

Back on track: Factors influencing Chinese returnee scholar performance in the reintegration process

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Abstract

Using a unique sample of 214 returnee scholars retrieved from the Changjiang Scholars Program in the fields of natural and life sciences, this study examines the impact of returnees' transnational capital on their performance in the reintegration process. We find that established returnee scholars are more likely to have gap periods, and they have a slower recovery from reduction in research impact during the post-return period than other returnees. We also find that scholars with higher overseas research impact have higher risks of reduced research impact in the initial years upon return, and slower recovery. The duration of overseas experience has mixed effects on returnee scholars' post-return performance. Our findings have implications for Chinese universities in terms of formulating policies regarding returnee talent recruitment and evaluation.

Key words: return migration; transnational capital; reintegration; research impact; China.

1. Introduction

Scholars with overseas experience have been considered important academic resources in Chinese universities. With various talent programs and favorable policies provided by national and local government, Chinese universities have made a special effort to attract and retain overseas talent. Meanwhile, they are also pushing domestic scholars to go abroad for further training via visiting scholar programs or postdoctoral programs. In order to meet the basic requirements of faculty promotion, junior faculty with domestic PhD degrees in Chinese state key universities are asked to study and work at a foreign institute for at least one continuous year (Zeng and Qiu 2016). The enthusiasm for recruiting scholars with overseas experience not only derives from Chinese universities' ambitions to achieve academic excellence, but also results from the national academic rating system. One typical example is the national evaluation of Chinese universities' disciplines implemented by the China Academic Degrees and Graduate Education Development Center (CDGDC). In the most recent 2016 evaluation, the CDGDC used the number of faculty members with overseas experience lasting at least 10 months as an indicator of faculty strength and internalization (CDGDC 2016). This has led to increasing efforts to send out domestic scholars and bring back overseas scholars on the part of Chinese universities.

The Chinese government has made sustained investments to reverse the brain drain, and thus has caused a rapid increase in the return migration of overseas scholars. To date, faculty members with overseas experience constitute a large proportion of total faculty counts in Chinese universities, especially state-owned research universities (Shi 2015; Welch and Jie 2013). According to the 2014 Faculty Survey conducted by Huazhong University of Science & Technology, two-thirds of faculty members in Chinese universities have been abroad at least once (Shen 2016). Furthermore, both the administrative and academic leadership positions in state key universities have been dominated by returnees. A total of 78 per cent of university presidents working at key universities under the direct administration of the Ministry of Education (MoE) have at least 1 year of overseas experience, and 72 per cent of the directors of state key research laboratories are also returnee scholars (Chen 2012).

Along with the accelerated growth of overseas scholars returning to work at Chinese universities, there has been an increasing amount of scholarly investigation of the performance of returnee scholars over the last two decades. Overall, the studies of returnee scholars have focused on three topics: motivations to return, post-return status, and the impact of returnees (Hao et al. 2017). Regarding the post-return status, various studies have investigated scholars' post-return performance in terms of research impact (Chen et al. 2015;

Jonkers and Tijssen 2008; Tian 2016; Wu 2015), international collaboration (Jonkers and Tijssen 2008; Li et al. 2015; Velema 2012; Yang et al. 2015), career advancement (Lu and McInerney 2016), and teaching skills (Choi and Lu 2013; Zweig et al. 2004). Many of these studies aimed to reveal the perceived value of overseas experience by examining performance differentials between returnees and locals (Hao et al. 2017), while to our best knowledge very few studies have focused on the differing academic performance before and after overseas scholars' return. Some studies have claimed that returnee scholars may face challenges of reintegration into the domestic academic community (Chen and Li 2013; Gill 2016; Hao et al. 2016; Ma and Pan 2015). The issue of reintegration is more pronounced during the first few years after return, when overseas scholars usually have a hard time fully utilizing their transnational capital (Chen 2016; Chen and Li 2013). However, we know little about how the reintegration process shapes the academic performance of returnee scholars. Our study aims to fill this research gap, by examining the changing dynamics of individual scholar's academic performance during the entire process of return.

We base our empirical examination on a group of returnee professors recruited by one of China's flagship talent programs (the Changjiang Scholars Program, hereinafter referred to as the CJS Program). We investigate how returnee professors' research impact differs before and after their return. Various personal characteristics have been included to test which scholars tend to face the least loss of transnational capital upon return, and thus have a successful (or smooth) reintegration. Our study offers two main contributions to the literature. First, by tracking the changes in research impact, we try to give a better understanding of the reintegration process of returnee scholars. Second, we offer a new angle to evaluate returnee performance. Rather than proving the superiority of overseas experience by comparing the post-return performance of returnees to the performance of locals, we propose a few new measures to evaluate returnee scholars' performance in the reintegration process.

The rest of this article proceeds as follows: Section 2 will review the relevant literature and present the research gap; In Section 3, we introduce the data resource; Section 4 defines a list of measures and proposes a set of hypotheses followed by descriptive statistics; Later, our empirical results are presented in Section 5, and the final section discusses and concludes.

2. Literature

2.1 Researcher mobility and academic performance

Researcher mobility serves as an effective catalyst for the development of an individual scholar's academic career and the overall research system (Fernández-Zubieta et al. 2015). Through moving internationally and between institutions, mobility helps a scholar accumulate both human and social capital (Cañibano et al. 2016; Horta and Yonezawa 2013; Jacob and Meek 2013) and build a diverse background, which results in more benefits than hindrances in the advancement of scholars' academic careers (Morano-Foadi 2005). In a broader sense, by connecting academic resources worldwide, the mobility of scholars helps create an open and collaborative culture in the modern research system (Orazbayev 2017; Trippel 2013; Wagner and Jonkers 2017).

The rising awareness of scientific mobility has led to a surge in scholarly investigation. The primary focus of such literature is on the impact of mobility. In particular, scrupulous attention has been paid to the impact of scientific mobility on researchers' earnings

(Barbezat and Hughes 2001; Saarela 2015), career trajectory (Lu and McInerney 2016; Lutter and Schröder 2016), and various aspects of academic performance, including performance in research production (Bolli and Schläpfer 2015; Fernández-Zubieta et al. 2013), research impact (Bäker 2015; Halevi et al. 2016; Sugimoto et al. 2017), research collaboration (Jacob and Meek 2013; Scellato et al. 2015), and knowledge transfer (Edler et al. 2011). Considering the theme of our study, we will only review extant literature with regard to the relationship between researcher mobility and academic performance (mainly measured by research production and impact).

First and foremost, types of mobility matter, and different mobility patterns may exhibit different impacts on academic performance (Geuna et al. 2015). Researcher mobility usually refers to job-to-job mobility of researchers after the completion of a PhD (Aksnes et al. 2013). According to different definitions of change, Fernández-Zubieta et al. (2015) have identified five types of researcher mobility, as follows: occupational mobility (change of professional status), sectoral mobility (mobility between university and business), geographic mobility (change of location), social mobility (change of social status), and disciplinary mobility (change of research direction). Furthermore, these mobility types can be broken down into smaller categories. For example, some scholars further divided occupational mobility into voluntary mobility and forced mobility, where forced mobility is referred to as mobility before researchers obtain permanent positions, while voluntary mobility occurs after permanent positions are obtained (Fernández-Zubieta et al. 2015; Geuna et al. 2015). As for geographic mobility, both international mobility across borders and mobility inside countries have been discussed (Bäker 2015; Cruz-Castro and Sanz-Menéndez 2010). Meanwhile, by measuring the prestige of affiliated universities (or departments) both before and after mobility, a few other studies have recognized social mobility as upward mobility and downward mobility (Allison and Long 1990; Bolli and Schläpfer 2015; Fernández-Zubieta et al. 2013; Fernández-Zubieta et al. 2016).

To date, there has been mostly mixed evidence regarding the relationship between mobility and academic performance. Some scholars have reported that mobility increased research production and impact (Aksnes et al. 2013; Horta and Yonezawa 2013), while some others found that the effect of mobility on research production and impact was insignificant (Bolli and Schläpfer 2015; Fernández-Zubieta et al. 2013; Fernández-Zubieta et al. 2016; Rotolo and Messeni Petruzzelli 2013). When we look at some specific mobility types, results can also be bewildering. Most studies have reached the same conclusion—that international mobility is a positive predictor of both research production and impact (Aksnes et al. 2013; Jonkers and Cruz-Castro 2013; Jonkers and Tijssen 2008; Yamashita and Yoshinaga 2014). A recent study by Sugimoto et al. (2017) reported that the citation rates of internationally mobile scholars are about 40 per cent higher than those of nonmobile scholars. However, a few other scholars have reported different results. Gibson and McKenzie (2014) found that return migrants in three island countries did not have a greater research impact than locals without any overseas experience. Halevi et al. (2016) analyzed top scholars in seven disciplines and noticed that mobility inside countries rather than international mobility had a positive impact on research production and impact. Another study by Payumo et al. (2018) examined the patterns of researcher mobility in a US-based university and found that domestically mobile researchers were more prolific than internationally mobile researchers, while the latter group had higher research impact. Similarly, inconclusive evidence was presented in studies about upward mobility and downward mobility. An early

study found that upward mobility increased both research production and impact, while downward mobility had the opposite effects (Allison and Long 1990). Bolli and Schläpfer (2015) had similar but different findings. In their study, upward mobility and downward mobility had similar opposing effects on research production; however, both effects were statistically insignificant. Recently, Fernández-Zubieta et al.'s (2016) study found upward mobility had a positive impact on research production, while its impact on research impact was insignificant.

In order to clarify the ambiguous results yielded in past literature, more empirical studies need to be done concerning the impact of mobility on researcher academic performance. Most importantly, existing studies have been largely targeted at researchers from Western countries. Since researchers from different countries usually exhibit different academic behavior (Scellato et al. 2015), it is hard to tell whether Chinese researchers display similar effects to researchers from other countries. No doubt, more empirical evidence gathered from Chinese researchers will provide valuable insights for the current discussion.

2.2 Return migration and reintegration

As one particular type of geographic mobility, return migration usually refers to the phenomenon whereby people return to work in their country of origin after spending a period of time in another country (Gill 2005; Xiang 2014). It has been reported that returning academics are the most visible returnees in China (Wang et al. 2015). Beyond the consensus on the significance of return migration in reducing brain drain in home countries, studies have increasingly focused on barriers to return (Cao 2008; De Haas and Fokkema 2011; Ma and Pan 2015) and challenges facing returnees upon return (Chen 2016; Gill 2016; Hao and Welch 2012; Hao et al. 2016). It has been claimed that reverse culture shock and intercultural reintegration are the biggest challenges for returnee talents (Hao et al. 2016; Szkudlarek 2010). In some early interviews, Hao and others found that high-skilled returnees usually had an incomplete and narrow understanding of Chinese culture, which inhibited a successful reintegration (Hao and Welch 2012; Hao et al. 2016). In particular, the cultural differences between China and Western countries are apparent in the guanxi networks (networks based on interpersonal relationship) heavily embedded in Chinese society (Cao 2008; Gill 2016), and different mentalities influenced by traditional Chinese culture (Hao and Welch 2012). Recently, Chen (2016: 65–74) pinpointed two major issues facing Chinese academic returnees during the reintegration process. One was the bureaucratic governance structure of Chinese universities and academic system (e.g. evaluation and funding policies, quantity-oriented research culture), and the other was local politics and complicated interpersonal relationships.

The above-mentioned literature has clarified some facts regarding reintegration issues. First, scholars have confirmed the significance of reintegration during the process of return migration, and the major challenges facing Chinese returnees in the reintegration process have been identified. Second, scholars have expressed the unanimous view that a successful reintegration depends on how returnees manage to balance and integrate cultural differences between the host countries (where they had overseas experiences) and the home countries (Franken et al. 2016; Gill 2016; Hammer et al. 2003). It seems that existing studies have mostly centered on explaining what reintegration issues are and why returnee scholars are facing them, while few have asked how scholars behave during

the process of reintegration. So far, little attention has been paid to how the reintegration process shapes academic returnees' research behavior and outcomes. As far as we know, some scholars have noticed that mobility has a negative impact on researchers' short-term research production (Bäker 2015; Fernández-Zubieta et al. 2016). Although instructive, these results are not specifically targeted at return mobility. Another pilot study by Li et al. (2015) found that the return of overseas Chinese scholars was accompanied by a continuous decrease in the tendency towards international research collaboration. But this study only revealed scholars' post-return behavior in research collaboration, while it was unclear how scholars' collaborative behavior differed before and after return.

In addition, earlier studies have identified several institutional factors causing reintegration issues. However, little research has addressed the prereturn features of returnees which may also affect the reintegration process (Szkudlarek 2010). In her recent book, Chen (2016: 51–5) analyzed how different groups of returnees (established scholars, recent PhD graduates, and postdoctoral fellows) negotiated their career options, and found different groups made different calculations in terms of return motivations. But unfortunately, she did not dig deeper into how different types of returnees performed in the later reintegration process. Our research is developed on the basis of Chen's (2016) work and mainly focuses on the examination of personal factors impacting returnee scholars' reintegration processes.

3. Data

3.1 Returnee scholars

Our sample was selected from the talent pool of the CJS Program, which was initiated by the MoE in 1998 and has now become one of the most influential national talent programs. During the period of 1998–2015, the CJS Program recruited a total number of 1,991 distinguished professors (hereinafter referred to as CJS scholars). We gathered each CJS scholar's demographic information, education background, and working experience from their personal websites. All records were coded to form a unique curriculum vitae (CV) database. According to our database, about 90% of CJS scholars have some sort of overseas experience, and about half were recruited by the program directly from overseas institutions. The statistics are in line with the basic understanding that returnee scholars have constituted a considerable proportion of top-level scholars in China (Chen 2012; Shi 2015; Welch and Jie 2013).

In using a narrow definition of overseas experience, our research only considered returnee scholars who had full-time overseas experience lasting at least one continuous year, while those who only made temporary international visits or were abroad less than 1 year were not included. Meanwhile, since we planned to examine returnee reintegration processes by measuring performance in international publications, we only targeted returnee scholars in the fields of natural and life sciences, where international publication is a strong predictor of research capacity (Bornmann and Marx 2014). That is to say, returnee scholars in some other research fields (e.g. social sciences, humanities, engineering, etc.) whose research outputs are mainly books, domestic publications, or patents, rather than international publications, were not suitable for our research. The four specific fields included in this study are: mathematics (MATH), physics (PHY), earth and environmental sciences (EES), and life sciences (LIFE).

In the next step of sample preparation, we excluded scholars with inappropriate or incomplete information. Among these, three were originally from foreign countries; forty-three reported part-time return as they still held positions in foreign institutions; twenty-five reported repeat mobility between Chinese institutions and foreign institutions; and fifteen appeared to have incomplete publication data.¹ The selection process led to a final sample of 214 scholars (see Table 1).

3.2 Publication data

Since analysis of research output and the impact of international publications are widely used in university ranking and government funding decisions (Yang and Welch 2012), Chinese universities are pushing their faculty members to publish in international journals through promotion and reward policies (Quan et al. 2017). The expectation for returnee faculty members to publish in high-impact journals is usually much higher than that for local faculty (Chen 2016: 100). Therefore, we chose international publication over domestic publication to measure the research performance of returnee scholars. The international publication data of each scholar was retrieved from Elsevier's Scopus database. The search was confined to article-type publications written in English and was conducted from the period of 22 June–25 September 2016. Name disambiguation remained the biggest challenge, especially for Chinese scholars (Tang and Walsh 2010). In order to overcome the author name disambiguation problem, we have developed the following procedure to collect and clean the publication data.

During the process of data collection, we sought to gather as many relevant publications as possible. The Scopus database allows us to use its -Author ID! (author identification) function, which eliminates most of the inaccuracy caused by name ambiguity (Kawashima and Tomizawa 2015). However, we found that most Chinese scholars had more than one Scopus Author ID, so publications by the same scholar may be grouped under different Author IDs. We, therefore, proposed a two-step strategy to collect every Author ID and related publication data. The first step was to include both the name of a scholar and his/her affiliations reported in our CV database in the search conditions, and we compiled a preliminary publication list by combining all potential Author IDs. In the next step, we merged the scholar's self-reported publication list from his/her CV² into the above-mentioned preliminary publication list retrieved from the Scopus database, and checked whether there were missing publications in the first step's data. Then, we used these missing publications to identify the missing Author IDs and further related publications. Once we gathered all the Author IDs, a complete publication list for each scholar was subsequently compiled.

Next, in the data cleansing process, the ultimate goal was to make sure each publication belonged to the exact target scholar. We first extracted the name and address of the target scholar from each publication. If one publication had multiple authors sharing the same name as the target scholar, we identified the correct one by referring to the full text of the publication. In this step, we not only acquired the missing addresses, but also removed publications without the precise name of the target scholar at the same time. In doing so, all publications were coded with the addresses of only one target scholar, and a complete address list was compiled for each target scholar. Following that, we checked each target scholar's address list manually. If the department name or institution name contained in the address did not accord with the affiliations listed in the CVs,

Table 1. Sample selection.

Sample size	MATH	PHY	EES	LIFE
Total number of CJS scholars (1998–2015)	118	137	108	116
Number of returnees	67	87	53	93
Number of returnees in final sample	48	63	37	66

Note: Returnees refers to those having full-time overseas experience of at least one continuous year.

we concluded that the publication belonged to another scholar who coincidentally had the same name as the target scholar. These irrelevant publications were eliminated after careful scrutiny. Finally, a list of affiliations in chronological order was produced for each scholar by removing extra information in the address list.

3.3 Describing returnee scholars' mobility processes

The mobility of scholars can be tracked in two different ways. One is CV analysis (Cañibano et al. 2008; Cañibano et al. 2011), and the other is analyzing the changes in author affiliations retrieved from publication data (Appelt et al. 2015; Dubois et al. 2014; Ganguli 2015). Both methods are reported to have advantages and disadvantages (Geuna et al. 2015). Based on our observations, CV data may have problems of incompleteness as informed by Cañibano and Bozeman (2009). Some mobilities or the time line of mobility may be left out of a scholar's CV. Also, the types of mobility are sometimes unclear in CV data, so we are unable to distinguish long-term mobility from temporary mobility. On the other hand, through strict data cleansing processes, author affiliations turn out to be a more accurate and reliable resource than CV data. Therefore, we decided to mainly use bibliometric data to measure the mobility process, while CV data was used as complementary information.

International mobility can be identified if a scholar's affiliation changes from a domestic institution to a foreign institution; and the opposite direction of international mobility implies a return mobility. Chinese returnee scholars usually report three types of affiliations in their career publications, namely Chinese affiliations, foreign affiliations, and mixed affiliations. A scholar is supposed to report Chinese (or foreign) affiliations in an article if the article is written and published when the scholar is working at a domestic (or foreign) institution. That is to say, Chinese affiliations probably appear either before a returnee scholar goes abroad or after the returnee scholar returns, while foreign affiliations only appear when the returnee scholar is abroad. In addition, scholars may report mixed affiliations (including both Chinese and foreign affiliations at the same time) in three other typical scenarios. In the first scenario, some overseas scholars may choose to return as part-time researchers in Chinese institutions while keeping their overseas positions, and therefore publications during their part-time returns usually report mixed affiliations. Based on our observations, the part-time return is often treated as a transition period for overseas scholars prior to a full-time return. The second scenario is when Chinese scholars go abroad only for temporary purposes while keeping their domestic positions, which may also lead to the demonstration of mixed affiliations. In the last scenario, mixed affiliations are reported when a scholar conducts and submits research at a Chinese (foreign) institution and subsequently moves to a foreign (Chinese) institution when the research is published (Frenken et al. 2009). Since our study only focuses on full-time overseas experiences, we have removed the publications reporting mixed affiliations caused by temporary overseas experience (the second scenario)³. As a result, we can say that mixed

affiliations in our study are mostly caused by the first and last scenarios, and in both scenarios, scholars are in the process of international mobility and return mobility.

In accordance with the above-mentioned underlying definitions of affiliation types in the publication data, we divided each returnee scholar's career publications into five time periods—a pre-abroad period, a transition period before leaving, an abroad period, a transition period before returning, and a post-return period. As shown in Table 2, the basic grouping criteria is that, (1) publications where CJS scholars report only Chinese affiliations are grouped into either pre-abroad period or post-return period; (2) publications where CJS scholars report mixed affiliations are grouped into either one of the two transition periods; (3) most clearly, publications where CJS scholars report only foreign affiliations are grouped in the abroad period. Since there are two options for grouping both publications reporting Chinese affiliations and those reporting mixed affiliations, we have generated the classification by reference to CV data. Each time period is compiled in a sequential order from the pre-abroad period to the post-return period.

Our data reveals that not every CJS scholar reported all three affiliation types in publication, and thus some CJS scholars may only have data for some of the five time periods. In all, 42.5 per cent of CJS scholars (91 out of 214) had international publications before they went abroad. Only twenty-nine scholars appeared to display transition periods before leaving, while the majority of CJS scholars displayed abroad periods and transition periods before returning.

4. Measures and hypotheses

4.1 Defining a successful reintegration process

Chinese universities have high expectations for returnee scholars in terms of producing high-quality research (Hao and Welch 2012; Pella and Wang 2013). Returnee scholars are supposed to produce research of at least the same quality as they do while they are abroad, but the loss of transnational capital caused by relocation may lead to a high risk of research quality reduction. In particular, shortly after their return scholars face challenges of reverse culture shock and reintegration, which may have a negative effect on their short-term research performance (Bäker 2015; Fernández-Zubieta et al. 2016). From the perspective of university administrators, we here propose three sets of measures to define the successful reintegration process of a returnee scholar.

First, the existence of gap periods is strong evidence of reintegration issues. Universities like to see that returnee scholars are able to publish in international journals immediately after their return with no gap period being observed. The GAP_PERIOD variable is therefore proposed to measure whether returnee scholars have periods of zero production right after return. If a returnee scholar has international publications right after return without a gap period, then this scholar is found to reintegrate into the domestic environment within a short period of time, and thus, (s)he has had a successful reintegration process. To rule out the possibility of publication delays also leading to a gap period, we have assumed that returnee scholars have similar publication delays before and after return. Based on our observations, the majority of returnees reported gap periods only during the process of mobility, and otherwise have stable publications in each year. Furthermore, in order to ensure quick publication and meet the expectations of domestic universities, returnees may also submit research to journals with shorter publication delays, based on past publishing experiences. In accordance with the

Table 2. The five time periods of the entire process of return migration.

Time periods	Affiliation type	Observations
Pre-abroad period	Chinese affiliations	91
Transition period before leaving	Mixed affiliations (last scenario)	29
Abroad period	Foreign affiliations	176
Transition period before returning	Mixed affiliations (first or last scenario)	114
Post-return period	Chinese affiliations	214

above, the existence of gap periods in our study can be specifically attributed to reintegration issues rather than publication delays.

Second, we here propose a new measure—change of research impact from the abroad period to the post-return period—to examine returnee scholars' performance in the reintegration process. Obviously, a lower reduction (or no reduction at all) of research impact indicates a more successful reintegration process. Although a great deal of criticism has been aimed at the usage of journal impact factors in evaluating individual research (Adam 2002; Hicks et al. 2015; Seglen 1997), journal impact factors remain one of the most commonly used tools in China to gauge an individual researcher's research impact (Hvistendahl 2013; Quan et al. 2017; Tang et al. 2015). For a returnee scholar, having articles published in international journals with high-impact factors is a particularly direct way of proving his/her research capacity. Therefore, it is reasonable to use changes of journal impact factors as a proxy for changes of research impact. To observe changes of research impact within different time windows, we constructed two average impact (AI) dummies. The AI(Y1 – Y3) dummy is used to measure whether the average research impact scholars achieved during the first 3-year period after return is higher than that achieved during the abroad period, while the AI(Y4 – Y6) dummy compares the average research impact of the second 3-year period after return to that of the abroad period. To get each scholar's average research impact in each time period, we calculated the average journal impact factors by dividing the total impact factors of journals where articles were published in one period by the total number of articles in this period. The journal impact factors were retrieved from Journal Citation Reports (JCR) Science Edition 2015 (also below). Since the journal impact factors change over time while the citation-based journal ranking is relatively stable (Pajić 2015), we applied the 2015 impact factors for all publications instead of the impact factors at the time of publication, which ensures that the changes of research impact are not caused by changes of journal impact factors themselves. For those who had reduction in research impact after return, we also wanted to know how long it took these returnee scholars to raise their post-return research impact to the level of their abroad period research impact. We divided the whole post-return period into several successive overlapping 3-year segments. The RECOVERY_AI variable is then proposed to measure in which overlapping 3-year post-return period returnee scholars first report higher average research impact than their abroad period research impact.

Lastly, Chinese universities also have great expectations for returnee scholars in terms of publishing in high-impact journals. Overseas scholars with a history of publishing in high-impact journals (e.g. *Nature*, *Science*, *Cell*, etc.) are more likely to be recruited by Chinese universities. We designed two highest impact (HI) dummies to compare returnee scholars' performance in high-impact

research before and after return. The HI(Y1 – Y3) dummy was developed to measure whether the maximum journal impact factor of a returnee scholar's publications in the first 3-year period after return is not lower than the maximum journal impact factor of the abroad period publications, while the HI(Y4 – Y6) dummy compares the maximum journal impact factor of the publications during the second 3-year post-return period to that of abroad period publications. We also proposed the RECOVERY_HI variable to measure how many years it takes returnee scholars to first publish in an international journal with an impact factor not lower than the maximum journal impact factor of the abroad period publications.

Overall, a quicker recovery in post-return research impact represents a better reintegration process. That is to say, after returnee scholar return, the faster they are able to deliver research of at least the same impact as that which they achieved during their time abroad, the more likely they are to have a successful reintegration process.

4.2 Defining the amount of transnational capital

Transnational capital, obtained by scholars during the period of overseas study and work, is the essential reason why returnee scholars have in many aspects been of greater value than local scholars without any overseas experience (Rosen and Zweig 2004; Zweig et al. 2004). The amount of transnational capital is usually determined by the length and quality of overseas experience (Jonkers and Tijssen 2008). In our study, three variables have been proposed to measure the amount of transnational capital which each scholar accumulated during the abroad period.

First, building on the basis of the three categories (established scholars, recent PhD graduates, and postdoctoral fellows) suggested by Chen (2016: 51), we have distinguished four groups of returnee scholars—PhD returnees, post-doc returnees, junior faculty returnees, and senior faculty returnees. Senior faculty returnees refer to established returnee scholars who have obtained high academic positions of at least associate professor or equivalent during their time abroad. Junior faculty returnees refer to returnee scholars who used to work at foreign universities as junior faculty. PhD returnees and post-doc returnees refer to scholars who return immediately after the completion of a foreign PhD and post-doctoral training, respectively. Generally speaking, established returnee scholars accumulated more transnational capital than the other scholars. The variable SENIOR is used to describe whether a returnee is an established returnee scholar.

Second, we employ the variable IMPACT to measure the research impact achieved by scholars when they are abroad. The average journal impact factors of international publications in which returnee scholars report foreign affiliations are used to calculate this variable. We assume that scholars achieving higher research impact while abroad have accumulated more transnational capital than other scholars.

Lastly, the third variable DURATION describes the duration of overseas experience. Instead of CV data, we used the elapsed time between the first and the last publications reporting foreign affiliations to calculate the duration. To be specific, if scholars have not produced any international publications during their time abroad, their duration of overseas experience is considered to be zero in our study. Publication years are more appropriate for measuring scholars' pre-return research capacity. Scholars with a longer history of international publications while they are abroad are likely to obtain more transnational capital (Li et al. 2013).

In addition, we included the quality and destination of international mobility as complementary measures of transnational capital. Several studies have suggested that attending elite universities helps accumulate social and cultural capital (Hall 2011; Wang et al. 2015). Therefore, we developed the RANK variable to represent the prestige of foreign institutions where scholars studied or worked during their abroad period. Furthermore, different training systems and cultural contexts make the host countries of international mobility another potential factor in the accumulation of transnational capital (Jonkers and Tijssen 2008; Ynalvez and Shrum 2011). So, we also introduced DESTINATION measures, which consist of three dummies determining whether scholars have overseas experience in the Asia-Pacific region, in North America, or in Europe, respectively.

4.3 Hypotheses

Who have a more successful reintegration process, returnees with more transnational capital, or those with less transnational capital? Before embarking on this line of investigation, we should consider that there may be contradicting answers to this central question.

On the one hand, as most Chinese universities and institutions value transnational capital, returnees with more transnational capital are usually given more resources and support by domestic receiving institutes. Also, these returnees often have greater autonomy in research activities (Chen 2016: 47), and some of them assume leadership in a research team. Therefore, with more transnational capital, returnees tend to have a better chance of a smooth transition from a foreign country to a home country, and thus go through a more successful reintegration process.

On the other hand, the amount of transnational capital gained by overseas scholars is largely determined by the length of overseas experience (Jonkers and Tijssen 2008; Zweig et al. 2004). But the longer scholars stay abroad, the more unfamiliar with domestic culture and environment they become. Accordingly, the risk of uncertainty in the reintegration process increases when a scholar with more transnational capital through longer years overseas decides to return.

However, we are more inclined to look on the bright sight, and suppose that the amount of transnational capital possessed by returnee scholars before their return has a positive impact on the reintegration process after their return. According to three measures of transnational capital and three sets of indicators describing a successful reintegration process, we propose three groups of hypotheses to examine whether larger amounts of transnational capital lead to a successful reintegration process. To sum up, Table 3 presents an overview of the hypotheses underlying the empirical analysis.

Some other factors which may disturb the impact of transnational capital on returnee scholar performance are included as controlling variables.

First, we introduced a TRANSITION dummy to measure whether a returnee scholar has a transition period before returning. A transition period is a particular period when scholars are affiliated to both domestic institutions and foreign institutions. Transition periods may act as a buffer between pre-return and post-return periods, and allow returnees to prepare for a better reintegration process.

Second, we included some institutional factors which may also be relevant in predicting returnee scholars' post-return performance. The STATUS of domestic hosting institutions is proposed to describe the quality of the domestic institutions where scholars

Table 3. Overview of hypotheses.

Measures of a successful reintegration process	Scholars with larger amount of transnational capital		
	Established returnee scholars	Higher overseas research impact	Longer duration of overseas experience
Smaller chance of having a gap period	H1a	H2a	H3a
Greater chance of achieving higher research impact			
First three years after return	H1b	H2b	H3b
Second three years after return	H1c	H2c	H3c
Quicker recovery in average research impact	H1d	H2d	H3d
Greater chance of publishing in higher impact journals			
First three years after return	H1e	H2e	H3e
Second three years after return	H1f	H2f	H3f
Quicker recovery in high impact research	H1g	H2g	H3g

first returned to work. The nine original universities sponsored by Project 985 (referred to as C9 universities) are used to represent the most distinguished universities in China (Zong and Zhang 2017). The CONNECTION dummy is proposed to measure whether a scholar returns to work at the same domestic institution as the one where (s)he worked before going abroad. Returning to such a domestic institution helps returnee scholars to build local connections in a short time, which proves to be important in the career advancement of returnees (Chen 2016: 53; Li et al. 2015).

Third, the interactions between research collaboration, production and impact have been perennial topics in research policy (Lee and Bozeman 2005; Li et al. 2013). When we study returnee scholars' post-return performance in academic research, the effects of research collaboration and production cannot be neglected. As a result, we included the AUTHORS variable to measure the average number of collaborators scholars have during the post-return period. Meanwhile, the annual PRODUCTION of international publication during the post-return period is also included as a control variable.

Lastly, we also included some commonly used factors (such as GENDER, AGE, and FIELDS) in this study to control the effects of personal characteristics.

4.4 Descriptive analysis

Table 4 presents the descriptive statistics of each variable. The statistics of dependent variables show a general picture of how returnee scholars behave in the reintegration process. In particular, 27.5 per cent of returnees (55 out of 200) appear to have gap periods, showing that a large proportion of returnees do not stop publishing in international journals regardless of an international move. As evidenced by the AI dummies, only 32.4 per cent of returnees (57 out of 176) achieved higher average research impact in the first 3-year post-return period than that achieved during the abroad period. When comparing the average research qualities of the second 3-year post-return period and the abroad period, the percentage of returnees with higher impact rises slightly to 38.3 per cent. Similarly, the HI dummies indicate that in the first 3 years and second 3 years after return only 33.5 per cent and 42.0 per cent of returnees, respectively, were able to publish in as high-impact journals as during the abroad period. Evidently, most returnees suffer a reduction in

research impact during the preliminary years after return. According to the mean of the RECOVERY_AI variable, most returnees need more than five overlapping 3-year periods to recover from the post-return decline in average research impact. The mean of the RECOVERY_HI variable also indicates that returnees took on average 5.9 years to publish in journals with the impact of those as they published in when they were abroad.

We have a few independent and controlling variables which capture the dynamics of transnational capital. Among the 214 returnee scholars, 68 obtained senior faculty positions in foreign institutions. The average journal impact factor of returnee abroad period publications is 4.2 per publication. Meanwhile, the average duration of returnee scholar abroad periods, measured using publications in which returnees reported foreign affiliations, is 5.7 years. Scholars who went abroad to study and work in the most prestigious foreign universities are supposed to obtain more transnational capital. In our sample, more than half (122 out of 214) of the total returnees reported full-time overseas experience with at least one of the world's top 100 universities. With regard to location, 22.9 per cent of returnee scholars had overseas experiences in the Asia-Pacific region, 54.2 per cent in North America, and 46.7 per cent in Europe.

Some other variables are also worth mentioning. Scholars in our sample returned at an average age of 38.3, which is a very productive age in a scholar's academic career. In all, 53.3 per cent of scholars appear to have had transition periods before returning, which is good for ensuring a successful reintegration. About half of scholars returned to work at the same domestic institution they left, implying that the relationship between returnees and domestic hosting institutions cannot simply be neglected when considering their post-return performance. Also, only twenty scholars in our sample were female, indicating an uneven distribution of returnee scholars in terms of gender.

5. Results

5.1 Testing hypotheses

To test the hypotheses developed in Section 4.3, we adopted two sets of regressions to probe the potential factors influencing returnee scholar performance in the reintegration process. First, pooled logistic regressions with robust standard errors are applied to test the impact of transnational capital on the gap period, AI and HI dummies. Secondly, Cox regressions are run to assess the impact of transnational capital on the duration of recovery from the reduction of post-return research impact (measured by the RECOVERY_AI and RECOVERY_HI variables). Along with regression analysis, we also checked the interactions among independent variables and no multicollinearity was detected. For logistic regressions, a few more tests were run and the results indicated no problems with model specification.

Model 1 of Table 5 presents logistic estimates for different impacting factors on the probability of returnee scholars having a gap period between the abroad period and post-return period. The results provide support for Hypothesis 3a—that returnee scholars with longer durations of overseas experience appear to have a smaller chance of suffering gap periods. The odds ratio of the DURATION variable indicates that each unit increase in the duration leads to a 29.5 per cent reduction in the chance of having a gap period. However, both Hypotheses 1a and 2a are rejected. Being an established returnee scholar (or senior faculty returnee) and achieving higher overseas research impact increase the probability of having gap periods. According to the odds ratios, the chance

Table 4. Descriptive statistics.

Variable	Description	Observations	Mean	SD	Minimum	Maximum
Dependent variables						
GAP_PERIOD	Dummy. 1 if has a gap period; 0 otherwise.	200	0.275	0.448	0	1
AI(Y1 – Y3)	Dummy. 1 if the average research impact during the first 3-year post-return period is higher than that during the abroad period; 0 otherwise.	176	0.324	0.469	0	1
AI(Y4 – Y6)	Dummy. 1 if the average research impact during the second 3-year post-return period is higher than that during the abroad period; 0 otherwise.	175	0.383	0.487	0	1
RECOVERY_AI	Count. Elapsed time between the first overlapping 3-year period with higher average research impact than that of the abroad period and the first year of the post-return period.	176	5.506	5.011	1	21
HI(Y1 – Y3)	Dummy. 1 if the highest journal impact factor of the first 3-year post-return publication is not lower than that of the abroad period publications; 0 otherwise.	176	0.335	0.473	0	1
HI(Y4 – Y6)	Dummy. 1 if the highest journal impact factor of the second 3-year post-return publication is not lower than that of the abroad period publications; 0 otherwise.	176	0.420	0.495	0	1
RECOVERY_HI1	Count. Elapsed time between the first year of publishing in journals with at least the same impact factor as the maximum journal impact factor achieved abroad and the first year of the post-return period.	176	5.949	5.144	1	22
Independent variables						
SENIOR	Dummy. 1 if senior faculty returnees; 0 otherwise.	214	0.318	0.467	0	1
IMPACT	Scale. Average journal impact factors of abroad period publications.	214	4.226	4.195	0	20.365
DURATION	Count. Length of abroad period.	214	5.729	4.961	0	21
Controlling variables						
RANK	Nominal. According to the ARWU Rankings 20162, 1 if the foreign university is among the top 100; 2 if ranks between 101 and 200; 3 if ranks between 201 and 300; 4 otherwise.	214	1.949	1.227	1	4
ASIA_PACIFIC	Dummy. 1 if has overseas experience in Asia-Pacific region; 0 otherwise.	214	0.229	0.421	0	1
NORTH_AMERICA	Dummy. 1 if has overseas experience in North America; 0 otherwise.	214	0.542	0.499	0	1
EUROPE	Dummy. 1 if has overseas experience in Europe; 0 otherwise.	214	0.467	0.500	0	1
AGE	Count. Age upon the first year of the post-return period.	214	38.308	4.981	28	55
TRANSITION	Dummy. 1 if has a transition period before returning; 0 otherwise.	214	0.533	0.500	0	1
STATUS	Dummy. 1 if C9 university; 0 otherwise.	214	0.519	0.501	0	1
CONNECTION	Dummy. 1 if returning to work at the same institution scholar left to go abroad; 0 otherwise.	214	0.505	0.501	0	1
AUTHORS(Y1 – Y3)	Scale. Average number of authors per publication during the first three years of post-return periods.	214	5.085	3.372	1	32.500
AUTHORS(Y4 – Y6)	Scale. Average number of authors per publication during the second three years of post-return periods.	214	5.452	2.905	0	13.308
PRODUCTION(Y1 – Y3)	Scale. Annual production of international publications during the first 3 years of post-return periods.	214	7.874	6.259	1	35
PRODUCTION(Y4 – Y6)	Scale. Annual production of international publications during the second 3 years of post-return periods.	214	15.710	13.782	0	82
GENDER	Dummy. 1 if male; 0 otherwise.	214	0.911	0.285	0	1
FIELDS	Nominal. 1 if mathematics; 2 if physics; 3 if earth and environmental sciences; 4 if life sciences.	214	2.565	1.148	1	4

Notes: Both the RECOVERY_AI and RECOVERY_HI variables are compiled to meet the requirements of survival analysis. If returnee scholars fail to surpass their abroad period research impact by the end of 2015, their total duration of the post-return period is used to calculate both variables. Meanwhile, these returnees are considered censored data in the following analysis.

We only considered the rankings of the best foreign universities where returnees report full-time experience. The ranking result is retrieved from <http://www.shanghairanking.com/ARWU2016.html>.

Table 5. Results from logistic regressions.

	Model 1 DV: GAP_PERIOD	Model 2 DV: AI(Y1 – Y3)	Model 3 DV: AI(Y4 – Y6)	Model 4 DV: HI(Y1 – Y3)	Model 5 DV: HI(Y4 – Y6)
SENIOR	2.777* (1.657)	0.464 (0.232)	0.526 (0.269)	0.400* (0.217)	1.037 (0.466)
IMPACT	1.149** (0.070)	0.721*** (0.079)	0.657*** (0.093)	0.839*** (0.050)	0.834*** (0.051)
DURATION	0.705*** (0.059)	1.007 (0.057)	1.080 (0.067)	0.958 (0.055)	0.910* (0.049)
AGE	1.207*** (0.057)	0.966 (0.047)	0.929 (0.047)	0.940 (0.046)	0.949 (0.046)
CONNECTION	0.360** (0.168)	0.956 (0.383)	1.262 (0.479)	0.718 (0.268)	1.496 (0.532)
TRANSITION	0.083*** (0.048)	1.568 (0.636)	1.008 (0.392)	2.549** (0.975)	1.151 (0.419)
AUTHORS(Y1 – Y3)		1.402*** (0.111)			
PRODUCTION(Y1 – Y3)		0.939** (0.029)			
AUTHORS(Y4 – Y6)			1.176** (0.090)		
PRODUCTION(Y4 – Y6)			1.003 (0.016)		
RANK					
101–200	0.222** (0.130)	5.442*** (3.536)	7.121*** (4.977)	2.422 (1.557)	1.909 (1.139)
201–300	0.793 (0.611)	1.478 (0.961)	0.383 (0.258)	1.287 (0.850)	1.035 (0.688)
Others	0.241** (0.157)	1.169 (0.626)	1.157 (0.609)	0.702 (0.395)	0.578 (0.309)
ASIA_PACIFIC	0.899 (0.636)	0.611 (0.330)	0.743 (0.398)	0.814 (0.447)	1.621 (0.880)
EUROPE	1.675 (1.007)	0.437 (0.242)	1.109 (0.571)	0.754 (0.388)	2.182* (0.983)
NORTH_AMERICA	0.899 (0.554)	0.465 (0.288)	0.963 (0.555)	0.753 (0.451)	1.620 (0.871)
STATUS	0.537 (0.242)	0.682 (0.265)	1.028 (0.389)	0.449* (0.186)	0.793 (0.287)
GENDER	0.312* (0.187)	0.547 (0.401)	0.241 (0.216)	0.154** (0.135)	0.245** (0.163)
FIELDS					
PHY	0.451 (0.322)	1.272 (0.753)	1.171 (0.639)	8.313*** (5.234)	2.406 (1.315)
EES	1.070 (0.664)	1.400 (0.988)	1.155 (0.754)	4.796** (3.503)	1.152 (0.701)
LIFE	0.230** (0.152)	1.026 (0.774)	2.375 (1.852)	1.861 (1.321)	1.157 (0.669)
CONSTANT	0.035* (0.064)	7.590 (15.187)	36.977* (74.493)	50.289* (101.487)	25.452* (47.945)
N	200	176	175	176	176
PSEUDO R2	0.359	0.226	0.238	0.258	0.171

Notes: DV, dependent variable; quantities are odds ratios; quantities in bracket are robust standard errors; the reference group for RANK is top 100 universities; the reference group for FIELDS is MATH (mathematics).

*P < 0.10, **P < 0.05, ***P < 0.01.

of senior faculty returnees having a gap period is 1.8 times higher than that of other returnees. Meanwhile, each unit increase in the average research impact of abroad period publications causes a 14.9 per cent increase in the chance of having a gap period. Besides this, the probability of having a gap period is much smaller for scholars who return at younger ages, and also for those who have transition periods and those who return to their former domestic institutions. Interestingly, our results also reveal that returnee scholars with overseas experience in lower-ranked universities are less likely to have a gap period than those who went to one of the top 100 universities.

Models 2 and 3 of Table 5 examine the effect on the AI dummies—specifically whether the average research impact in the initial years of the post-return period is higher than that in the abroad period. Unlike Model 1, we included two additional post-return factors (AUTHORS and PRODUCTION) in the new logistic models. Although Models 2 and 3 analyzed the research performance at different phases of the post-return period, both models delivered similar results. One unexpected result is that the overseas research impact has a significant negative impact on the probability of post-return research impact surpassing overseas research impact, which is the opposite of both Hypotheses 2b and 2c. The odds ratios indicate that each unit increase in the overseas research impact leads to a 27.9/34.3 per cent decrease in the odds of the first/second 3-year post-return research impact surpassing overseas research impact. In both models, the SENIOR variable reports insignificant odds ratios with values < 1, indicating that the post-return research impact of senior faculty returnees is less likely to exceed overseas research impact when compared to other returnees. Since such difference is not statistically significant,

the result cannot support both Hypotheses 1b and 1c. Similarly, with odds ratios slightly > 1 in both models, longer duration of overseas experiences may lead to a higher probability of post-return research impact surpassing overseas research impact. However, due to insignificant statistics, our results cannot provide support for both Hypotheses 3b and 3c. In addition, research collaboration is significant in predicting post-return research impact. With more collaborators (measured by authors per publication), returnee scholars tend to have a better chance of having higher research impact during the first and second 3-year post-return periods than the research achieved abroad. In contrast, research production has a negative effect on the average dummy of the first 3-year post-return period. Returnee scholars with higher research production during the first 3 years after return are less likely to achieve higher research impact in the same period than the overseas research impact. The effect of research production becomes insignificant in the second 3-year post-return period.

Models 4 and 5 of Table 5 illustrate the post-return performance of returnee scholars in high-impact publications. During the first 3 years after return (see Model 4), both the SENIOR and IMPACT variables have a negative effect on the HI dummy. As evidenced by odds ratios, the probability of senior faculty returnees publishing in high-impact journals with at least the same journal impact factor as their abroad period publications is 60 per cent lower than that of other returnees. Meanwhile, each unit increase in overseas research impact leads to a 16.1 per cent decrease in the probability of the highest journal impact factor of post-return publications exceeding that of abroad period publications. Therefore, both Hypotheses 1e and 2e are rejected. Given the insignificant odds ratio for the

DURATION variable in Model 4, we failed to provide support for Hypothesis 3e. Furthermore, the TRANSITION variable appears to be a strong predictor. Returnee scholars with transition periods are more likely to publish in as high-impact journals as they did when abroad.

Model 5 exhibits slightly different results. Similarly to Model 4, returnee scholars' overseas research impact is also a significant but negative predictor of the second 3-year post-return performance in high-impact publications, which leads to a rejection of Hypothesis 2f. Another significant factor is the duration of overseas experiences. Contrary to Hypothesis 3f, the result indicates that, with a longer duration of overseas experience, returnee scholars are less likely to publish in high-impact journals with at least the same journal impact factor as their abroad period publications. Although the odds ratio of the SENIOR variable turns out to be insignificant, the value rises from <1 in Model 4 to slightly >1 in Model 5, implying that senior faculty returnees' post-return performance has reversed. During the second 3 years, senior faculty returnees seem to outperform other returnees in publishing in high-impact journals. Again, since the effect is insignificant, Hypothesis 1f is unsupported.

To further examine how returnee scholars perform in terms of speed of recovery from research impact reduction caused by return mobility, we applied Cox proportional hazard regressions to the variables RECOVERY_AI and RECOVERY_HI. As shown in Table 6, Models 6 and 7 presented similar results. The variables SENIOR and IMPACT appear to be significant in both models, and their effects are similar. According to the hazard ratios, senior faculty returnees are less likely to recover from research impact reduction than other returnees. Meanwhile, overseas research impact also has a negative effect on the rate of recovery. Taking Model 6 as an example, the results demonstrate that the probability of senior faculty returnees' recovery from impact reduction is 38.5 per cent lower than that of other returnees, while each unit increase in overseas research impact leads to a 19.7 per cent decrease in the rate of recovery. These results also imply that returnee scholars with senior positions in foreign institutions and those who achieved higher research impact abroad tend to have a slow recovery from research impact reduction. Unfortunately, the negative effects of both variables have been enlarged in Model 7. It becomes even harder for senior faculty returnees and for returnees who achieved high overseas research impact to publish in journals with at least the same impact factor as the HI journals published in while they were abroad. Consequently, another four hypotheses (Hypotheses H1d, H2d, H1g and H2g) are rejected.

The duration of overseas experience presents different effects in Models 6 and 7. A longer duration of overseas experience reduces the rate of recovery measured by average research impact, which, in other words, leads to a slower recovery from research impact reduction. However, when using the highest research impact to measure the RECOVERY dummy, the duration becomes insignificant, with a hazard ratio value larger than 1. It seems that the duration of overseas experience has a positive effect on accelerating recovery in high-impact research, although the effect is not significant. Based on these results, we reject Hypothesis H3d, while Hypothesis H3g cannot be supported either. As for the effects of controlling variables, it is interesting to see that returnee scholars with a transition period appear to have a quicker recovery in average research impact.

5.2 Examining the changing dynamics of research impact

In this section, a repeated-measures analysis of variance (rANOVA) followed by predicted marginal means is proposed to test the

Table 6. Results from Cox regressions.

	Model 6 DV: RECOVERY_AI		Model 7 DV: RECOVERY_HI	
	Hazard ratio	Robust standard error	Hazard ratio	Robust standard error
SENIOR	0.615**	0.133	0.553***	0.114
IMPACT	0.803***	0.037	0.759***	0.051
DURATION	0.924***	0.020	1.039	0.026
AGE	1.008	0.021	0.974	0.020
CONNECTION	1.006	0.160	1.062	0.158
TRANSITION	1.302*	0.203	1.036	0.152
RANK				
101–200	1.477*	0.289	1.352	0.254
201–300	0.886	0.240	0.651	0.200
Others	0.899	0.205	0.893	0.199
ASIA_PACIFIC	1.149	0.218	1.270	0.272
EUROPE	1.128	0.222	1.151	0.228
NORTH_AMERICA	0.963	0.222	0.925	0.210
STATUS	1.045	0.170	1.163	0.175
GENDER	0.485**	0.153	0.610**	0.150
FIELDS				
PHY	2.038***	0.462	2.498***	0.619
EES	1.586	0.449	2.517***	0.798
LIFE	2.233***	0.590	4.256***	1.375
N	176		176	
Number of failures	131		120	

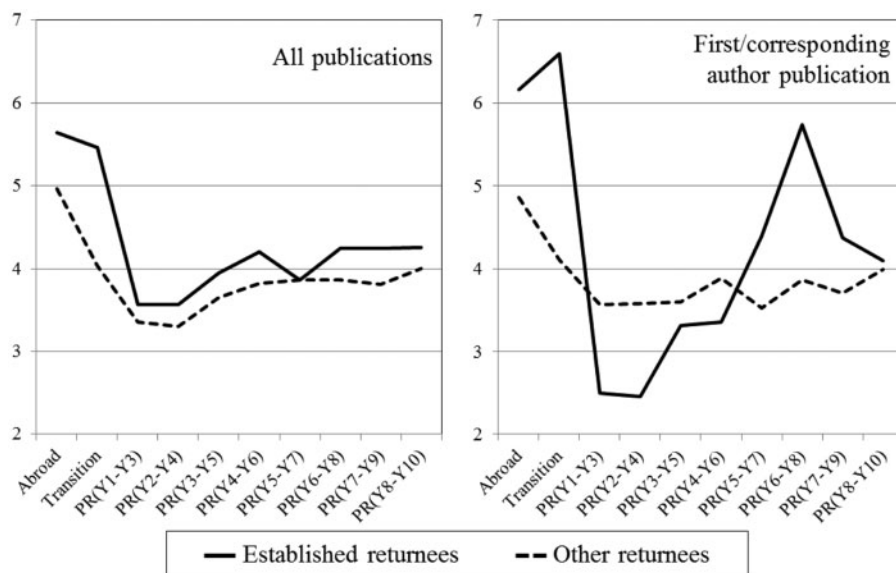
Notes: DV, dependent variable; the reference group for RANK is top 100 universities; the reference group for FIELDS is MATH (mathematics).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

changing dynamics of research impact upon scholar return. Firstly, we divide the whole post-return period into eight successive overlapping 3-year subperiods. Together with the abroad period and transition period, we compiled each scholar's career publications into ten consecutive time periods. Then, we calculated the average journal impact factor per publication to get the average research impact for each time period, which was later included as a within-subjects factor. Finally, to examine how different groups of returnees behave in terms of change of research impact over periods, we included the SENIOR dummy as a between-subjects factor. In order to examine returnee scholars' major contribution publications, we repeated the steps above to analyze the changing research impact of their first/corresponding author publications.

The rANOVA gave similar results when performed on all publications and first/corresponding author publications alone. Taking the analysis of all publications as an example, the results showed that returnee scholars' research impact was significantly affected by time periods— $F(3.67, 282.26) = 5.75, P < 0.01$. We can, therefore, conclude that there was a significant difference in research impact among the five periods. The between-subjects effect of SENIOR is insignificant— $F(1, 77) = 0.84, P > 0.1$ —indicating that there is no significant difference between senior faculty returnees and other returnees in the changing patterns of research impact. By predicting marginal means, we are able to get a straightforward view of how research impact changes over periods and how returnees differ in the changing patterns.

As demonstrated in Figure 1, both groups of returnee scholars suffer great decreases in average research impact from the abroad period to the initial years of the post-return period. Although senior



Note: PR(Y1-Y3) indicates the first three years of the post-return period.

Figure 1. Estimated marginal means of average research impact over periods.

faculty returnees achieved higher research impact during the abroad period, they suffered a sharper decline in research impact in the first 3 years after return. In particular, senior faculty returnees displayed the greatest decrease in average research impact of first/corresponding author publications. The impact of senior returnees' first/corresponding author publications even falls behind that of other returnees' first/corresponding author publications in the initial years of the post-return period. Both groups of returnees are found to display lower impact during the first and second overlapping 3-year periods after return. The research impact of returnees begins to climb during the 3–5 years of the post-return period, and reaches a first peak during the 4–7 years of the post-return period. When we look at the changing patterns of AI of first/corresponding author publications, established returnees appear to have a later, but higher, peak during the 6–8 years of the post-return period. Unfortunately, both groups of returnees fail to match the overseas research impact before the last observed period.

6. Discussion and conclusion

Knowing that due to reintegration issues, return migration may lead to a short-term decrease in scholar research performance (Li et al. 2015), our study has further tested how different types of returnee scholars—measured by the amount of transnational capital accumulated via overseas experiences—behave in the reintegration process. According to the results of several regression analyses, our main hypothesis that returnee scholars with larger amounts of transnational capital tend to have a successful reintegration process after their return is not substantiated. In most instances, returnee scholars with more transnational capital are more likely to have reintegration issues. Our contribution lies in the implementation of new measures to evaluate returnee scholar post-return performance. Unlike in existing literature, we focused on the evaluation of returnee scholar performance differentials between pre-return periods and post-return periods, and all measures were developed from the perspective of university administrators. Furthermore, we made a

methodological contribution by combining both CV and publication data to form a unique and reliable data source, which enables the use of author affiliations in tracking researchers' return mobility. Some limitations should also be acknowledged. Our sample was selected from top-level scholars recruited by the CJS Program. The return year of scholars covered a wide range from 1987 to 2013, making it difficult to control the effect of return years. It would have been a better sample if we had used scholars who returned within a smaller time period. In general, the most important findings are summarized as follows.

Regardless of the types of returnee scholars, we found that return migration may have longer-term impacts on returnee scholars' post-return research impact. When compared to their overseas research impact, returnees suffer a drastic decrease in research impact during the initial years upon return. Although a recovery of research impact was found in later years of the post-return period, the overall research impact during the decade after return failed to reach the research impact returnee scholars achieved abroad.

We also identified the groups of returnee scholars who tended to have reintegration issues. First, established returnee scholars appear to face difficulties. They are more likely to have a gap period upon return, and they also tend to have a slower recovery in post-return research impact. Second, the performance of returnee scholars with higher overseas research impact in the reintegration process is contrary to the hypotheses. They not only have a larger chance of experiencing a gap period and research impact reduction during the first 6 years upon return, but also have a slower recovery of research impact during the overall post-return period. Third, the duration of overseas experiences presents mixed results. On the one hand, a longer duration of overseas experience reduces a returnee scholar's chance of having a gap period. On the other, a longer duration may also lead to a slower recovery of research impact.

From a policy standpoint, this study has raised concerns about the post-return performance of established returnee scholars. Established returnee scholars, having received tenure at a foreign institute, are mostly top-level scholars who Chinese universities are competing for. Upon return, they are given more autonomy and

independence in research activities than junior faculty returnees and new graduates (Chen 2016: 70), and they are also granted more academic resources (Chen 2016: 79). However, it seems that Chinese universities' high-input strategy in recruiting established overseas scholars does not pay off. The outcomes of return migration appear worse for established scholars than for other returnees. Established scholars have a higher probability of facing a gap period and slower recovery of research impact. Clearly, the challenges facing established returnee scholars in reintegration are far more serious than expected. Their requirements for an adjustment period to readapt to the domestic environment are greater than other groups of returnee scholars'. Therefore, we suggest that Chinese universities provide established overseas scholars with more flexible contracts. Instead of asking them to return immediately as full-time faculty, Chinese universities could offer them a buffer period, whereby, they begin with a part-time position and have the freedom to decide when to make a full-time return. As shown in our results, such a buffer period is helpful for reducing the chance of having a gap period.

Another policy suggestion is to extend the evaluation period for returnee scholars in the initial years of their return. Some Chinese universities have created a dual-track system where returnee scholars are placed into an American-style tenure-track system or principal investigator system, while locally trained scholars are placed into the regular system (Lu and McInerney 2016; Xu 2009). Although the new tenure-track system allows a probation period of 6 years for junior faculty to get tenured, most Chinese universities are still using annual faculty evaluation combined with regular tenure evaluation. That is to say, most returnee scholars have to be evaluated both every year for annual evaluation and every 3 years for tenure evaluation. Our study gives undeniable results that returnee scholars suffer great decreases in research impact in the initial years after return. Most groups of returnees do not have a noticeable improvement in research impact until 3–5 years of the post-return period. Therefore, we recommend that Chinese universities extend the evaluation period for new returnees to 4–5 years, and also help them relieve the stress of annual evaluation.

It is also important for Chinese universities to reassess their recruitment policies. While focusing on bringing back established scholars with a high research profile, universities should pay more attention to early-career scholars with high potential, and balance the distribution of resources between established and early-career scholars (Chen and Li 2013). Crucially, building a healthy academic culture which consistently supports returnee scholars in conducting high-impact research is far more important than who is brought back.

Notes

1. These scholars were identified after we collected and analyzed the scholars' publication data. Some scholars had very low productivity in international publication (less than one publication per year). Some others displayed no sign of overseas experience in their career publications as their affiliations were all Chinese affiliations, and this publication trend was consistent over the years. To make sure that every scholar had full-time overseas experience and their international publications were numerous enough for further analysis, we removed these scholars.
2. Not every scholar reported publication in their CVs, and in most instances, the publication lists shown in CVs were incomplete and irregularly updated. Therefore, the self-reported publication list of CVs can only be used as a supplementary data source.

3. According to CV data, 175 research articles were recognized as outcomes of temporary overseas experience, which only accounts for 0.6 per cent of total publications. All this temporary overseas experience occurred after scholar return.

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