China's Brain Gain at the High End: An Assessment of Thousand Youth Talents Program[1]

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Abstract   While studies have viewed the effect of Chinese talent-attracting programs launched by government since reform and open door policy, little of them has assessed these programs empirically and pertinently. This article intends to assess an important program - the Thousand Youth Talents Program (TYTP). Frist, this paper proposed a transnational migration matrix of the academics to clarify the dynamic mechanism of academic brain gain at the high end. Then, the Kaplan-Meier analysis and Cox regression model are used to empirically analyze the policy effect of TYTP. The results show that, academic ability have double edged impacts on brain gain at the high end, some scholars whose last employer's academic ranking is world's Top100 have stronger willing to return, and the negative effect of academic ranking decreases with time passing; while scholars with a tenure-track position, a tenure position or a permanent position tend to stay overseas, and the hazard rate of staying increases with age. The older scholars have more intentions to go back China, while gender was not a significant factor influencing academic return at the high end. That is, the talent-attracting programs has partly succeeded in bringing back the academics at the high end.

Keywords   Brain gain, government policy, talent-attracting programs, academic ability, survival analysis

I. Introduction

   In this knowledge-economy era, knowledge and skills are the most important resource on which nation states rely for their economic development, and highly skilled individuals, recognized as "carriers" of knowledge, are the priority resource countries around the world competing for (Pan, 2010; Trippl, 2010). Therefore, brain drain and brain gain is a very significant issue for policymakers and scholars, due to there are significant economic benefits of

brain cycle both for the migrants themselves and those who remain in the country of origin.

Actually, the international mobility of high skilled talents has been widely discussed by researchers and policy makers since 1960s when a large number of British scholars migrated to America (Baruffaldi, 2012). How to attract and remain on high skilled talent is a big policy issue for both developed and less-developed countries (Cervantes, 2002). Less-developed countries face severe challenges of brain drain, and try to narrow the S&T and economic gap with developed countries by brain gain. Meanwhile, developed countries are worried about the reverse flow, as the rate of scholars who return to their original countries began to rise since the 1990s (Pan, 2010; Coe and Bunnell, 2003).

In the case of China, since the reform and opening-up policy, in order to narrow S&T and the economic gap with developed countries, China's governments have invested a great deal of time, energy and capital in encouraging overseas academics and entrepreneurs to return for many years (Zweig, 2006). China has gradually established a national financial aid system for high-end talents from overseas through the One Hundred Talents Programme sponsored by the Chinese Academy of Sciences (CAS), the Distinguished Young Scholars Programme sponsored by the National Natural Science Foundation of China (NSFC), Chunhui Programme and Cheung Kong Scholar Programme sponsored by the Ministry of Education (MOE) and so on.

When international financial crisis happened in 2008, Shi Yigong, a Chinese top biophysicist, took off his permanent positions at Princeton University and led the School of Life Science at Tsinghua University. At that time, the Chinese government announced a nationwide plan-Thousand Talents Programs that promises top salaries and attractive funding to elite researchers who are working overseas and willing to return to China. Shi's return and China's action have aroused widespread international attention, even become a hot topic in *Science* and *Nature* (Qiu, 2009; Xin, 2009, 2011). Actually, the effect of these talent-attracting programs is the attention focus of international community and policymakers.

Plenty of works have examined the policy effect of these talent-attracting programs. However, there is no agreement, and the existing research provides two different viewpoints. On the one hand, some scholars argued that China's talent-attracting program has attracted a large number of returnees. Wang and Guo (2012) found that, a total of 818,400 overseas-trained Chinese returned to China between 1978 and 2011. The number was increasing at an average annual rate of 13 percent average during the mid-to-late 1990s, and talent-attracting programs are surely playing a positive role (Zweig, 2006). According to the official statistics, the Thousand Talents Program (TTP), launched in 2008, has attracted some 2000 leading talents; while the TYTP,

launched in 2011, has attracted about 3000 excellent young oversea scholars to return to China since then[2].

On the other hand, scholars argued that these government policies have failed to attract first-rate academics to return. Cao (2008) argue that we cannot assume all non-returnee academics of Chinese-origin are the best and brightest, however there is little doubt that the best and the brightest have not returned. Tian (2013) has found that China only attracted a few emigrant scientists who graduated from top 200 universities in the world, meanwhile a majority of returnees are domestic scientists without foreign degrees acquired overseas experience by short-term working or visiting programs. Zweig and Wang (2013) also provide evidence, 73.5 percent of the candidates, who have excellent jobs overseas precisely because they are quite talented, didn't give up their overseas post. That is, such effort has not yet succeeded to get the very best Chinese academics return from overseas fulltime. China is experiencing a serious shortage of academics at the high-end, which presents a great challenge to its efforts to build an innovation-oriented country.

Indeed, neither of them are refined enough to verify the policy effect of these programs. First, it's rather hard to figure out that returnees who were recruited under talent-attracting programs are due to the favorable condition of these programs, and there are several reasons accounting for brain gain, and a part of young returnees selected in TYTP have a plan to return or had returned to China before applying for this program. Second, Chinese government failed to attract the academics return at the high end through these programs, however it doesn't mean that these programs don't work at all. Furthermore, the majority of previous findings were based on qualitative research through observation, in-depth interviews and case studies, and there has limited research try to quantify the policy effect of these programs empirically.

Providing academic talents as economic agents, this work develops a decision matrix of brain gain which provides new evidence to theoretical debate on how exactly academic ability and academic benefit play out in driving brain gain. The decision matrix shows that academics with high academic ability are less likely to return than academics with less academic ability due to the large salary disparity between the two countries. Thus, targeting the best academics, Chinese government provides high salaries and attractive funding to fill the benefits gap between China and overseas through the talent-attracting programs. This indicates that these programs are vindicated if academics with high academic ability are willing to return, or vice visa. To test our hypotheses, we use survival analysis to examine China's situation of brain gain, which accounts for right censoring and allows us to

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[2] The statistical results are calculated by the data from 1000plan website.
http:/ /www.1000plan.org//

examine the probability of return or stay taking academic ability into consideration.

The rest of this paper is organized as follows. The next section gives a review of theories, based on which we develop a transnational migration matrix of the academics and formulate our core hypotheses; the following section we describe our sample, data and methods, then we test our hypothesis using CV data of the candidate of TYTP, and clarify the effect of the TYTP on attracting the academics at the high end; finally we conclude by discussing our findings and present avenues for future research.

II. Theoretical Background and Hypothesis

Traditional theories on international migration have offered theories and models to explain people migrate from different perspectives, especially across the borders of countries. Early studies concentrated on modeling the sending countries' labor markets, later more truly dynamic models of the brain drain focused on the motivation for human-capital accumulation (Commander et al., 2004). Based on the economic geography, there is another stream of literature concentrating on the balance of brain gain and brain drain. Although more recent works suggest migratory flows as "circulation" more than a one-way flow, there is still a "core-periphery" model, according which only a few receiving, core countries benefit from migration, and more sending, periphery countries receive negative welfare(Commander et al., 2004; Maier et al.,2001; Ackers, 2005).

Furthermore, it is possible that brain gain particularly academic return can be influenced by several factors (Baruffaldi and Landoni, 2012). For instance, education for children, and jobs for spouses, more important are the institutional factors, including political liberalization and freedom in doing research (Cao, 2008), research culture (Cao, 2008; Shi and Rao, 2010), vested interests, extant power structures, non-transparent decision making and a relatively stifling bureaucracy (Zweig and Wang, 2013). In the present article, we will consider two most important factors-academic ability and academics' benefit. One hand, the talent-attracting programs intend to attract returnees with high academic ability; the other hand, academics intend to be selected by these programs due to benefits. Brain gain happens if academic ability fit with benefits.

1. Academic Ability

Given a strong and positive selectivity in the skilled emigration has been observed by lots of works, how the scholars appraised depends on their academic ability (Kapur, 2010), so that scholars always attach importance to acquiring the knowledge (Morano-Foadi, 2005).

Dustmann (2010) explains migrations as decisions that respond where the return to human capital is highest, and found that some countries are learning centers where one can learn skills more effectively, including skills that are applicable to the home country. Searching for a bright career, individuals with a relatively higher endowment of the skill that is more highly rewarded in the home country are more likely to stay in the home country and those individuals with a relatively higher endowment of the skill that has a higher value in the host country are more likely to emigrate (Dustmann, 2010; Stark et al., 1997).

In addition, more chances are offered to talents with relatively high academic ability for the foreign academic markets are selective, and there is a positive relationship between the probability of overseas employment and the quality of education (Tian, 2013).

2. Academics' Benefit

Academic ability enables scholars to choose freely, and whether stay or return depends on the benefits the migrants get. A series of classical works depict migrants as economic agents that search for better economic or professional conditions abroad (Gaillard and Gaillard, 1997).

Existing literature focused on the economic determinants of migrations (Borjas, 1994; Baruffaldi and Landoni, 2012; Meyer, 2001). To maximize the economic return of their investments in education, that high-skill talents are likely to migrate if their earnings abroad exceed their earnings at home, also they are likely to remain abroad if the average wage in the foreign country is higher than their home country wage (Becker, 1964; Massey et al., 1993; Stark, 1997, 1998, 2004). Based on a large-scale multi-school revealed-preference survey of job preferences among US STEM PhD students and postdocs from China, Zeithammer and Kellogg (2013) argued that the reason that Chinese doctoral graduates chose to remain in the US is the large salary disparity between the two countries rather than other factors.

Besides the economic benefit, factors such as the institutional and academic environment, research facilities motivate researchers have been widely discussed (Thomas et al., 1984; Mahroum, 2000). Of them, institutional environment and living environment are highly regarded especially in the Chinese context. The opportunity costs in career development are relatively

too high for the returnees. Leaving for a long time, they need to start again and rebuilt professional and social networks that can help and support them (Cao, 2008). Also, migration is more complicated when the migration is related to family issues, including schooling for their children, housing.

3. A decision Matrix of Brain Gain

Considering existing theories and China's context, our research address the phenomenon of brain gain using a transnational migration matrix of academics. The migration decision of overseas academics depends on two dimensions- the level of academic ability and the level of academics' benefit (See Figure 1).
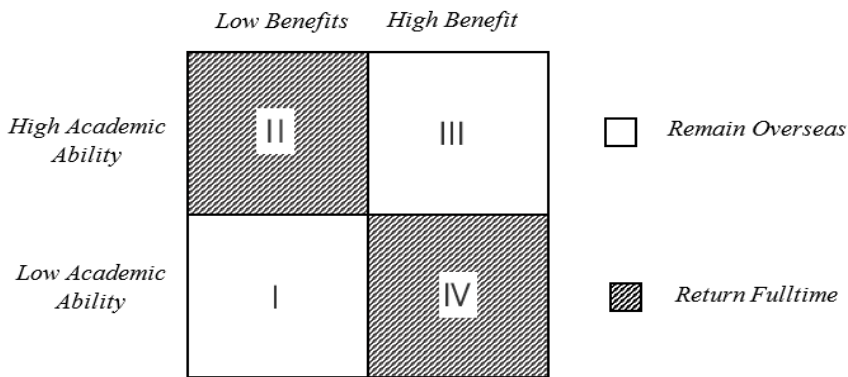
Figure 1 The decision matrix of brain gain in China

In terms of China's status, there are two important preconditions. First, most Chinese students will select the advanced countries of education and research when they study abroad, so oversea PhDs are worth more than domestic PhDs in the academic market. Second, these advanced countries of education and research have the higher level of economic development, and for academic jobs, the average wage in the host country is higher than the average wage in the home country. In this sense, our assumption is that the home country is a less-developed economy, and the host country is a developed economy. We assume academics are rational economic persons. As a kind of profession, they also pursue economic and academic benefit.

Based on the transnational migration matrix, (1) the academics with high ability have competitiveness in both oversea and domestic academic market, and they can enjoy a higher salary and academic reputation in the oversea academic market due to the more mature mechanism of academic evaluation relative to their home country. If the academics with high ability return to their

home country, they could acquire low benefit relative to remain the host county (see Quadrant II). If the academics with high ability remain in oversea, they could acquire high benefit relative to return to the home county (see Quadrant III) .

(2) The academics with low ability have less competitiveness in the oversea academic market, and it is difficult for them to get a dreaming position (tenure-track position) as well as a stable life and family. However, they could have a competitive advantage in the domestic market because there is a big gap of academic level between oversea and domestic academic market. Their oversea PhD, work experiences and research outcomes are high valuable for domestic institutions. If the academics with low ability return to their home country, they could acquire high benefit relative to remain oversea (see Quadrant IV). If the academics with low ability remain in oversea, they could acquire low benefit relative to return to the home county (see Quadrant I).

4. Chinese Context

Indeed, the oversea academic market enjoys a more selective market mechanism than China. The academic faculty with high academic ability, who have numerous options both at home and abroad, are relatively less likely to return as a result of low benefits. However, they may well depend upon whom they know rather than how they perform in China for it still a Guanxi based society(Cao, 2008; Stark et al., 1998; Zweig, 2013). In contrast, the academic faculty with low academic ability, who are already considered elites by virtue of their experiences abroad (Tai and Rory, 2015), prefer to return, in case of employers overseas know their real productivity and dismiss them.

Aiming to boost country's innovation capability, China is in desperate need of talent, especially those at the first rate (Cao, 2008). Targeting the best ones, the Chinese government has launched series of talent-attracting programs to compensate the benefit disparity and provide broader career possibilities as well. On the basis of the talent-attracting programs, candidates are guaranteed a relatively high salary and research and development funding, which, to some degree, cut the large salary disparity between China and overseas. On the other hand, these candidates can expect to gain the very best opportunities and positions in virtue of experiences abroad, advanced knowledge and skills as well as broad overseas social networks.

According to Cao and Suttmeier (2001) focusing on scientists who have received the Distinguished Young Scientist (DYS) award from NSFC, these programs do help the candidates in mastering the institutional environment for research, finding the resources and building research enterprises autonomously. However, the basic way to prove the effectiveness of the programs is the variance in the return decision of the academic with high academic ability,

otherwise, there is no necessity to offer special programs favorable to returnee scientists (Tian, 2013). We expect to observe the willing of academics to return do not vary in term of their level of academic ability any more, that is to say, the talent-attracting programs paly it's due role in narrowing the benefit gap and attracting the talents at the high end.

To summarize, our objective is to examine the effect of the talent-attracting programs by verifying if the academic ability is still a critical predictor distinguishing the returnees and stayers. In other words, if the program could attract returnees with high academic ability, it means that the policy works, or vice versa.

III. Methods and Data

1. Sample

Our study contributes to the existing debate by looking into whether there is a fit between overseas talent and the organization that attempts to recruit them and particularly analyzing the role of government's talent-attracting programs in the fit process, which is critical to understand academics migration.
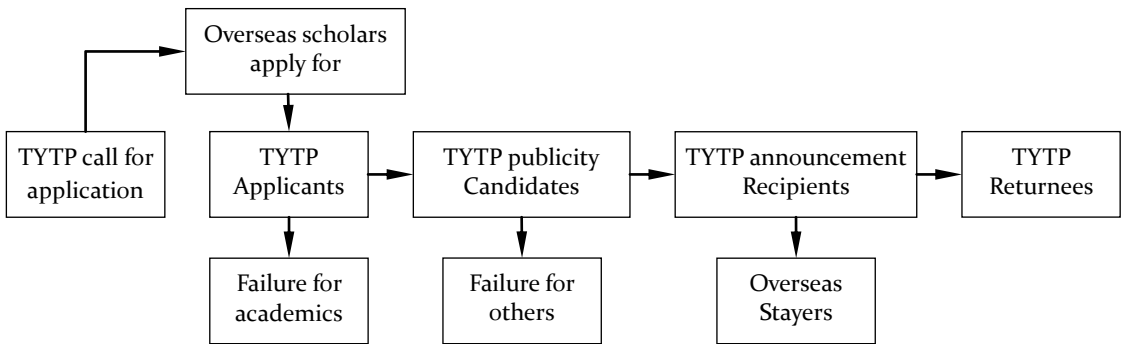
Figure 2 The process of TYTP selection

The selection of TYTP is a strict process (see Figure 2). TYTP organizer call for application first, then Young overseas scholars apply for this program based on domestic academic organizations called host employer. This indicates that applicants could accept the domestic political, economic and academic environment and have a firm plan to return. Next, through a strict peer review process, some applicants whose performance could reach the program's

requirements become candidates, while others fail to be selected in the program. And, the program organizer would publicize the list of candidates, and the public could inform the candidates' false information. Third, most of them would become the recipients of TYTP, and some fail to be selected in the program due to several other reasons such as academic misconduct. Finally, the program organizer would announce the list of recipients, most of TYTP recipients do return on the fulltime basis, become returnees, however some did not return to China, become stayers. Therefore, the group of TYTP scholars shows not only "who" wanted to return but also "who" China has gained.

According to the academic requirement of national programs, TTP and TYTP candidates are the brain gain at the high end, and TTP candidates should be full professors who are working overseas and willing to return to China. However, as a research sample, young returnees through TYTP have several advantages compared with that through TTP. First, scholars selected in the TYTP should return to the home country fulltime, however scholars selected in the TTP only need work 6-month in China or part time, although part of them return to the home country fulltime, such as Shi Yigong as mentioned above. In fact, most US universities would not allow tenured principal investigators to work part time for extended periods (Xin, 2009). TTP's 6-month requirement is not workable, some scholars only spent short periods in domestic employers, even never arrive. In this means, full time young returnees as a sample are more significance for policymaking.

Second, 1000plan website (http://www.1000plan.org/) has released TYTP candidates' basic information, which provides a possibility for quantitative research; relatively, the government agency has not released candidates' names selected in the TTP, although a dozen universities have publicized their awardees, thus it is not easy to get the complete information.

Third, some assistant or associate professors may have more potential than full professors, and the majority of TTP recipients had been recruited by previous incentive programs-such as Changjiang schorlars, which is difficult to know the effect of new programs.

2. Survival Analysis

Generally, the negative binomial regression has been widely adopted in high-skilled international migration research to quantify factors (Docquier et al., 2012; Baudassé, Bazillier, 2014). Although this approach suit well for studying migration for which data are often involving dummy variable and classified variable in the individual level, its application in TYTP recipients has been limited. Specifically, most of them choose to return fulltime, while there is still a few stayers which can not be analyzed by negative binomial regression. However, the censored data provides a good opportunity to answer

our question using survival analysis which has been widely adopted in social science research (Dobrev, 2005; Hsu et al., 2007).

Survival analysis is a branch of statistics that deals with the analysis of time duration until one or more events happen, such as international migration (Fang,2015). In particular, we use the Kaplan-Meier analysis and Cox's proportional hazards regression model (for short "Cox's model") in survival analysis to academic ability effect. At first, whether return to the home country is defined as a survival event, stay in oversea is defined as success or survival or 1, return to the home country is defined as failure or 0; the number of years between scholars receiving their Ph.D. and selected into TYTP is defined as the time duration or "lifetime".

The general equation of Cox's model is $h(t) = h_0(t)e^{\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_m x_m}$. Of them, $h(t)$ is the hazard rate of dependent variable- survival event, $h_0(t)$ is baseline hazard function-the time duration, $x_1, x_2, ..., x_m$ are hazard factor, $\beta_1, \beta_2, ..., \beta_m$ are regression coefficients. In order to explain the model clearly, the Cox's model is transformed into a general regression model:

$$\ln\left(h(t)/h_0(t)\right) = \beta_1 academic + \beta_2 gender + \beta_3 age + \beta_4 academic \times gender + \beta_5 academic \times age + \beta_6 control$$

Within the equation, academic ability is the primary independent variable, it's measured by scholars' academic position and last employer's academic ranking. Besides the academic ability variable, gender and age are two main independent variables, others are control variables. We present evidence for choosing these variables and the way measuring them in the following section.

3. Measures

Academic ability is an important determinant of academics international migration. On the one hand, scholars with strong academic ability will be easy to gain the position in the oversea academic market, and trend to stay in overseas. On the other hand, TYTP attempts to attract returnees with strong academic ability. Specifically, academic ability measured by a scholar's academic ability characterized by his/her position before returning and his/her last employer's academic reputation characterized by the academic ranking.

Generally, a tenure-track position, a tenure position or a permanent position ("a stable position" for short) is a sign of high academic ability for scholar obtain it through a long-term and rat race. If a scholar has gained a stable position, including Professor, Associate Professor and Assistant Professor in American Universities, Senior Investigator, Investigator in American national lab; Lecturer, Senior Lecturer, Reader, Professor in British Universities or equal permanent position; other permanent positions in Japan, Singapore and

Canada and other countries, his/her position is defined as 1; other positions are defined as 0.

According to Tian (2013), academic ranking can reflect the educational and academic level, and employers in universities with higher ranking are generally expected to have higher academic ability. If his/her last employer's academic ranking is world's Top100 in a specific subject field according to Academic Ranking of World Universities (ARWU)[3], the scholar's academic reputation is defined as 1; other rankings are defined as 0.

Obviously, gender and age are important demographic characteristics of the candidate. Gender: gender is a classification variable that usually expected to account for personal constraints that might affect men and women differently (Baruffaldi,2012), of which, male is defined as 1, and female is defined as 0. Age: Return propensities of migrants increase with the age at entry, but decrease with the number of years of residence (Dustmann, 1996), age is set as a continuous variable, which is defined as the gap between the year of birth and selected into the program. Moreover, we interact academic ability with gender and age separately to explain high-skilled international migration within different gender and age.

Our control variables include academic relations, the country of a PhD, the first batch of candidates and the classification of host employer. Academic relations: the presence of linkages with the country of origin might increase the probability of becoming aware of opportunities and make it easier to find an opportunity and necessary information and support (Ackers, 2005). The returnee's academic relationship measured by whether returnee works for his/her alma mater. If a scholar returns to the home country and works for his/her alma mater where he/she received his/her bachelor's degree or doctor's degree, his/her academic relation is defined as 1; if not defined as 0.

The classifications of host employer: Within the development system of education and research in China, the system of CAS differ with the high education system consisted of universities and colleges. Furthermore, the C9 League is an alliance of nine elite universities in mainland China, analogous to the Ivy League in the USA, the Russell Group in the UK. The members of the C9 League are Fudan University, Harbin Institute of Technology, Nanjing University, Peking University, Shanghai Jiao Tong University, Tsinghua University, University of Science and Technology of China (USTC), Xi'an Jiao Tong University, and Zhejiang University. Of them, Peking and Tsinghua are on the top of pyramid. The different classifications of host employer will provide different salary, job title, work condition, development space and so on, which would influence academic migration. In order to examine the attraction of different level employers, we defined the host employer as a multiple

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[3] http://www.shanghairanking.com/

categorical variable. Specifically, if a scholar's employer is inside the system of CAS (including USTC), he/she is defined as 0, Peking and Tsinghua are defined as 1, other C9 universities are defined as 2, and other universities are defined as 3.

The country of PhD: The nature of brain drain depends on scholars' study and work locations. Since returnees include both foreign degree holders and research fellow received PhD in domestic, it is necessary to distinguish the former from the latter (Tian, 2013). Scholars received their Ph.D. in domestic and the US accounted for 76.2% of total candidates. Thus, we only consider the country of PhD as a two dichotomy variable. Whether a scholar received his/her PhD in mainland China, if yes, it is defined as 1, if not is 0; whether a scholar received his/her PhD in the US, if yes, it is defined as 1, if not is 0.

The first batch of candidates: If a scholar was the first batch of candidates, he/she is defined as 1, other batches of candidates are defined as 0. At the beginning of the program operation, host employers cannot differentiate the skill levels of overseas scholars effectively due to information asymmetry (Tian, 2013), and overseas scholars also hesitate to apply for TYTP due to due to information asymmetry, the selectivity is weak. The first batch of candidates could increase the information transparency.

First is to examine whether academic ability has significant effect on Chinese brain gain at the high end by using Kaplan-Meier analysis. Second is the regression analysis of how academic ability effect using Cox's model.

4. Data

Our basic data on the first four batches of TYTP candidates is from government agency's publicity on the 1000plan website[4], which includes candidates' name, gender, the date of birth, domestic employer, overseas last employer, job title, subject filed, the alma mater of receiving PhD, and the date of receiving PhD. Furthermore, we built a database which includes the information of the TYTP scholars through searching their CVs and other available information such as the academic ranking of employer and so on. CVs can be reliably coded to reflect valid career constructs and longitudinal records of scientific careers, an emerging research tradition has been using the CVs of researchers to study career transitions (Gaughan and Robin, 2004; Gaughan, 2009).

Fortunately, most of candidates' work in universities or research institution (Xin, 2011), it is easy to access candidates' CVs on employers' website.

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[4] http://www.1000plan.org/

Besides, we also have accessed candidates' CVs through Google Scholar, Research Gate and Linkedin when no CVs on their employers' website.

There are three issues needing to be declared. First, there is a little difference between candidates' list on publicity (preliminary result for comments) and recipients' list on announcement (final result), some scholars did not become official recipients on announcement because of some reasons such as fabricate academic credentials[5]. We use the candidates' list on publicity, and these scholars who did not be selected into the final list are defined as failure or stayers. Second, some recipients did not return to host employer selecting them into the program but to another domestic employer, these recipients are also defined as success or returnees. Meanwhile, its final employer would be used to encode. Finally, some candidates' CVs censored. We could not find their CVs on domestic employer and oversea last employer's website, and other place of internet. These recipients are also defined as failure or stayers.

Consequently, we set up a small database including 736 scientists (the first four cohorts of TYTP returnees between 2011 and 2012).

IV. Results

On the basis of data collection, cleaning and coding, we use Kaplan-Meier analysis and Cox's model respectively to observe the role and the extent that academic ability play in TYTP recipients' migration in the empirical analysis.

1. Kaplan-Meier Analysis

In terms of Table 1 and Figure 3, we attempt to observe whether there are academic ability differences even ability gap in academic brain gain at the high end by using Kaplan-Meier analysis.

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[5] Such as Lu Jun, previously a professor at Beijing University of Chemical Technology (BUCT), was recently found to have taken a shortcut of his own. Lu, 39, was hired as a professor by BUCT in November 2011. In March, he was invited into China's 1,000 Young Talents Program. In his online resume, Lu listed seven papers as his key publications. The seven papers were all published in prestigious overseas academic journals, including two in Nature. Indeed, it was found that the real author of these papers works as an assistant professor at Yale University whose name coincidentally shares the same Chinese pinyin spelling as the Lu at BUCT. Lu's doctoral degree from University of Toronto in Canada and his work experience in an American company were also fraudulent.
http://www.china.org.cn/opinion/2012-08/24/content_26322780.htm

Table 1 The results of Kaplan-Meier analysis

| Variable	Total	Censored	Share (%)
Have gain a tenure-track position, a tenure position or a permanent position, including Professor	146	32	21.9%
Haven't gain a tenure-track position, a tenure position or a permanent position, including Professor	590	48	8.1%
Academic position Log Rank Sig.		0.000	
last employer's academic ranking is world's Top100 in a specific subject field	360	29	8.1%
last employer's academic ranking is out of world's Top100 in a specific subject field	376	51	13.6%
Academic ranking Top100 Log Rank Sig.		0.002	

In total, 736 candidates are selected into the 1-4 batch of TYTP. Of them, 146 has gained a stable position abroad, and there are 21.9% of the candidates censored, which means 32 candidates didn't return to China. 590 candidates haven't gained a stable position, within which, 8.1% are censored. 360 candidates' last employer's ranked in world's academic Top100, and right-censored data account for 8.1%; the other 376 whose last employer's academic ranking is out of world's Top100, its rate of right-censored data is 13.6%. In terms of Table 1, more than 80% of the candidates hasn't gained a stable position, and about half of the candidates' last employer's academic ranking is out of world's Top100. The Log Rank test show that, both of academic position and academic ranking have a significant effect on Chinese brain gain at the high end.

Survival curves in Figure 3 show how academic position and academic ranking factor influence TYTP recipients return to the country, and Cumulative survival function reflect the percentage of recipients who haven't returned after the survival time T.

In terms of academic position (see Figure 3a), the curves indicate the percentage of TYTP recipients fail to return. Specifically, the curve above indicate the recipients who have gained a stable position, while the curve below indicates who hasn't. No matter how long the survival time is, compared with the recipients without a stable position, the share of recipients failing to return is higher. That is to say, the recipients with a stable position, have less of a tendency to return than those without it.
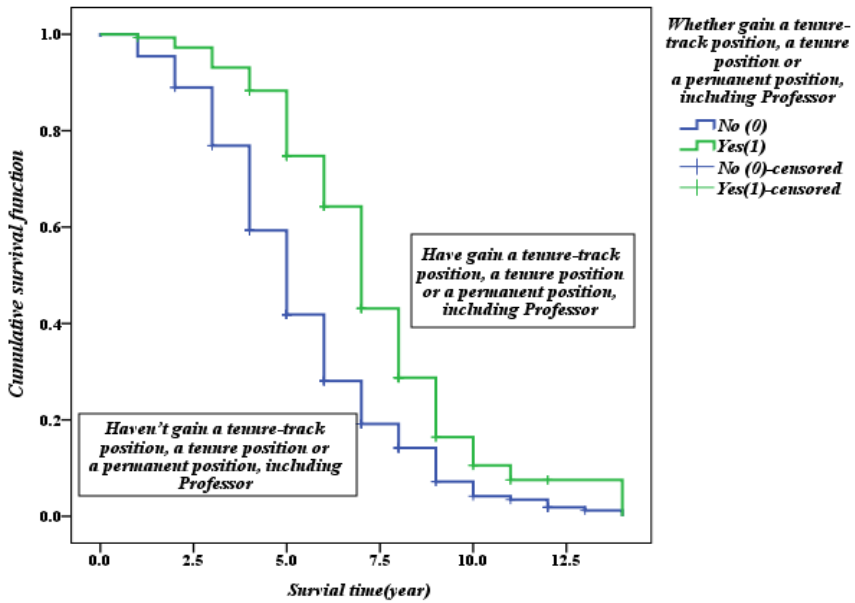
(a)
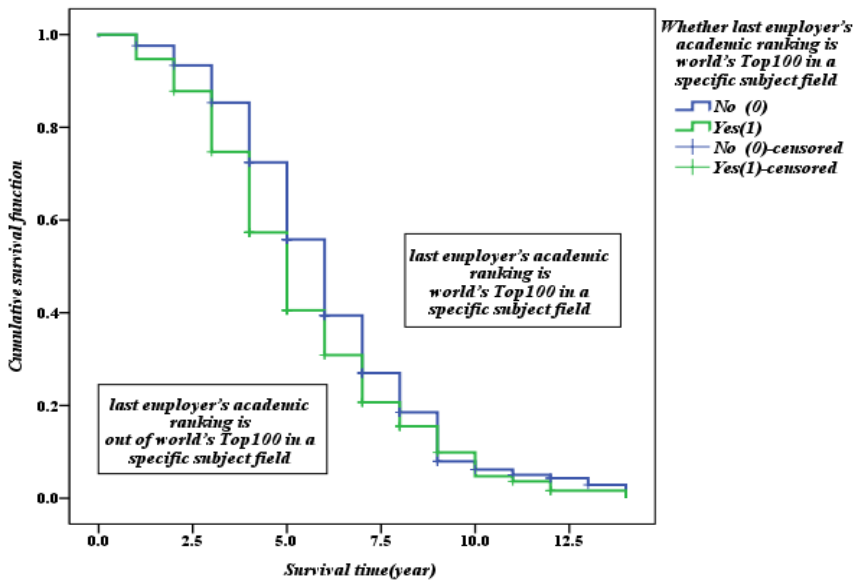
(b)

Figure 3 The survival function of TYTP returnees of academic ability

In terms of academic ranking (see Figure 3b), the curves intersect twice at the time spot of 9 years and 10 years respectively. In the case that the survival time is shorter than 9 years, the share of returnees in recipients whose last employer's academic ranking in world's Top100 is rather high. Considering the rat competition within the top universities abroad, it's difficult for youth scholars to get or promote to a higher position without outstanding outputs at the prime of their careers. On the contrary, since there is a serious shortage of academics at the high-end in the domestic academic labor market, it's more realizable for returnees with top-university working experience to expect a bright academic future. During the period that the survival time is within 9 and 10 years, the migration pattern shows an opposite tendency. Compared with the youth scholars whose last employer's academic ranking is out of world's Top100, those work in the world's Top100 has less possibility to return. Because 10 years are enough for them to get a stable position and rather a happy family, and they may face a comparatively high risk to return. When the survival time is longer than 10 years, the two curves are similar in a high level, whether the recipients work in the world's Top100 or not, they prefer to stay abroad. The result shows that, the academic ranking do effect the academic brain gain at the high end but it was not significant, and it was different according to survival time variety.

2. Cox's Model

According to the results of Kaplan-Meier analysis, we figure out both of the academic positions and academic ranking have a significant different effect on Chinese brain gain at the high end. Based on the statistical analysis of TYTP candidates (see Table 2), we attempt to examine the extent of academic ability gap in academic brain gain at the high end.

The effect of academic position and academic ranking on brain gain were examined respectively through model 1 and model 2. In model 1, the regression coefficient of academic position is 0.484 and very significance. In model 2, the regression coefficient of academic ranking is -0.093 and not significance. Meanwhile, we added both of academic position and academic ranking in model 3, the result is in line with model 1 and model 2. The regression coefficient of academic position is 0.478 and very significance, while the regression coefficient of academic ranking is -0.064 and not significance.

According to model 4-10, we examined the interactive effect among academic ability and gender, age. In specific, we added the interaction between academic ability and gender first. In model 4, both academic position and the interaction between academic position and gender are not significance. In model 5, both academic ranking and the interaction between academic ranking

and gender are not significance. Following, we added the interaction between academic ability and age. In model 6, the regression coefficients for academic position and the interaction between academic position and age are 3.215 and 0.078, and very significance. In model 7, both academic ranking and the interaction between academic ranking and gender are not significance.

Table 2 The results of Cox regression analysis

Variables	Independent variable				Interaction	
	Academic position	Academic ranking	Gender	Age	Academic position × Gender	Academic ranking × Gender
Model 1	0.484**		-0.202	-0.327**		
Model 2		-0.093	-0.173	-0.331**		
Model 3	0.478**	-0.064	-0.202	-0.325**		
Model 4	0.31		-0.23	-0.327**	0.189	
Model 5		-0.393	-0.344	-0.332**		0.33
Model 6	3.215*		-0.193	-0.340**		
Model 7		-0.112	-0.172	-0.331**		
Model 8	0.273	-0.365	-0.407	-0.326**	0.221	0.333
Model 9	3.224*	-0.114	-0.193	-0.341**		
Model 10	2.973*	-0.432	-0.392	-0.341**	0.259	0.313

Furthermore, we added all the independent variables in model 8 and model 9. In model 8, both of the interactions between academic position, academic ranking and gender are not significance; in model 9, the regression result and the effect were both in line with model 6-the interactions between academic position, academic ranking and age are significance. Model 10 is a full model, we added all the variables and interactions in it. The result shows that, the interactions between academic position, academic ranking and age are significance, and the effect is similar to model 6 and model 9.

The results suggest that academic position has a significant influence to recipients return to China. It indicates that this factor increased the hazard rate during the drain gain process, In other words, youth scholars with a stable position tended to stay overseas. On the contrary, the academic ranking is not a significant factor for recipients returning to China. Interestingly, only the interaction between academic position and age is significance among all the interactions, which indicates that for the scholars with a stable position, the

older he is, the higher the hazard rate of return was. Considering their bright career and stable position as well as happy family and good social relations, it is reasonable for the aged scholars to remain abroad.

To probe the effect of gender and age, we test them in model 1-10. The regression coefficients for gender are between -0.407 and -0.173, and not significant. The regression coefficients for age are about -0.3 and very significant, which indicates that the age factor decreased the hazard rate of recipients return to China, and the older recipients trended to return to the county. The age is a double-edged sword. On the one hand, with the PhD holders working time increasing, the stronger academic ability and more outcomes a scholar has, the more competitive he is in the oversea academic labor market; on the other hand, the problems concerning pension, children's education and own career are increasingly serious with age, and return to the home country is one of the effective way to solve all these problems. The result was in line with Van (2012)'s research published in Nature-those who had just obtained their PhDs were more open to an international move than senior scientists, presumably because their career paths were not settled and they were less likely to be tied down by relationships and families.

In addition, the mainland PhD also increased the hazard rate of academic return, its regression coefficients are between 0.55 and 0.63 and very significance, which indicates that mainland PhD holders were not likely to build their career at home, because mainland PhD holders can't help them hold superiority in the competition with overseas PhD holders. Just like Zeithammer and Kellogg (2013)'s conclusion, Chinese students are more likely to return despite the high-paying overseas after they have gain PhDs from America's top universities. In addition, the academic relations and other factors have less influence on attracting returnees.

In conclusion, the academic position has a significant and positive effect on leading recipients to stay overseas, while the effect of academic ranking turns out to be not significant. Generally, academic ability influences the brain gain at the high end in the double edges-the effect of the academic position and academic ranking is opposite. To a degree, it indicates that, TYTP program does play its due role and has attracted a group of young oversea scholars from top universities all over the world.

V. Discussion and Conclusions

Since reform and open door policy, China has attracted a large number of talents at the high-end by launching a series of talent-attracting programs. While it's rather hard to figure out the effect of these programs on talents'

return. This work proposed a transnational migration matrix of the academics to clarify the dynamic mechanism of academic brain gain, which indicates that academics with high academic ability are less likely to return than academics with less academic ability in general. Based on a sample of 736 scientists (the first four cohorts of TYTP returnees between 2011 and 2012), the Kaplan-Meier analysis and Cox regression model are used to empirically analyze the policy effect of TYTP. We have reached some preliminary conclusions.

First, Kaplan-Meier analyzing shows that, there was significant academic ability gap within Chinese brain gain at the high end. Obviously, the share of returnees in the group with a stable position is higher than that of the group without it. That is to say, scholars with stronger academic ability tended to stay overseas, especially scholars with a stable position. While last employer's academic ranking has a negative effect to returning of young academics, and it decreases with time passing.

Second, the result of Cox's regression analysis indicates that, TYTP program did play its due role in attracting scholars with high academic ability. To be specific, scholars with a stable position are not willing to return, and the willing decreases with age. While some scholars whose last employer's academic ranking is world's Top100 tend to return from overseas. Thus, considering the salary disparity, remain abroad is the best choice for the high-ability scholars, the talent-attracting programs have partly succeeded in bringing back the good scientists and academics. Meanwhile, age is significance that older scholars tended to stay overseas, and mainland PhD holders are more likely to settle in the host country.

In addition, this paper examined the effect of talent-attracting programs based on the data of TYTP candidates, which enrich the growing literature that focuses on brain drain and brain gain. Furthermore, two limitations should be concerned in future study. At first, our research takes into account the difficulties of examining the effect of TYTP program indirectly, we try to evaluate it by examining the returning decision-making of young academics. It almost reflects the program's working mechanism, however it doesn't consider the variety of before and after brain gain selected in the program.

Second, the academic ability of academic brain drain at the high end has been the issues that caused extensive social concerning. It is difficult to compare the performance of TYTP candidates directly in different subject filed even sub-filed through academic outcomes. Thus, this paper indirectly measured the academic ability though candidates' academic position and its last employer' academic ranking, which could reflect candidates' academic ability generally. Meanwhile, it is also possible that this way generates individual error, for example a candidate with strong academic ability did not occupy a permanent academic position, or the other way around.

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