find significant level of difference in our multiple measures of research productivity among the culture groups. In Figure 1, we plot the coefficients of the culture group dummy variables across the four regression models of research productivity of Table 7. We can observe that the North America and HK-Singapore groups cover the largest areas in the quadrilateral diagram. The UK group has the highest level of total publication, while the EU group is among the highest level of citation per paper. However, both these culture groups are bounded by the North America and HK-Singapore groups. Importantly, the education culture of HK-Singapore is the most successful to help the PhD scholars to publish top-ranked journals in their later career, followed by the North America. Besides, we also have additional findings beyond the culture differences: (1) the economics and finance are the most difficult fields to publish in the top-ranked journals, where it is the opposite for the management field; (2) the self-selection makes significant change in levels of the regression coefficients but our results are robust to it; (3) there is no differences between genders in terms of publish in the top-ranked journals, but male scholars tend to publish more in the lower-ranked journals; and (4) after controlling for the undergraduate school and PhD countries, the ranking of the PhD program essentially doesn't

contributes to the scholar's productivity.

4.2 Interpreting the culture difference

In this subsection, we study the mechanism of how the culture background influence the scholar productivity. Specifically, we examine the collaboration styles across different culture backgrounds through the following regression model Eq(2):

$$Y_i = \beta_0 + \beta_1 \times D_{UK,AU,NZ} + \beta_2 \times D_{HK,SG} + \beta_3 \times D_{EU} + \beta_4 \times D_{US,CA} + \boldsymbol{\eta'\mu_i'} + \boldsymbol{\gamma' X_i'} + \boldsymbol{\pi' Z_i'} + \varepsilon_i \quad (2)$$

For the dependent variable, we have two sets of measurement of collaboration styles. The first set is at the scholar level, which includes the total number of coauthors of the scholar (Total_Coauthor), the total number of foreign coauthors (coauthors from a foreign institute) outside the scholar's PhD country (Total_Diff_foreign), and the total number of foreign coauthors from the scholar's PhD country (Total_Same_foreign). The second set is at the paper level, which includes the number of authors of a paper (Num_Authors/paper), the number of foreign coauthors outside the scholar's PhD country per paper (Diff_foreign/paper), and the number of foreign coauthors from the scholar's PhD country per paper (Same_foreign/paper). μ_i' is the same set of variables measuring the research productivity of the scholar i as in Eq(1): the number of total publications, average citation per paper, average impact factor per paper, and number of FT50 publications. X_i' is the set of characteristic variables of scholar and Z_i' is the set of self-selection approximations.

Panel A of Table 8 reports the regression results for Eq(2) at the scholar level. For the dependent variable of total number of coauthors, the D_{EU} has the highest coefficient, followed closely by $D_{HK,SK}$, suggesting the EU and the HK-Singapore groups have the highest level of number of total coauthors. On the contrary, the UK-AS-NZ and Asia groups have the the lowest level of number of total coauthors. For the dependent variable of total foreign coauthors outside the scholar's PhD country, the HK-Singapore group has the highest estimate of coefficient, followed closely by the EU group, while the other three groups are at the same lower level. For the dependent variable of total foreign coauthors from the scholar's PhD country, the pattern is reversed compared to column (1) and (2): the North America and UK-AS-NZ groups have the highest level of estimated coefficients, while the coefficients of the HK-Singapore and the EU

are at a lower level.

Panel B of table 8 reports the regression results for Eq(2) at the paper level. For the total number of authors per paper, the HK-Singapore group has significantly higher level of coefficient than the rest of the groups. For the total number of feign coauthors outside the PhD country per paper, the coefficient of the North America group is significantly lower than the other groups. For the total number of feign coauthors from the PhD country per paper, the North America group has the highest coefficient, followed closely by the HK-Singapore group, while the UK-AS-NZ and EU groups are at the second tier.

In conclusion, different culture groups show significant patterns of heterogeneity in collaboration styles through our multiple measures after controlling for scholar productivity, characteristics, and self-selections. In Figure 2, we plot the coefficients of the culture group dummies across the six regression models of collaboration style of Table 8. At the scholar level, the HK-Singapore and the EU groups have the higher level of total coauthor and total cross-culture foreign coauthors, the North America and UK groups have higher level of total home-culture foreign coauthors. At the paper level, the HK-Singapore group has significantly higher level of the total number of authors per paper than the other groups, and the North America group has significantly lower level of the number of cross-culture foreign coauthors per paper than the other groups. We thus have the following findings for each group: (1) the North America graduates have the highest level of coauthoring with home-culture foreign coauthors, but they behave the worst of all groups in terms of coauthoring with cross-culture foreign coauthors; (2) the HK-Singapore graduates are among the highest level of coauthoring with both cross-culture and home-culture foreign coauthors at the same time, and they also have significantly higher number of authors per paper; (3) features of both the EU and the UK groups are relatively balanced; and (4) the Asia group seems to have the loosest collaboration style among all five groups.

4.3 Connection to the editors: North America vs. HK-Singapore

In this subsection, we further analyze the mechanism of collaboration related to top-ranked publication by focusing on the groups of North America and HK-Singpore, which contribute the majority of the FT50 publications in our sample. Particularly, given the finding that HK-Singapore scholars are more productive of FT50 papers than the North America scholars after controlling for the scholar characteristics and self-selections as shown in Table 7, it is important

to understand through which tunnels the HK-Singapore scholars improve their productivity. Previous literature (Brogaard, Engelberg, and Parsons, 2014; Colussi, 2018) suggest that building connections with editors will improve the probability of publish in top-ranked journals. We thus compare the three types of connections to editors between these two groups as defined in Section 3.3.

Table 9 report the comparison of different types of connection to editors of the FT50 journals between the HK-Singapore and North American scholars. In Panel A, we report the average dummy variable of connections given each type. The connection dummy variable equals to 1 if there is at least one connection given a Type Identified in our sample. We further split our sample into three levels based on the scholar's FT50 publication records: high (with more than 3 FT50 publications), medium (with 1 or 2 FT50 publications), and low (with 0 FT50 publication). For the Type I connection (coauthoring the editor) dummy, there is no significant difference between the two groups across 3 levels. For the Type II connection (graduating from the editor's department) dummy, the HK-Singapore scholars makes more connection at the high level than the North America. For the Type III connection (sharing common coauthor with the editor) dummy, the HK-Singapore scholars makes more connection at the low level than the North America. Overall, there is no difference between two groups for Type I connection and the patterns of difference for Type II and Type III are not consistent across different levels. However, the average of the dummies of all three types increases monotonically for both groups from low to high levels. This is consistent with the finding in Brogaard, Engelberg, and Parsons (2014) and Colussi (2018), and thus implies the validity of our measures of connections to editors.

We further split both Type I and Type III connection into two sub-types respectively based on where the connection is made: Type IA refers to the Type I connection where the editor is from the North America; Type IB refers to the Type I connection where the editor is from HK-Singapore; Type IIIA refers to the Type III connection where the common coauthor is from North America; and Type IIIB refers to the Type III connection where the common coauthor is from HK-Singapore. Panel B reports the proportion of each sub-type to its general type of a scholar given the two country groups and three FT50 publication levels of the scholars. Specifically, a proportion is defined as the ratio between the number of connections of a sub-type and the total number of connections of the general type of the scholar. For example, the

proportion of Type IA out of Type I for scholar i is defined by:

$$\text{Type IA/Type I}_i = \frac{\text{Number of North American editors coauthoring with Scholar } i}{\text{Number of editors coauthoring with Scholar } i}$$

For Type IA connection, there is no difference between the HK-Singpaore and the North American groups, suggesting that the two groups have the same level of connections to the US editors. For the Type IB connection, the subgroup of medium level of HK-Singapore has higher proportion of Type IB out of Type I connections, suggesting this subgroup is more connected to HK-Singapore editors than its peers graduated from North America. For the Type IIIA, the North America group shows a consistent pattern of higher proportion of Type IIIA out of Type III compared with the HK-Singapore group, implying that scholars graduated from North America have a higher proportion of sharing a common North American coauthor with an editor than the HK-Singapore group. For the Type IIIB, the pattern is reversed: the scholars graduated from North America are more likely to share a common North American coauthor with an editor.

To further examine the scholar i's connections with the FT50 editors, we use the following regression equation Eq(3):

$$Type_i = \beta_0 + \beta_1 \times D_{HK,SG} + \boldsymbol{\eta'\mu_i'} + \boldsymbol{\gamma' X_i'} + \boldsymbol{\pi' Z_i'} + \varepsilon_i \tag{3}$$

where $Type_i$ is the set of connection types and type proportions as defined above, μ_i' is the set of variables measuring the research productivity of the scholar i, X_i' is the set of characteristic variables of scholar, and Z_i' is the set of self-selection approximations.

Table 10 reports the regression results for Eq(3) when the dependent variables are the dummy variables of the Type I, II, and III connections, respectively. For the Type I connection, the coefficients of $D_{HK,SG}$ are both insignificant for column (1) and (2), suggesting there is no difference between the HK-Singapore and North America groups in terms of the level of making Type I connection to editors at the scholar level, after controlling scholar characteristics and self-selections. For the majors, the coefficient of the accounting is the lowest, showing that it is most unlikely to make coauthor with an editor in this field. For the Type II connection, the coefficients of $D_{HK,SG}$ are significantly negative in column (3) and (4), indicating that the North America group makes connections to editors by graduating from the same department where the editor works than the HK-Singapore group. For the Type III connections, the coefficients of $D_{HK,SG}$ are significantly positive in column (5) and (6), indicating that the HK-Singapore

group is about 5.7% more likely to make connections to editors by sharing a common coauthor with the editor than the North America group. The coefficient of the economics major has the lowest estimate in last four columns, demonstrating that the economics major has the lowest level of both Type II and Type III connections to editors.

Table 11 reports the regression results for Eq(3) when the dependent variables are the proportions of the Type IA, IB, IIIA, and IIIB to their general types. For the proportion of Type IA out of Type I, the coefficient of $D_{HK,SG}$ is insignificant. This implies that there is no difference between the HK-Singapore and the North America groups in terms of the likelihood of coauthoring with a US editor given the scholar coauthor with an editor. For the proportion of Type IB out of Type I, the coefficient of $D_{HK,SG}$ is significantly positive, indicating that the HK-Singapore graduates have higher proportion (about 3.2%) of direct coauthorship with the HK-Singapore editors than the North America graduates. For the proportion of Type IIIA out of Type III, the coefficient of $D_{HK,SG}$ is insignificant. This finding provides evidence that there is no difference between the HK-Singapore and the North America groups in the proportion of North America common coauthors to editors out of the total common coauthors to editors. For the proportion of Type IIIB out of Type III, the coefficient of $D_{HK,SG}$ is significantly positive. This demonstrates that the HK-Singapore graduates have higher proportion of common coauthors from HK-Singapore than the North American graduates. Given the finding in Column (5) and (6) of Table 10 that HK-Singapore graduates make more Type III connections than the North American graduates, the last two columns of Table 11 suggest that HK-Singapore graduates makes more of both Type IIIA and IIIB connections. One can interpret this finding as the HK-Singapore graduates make more of both North America and HK-Singapore common coauthors of the editors than the North America graduates.

In sum, we have the following findings in this subsection: (1) when it comes to direct coauthorship connection with the editor (by coauthoring a paper with the editor), there is no difference between the North America and the HK-Singapore. More importantly, given this finding that they are at the same level of coauthoring with the editor, we further find that they are also at the same level of coauthoring with the North American editors, but the North America graduates make significantly less direct coauthorship with the HK-Singapore editors than the HK-Singapore graduates; (2) the North America graduates makes more connections of graduating from the editor's department than HK-Singapore graduates; (3) for the indirect coauthorship with the editor (by sharing a common coauthor with the editor), the HK-Singapore

group makes more of these type of connection than the North America group. Specifically, for the proportion of the North America common coauthors in the total common coauthors, there is no difference between the North America and the HK-Singapore, further implying that the HK-Singapore makes more of indirect coauthorship with editors through the common North America coauthors than the North America graduates. In the meantime, the HK-Singapore group also has higher level of indirect coauthorship with the editors through common HK-Singapore coauthors than the North America graduates.

The finding that the HK-Singapore graduates has the same level of direct coauthorship to the North American editors as the North America graduates and more indirect connections to the editors through common North American coauthors than the North America graduates suggests that the HK-Singapore graduates excel at making cross-culture connections to the editors and common coauthors from North America to at least the same level of the home-connection of the North American graduates. As a comparison, the North American graduates makes significantly less connections through both direct and indirect coauthorship to the HK-Singapore editors than the HK-Singapore graduates. However, when it comes to the connections with editors by graduating from the editor's department, the North American graduates make more these connections than the HK-Singapore graduates.

5 Conclusion and Discussion

How does the culture of a scholar's education system influence her research productivity in her later career is a fundamental yet rarely studied question. The culture of education system not only provides training of skills in technique and collaboration, but also shapes the value of the scholar, both playing important roles in research productivity. In this paper, we study how the culture of the education system of the business school scholars, which is approximated by their PhD countries, influence their research productivity. To control for confounding culture backgrounds of the scholars, our study is designed to focus on the returnee scholars whose both undergraduate education and current placement are in China. For the self-selection related to the hidden ability of the scholars, we control both undergraduate and PhD program ranking in our analysis. We also include a set of scholar characteristics, including major, age, gender, department size, and current position from previous literature.

Overall, we find significant heterogeneity of the scholar productivity across groups of coun-

tries and regions based on the culture of their education system: the group of UK, Australia and New Zealand produce the most of the general publications; the group of EU is among the highest level of citation per paper; importantly, the group of HK-Singapore publish the most of the top-ranked papers, followed by the group of North America.

We then interpret the heterogeneity of the scholar productivity across cultures by comparing their collaboration and connection styles. Specifically, we measure the collaboration style in following dimensions at both the scholar and the paper level: the total number of coauthors, the number of coauthor from cross-culture, and the number of coauthor from home-culture. Our finding suggests that while the North America scholar are at the highest level of collaborating with home-culture and lowest level of collaborating with cross-culture coauthors at the same time, the HK-Singapore scholars dominate other groups in collaboration with cross-culture coauthors and the number of coauthors per paper.

We further focus on the comparison between HK-Singapore and North America by examining three types of connections to the top-ranked journal editors. Consistent with the evidence from collaboration styles, the HK-Singapore scholars show stronger connection to the cross-culture editors and coauthors of the editors than the North America scholars. Specifically, the HK-Singapore scholars are at the same level of connecting with the North America editors with the North America scholars. The North America scholars are more likely to graduate from the editor's department than the HK-Singapore scholars.

Our contributes to the literature of research productivity, which sits on the center of innovation, by showing the heterogeneity of scholar research productivity across cultures of education systems. The additional finding of correspondent heterogeneity of collaboration and connection styles across cultures is consistent with previous literature on collaboration and productivity (Baruffaldi and Landoni, 2012; Pezzoni, Sterzi, and Lissoni, 2012; Li, Liao, and Yen, 2013), and consequently further supports the existence of culture differences.

This paper also sheds lights on how to become a more successful scholar. The case of the HK-Singapore scholars indicates the cross-culture connection with coauthors and editors is positively correlated with research productivity and, more importantly, this cross-culture connection can be built after the graduation of the PhD. Besides, working closely within a small group, which is indicated by HK-Singapore scholars' significantly higher number of coauthors per paper than other groups, may also improve the productivity and collaboration and connection skills.

Finally, this paper relates to the job market in China for returnee business and economics

PhD students. Although the motivation and design of the hiring strategy of the Chinese universities is beyond the scope of this study, several quantitative facts can be provided from this paper to the dialogue between the two sides of this high-end job market: (1) the distribution of the publication, especially in the top-ranked journals, of existing returnee scholars is highly skewed to the right tail. In our comprehensive sample of all the scholars from top50 business schools in China, 33.5% of them don't have a single SSCI publication, and 84.6% of them don't have a single FT50 publication. There are only 93 scholars, which is 3.3% of the entire sample, have more than 2 FT50 publications. (2) Scholars from Hong Kong and Singapore publish more in FT50 journals than scholars from North America, after controlling for scholar characteristics and self-selection. (3) To improve research productivity is dynamic growing process and many factors can contribute to it. Given the distribution of publication of our sample, many scholars need time to build the cross-culture connection and their collaboration networks.

These facts bring the current contract-basis strategy of the Chinese business school toward the returnee scholars into question. To the best of our knowledge, most of them require at least one FT50 publication to continue the term of contract, which is usually 5 or 6 years. However, such requirement, according to our findings, implies a default termination of the contract after the first term for most of the returnee scholars. This strategy, either due to the asymmetric information between two sides or treating returnee scholars as a lottery of publications, can result vast waste for both sides. This lose-lose situation can be avoided if the Chinese business schools adopts a perspective focusing on long-term development of the returnee scholars' human capital, and provide a more flexible menu of contracts in terms of requirements for the returnee scholars.

References

[1] Bäker, A. (2015). Non-tenured post-doctoral researchers' job mobility and research output: An analysis of the role of research discipline, department size, and coauthors. *Research Policy*, 44(3), 634-650.

[2] Bruner, J. (1996). The culture of education. Cambridge, MA: Bradford.

[3] Brogaard, J., Engelberg, J., Parsons, C. A. (2014). Networks and productivity: Causal evidence from editor rotations. *Journal of Financial Economics*, 111(1), 251-270.

[4] Baruffaldi, S. H., Landoni, P. (2012). Return mobility and scientific productivity of researchers working abroad: The role of home country linkages. *Research policy*, 41(9), 1655-1665.

[5] Colussi, T. (2018). Social ties in academia: A friend is a treasure. *Review of Economics and Statistics*, 100(1), 45-50.

[6] Card, D., DellaVigna, S., Funk, P., Iriberri, N. (2020). Are referees and editors in economics gender neutral?. *The Quarterly Journal of Economics*, 135(1), 269-327.

[7] Gudykunst, W. B., Ting-Toomey, S., Chua, E. (1988). Culture and interpersonal communication (p. 231). Newbury Park, CA: Sage.

[8] Gonzalez-Brambila, C., Veloso, F. M. (2007). The determinants of research output and impact: A study of Mexican researchers. *Research Policy*, 36(7), 1035-1051.

[9] Hamermesh, D. S. (2013). Six decades of top economics publishing: Who and how?. *Journal of Economic Literature*, 51(1), 162-72.

[10] Heckman, J. J., Moktan, S. (2020). Publishing and promotion in economics: the tyranny of the top five. Journal of Economic Literature, 58(2), 419-70.

[11] Hudson, J. (1996). Trends in multi-authored papers in economics. *Journal of Economic Perspectives*, 10(3), 153-158.

[12] Jonkers, K., Cruz-Castro, L. (2013). Research upon return: The effect of international mobility on scientific ties, production and impact. *Research Policy*, 42(8), 1366-1377.

[13] Jordan, J. M., Meador, M., Walters, S. J. (1988). Effects of department size and organization on the research productivity of academic economists. *Economics of Education Review*, 7(2), 251-255.

[14] Kahn, S., MacGarvie, M. (2020). The impact of permanent residency delays for stem PhDs: Who leaves and why. *Research Policy*, 49(9), 103879.

[15] Liang, W., Gu, J., Nyland, C. (2022). China's new research evaluation policy: Evidence from economics faculty of Elite Chinese universities. *Research Policy*, 51(1), 104407.

[16] Li, E. Y., Liao, C. H., Yen, H. R. (2013). Co-authorship networks and research impact: A social capital perspective. *Research Policy*, 42(9), 1515-1530.

[17] Lu, X., McInerney, P. B. (2016). Is it better to "Stand on Two Boats" or "Sit on the Chinese Lap"?: Examining the cultural contingency of network structures in the contemporary Chinese academic labor market. *Research Policy*, 45(10), 2125-2137.

[18] Liberti, J. M., Petersen, M. A. (2019). Information: Hard and soft. *Review of Corporate Finance Studies*, 8(1), 1-41.

[19] Loflin, M. D., Winogrond, I. R. (1976). A Culture as a Set of Beliefs. *Current Anthropology*, 17(4), 723-725.

[20] Merton, R. K. (1973). The sociology of science: Theoretical and empirical investigations. University of Chicago press.

[21] Müller, M., Cowan, R., Barnard, H. (2018). On the value of foreign PhDs in the developing world: Training versus selection effects in the case of South Africa. *Research Policy*, 47(5), 886-900.

[22] Pezzoni, M., Sterzi, V., Lissoni, F. (2012). Career progress in centralized academic systems: Social capital and institutions in France and Italy. *Research Policy*, 41(4), 704-719.

[23] Reymert, I., Jungblut, J., Borlaug, S. B. (2020). Are evaluative cultures national or global? A cross-national study on evaluative cultures in academic recruitment processes in Europe. *Higher Education*, 1-21.

[24] Segall, M. H. (1986). Culture and behavior: Psychology in global perspective. *Annual Review of Psychology*, 37(1), 523-564.

[25] Stephan, P. E. (1996). The economics of science. *Journal of Economic literature*, 34(3), 1199-1235.

[26] Whitley, R. (2003). Competition and pluralism in the public sciences: the impact of institutional frameworks on the organisation of academic science. *Research Policy*, 32(6), 1015–1029.

Table 1.

Variable Description

This table reports the main variable names used in this study and their descriptions .

Category	Variable Name	Description
PhD Countries	$D_{UK,AU,NZ}$	Dummy variable for PhD graduated from the UK, Austria or Newzealand
	$D_{HK,SG}$	Dummy variable for PhD graduated from Hongkong or Singapore
	D_{EU}	Dummy variable for PhD graduated from EU except for UK
	$D_{US,CA}$	Dummy variable for PhD graduated from the US or Canada
	D_{Asia}	Dummy variable for PhD graduated from Asia except for Hongkong and Singapore
Characteristics	*Gender*	The gender of the scholar
	Employer	Current university the scholar is working at
	Position	Current acedemic position: Full Professor, Associate Professor, Assistant Professor or Post-doctrioal position
	Dep_Size	The number of faculty of the current department the scholar is working at
	PhD year	The year the PhD degree is earned
	Major	The major of the scholar: accounting, economics, finance, management, and management science
Self-Selection	*Undergraduate*	Category of undergraduate school
	PhD Ranking	Ranking of PhD program based on NTU score of the subject of Business and Economics
Productivity	*Total_Publication*	Total number of publications of the scholar
	Impact_Factor	Average impact factor of the scholar per publicaiton
	Citation	Average number of citation of the scholar per publication
	FT50_Publication	Total number of publication in the Financial Times 50 journals of the scholar
Collaboration Style	*Total_Coauthor*	Total number of coauthors of the scholar
	Coauthor/Paper	Number of coauthors per publication of the scholar
	Cross-Culture	Number of foreign coauthors outside the shcolar's PhD country
	Cross-Culture/Paper	Number of foreign coauthors outside the shcolar's PhD country per pubcliation
	Home-Culture	Number of foreign coauthors fom the shcolar's PhD country
	Home-Culture/Paper	Number of foreign coauthors from the shcolar's PhD country per pubcliation

Table 2.

Subsample Distributions

This table reports the distribution of the scholar characteristic and self-selection variables across of subsamples.

Variable Name	Category	Number of Obs.
PhD Countries	UK, Auastralia and New Zealand	420
	Hong Kong and Singapore	275
	EU except for UK	335
	US and Canada	1581
	Other countries of Asia	191
Gender	Female	1172
	Male	1630
Undergraduate	985 university of China	1369
	other university of China	1203
	aboard	230
Position	Full Professor	730
	Associate Professor	976
	Assistant Professor	1064
	Post-doc Position	32
Major	Accounting	208
	Economics	1013
	Finance	607
	Management	606
	Management Science	368
Total		2802

Table 3.

Summary Statistics

This table reports the summary statistics of our sample. We report the mean, standard deviation, 25%-percentile, median, 75%-percentile, and maximum of each variable.

Variable	Mean	Std.Dev.	25%	50%	75%	Max
Total_Publication	3.9047	8.1709	0	2	5	256
Impact_Factor	2.6596	2.5744	0	2.4371	4.301	26.763
Citation	6.0086	11.3619	0	1.5	7.2	170.6667
FT50_Publication	0.3044	0.96	0	0	0	13
Total_Coauthor	6.9425	10.6304	0	4	9	186
Coauthor/Paper	2.1147	1.7057	0	2.5	3.4286	6
Cross-Culture	0.9507	2.5112	0	0	1	48
Cross-Culture/Paper	0.1574	0.2964	0	0	0.2	2
Home-Culture	1.3594	2.379	0	0	2	21
Home-Culture/Paper	0.2822	0.3704	0	0	0.5	1
PhD Ranking	49.1548	24.538	47.1	54.9	64.5	94.4
Dep Size	118.8605	57.1599	74	115	152	278
PhD year	2011.526	6.9031	2008	2013	2017	2021

Table 4.

Variable means across cultures

This table reports the summary statistics by PhD country-groups of the scholars in our sample.

	UK, AU, NZ	HK, SG	EU	US, CA	Asia
Number of obs.	420	275	335	1581	191
Total_Publication	3.9548	3.1418	4.1582	4.0424	3.3089
Impact_Factor	2.6609	2.8098	2.7846	2.6374	2.4053
Citation	5.3144	4.6229	5.9243	6.5114	5.5162
FT50_Publication	0.1333	0.3527	0.1731	0.3947	0.0942
Total_Coauthor	6.781	6.1455	7.6836	7.0474	6.2775
Coauthor/Paper	2.1151	2.1726	2.2507	2.088	2.012
Cross-Culture	1.1095	1.0982	1.2746	0.8216	0.8901
Cross-Culture/Paper	0.1729	0.2289	0.2082	0.1299	0.1591
Home-Culture	1.3023	1.1127	0.9851	1.6097	0.4241
Home-Culture/Paper	0.2567	0.3033	0.2263	0.317	0.1176
PhD Ranking	51.5063	62.4051	30.1734	55.2608	7.656
Dep_Size	117.119	128.12	127.1582	113.5199	139.0105
PhD year	2012.536	2014.08	2011.627	2011.331	2007.068

Table 5.

Distribution of FT50 publications across cultures

This table reports the number of FT publication at the scholar level across PhD countries. The first column "# of FT50" reports the number of FT publication of a scholar; the columns "US-CA", "HK-SG", "UK-AU-NZ", "EU", and "Asia" report the number of scholars who publish the given number of FT of different PhD country-groups. For example, in row 3 and column "US-CA", the value of the table is 36, which indicates that there are 36 scholars who publish 3 FT50 papers graduated from the north America (the US and Canada).

# of FT50	US-CA	HK-SG	UK-AU-NZ	EU	Asia	Total
1	147	33	22	29	4	236
2	76	14	6	6	0	102
3	36	1	1	1	1	40
4	18	3	2	0	1	24
5	8	3	1	0	0	12
6	6	1	1	1	0	8
7	1	0	0	0	1	2
8	2	0	0	1	0	3
9	1	0	0	0	0	1
11	1	0	0	0	0	1
13	2	0	0	0	0	2
Total	298	55	33	38	7	431

Table 6.

Summary statistics of FT50 publication across cultures

This table reports the summary statistics of scholars who have at least one FT50 publication across cultures. 80% of HK-Singapore graduates, 81.15% of the north America graduates, 88.66% of EU graduates, 92.14% of the UK-AU-NZ graduates, and 96.34% of other countries in Asia graduates in our total sample are not included in this table, suggesting they don't have a single FT50 publication.

	obs	%/total	Mean	Std	Skew	25%	50%	75%	Max
HK, SG	55	20.00%	1.7636	1.2614	1.8496	1	1	2	6
US, CA	298	18.85%	2.094	1.7305	3.0415	1	2	3	13
EU	38	11.34%	1.5263	1.4092	3.5281	1	1	1	8
UK,AU,NZ	33	7.86%	1.697	1.2866	2.0127	1	1	2	6
Asia	7	3.66%	2.5714	2.2991	1.1011	1	1	4	7

Table 7.
Regression results: research productivity and PhD countries
This table reports the regression test results of Eq.1. Publication_Count is the number of total publications of the scholar; Citation is the average citation per publication of the scholar; Factor is the average impact factor per paper of the scholar; FT50_Count is the number of total publication in the FT50 list of the scholar.

VARIABLES	paper_count (1)	paper_count (2)	avg_citation (3)	avg_citation (4)	avg_factor (5)	avg_factor (6)	FT50_count (7)	FT50_count (8)
Constant	4.6662	5.0867*	-1.4723	-0.5508	3.8052	4.1024	-0.2763	-0.2373
	(2.8702)	(2.6744)	(3.5029)	(3.5938)	(3.3519)	(3.1501)	(0.2974)	(0.2895)
UK, AU, NZ	2.3892***	2.5265***	2.1588	2.0643	0.5606**	0.5340*	0.0902	0.0504
	(0.6706)	(0.7423)	(1.3703)	(1.4260)	(0.2505)	(0.2723)	(0.0634)	(0.0685)
HK, SG	1.8767***	2.0401***	1.9537	1.7731	0.6030**	0.5497*	0.2450***	0.1908**
	(0.6180)	(0.7256)	(1.3704)	(1.4368)	(0.2635)	(0.2946)	(0.0759)	(0.0847)
EU	1.8611***	1.8539***	2.5596*	2.2886*	0.4752*	0.3899	0.1024	0.0702
	(0.6727)	(0.7009)	(1.3991)	(1.3875)	(0.2467)	(0.2514)	(0.0662)	(0.0684)
US, CA	1.8684***	1.9629***	2.6051**	2.3481*	0.4722**	0.3934	0.1975***	0.1470**
	(0.5843)	(0.6748)	(1.3190)	(1.3623)	(0.2242)	(0.2495)	(0.0592)	(0.0622)

Table 7 Continued.

VARIABLES	paper_count (1)	paper_count (2)	avg_citation (3)	avg_citation (4)	avg_factor (5)	avg_factor (6)	FT50_count (7)	FT50_count (8)
finance	-2.3441***	-2.3295***	-2.2391***	-2.1907***	-1.0609***	-1.0454***	-0.1539**	-0.1508**
	(0.5703)	(0.5707)	(0.7843)	(0.7830)	(0.1933)	(0.1939)	(0.0666)	(0.0666)
economics	-1.2392**	-1.2097**	-2.0702***	-1.9692***	-1.0508***	-1.0184***	-0.3534***	-0.3469***
	(0.6091)	(0.6072)	(0.7304)	(0.7285)	(0.1749)	(0.1755)	(0.0580)	(0.0580)
management	-1.9911***	-1.9753***	-0.4582	-0.3882	0.1343	0.1567	0.1456*	0.1503*
	(0.5561)	(0.5567)	(0.7693)	(0.7628)	(0.1984)	(0.1980)	(0.0768)	(0.0769)
accounting	-2.9118***	-2.8965***	0.0421	0.1768	-1.1048***	-1.0620***	-0.0954	-0.0827
	(0.6139)	(0.6139)	(1.3753)	(1.3706)	(0.2262)	(0.2271)	(0.0764)	(0.0763)
Gender	-0.6148**	-0.6263**	0.1731	0.1535	0	-0.0063	0.0453	0.0447
	(0.2482)	(0.2495)	(0.4059)	(0.4046)	(0.0966)	(0.0960)	(0.0351)	(0.0351)
department_size	0.0035	0.0032	0.0119*	0.0114	0.0022	0.0021	-0.0008	-0.0008
	(0.0061)	(0.0060)	(0.0069)	(0.0069)	(0.0015)	(0.0015)	(0.0008)	(0.0008)
NTU rank		-0.004		0.0003		0		0.0009
		(0.0066)		(0.0102)		(0.0025)		(0.0008)
bachelor-Chinese 985		0.0263		0.4662		0.1488		0.0384
		(0.3075)		(0.4570)		(0.1040)		(0.0342)
bachelor-abroad		-0.8798**		-1.9230***		-0.6193***		-0.0887*
		(0.4426)		(0.5595)		(0.1960)		(0.0472)
phd_year FE	YES	YES	YES	YES	YES	YES	YES	YES
university FE	YES	YES	YES	YES	YES	YES	YES	YES
position FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,802	2,802	2,802	2,802	2,802	2,802	2,802	2,802
R-squared	0.2038	0.2047	0.1535	0.1563	0.1682	0.1739	0.2114	0.2129

Table 8.
Regression results: collaboration style and PhD countries
This table reports the regression test results of Eq.2. Publication_Count is the number of total publications of the scholar; Citation is the average citation per publication of the scholar; Factor is the average impact factor per paper of the scholar; FT50_Count is the number of total publication in the FT50 list of the scholar.

	Panel A: collaboration at scholar level			Panel B: collaboration at paper level		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	coauthor_num	Total_Diff_foreign	Total_Same_foreign	team_size	Diff_foreign/paper	Same_foreign/paper
Constant	7.6617	1.4506	-0.3065	-0.3777	-0.0001	-0.3659*
	(4.9422)	(0.9285)	(0.6227)	(0.4392)	(0.0977)	(0.1958)
UK, AU, NZ	0.8382	0.3288	0.7301***	0.1448	0.0165	0.0960***
	(0.6373)	(0.2094)	(0.1897)	(0.1190)	(0.0290)	(0.0309)
HK, SG	0.9180*	0.3253*	0.5003***	0.2171*	0.053	0.1217***
	(0.5343)	(0.1909)	(0.1787)	(0.1262)	(0.0326)	(0.0350)
EU	0.9359*	0.3051*	0.3530**	0.1495	0.0379	0.0541*
	(0.5419)	(0.1814)	(0.1620)	(0.1146)	(0.0294)	(0.0283)
US, CA	0.8375*	-0.1615	0.7910***	0.147	-0.0533**	0.1358***
	(0.4851)	(0.1570)	(0.1508)	(0.1100)	(0.0266)	(0.0277)
paper_count	0.9803***	0.1712**	0.1100**	0.0151*	0	-0.0027***
	(0.2283)	(0.0678)	(0.0455)	(0.0090)	(0.0009)	(0.0006)
avg_citation	0.0367*	0.0119*	0.0135**	0.0028	0.0007	0.0008
	(0.0197)	(0.0067)	(0.0054)	(0.0027)	(0.0009)	(0.0007)
avg_factor	0.6436***	0.0263	0.0935***	0.4790***	0.0372***	0.0602***
	(0.0820)	(0.0241)	(0.0202)	(0.0194)	(0.0035)	(0.0043)
FT50_count	0.6175*	0.3055***	0.6554***	-0.0478**	0.0201***	0.0497***
	(0.3414)	(0.1117)	(0.0982)	(0.0239)	(0.0070)	(0.0074)

Table 8 Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	coauthor_num	Total_Diff_foreign	Total_Same_foreign	team_size	Diff_foreign/paper	Same_foreign/paper
finance	-1.4336***	-0.3785**	-0.2712*	0.1217	0.0125	0.0741***
	(0.5171)	(0.1841)	(0.1627)	(0.0867)	(0.0209)	(0.0229)
economics	-1.2489***	-0.3217*	-0.1315	0.1634**	0.0207	0.0569***
	(0.4094)	(0.1781)	(0.1561)	(0.0777)	(0.0195)	(0.0211)
management	-1.1846**	-0.2997	-0.3631**	-0.2495***	-0.006	0.0071
	(0.5937)	(0.2132)	(0.1772)	(0.0808)	(0.0200)	(0.0216)
accounting	-1.4702**	-0.5019**	-0.3295	0.0577	-0.0108	0.0493*
	(0.6778)	(0.2276)	(0.2080)	(0.1024)	(0.0258)	(0.0295)
NTU rank	-0.0081	-0.0018	-0.0002	-0.0013	0.0002	-0.0004
	(0.0051)	(0.0018)	(0.0017)	(0.0011)	(0.0003)	(0.0003)
bachelor-Chinese 985	-0.0076	-0.0089	0.1111	-0.0365	0.003	0.0017
	(0.2025)	(0.0764)	(0.0742)	(0.0473)	(0.0120)	(0.0137)
bachelor-abroad	0.3571	0.0384	-0.0288	-0.2044**	-0.0152	-0.0624***
	(0.2830)	(0.0979)	(0.1152)	(0.0795)	(0.0176)	(0.0221)
Gender	0.0124	-0.0487	-0.0985	0.0414	0.0055	-0.005
	(0.2050)	(0.0704)	(0.0721)	(0.0427)	(0.0109)	(0.0128)
department_size	0.0026	0.0014	0.0018	0.0007	0.0003	-0.0001
	(0.0044)	(0.0014)	(0.0013)	(0.0007)	(0.0002)	(0.0002)
phd_year FE	YES	YES	YES	YES	YES	YES
university FE	YES	YES	YES	YES	YES	YES
position FE	YES	YES	YES	YES	YES	YES
Observations	2,802	2,802	2,802	2,802	2,802	2,802
R-squared	0.7946	0.4616	0.4495	0.6383	0.1935	0.2845

Table 9.

Connection to FT50 editors between US-CA and HK-SG

This table compares different types of connections of the scholar to the editors of FT50 journals. Panel A reports the groups average of three types of editor connections. Type I connection refers to the case if the scholar and the editor coauthored in the same paper; Type II connection refers to the case if the editor have worked in the same university department where the scholar is graduated from; Type III connection refers to the case if the scholar and the editor have at least a common coauthor. We separate our sample based on the scholar's number of FT50 publications, $\|FT50\|$, into three groups: high (more than 3 FT50 publications), medium (1 or 2 FT50 publications), and low (0 FT50 publication). Panel B reports further analysis of Type I and Type III connections. We divide Type I connection into two sub-types: Type IA and Type IB. Type IA connection refers to the Type I connection in which the editor is working at scholar's PhD country; Type IB connection refers to the Type I connection in which the editor is working outside the scholar's PhD country. Type IIIA connection refers to the Type III connection in which the common coauthor is working at scholar's PhD country; Type IIIB connection refers to the Type III connection in which the common coauthor is working outside the scholar's PhD country.

Panel A

	Type I Connection			Type II Connection			Type III Connection		
	HK-SG	US-CA	T-stat	HK-SG	US-CA	T-stat	HK-SG	US-CA	T-stat
$\|FT50\|$=0	0.018	0.072	0.026	0.182	0.196	-0.505	0.168	0.122	1.873**
0<$\|FT50\|$<3	0.277	0.197	1.209	0.383	0.314	0.916	0.596	0.534	0.775
$\|FT50\|$>=3	0.375	0.413	-0.207	0.625	0.347	1.551*	0.875	0.880	-0.041

Table 9 Continued.

Panel B

	Type IA/Type I			Type IB/Type I		
	HK-SG	US_CA	T-stat	HK-SG	US_CA	T-stat
$\|FT50\|$=0	0.018	0.015	0.376	0.005	0.006	-0.300
0<$\|FT50\|$<3	0.128	0.157	-0.507	0.191	0.031	4.435***
$\|FT50\|$>=3	0.375	0.373	0.009	0.063	0.041	0.326
	Type IIIA/Type III			Type IIIB/Type III		
	HK-SG	US_CA	T-stat	HK-SG	US_CA	T-stat
$\|FT50\|$=0	0.051	0.072	-1.191	0.038	0.011	3.300***
0<$\|FT50\|$<3	0.207	0.348	-2.034**	0.306	0.070	5.557***
$\|FT50\|$>=3	0.349	0.604	-1.680**	0.414	0.120	2.688***

Table 10.
Regression results: Connection types to the FT50 editors
This table reports the regression test results of Eq.3.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Type I	Type I	Type II	Type II	Type III	Type III
Constant	0.0686	0.0674	0.8090**	0.7959**	0.3029	0.2952
	(0.117)	(0.118)	(0.368)	(0.358)	(0.195)	(0.206)
HK, SG	0.0167	0.0168	-0.0404*	-0.0426*	0.0576**	0.0573**
	(0.016)	(0.016)	(0.024)	(0.025)	(0.025)	(0.026)
paper_count	0.0016	0.0016	-0.001	-0.0011	0.0057	0.0058
	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)
avg_citation	0.0009	0.0009	0.0015	0.0015	0.0038***	0.0038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
avg_factor	0.0077***	0.0078***	0.0023	0.002	0.0359***	0.0362***
	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
FT50_count	0.0826***	0.0826***	0.008	0.0078	0.0952***	0.0952***
	(0.009)	(0.009)	(0.012)	(0.012)	(0.013)	(0.013)

Table 10 Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Type1_dum	Type1_dum	Type2_dum	Type2_dum	Type3_dum	Type3_dum
finance	-0.0576**	-0.0578**	-0.4211***	-0.4190***	-0.0544*	-0.0548*
	(0.023)	(0.023)	(0.039)	(0.039)	(0.033)	(0.033)
economics	-0.0403**	-0.0407**	-0.4834***	-0.4808***	-0.0776**	-0.0781**
	(0.020)	(0.020)	(0.037)	(0.037)	(0.030)	(0.030)
management	-0.0247	-0.0243	-0.1550***	-0.1544***	0.0149	0.0164
	(0.025)	(0.025)	(0.043)	(0.043)	(0.033)	(0.033)
accounting	-0.0664***	-0.0662**	-0.4256***	-0.4224***	-0.0218	-0.0204
	(0.025)	(0.026)	(0.047)	(0.047)	(0.042)	(0.043)
NTU rank		-0.0001		0.0005		-0.0001
		(0.000)		(0.000)		(0.000)
bachelor- Chinese 985		0.0037		-0.0006		0.0132
		(0.012)		(0.020)		(0.019)
bachelor-abroad		0.0124		-0.0368		0.0338
		(0.020)		(0.035)		(0.028)
gender	-0.0013	-0.0009	-0.0005	-0.0015	-0.0079	-0.0069
	(0.011)	(0.011)	(0.018)	(0.018)	(0.017)	(0.017)
department_size	0.0002	0.0002	-0.0001	-0.0001	-0.0002	-0.0002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
phd_year FE	YES	YES	YES	YES	YES	YES
university FE	YES	YES	YES	YES	YES	YES
position FE	YES	YES	YES	YES	YES	YES
Observations	1,856	1,856	1,856	1,856	1,856	1,856
R-squared	0.2478	0.2479	0.2569	0.2578	0.3611	0.3616

Table 11.
Regression results: Connection sub-types proportions to the FT50 editors
This table reports the regression test results of Eq.3 when

Panel B				
	(1)	(2)	(3)	(4)
VARIABLES	Type IA/Type I	Type IB/Type I	Type IIIA/Type III	Type IIIB/Type III
Constant	0.0568	0.0673	0.3028	0.0497
	(0.1038)	(0.0855)	(0.2516)	(0.1069)
HK, SG	-0.0008	0.0321***	-0.0303	0.0735***
	(0.0140)	(0.0116)	(0.0185)	(0.0171)
paper_count	0.0012	0.0006	0.0037	0.0003
	(0.0012)	(0.0005)	(0.0024)	(0.0004)
avg_citation	0.0011	0.0001	0.0021**	-0.0003
	(0.0007)	(0.0004)	(0.0010)	(0.0005)
avg_factor	0.0039*	0.0047***	0.0182***	0.0091***
	(0.0024)	(0.0017)	(0.0035)	(0.0023)
FT50_count	0.0740***	0.0056	0.0634***	0.0282***
	(0.0087)	(0.0041)	(0.0109)	(0.0069)

Table 11 Continued.

Panel B				
	(1)	(2)	(3)	(4)
VARIABLES	Type IA/Type I	Type IB/Type I	Type IIIA/Type III	Type IIIB/Type III
finance	-0.0516**	-0.0191	-0.0018	-0.0068
	(0.0220)	(0.0135)	(0.0263)	(0.0165)
economics	-0.0412**	-0.0194	-0.0109	-0.0096
	(0.0186)	(0.0127)	(0.0246)	(0.0145)
management	-0.0233	-0.0191	0.0563**	0.0033
	(0.0234)	(0.0149)	(0.0278)	(0.0165)
accounting	-0.0681***	-0.0365***	0.0307	-0.0052
	(0.0226)	(0.0129)	(0.0345)	(0.0217)
NTU rank	0.0001	0	0.0001	-0.0002
	(0.0002)	(0.0001)	(0.0004)	(0.0002)
bachelor- others	(base)	(base)	(base)	(base)
bachelor- Chinese 985	-0.0011	0.0066	0.0106	0.0122
	(0.0106)	(0.0062)	(0.0152)	(0.0087)
bachelor-abroad	0.0216	-0.0009	0.0400*	0.0102
	(0.0188)	(0.0100)	(0.0241)	(0.0125)
female	0.0061	0.0005	-0.0017	-0.0072
	(0.0099)	(0.0053)	(0.0142)	(0.0087)
department_size	0.0001	0.0002*	-0.0003	0
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
phd_year FE	YES	YES	YES	YES
university FE	YES	YES	YES	YES
position FE	YES	YES	YES	YES
Observations	1,856	1,856	1,856	1,856
R-squared	0.2461	0.0822	0.2586	0.1354

Figure 1: Coefficients of culture group dummies across the four regression models of research productivity of Table 7

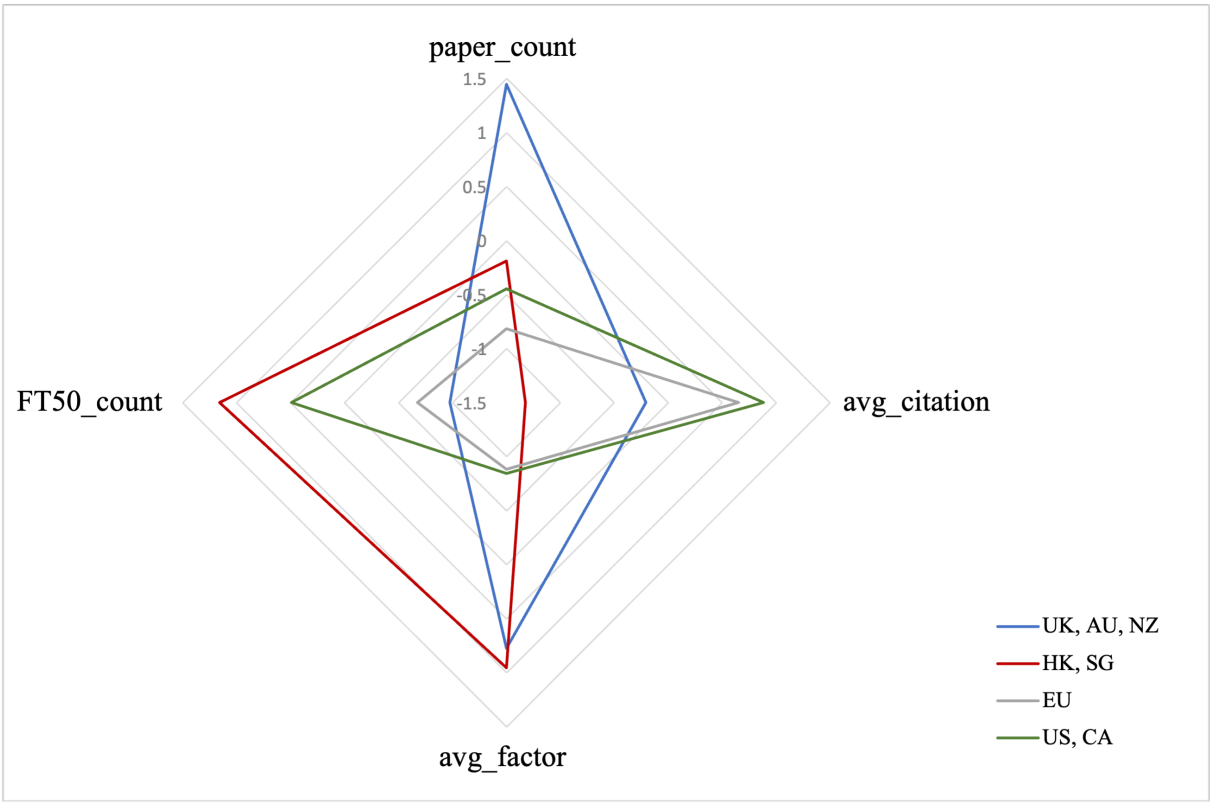

Figure 2: Coefficients of culture group dummies across the six regression models of collaboration style of Table 8