Department of Economics and Statistics
"COGNETTI DE MARTIIS"

# Working Paper Series

21/13

# TEMPORARY MOBILITY - A POLICY FOR ACADEMIC CAREER DEVELOPMENT

CORNELIA LAWSON and SOTARO SHIBAYAMA

Department of Economics and Statistics "Cognetti de Martiis"
Campus Luigi Einaudi, Lungo Dora Siena 100A, 10153 Torino (Italy)
www.unito.it/de

The Department of Economics and Statistics "Cognetti de Martiis" publishes research papers authored by members and guests of the Department and of its research centers. ISSN: 2039-4004

# Temporary Mobility - A Policy for Academic Career Development*

Cornelia Lawson†, Sotaro Shibayama‡

**Abstract**
Researcher mobility has received increasing support from policy makers around the world as an instrument to improve the performance of research systems by promoting the diffusion of knowledge, and facilitating knowledge and technology transfer, network creation, and productivity (OECD, 2008). International mobility grants have been a preferred means for governments across the world to facilitate the mobility of their research base (MEXT, 2009). This paper investigates the effect of temporary mobility spells abroad on a researcher's probability for promotion. Temporary research visits may help to expand existing networks and promote knowledge transfer while at the same time ensuring career stability, identified as the main barrier to mobility in Europe and Japan (Stephan, 2012). Using a dataset of 370 bioscience professors in Japan we identified their average career path and evaluated the role of mobility in Japanese universities. We find that international research visits have a positive effect on promotion and reduce the waiting time for promotion by one year. This provides evidence that these visits also benefit a researcher's career in the long-term. This positive research visit effect is weaker for researchers who also change jobs. Research visits may therefore present a way for immobile researchers to speed up promotion without the need for job mobility. We also find that research visits are particularly important for inbred researchers, again indicating that visits discourage late-career mobility and increase promotion speed. We further find that, while research visits of tenured staff enhance the career by providing an early chair, postdocs have no lasting effect on career progression. Instead, they may be an indicator for a researcher's struggle to find a permanent position after the PhD.

Keywords: Academic labour market, Researcher mobility, Career paths, Promotion
JEL codes: O31, I23

* Cornelia Lawson acknowledges financial support through the European Commission (FP7) Project "An Observatorium for Science in Society based in Social Models – SISOB" (#266588) and the Collegio Carlo Alberto Project "Researcher Mobility and Scientific Performance". Sotaro Shibayama acknowledges financial support from the Konosuke Matsushita Memorial Foundation and Grant-in-Aid for Research Activity Start-up of the Japan Society for the Promotion of Science (#23810004).

† Department of Economics and Statistics Cognetti De Martiis, University of Turin, Lungo Dora Siena 100 A, 10153 Turin, Italy; BRICK, Collegio Carlo Alberto, Via Real Collegio 30, 10024 Moncalieri, Italy; email: cornelia.meissner@unito.it
‡ Research Center for Advanced Science and Technology, The University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo, 153-8904 Japan; email: shibayama@00.alumni.u-tokyo.ac.jp

## 1 Introduction

Researcher mobility has received increasing support from policy makers around the world. It is encouraged at policy level as an instrument to improve the performance of the research system by promoting the diffusion of knowledge, and facilitating knowledge and technology transfer, network creation, and productivity. In the context of the university, immobility has been described as damaging to the advancement of knowledge, and enhanced transparency in hiring decisions and the movement of university staff between universities and to firms has been viewed as a major policy goal (OECD 2000, 2008). The globalisation of the research community, and the accompanying increase in international mobility (OECD 2008) and collaboration (Glanzel et al. 2008), and their importance for the knowledge transfer process, make the movements of researchers more relevant to the flow of knowledge and demand a better understanding of labour markets for academic researchers and the career consequences of mobility (Enders, 2005; Enders and Weert 2004; Zellner 2003). For these reasons researcher mobility has become an important issue for science and technology policy in Europe (EC, 2001; EC, 2010) as well as in Japan (MEXT, 2003; MEXT, 2009), which seeks to increase international collaboration and competitiveness.

However, academic careers were (and mostly still are) characterised by stability, long-term employment relationships (tenure), and a rigid structure of hierarchy (Pezzoni et al., 2009). Light (1974: 16) noted: 'While most other professions have several career models for their members, the academic profession has only one.' Career steps are well defined and requirements for advancement outlined in internal guidelines, which usually emphasize merit and seniority. Alternative career arrangements are difficult to evaluate and thus discouraged. Elements that may disrupt the laid out path, including voluntary and forced employment breaks or job changes, may thus stymie the fulfilment of promotion requirements, and may not be pursued. However, it is important to highlight changes in promotion patterns arising in recent years. The linear career progression from PhD to professor is no longer a given, with an increasing number of part-time and short-term contracts (Stephan and Ma, 2006; Stephan 2012). Young researchers are encouraged to engage in international mobility to increase career prospects, but Ackers (2008) argues that mobility becomes increasingly detached from its original objectives and is better viewed as a compulsory career step. As a consequence of changing career patterns, alternative work arrangements are increasingly common in universities, and postdoctoral appointments are becoming more frequent, adding to job

insecurity and fragmented career paths, which could lead to a decrease in productivity and loss of talent (Stephan, 2012).

This paper examines temporary mobility patterns and how they relate to promotion in the Japanese context. Using a dataset of 370 bioscience professors in Japan we identify their average career path and evaluate the role of temporary research visits for career advancement. Based on human capital theory we could expect the mobility of high-skill labour, which includes academic professions, to be beneficial as their job skills are easily transferred to a new workplace. However, life-long contracts and the importance of scholarly networks for increasing one's chances to be hired and promoted, endorse immobility. Cruz and Sanz (2010) suggest that such non-mobile careers may be an indicator of early permanent positions. Remaining in a lower rank may be favoured over mobility in a system that provides stable employment, as is the case in most of Europe (Stephan, 2012). Literature is less clear on temporary mobility while maintaining a permanent position. Temporary mobility, where an academic keeps her affiliation but is seconded to do research at an external institution, can help faculty development by enabling researchers to expand existing networks, promote knowledge transfer and, as a result, may increase both her chances for receiving promotion at home and for being offered a position elsewhere. A similar argument can be brought forward for postdoctoral stays which are implicitly assumed to raise a researcher's profile (Su, 2011). However, temporary visits also provide a secure job environment, leading to potentially higher benefits.

The remainder of the paper is structured as follows: In section 2 we review the literature on mobility and promotion and draw up our hypotheses. Section 3 gives background information on the Japanese labour market and educational system and section 4 introduces the data. Section 5 discusses the empirical strategy and presents the results and section 6 discusses and concludes.

## 2 Mobility and Promotion

### *2.1 Career Advancement through Mobility*

While the study of the determinants of scientific productivity has been a major focus in the Economics and Sociology of Science, the analysis of career and mobility has received less attention perhaps because both are assumed to be closely linked to productivity (Allison and Long, 1990; Long et al. 1993). However, while one would assume that promotion and hiring decisions are made on the basis of merit, there is no conclusive evidence confirming that this

is the case. Instead, in many countries merit is not the only driver behind promotion decisions but seniority and gender are equally if not more important (e.g. Long et al., 1993). Similarly, hiring can rely heavily on prestige effects, favouring graduates of top institutions (Crane, 1965, 1970), and, to a concerning extent, inbreeding, i.e. the hiring ofgraduates from the same institution (Burris, 2004; Horta et al., 2010; Pezzoni et al, 2009). As gaining promotion is the premise for access to resources and higher wages, a fast career progression is implicitly assumed to be the main objective of an academic. Mobility can facilitate career progression by giving access to a larger job market. Young academics from top institutions may therefore use their higher visibility to gain quicker promotion elsewhere (Oyer, 2008). At the same time, in many countries academics may be obliged to wait for openings for tenured positions and mobility may be a requirement for promotion (Stephan, 2012). Such forced job transition could be seen as disruptive at early stages of the career and indeed there is some evidence for Spain and Italy that non-mobile faculty are promoted sooner (Zinovyeva and Bagues, 2012; Pezzoni et al., 2009). Cruz and Sanz (2010) argue that early institutional commitment in these countries in terms of permanent positions may speed up career progression and discourage mobility. For the US, Mexico and Turkey, on the other hand, Hargens and Farr (1973), Horta et al. (2010) and Inanc and Tuncer (2011) find that inbred faculty were less productive and were promoted less or later. The role of temporary mobility by means of visiting fellowships and secondments, however, is less well understood in the context of career development.

### *2.2 Mobility and Brain Circulation*

The concept of temporary mobility is closely linked to the literature on brain circulation that observes the return of skilled workers to their home country (Johnson & Regets 1998; Mahroum 2001). Several papers find that returnees perform better and have a larger international network than their peers that have not been internationally mobile (Canibano et al., 2008; Cruz and Sanz, 2010; Franzoni et al., 2012; Jonkers; 2011; Scellato et al. 2012) and are thus believed to provide collective benefits in terms of spillovers to their home countries (Ackers 2005; Saxenian, 2005). This evidence sparked policy initiatives to encourage researchers who migrated abroad to return home (Hunter et al., 2009). Spain developed a program called “Ramón y Cajal” that provided particularly strong support for returnees. Also India is considering returnee policies to facilitate the return of Indian scientists (Franzoni et al., 2012).

Many of these studies, however, conflate different mobility types, for example combining pre- and post-doctoral mobility or forced and voluntary mobility (Ackers, 2008). Ackers

(2008) also points out that different mobility requirements and opportunities exist for different disciplines, which is supported by Canibano et al. (2011) and Zubieta (2009), making it difficult to give general policy recommendations. Already there is evidence that not all internationally mobile researchers benefit from their experience. Jonkers (2011), for example, reports that researchers who remain unproductive during their international mobility, do not gain in terms of career progression. Melin (2005) also shows that a discernable share of returnees have difficulties in incorporating the knowledge acquired abroad. Thus, brain circulation is increasingly becoming a conflated concept. Young researchers are encouraged to engage in international mobility to increase their career prospects, but the activity often becomes detached from its original objectives, and may be better described as an additional compulsory career stage (Ackers, 2008).

### *2.3 Research Stay and Promotion Advantage*

While the brain circulation literature refers to returnees in general, we want to focus specifically on researchers who continue to hold a permanent position in their home country. Temporary mobility, where an academic keeps her current affiliation but is invited to a second institution, usually abroad, may help professional development, and may increase her chances of promotion at home. This form of faculty development strictly differs from post-doctoral appointments as a result of the commitment of the sending institution in retaining a permanent position.

Faculty development has been a focus of universities and governments and a variety of programs and activities have been proposed, including faculty exchanges, sabbaticals, unpaid leaves, and research visits, often supported by foundations or government. They are designed to improve faculty performance, particularly in terms of scientific expertise and personal growth (Camblin and Steger, 2000; Centra, 1978). There is sufficient evidence in organisation and human capital literature that professional development, in this case temporary mobility to an external institution, increases job skills, which in turn results in better performance and higher wages (Becker, 1962; Colquitt et al., 2000; Parent, 1999). It also increases job satisfaction, as such temporary mobility, which is usually endorsed by the sending institution and financed through government scholarships, indicates approval and gives a sense of achievement (Allen et al., 2004). These personal benefits also raise the performance and visibility of the researcher's institution as it benefits from new or maintained links to other organisations (Almeida and Kogut, 1999; Agrawal et al., 2006; Azoulay et al., 2012; Jons, 2009). Thus, it is in the interest of the organisation to provide

early promotion in order to keep its best connected and most flexible researchers. We therefore hypothesise that temporary mobility decreases the time until promotion.

Similarly, temporary mobility and the associated higher job satisfaction and performance could be likely to reduce later job mobility (Parent, 1999). Thus, while some researchers appear immobile in terms of job-mobility, they may still benefit from a larger network and increased visibility acquired through temporary visits. We can therefore expect an additional positive effect of temporary mobility for otherwise non-mobile researchers.

In addition to temporary mobility, postdoctoral mobility has been argued to have a positive effect on research careers (Su, 2011; Stephan and Ma, 2005). Musselin (2004), for example, find that academics participating in post-doctoral visits perceive their international mobility as a personal strategy aimed at improving their career prospects back home. Some studies have focused specifically on international post-doctoral mobility and find that it has a positive effect on performance, career and networks (Horta, 2009; Zubieta, 2009). However, the increasing frequency of such stays and associated job insecurity (Stephan and Ma, 2005; Stephan, 2012) may make postdoctoral research periods less beneficial than later temporary mobility with secure job prospects. For example, many postdocs may spend a significant amount of time on job-hunting rather than research. We thus expect fewer benefits from postdoctoral stays abroad.

## 3 Background

### *3.1 The Japanese employment system*

It has been a firm belief of many scholars that Japan's employment system is characterised by lifetime employment and age-based reward (including promotion). Especially in the public sector and in large firms these mechanisms were perceived as prevailing, including universities. Thus, also in the academic professions we should largely expect lifetime employment in a single university and promotion that is primarily based on age, leaving little room for mobility and research efforts.

However, a closer look at employment data and recent reviews shows that these mechanisms are far less common than thought. Griffiths (2004) points out that while the average length of employment in the same company is much higher in Japan than in countries like the US and UK, it is comparable to figures found in Germany, France or Spain. Further, while labour fluctuation is perhaps lower than in the US or Europe, there is a very high degree of internal mobility within the company or within a group of affiliated companies. In Japan an

interlocked system of related companies (*keiretsu*) allows firms within the group to move employees between them. Thus, the effective mobility, through either temporary placements in other firms or permanent employer changes, is much higher than is apparent.

Griffiths (2004) also challenges the common belief of a primarily age-based reward system. He acknowledges that promotion occurs very late in the career of a Japanese employee, indicating that it might be exclusively linked to age. However, studies have shown that these promotions are signalled to the employees much earlier in their career through job rotation and higher basic wages or higher bonuses.

### *3.2 The Japanese academic employment system*

Japan has three types of institutions that offer 4-year courses and postgraduate education: national, public and private universities. In 2010 the 86 national universities employed 99,659 academic staff and the 95 public universities 26,670 (Statistics Bureau, 2012: 714-715). National universities are financed by the central government and public universities by regional and central governments. Their employees were government employees until reforms in 2004 and thus fell under the public servants law. The majority of students and academic staff, however, can be found at the 597 private universities that in 2010 employed 233,305 academic staff (Statistics Bureau, 2012: 714-715). Private universities, though theoretically sovereign institutions that are financed primarily through student fees, are also subject to government control, in terms of enrolment and organisation (Shimbori, 1981). Though only about 10% of their finances come from government (figure for FY2008; Statistics Bureau, 2012: 724), they are heavily affected by its regulation of national universities with which they need to compete, an endeavour made difficult by the heavy government subsidy and low tuition fees of national universities (Akabayashi and Naoi, 2004).

The Japanese employment system discussed above also extends into the university sector. Surveys of the Japanese university system describe it as highly elitist with an established hierarchy that limits any transition of researchers between universities and thus stymies overall mobility (Shimbori, 1981; Horta et al., 2011). Looking at employment statistics, we can see that the average length of employment is higher for academics than for university graduates in general (15 years vs. 12.5 in 2010), but the same as that of other high-skill professions (e.g. architects, engineers and teachers) with the exception of medical doctors (4.6 years) (Statistics Bureau, 2012: 518-520). However, Japanese universities have their equivalent of the *keiretsu* found amongst companies, an alma-mater based form of patronage

for graduates of one's university called *gakubatsu* (literally: school tie), which has gradually been institutionalised. Similar to the internal movement of employees inside a *keiretsu*, graduates are placed in a university (or firm) with links to their degree institution, thus reinforcing the *gakubatsu*. The university hierarchy is dominated by The University of Tokyo, followed by other national universities and a few old private universities. This structure is reinforced by the fact that the majority of postgraduate and specifically doctoral education is done in the few national universities. While private institutions have consistently accounted for 77% of undergraduate students in the past 25 years, they only produced 23% of PhDs in 2010. The national universities on the other hand, provide just 20% of undergraduate education but produce 70% of doctoral students (Statistics Bureau, 2012: 714-715). In 2001, 11% of the academic workforce had graduated from The University of Tokyo alone (Horta et al., 2011). However, the increase in the number of postgraduate students, which has tripled in the past 20 years while the number of university teachers only increased by 50% (Statistics Bureau, 2012: 714-715), makes the competition for academic positions much tougher and thus may have led to a more transparent hiring process. While positions were filled internally before the 1990s often without being advertised publicly, by 2000 this had changed and the recruitment process has become more open. This is particularly reflected in the increasing number of Japanese academics with PhDs from abroad (Horta et al., 2011)[1].

Japanese universities largely have a three level promotion system with professor at the top, then associate professor and finally lecturer (instructor) or assistant. In 2010, 51% of all academic positions were professorships, 22% associate professors and 27% lecturers or assistants (Statistics Bureau, 2012: 521-522). Promotion decisions in Japan are largely made at the departmental level. It has further been claimed that promotion is primarily based on seniority with minor adjustments for education and performance (Shimbori, 1981; Takahashi and Takahashi, 2009). This is particularly true for national and public universities which, until recently, fell under the public servant laws. Takahashi and Takahashi's paper may not find a merit-based promotion effect due to their sample being mainly drawn from education-oriented institutions, whereas performance may play a greater role at research universities. Moreover, before 1990 the academic labour market was characterised by a chair structure, where promotion was only possible if a chair resigned. This system was challenged when other academic structures were introduced, e.g. allowing for fixed-term appointments (Takahashi and Takahashi, 2010). In April 2004, a reform to incorporate these national and

[1] 10% of academics in a sample of Japanese economists hold a PhD from a foreign institution (Takahashi and Takahashi, 2009)

public universities removed the public servant status from academics and allowed greater freedom in recruitment, wages and promotion (Takahashi and Takahashi, 2009). Nevertheless, the old structures prevail and still in 2005 only 3.4% of academics were hired on a fixed-term basis (Takahashi and Takahashi, 2010).

### *3.3 Faculty Development through Temporary Mobility*

The Japanese government (MEXT) has always pursued the internationalisation of its universities and implemented several programs for temporary mobility abroad starting in the late 19th century. The primary objective of these programs was the quick absorption of knowledge from and catching up with other advanced countries, but their emphasis has been shifted toward the promotion of academic and educational exchange (Tsuji, 2010). The government task force for faculty development has recently published its future vision, in which the necessity for early-career research experience in foreign institutions is stressed as a means for increasing global competitiveness (MEXT, 2003; MEXT 2009).

Many government faculty development programs provide fellowships for temporary stays or travel funds for conference attendance, and according to government statistics, in the 1990s approximately 7,000 university faculty members were sent abroad every year (MEXT, 1980). Importantly, many of them were allowed to visit a foreign institution while on leave from their home institution. These stays differ from sabbaticals in that sabbaticals are given to senior scholars more as a reward rather than as part of faculty development for younger scholars. Further, they differ from postdoctoral stays in terms of job security. The programs aim "to dispatch university faculty members to foreign research institutions, encourage them to concentrate on their research, and improve their research capabilities" (MEXT, 1980). Thus, it represents a type of career development funded by the government.[2] The major government sponsored program for temporary visits was called "Overseas Research Scholars Program," which started in 1882. As of 1990, 1,200 scholars (approximately 17%) were dispatched under this program. The program offered financial support for short periods of up to three years of research visits abroad mainly for young researchers in their 30s and 40s. With a strong demand from universities, the program was growing and more researchers sent abroad. The program was recently replaced by the "Special Overseas Research Scholars Program," which awards two-year fellowship for research abroad to 100-200 scholars not

[2] Some (private) universities have similar programs for young scholars.

older than 35, every year[3]. Some other programs based on bilateral agreement with specific countries allow smaller numbers of scholars to participate in research visits abroad (MEXT, 1980).

## 4 Data and Descriptive Statistics

### *4.1 Data*

The data used in this paper was collected as part of a survey conducted in 2010. The survey was addressed to full professors in the field of biology and bioscience that received a Grant-in-Aid (GiA) at least once between 2006 and 2009. GiA is the largest and primary funding source for university researchers in Japan, amounting to 200 billion JPY (2.4 billion USD) in 2010.[4] We identified 1378 researchers in the database that fulfilled the criteria. From this population we chose 1,080 professors in the top 56 universities[5]. After reviewing research fields and affiliations on university websites, we arrived at a final sample of 900 researchers.

Postal questionnaires were sent to the 900 researchers in May 2010. A reminder was sent one month later. Participants had to fill in the paper based questionnaires and send them back by post. We received 400 responses by August 2010, thus achieving a response rate of 44%. Although this represents a good response rate, there may be a concern of respondent bias. For example, those that were mobile or had an unusual career path may have felt more encouraged to reply. However, the original survey did not indicate that the data would be used for the analysis of mobility and career advancement, mitigating this risk.[6] In addition, to examine non-response bias, we randomly selected 50 non-respondents and found no significant difference between the response and non-response groups in productivity, organisational rank, and gender ($p > 0.1$)[7].

CV information was collected from ReaD,[8] a career database created by the governmental agency, where scientists deposit their CV information voluntarily. The data in ReaD is completely structured and thus particularly useful for career analysis. As data registration at ReaD is not mandatory and information may not be complete, we completed CVs with

[3] http://www.jsps.go.jp/j-ab/ab_gaiyo.html (retrieved 28 March, 2013)
[4] GiA used to be the sole government research grant provider in the early 1980s (CNUFM, 2009: 89). Several other funding systems were later implemented, but GiA remains the primary funding source.
[5] This was done to reduce workload for preparing the sampling frame. These 56 universities cover 80% of researchers in the original population.
[6] The original survey primarily intended to investigate the style of laboratory management and only the secondary objective was to investigate careers.
[7] Analysis available from authors upon request.
[8] http://read.jst.go.jp/ (retrieved 28 March 2013)

information from the scientists' personal websites. All CVs were verified with information collected through the questionnaire survey, which included questions on year of PhD and years of promotion. Full CVs are available for 370 researchers who in 2010 worked at 56 different universities in Japan.

CVs provide a rich source of longitudinal information that covers the major dimensions of a researcher's career as well as their research contacts. While some of the dimensions of mobility can be inferred from bibliometric data, most of a researcher's activities may not be observed using traditional data sources, particularly if they do not involve publications in scientific journals. CVs have been found to be particularly useful in the analysis of academic careers as they inform about job transitions and additionally allow us to gather reliable publication data. Using data collected from CVs in addition to pure bibliographic measures improves accuracy of the data as mismatches arising from name similarities and changes in researchers' institutional affiliations can be avoided. In recent years, several academics have taken to CV analysis to study the impact of mobility on researchers' productivity and career progression (Canibano and Bozeman, 2009).

Data taken from CVs includes all career information starting from the year of the first degree (Bachelor). It comprises a comprehensive listing of all positions, including visiting stays. Additionally, publication data was collected from the Web of Science (WoS).

### *4.2 Variables and Descriptive Statistics*

Of the 370 professors for which full CVs were available, only 12 are female, which represents 3.2% of the sample (3% of the total sample of 900 are women). The average professor finished his undergraduate studies in 1977 and his PhD in 1983. The average age of professors in 2010 is 54. All 370 researchers are Japanese, reflecting the difficulty for foreign researchers to succeed in the academic profession in Japan. As discussed earlier, doctoral courses are highly concentrated and promotion is directly linked to training in one of the elite institutions in Japan. In our sample 91% of researchers received their doctorate from a national university (336 professors), including 26% from The University of Tokyo alone. Just 3% of doctoral degrees came from public universities (10 professors), 5% from a private universities (17 professors) and 2% received their degree abroad (7 professors). 58 researchers in the sample have a degree in medicine and may behave differently from the rest of the sample due to periods spent as medical staff in hospitals with lower levels of research activity.

*Career and Mobility Paths*

We define positions in terms of the three career steps described above: assistant professor or lecturer, associate professor and professor. On average, researchers finish their PhD at the age of 28 and take up their first position as assistant or lecturer at the age of 29. They are promoted to the position of associate professor at the age of 37 and to full professor at 44. The mean promotion age is higher for women (40 and 46), but lower for researchers with a medical degree (35 and 41).

We have to consider that not all researchers in our sample follow this strict career path. In fact, 45 researchers never assume the position of an assistant or lecturer, but take up other types of appointments and enter the standard academic career as associate professors (27 cases) or as full professor (18 cases). Moreover, 34 researchers in our sample are promoted from the rank of an assistant to that of a full professor without the intermediate step of an associate.

Focussing on the 325 researchers that start their career as assistant professors, we see that 79% take up a position at one of the national universities, 4% at public universities, 12% at private universities, 3% at public research organisations that follow academic career steps and 2% at foreign institutions.

To measure the job mobility of these researchers we define a move as a change of position that occurs after a researcher's first appointment as assistant professor or lecturer. The move has to be permanent with no return to the original institution within three years of the initial move. Some of these appointments may be research fellow appointments at foreign institutions, but as they are held for at least three years and researchers do not return to their original institutions they are considered career mobility.

We can identify three main career mobility patterns:

1. Those that never change universities (84 academics)
2. Those that move at assistant and/or associate level (232 academics)
3. Those that move at professor level (40 academics; including 31 from group 2)

The group of immobile researchers constitutes just 26% of the sample, indicating a very high degree of mobility amongst university academics in Japan. This contradicts Shimbori (1981) and Horta et al. (2011) who argue that the Japanese system limits mobility. This high rate of mobility could be due to our sample selection that only included full professors at research intensive universities. The 241 mobile professors move 414 times, spending an average of 7.9 years in each institution. 251 of these moves were accompanied by a rank promotion. Of

those mobile at assistant professor level, 62% move to be promoted to associate or professor; amongst those mobile at associate professor level, 76% move to gain the position of a professor. Thus, mobility in Japan is closely linked to promotion opportunities. While mobile assistant professors do not gain an advantage over their immobile colleagues in terms of promotion age, mobile associate professors are promoted to full professor about two years earlier than their peers.

In addition to immobile researchers we can look at academic inbreeding, widely defined as the practice of universities to hire their own graduates, a practice assumed to be widespread in Japan (Horta et al., 2011). In our sample 146 researchers are initially hired by their PhD institutions and another 53 researchers move back to their PhD institution after a short period elsewhere. Just like previous studies we find that inbreeding is more prevalent amongst elite institutions (Burris, 2005). The Japanese university ranking is headed by the seven pre-imperial universities (Tokyo, Kyoto, Osaka, Tohoku, Hokkaido, Nagoya, and Kyushu). We can distinguish The University of Tokyo from the other six as it receives twice as much funding in the Biosciences compared to the second ranked institution (Kyoto). More than 80% of new hires at The University of Tokyo received their PhD from the same institution. For the other six elite institutions this share is still 78%. Lower rank institutions mostly hire out of the pool of top graduates, partly out of necessity due to less developed post-graduate programs. On average, 10 years after first hiring, still 60% of researchers at the top seven institutions are inbred. Figure 1 shows the distribution of researchers amongst different types of institutions for years since PhD. It clearly shows the dominance of top institutions and the high degree of inbreeding at the top.

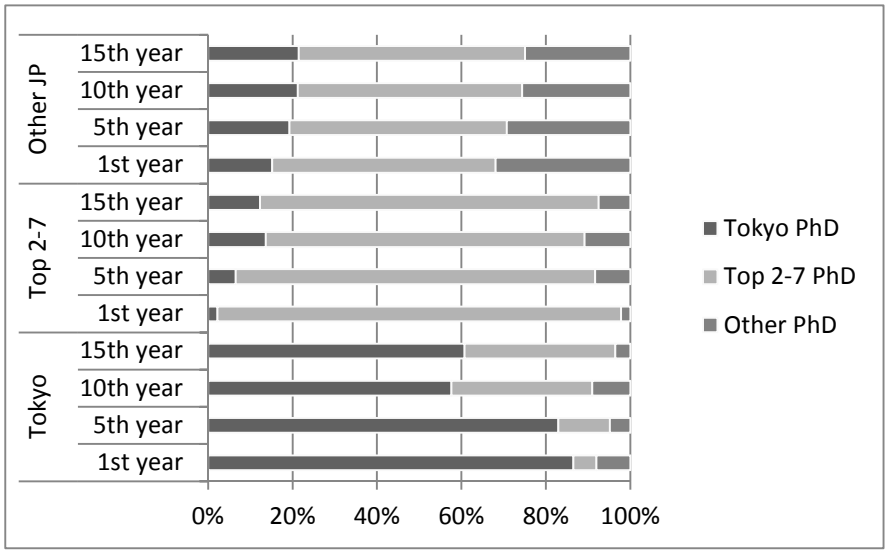


**Figure 1: Destinations in years since PhD**

*Visiting Research Stays*

The main focus of this paper is visiting research stays. We define as a research stay a move to another university or public research institution of up to three years that is usually followed by a return to the original institution. We do not include post-doctoral appointments but only research stays that occur after an academic has been appointed assistant professor. Research stays can appear very similar to post-doctoral appointments; however, they are marked by a return to the original institution and original tenured position, indicating that they were solely intended as visiting fellowships. This type of mobility is fairly common amongst Japanese researchers. In our sample, 24% of professors spend some time as researchers or visiting fellows at other institutions, usually outside Japan (95% of cases). The majority of these research stays happen early during a researcher's career with 80% of visiting fellows being assistant professors. Only one academic in our sample has been a visiting fellow after his promotion to full professor. This may be due to increased administrative and teaching commitments of full professors that do not allow them to leave their institutions for more than a few weeks.

In comparison, post-doctoral fellowships, which are defined as research stays of up to four years starting straight after completion of PhD, were taken up by 94 researchers in the sample. In contrast to visiting research stays, these post-doctoral appointments are distributed evenly across Japanese and foreign institutions, with 60% of appointments being abroad. In 23 cases professors are appointed post-doctoral researchers in the same institutions that rewarded their PhD. In 20 cases professors are offered a position as assistant professor in the institution upon completion of their post-doctoral research. 16 researchers later also take up visiting research fellowships.

On average, researchers that visited other institutions during their time as assistant professor are promoted to associate one year earlier than their immobile peers. Further, academics that undertake research stays are also promoted to full professor more than one year earlier than their peers[9]. In contrast, researchers that completed a post-doctoral appointment do not benefit in terms of promotion speed.

*Other variables*

We collected the number of publications for each researcher from the Web of Science (WoS). A researcher published on average seven publications per year. This shows that Japanese

[9] Only the second difference (age at promotion to professor) is statistically significant.

bioscience professors are very productive. Additionally, we collected the number of citations received by each publication as a quality measure. Publications receive on average 22 citations, again indicating that researchers in our sample are high performers. In our estimations we use the stock of publications and average number of citations to measure a researcher's productivity.

**Table 1: Descriptive Statistics**

| | | mean | sd | min | max | count |
|---|---|---|---|---|---|---|
| *Duration Variable* | | | | | | |
| Years since BA | | 14.15 | 5.71 | 1.0 | 34 | 5199 |
| *Mobility Measures* | | | | | | |
| Visit | Dummy; research visit prior to t | 0.13 | 0.33 | 0.0 | 1 | 5199 |
| Visit_US | Dummy; research visit in US prior to t | 0.09 | 0.28 | 0.0 | 1 | 5199 |
| Visit_Other | Dummy; research visit other country prior to t | 0.04 | 0.20 | 0.0 | 1 | 5199 |
| Postdoc_abroad | Dummy=1 if researcher did a Postdoc abroad | 0.16 | 0.37 | 0.0 | 1 | 5199 |
| Inbred | Dummy; current institution=PhD institution | 0.36 | 0.48 | 0.0 | 1 | 5199 |
| Mobility | Dummy; mobility prior or in t | 0.36 | 0.48 | 0.0 | 1 | 5199 |
| *Performance Measures* | | | | | | |
| Stockpub | Stock of publications | 51.29 | 81.08 | 0.0 | 1071 | 5199 |
| Avgcit | Stock of Avg citations per publication | 29.24 | 26.85 | 0.0 | 800 | 5199 |
| Stockfund | Stock of Funding in million JPY | 8.11 | 14.79 | 0.0 | 172 | 5199 |
| *Control Variables* | | | | | | |
| Female | Dummy | 0.03 | 0.17 | 0.0 | 1 | 5199 |
| Med degree | Dummy=1 if medical degree | 0.13 | 0.33 | 0.0 | 1 | 5199 |
| PhDRank | PhD Rank | 0.54 | 0.33 | 0.0 | 1 | 5199 |
| Rank Current | Rank of Current Institution | 0.27 | 0.32 | 0.0 | 1 | 5199 |
| Foreign Uni | At foreign university in t | 0.03 | 0.16 | 0.0 | 1 | 5199 |
| PRO | At PRO in t | 0.06 | 0.23 | 0.0 | 1 | 5199 |

We also have detailed information on GiA funding received by each researcher in each year. The amount of funding was split across years and investigators and each professor received an average of 5 million yen per year (60000 USD).

We further assume that promotion is more difficult to achieve at top institutions. We therefore rank these based on GiA funding received by a university in the field of bioscience in the previous five years. Funding values are normalised linearly, dividing each value by the maximum amount received in the sample. Thus, we have a one-to-one relationship between the original and normalised values. The University of Tokyo represents the value 1 and all other universities are defined as a share of this. Based on this we assign each researcher a PhD ranking and a university ranking. The mean PhD rank is 0.5 indicating that most researchers receive their PhDs from one of the top universities. The mean rank amongst current institutions is 0.3, indicating a general downward mobility amongst researchers following their PhD as indicated above.

We further include controls for gender and employer type.

Table 1 shows descriptive statistics for the main variables used in the regressions for the sample of 365 academics that experience promotion to professor.

## 5 Empirical Strategy and Results

### *5.1 Main Results: Hazard Model*

We estimate a duration model of career promotion as a function of temporary mobility, taking into account past and current mobility events. We assume that each researcher is subject to the probability of being promoted conditional on her status of being an assistant or associate professor. We therefore estimate our promotion equation separately for assistant professors that are promoted to associate professors and associate professors that are promoted to full professors. In the duration analysis a researcher is at risk of being promoted to associate professor from the beginning of her career and at risk of being promoted to full professor as soon as she becomes associate professor[10]. We make use of Cox-proportional hazard model where the dependent variable is the time that elapses from first degree until promotion. The same model is used to evaluate the differential effect of temporary research visits for inbred or non-mobile faculty. We expect that non-mobile or inbred researchers benefit more from research visits than their mobile peers and therefore introduce an interaction term. Performance stock measures are used to control for a merit effect on promotion. Age and its square term are included to control for a possible age effect on promotion. Gender, PhD, and university type indicators are used as controls. All regressions also include year dummies. Table 2 shows the results of the Cox model estimations for promotion to Associate Professor; Table 3 shows the estimates for promotion to Full Professor. In column 1 we also include a dummy for international postdoc experience to compare its effect to international temporary visits. In column 2 we split visiting fellowships and differ between visits to the US, which is assumed to be the most valuable for Japanese researchers, and other countries.

The results for promotion to associate professor (Table 2) show that temporary research visits have a strong positive effect, indicating that these researchers benefit from their stay and are promoted faster. This confirms our expectations. International postdoctoral mobility on the other hand does not have a significant effect on promotion risk.

[10] 27 professors are promoted from assistant straight to full professor. These are included in the model for promotion to full professor but omitted from the model for promotion to associated professor.

**Table 2: Survival analysis: risk of being promoted to Associate professor in t after BA.**

| VARIABLES | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Visit | 0.715*** | | 1.019*** | 0.474** | 0.441** |
| | (0.148) | | (0.194) | (0.212) | (0.208) |
| Visit_US | | 0.763*** | | | |
| | | (0.163) | | | |
| Visit_Other | | 0.516* | | | |
| | | (0.268) | | | |
| Postdoc_Abroad | 0.126 | | | | |
| | (0.141) | | | | |
| Mobility | | | 0.920*** | | |
| | | | (0.133) | | |
| Inbred | | | | -0.453*** | |
| | | | | (0.152) | |
| Mobility X Visit | | | -0.845*** | | |
| | | | (0.292) | | |
| Inbred X Visit | | | | 0.600* | |
| | | | | (0.315) | |
| Stockpub | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Avgcit | 0.003 | 0.003 | 0.003 | 0.002 | 0.003 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Stockfund | 0.006 | 0.006 | 0.002 | 0.007 | 0.006 |
| | (0.012) | (0.012) | (0.013) | (0.012) | (0.012) |
| Female | -0.198 | -0.173 | -0.006 | -0.217 | -0.192 |
| | (0.162) | (0.166) | (0.238) | (0.169) | (0.164) |
| Med degree | 0.167 | 0.174 | 0.170 | 0.239 | 0.166 |
| | (0.182) | (0.183) | (0.179) | (0.180) | (0.183) |
| Rank of Phd Institution | 0.190 | 0.205 | 0.243 | 0.148 | 0.182 |
| | (0.167) | (0.171) | (0.176) | (0.167) | (0.169) |
| Rank of Current Institution | -0.642*** | -0.624*** | -0.548*** | -0.355* | -0.755*** |
| | (0.180) | (0.179) | (0.179) | (0.205) | (0.188) |
| Rank of Current Institution X Visit | | | | | 0.945** |
| | | | | | (0.450) |
| Reference Category: Japanese University | | | | | |
| Foreign Uni | -0.389 | -0.408 | -0.918** | -0.493 | -0.436 |
| | (0.439) | (0.439) | (0.452) | (0.437) | (0.440) |
| PRO | 0.045 | 0.046 | -0.082 | -0.028 | 0.022 |
| | (0.335) | (0.343) | (0.355) | (0.346) | (0.345) |
| Subjects | 325 | 325 | 325 | 325 | 325 |
| Observations | 2,710 | 2,710 | 2,710 | 2,710 | 2,710 |
| log Likelihood | -1407 | -1407 | -1385 | -1403 | -1406 |
| Robust standard errors in parentheses | *** p<0.01, ** p<0.05, * p<0.1 | | | | |

To examine if temporary research visits particularly benefit the immobile, we interact research visits with indicators for mobility and inbreeding. Column 3 shows that the interaction between job-job mobility and research visits is negative. Thus, the additional positive effect of research visits is weaker for researchers that also change jobs. However, as job changes themselves are associated with a strong positive effect, overall mobile researchers that also participate in research visits would be at highest risk of promotion. In column 4 we present the interaction with inbred researchers, which is positive and significant,

signalling that research stays are particularly important for inbred researchers. The main effect for inbreeding is negative.

Merit (publications, citations and funding) has no significant effect on promotion duration for promotion to associated professor. This confirms prior research on Japan; promotion is not accelerated through better performance. However, since we are only looking at full professors that have successfully applied for research funding we are already looking at the best performers and therefore might not find an additional performance effect.

Researchers at highly prestigious institutions are promoted later. We interact this university rank with research visits to see if researchers at top universities benefit more from such stays. The interaction term is indeed positive, indicating that researchers at top institutions who have participated in a research visit are promoted sooner than their peers.

Looking at Table 3, we see that for promotion to professor the picture is slightly different.

Research visits seem to play less of a role, turning insignificant but remaining positive. Mobility in column 3 is highly significant and visiting fellowships also turn positive significant if we include an interaction term, thus indicating a general positive effect of visiting fellowships for researchers that remained non-mobile until full professorship[11]. Time to promotion remains longest for inbred researchers.

While mobility seems to become less important overall, also merit, as measured through average citation counts and funding, has a positive effect on reducing duration to promotion. Thus, merit is indeed important for advancing to the rank of a full professor, a promotion usually accompanied with responsibility for a large research group.

Overall this indicates that mobility becomes less important and promotion is rather based on merit in later career years. All regressions take into account the rank of the current institution which has a negative effect on the risk of promotion. Thus, researchers at top-universities generally wait longer for promotion. Again research visits do not reduce this time.

As for control variables we find that women have to wait longer to be promoted to full professor. We further see that the PhD institution plays no important role in promotion. Academics with a degree in medicine are promoted to full professor earlier than bioscience researchers.

[11] Job-mobility (MOBILITY) remains positive also if we do not include an interaction with visiting fellowship. The coefficient is very similar with 0.89

**Table 3: Survival analysis: risk of being promoted to Full professor in year t after BA.**

| VARIABLES | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Visit | 0.200 | | 0.487** | 0.186 | 0.203 |
| | (0.141) | | (0.189) | (0.184) | (0.197) |
| Visit_US | | 0.250 | | | |
| | | (0.168) | | | |
| Visit_Other | | -0.000 | | | |
| | | (0.246) | | | |
| Postdoc_Abroad | 0.140 | | | | |
| | (0.118) | | | | |
| Mobility | | | 0.963*** | | |
| | | | (0.121) | | |
| Inbred | | | | -0.325** | |
| | | | | (0.149) | |
| Mobility X Visit | | | -0.340 | | |
| | | | (0.281) | | |
| Inbred X Visit | | | | 0.003 | |
| | | | | (0.321) | |
| Stockpub | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Avgcit | 0.007*** | 0.007*** | 0.006*** | 0.007*** | 0.007*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Stockfund | 0.008*** | 0.008*** | 0.006** | 0.008*** | 0.008*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Female | -0.209 | -0.172 | -0.055 | -0.232 | -0.194 |
| | (0.217) | (0.215) | (0.228) | (0.222) | (0.215) |
| Med degree | 0.741*** | 0.765*** | 0.713*** | 0.779*** | 0.756*** |
| | (0.151) | (0.150) | (0.151) | (0.149) | (0.150) |
| Rank of Phd Institution | 0.111 | 0.119 | 0.025 | 0.057 | 0.109 |
| | (0.161) | (0.161) | (0.174) | (0.162) | (0.162) |
| Rank of Current Institution | -0.677*** | -0.670*** | -0.495** | -0.408* | -0.648*** |
| | (0.200) | (0.202) | (0.195) | (0.218) | (0.216) |
| Rank of Current Institution X Visit | | | | | -0.095 |
| | | | | | (0.455) |
| Reference Category: Japanese University | | | | | |
| Foreign Uni | -1.140* | -1.131* | -1.407** | -1.142* | -1.124 |
| | (0.659) | (0.685) | (0.695) | (0.674) | (0.685) |
| PRO | -3.393*** | -3.363*** | -3.389*** | -3.389*** | -3.374*** |
| | (1.034) | (1.036) | (1.038) | (1.035) | (1.035) |
| Subjects | 365 | 365 | 365 | 365 | |
| Observations | 5199 | 5199 | 5199 | 5199 | |
| log Likelihood | -1687 | -1687 | -1658 | -1685 | |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

### *5.2 Robustness check: DD Model*

Standard models that control for confounding factors fail if the treatment, mobility in our case, is time-variant (Robins, 1999). Thus, controlling for past values of for example productivity, which effect later mobility and promotion, can lead to biased estimates. Therefore, to address the problem of reverse causality between mobility and promotion, we use matching techniques to match each researcher to an immobile peer based on pre-mobility observable characteristics. This strategy considers mobility as a treatment with a lasting effect on researchers' careers. Research stays are usually undertaken by junior researchers

and can be assumed to be assigned based on criteria other than job ability or promotion prospects and can serve as a treatment affecting future career paths.

We thus divide the sample into a treated group and an untreated control group, i.e. researchers that participate in research stays and similar researchers that do not. We then use a difference-in-difference framework to estimate the effect of mobility on years until promotion. Thus, we analyse if, everything else being equal, academics that spend some time in a different, usually foreign institution as a visiting fellow are able to increase their value for the university and thus are promoted faster. The propensity score matching is described in Appendix A.

The difference-in-difference estimations for both promotions are shown in Table 4. The results show that research stays reduce the time until promotion once we control for pre-mobility factors and year fixed effects and institution rank. Thus, the career effect from the duration analysis can be confirmed. The effect is driven primarily by research stays at US institutions. Stays at institutions in other countries have no significant career advancing effect.

We then interact the treatment effect with other post-mobility characteristics. We see that in the matched sample mobility between universities delays promotion, while the interaction term is insignificant. Inbreeding, on the other hand, enhances promotion speed, and again the interaction is insignificant. This is somewhat counterintuitive as we would have expected increased benefits of research visits for inbred researchers and decreased benefits for mobile researchers. Neither is confirmed, perhaps due to the low overlap in these categories.

In all regressions we include institution rank at the time of promotion to control for any potential institutional differences. Researchers at top-universities are promoted later, which we already showed in the duration analysis. The interaction between rank and research stays is negative, indicating that the group of mobile researchers is promoted faster at higher rank institutions. Thus, research stays could indeed present a strategy to enhance promotion chances at top universities.

Also for promotion to full professor (Table 5) we find a career enhancing effect. Researchers participating in research visits are awarded their own chair sooner. Again, this effect is strongest for researchers that spent time in an US institution. Institution rank or any of the mobility interaction terms are insignificant, indicating that the effect of research visits is not compromised by other experiences or career decisions.

**Table 4: Difference in Difference Poisson Regression**
**Dependent Variable: Promotion to Associate Professors in years since PhD**

| VARIABLES | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Visit | -0.131* | | -0.107 | -0.126 | 0.00958 |
| | (0.0702) | | (0.0920) | (0.0930) | (0.101) |
| Visit_Non-US | | -0.105 | | | |
| | | (0.0962) | | | |
| Visit_US | | -0.146* | | | |
| | | (0.0793) | | | |
| Mobility | | | 0.233** | | |
| | | | (0.108) | | |
| Visit * Mobility | | | 0.0769 | | |
| | | | (0.155) | | |
| Inbred | | | | -0.212* | |
| | | | | (0.119) | |
| Visit * Inbred | | | | 0.0373 | |
| | | | | (0.148) | |
| Visit * Institution Rank | | | | | -0.474* |
| | | | | | (0.255) |
| Institution Rank (at time of Promotion) | 0.192 | 0.193* | 0.264** | 0.349** | 0.351** |
| | (0.117) | (0.117) | (0.119) | (0.138) | (0.149) |
| Year Fixed Effects | YES | YES | YES | YES | YES |
| Constant | 2.079*** | 2.079*** | 1.846*** | 2.079*** | 2.320*** |
| | (0.354) | (0.354) | (0.370) | (0.354) | (0.417) |
| Observations | 112 | 112 | 112 | 112 | 112 |
| log Likelihood | -283.6 | -283.5 | -277.8 | -281.3 | -281.7 |
| Pseudo R-squared | 0.0921 | 0.0924 | 0.111 | 0.0995 | 0.0983 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

**Table 5: Difference in Difference Poisson Regression**
**Dependent Variable: Promotion to Full Professors in years since PhD**

| VARIABLES | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Visit | -0.114** | | -0.118* | -0.113** | -0.117* |
| | (0.0482) | | (0.0653) | (0.0559) | (0.0646) |
| Visit_Non-US | | -0.0743 | | | |
| | | (0.0642) | | | |
| Visit_US | | -0.137** | | | |
| | | (0.0546) | | | |
| Mobility | | | -0.0277 | | |
| | | | (0.0712) | | |
| Visit * Mobility | | | 0.00698 | | |
| | | | (0.102) | | |
| Inbred | | | | 0.00224 | |
| | | | | (0.0976) | |
| Visit * Inbred | | | | -0.00225 | |
| | | | | (0.114) | |
| Visit * Institution Rank | | | | | 0.0155 |
| | | | | | (0.184) |
| Institution Rank (at time of Promotion) | 0.00550 | 0.00253 | 0.000579 | 0.00424 | 0.00193 |
| | (0.0826) | (0.0826) | (0.0846) | (0.104) | (0.105) |
| Year Fixed Effects | YES | YES | YES | YES | YES |
| Constant | 2.565*** | 2.565*** | 2.593*** | 2.565*** | 2.570*** |
| | (0.277) | (0.277) | (0.286) | (0.277) | (0.280) |
| Observations | 134 | 134 | 134 | 134 | 134 |
| log Likelihood | -361.6 | -361.2 | -361.5 | -361.6 | -361.6 |
| Pseudo R-squared | 0.0760 | 0.0771 | 0.0763 | 0.0760 | 0.0760 |

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

## 6 Conclusions

Mobility of researchers has received increasing support from policy makers around the world as an instrument to improve the performance of the research system by promoting the diffusion of knowledge, and facilitating knowledge and technology transfer, network creation, and productivity (OECD, 2008). In this context it is generally assumed that mobility will also benefit the individual academic, but evidence is mixed (Ackers, 2008). Further, life-long contracts and the importance of scholarly networks for increasing one's chances to be hired and promoted, endorse immobility in systems like Europe and Japan. Many young researchers in Japan have little incentive to go abroad as science facilities inside the country are of international standing and because their job chances may decrease upon return due to a close-knit scholarly network (MEXT, 2003; MEXT 2009). As a consequence of this the government has a long history of providing international mobility grants, which have been further strengthened in recent years. They also encourage and support universities to adopt a tenure-track program. These strategies are similar to those taken in Europe.

This paper investigated the effect of temporary mobility on time until promotion. As gaining promotion is the premise for access to resources and higher wages, a fast career progression is implicitly assumed to be the main objective of an academic. Temporary research visits may help to expand existing networks and promote knowledge transfer while at the same time ensuring career stability, identified as the main barrier to mobility in Europe and Japan (Cruz and Sanz, 2010; Stephan, 2012).

Using a dataset of 370 bioscience professors in Japan we identified their average career path and evaluated the role of mobility in Japanese universities. We find that merit does not determine promotion of early career researchers, but that it will predict promotion to full professor. Mobility reduces the time until promotion. Research visits have a positive effect on promotion and reduce the waiting time by one year. This provides evidence that research visits also benefit career development in the long-term. This positive research visit effect is weaker for researchers that also change jobs. Research visits may therefore present a way for immobile researchers to increase their human capital and speed up promotion without the need for job-job mobility. We also find that vising research stays are particularly important for inbred researchers, again indicating that visits discourage later mobility and increase promotion speed.

We further find that, while research stays of tenured staff enhance the career by providing an early chair, postdocs have no lasting effect on career progression. This is confirmed by a DD

estimation based on a sample of researchers participating in international postdocs and a matched control group (Appendix B). Instead, postdoctoral stays may be an indicator for a researcher's struggle to find a permanent position after the PhD. This 'extension of the educational career ladder' (Zumeta 1985) is a source of temporariness and uncertainty that could create future problems in recruiting and promotion, as a lack of autonomy and decreasing opportunities for specialisation are possible consequences of delaying tenured positions (Stephan 2012).

Our results present some interesting insights into the role of temporary research visits as a policy for career advancement. Research visits can be considered a form of on-the-job-training that increases skills but also job satisfaction and may thus increase a researcher's performance and sense of achievement. These personal benefits also raise the performance and visibility of the sending institution making the researcher more valuable. These benefits in turn translate into earlier promotion, and academics undertaking such research visits appear to be less likely to change institution, both indicating the increased value of the researcher. Research visits thus present personal and departmental benefits and a successful government faculty development program that should be further encouraged.

## References


Ackers, L. 2005. Moving people and knowledge: Scientific mobility in the European Union. International Migration, 43: 99-131.

Ackers, L. 2008. Internationalisation, mobility and metrics: A new form of indirect discrimination? Minerva, 46: 411-435.

Akabayashi, H., Naoi, M., 2004. Why is there no Harvard among Japanese private universities? Econometric Society Far Eastern Meetings, no. 726.

Agrawal, A., Cockburn, I., McHale, J. (2006) Gone but not forgotten: knowledge flows, labor mobility, and enduring social relationships. Journal of Economic Geography, 6, 571–591

Allison, P.D. and Long, J.S. (1990) Departmental effects on scientific productivity. American Sociological Review, 55 (4), 469-478.

Allen, T.D, Eby, L.T, Poteet, M.L., Lentz, E., Lima, L., 2004. Career benefits associated with mentoring for proteges: A meta-analysis. Journal of Applied Psychology, 89, 127-136.

Almeida, P. & Kogut, B. (1999) Localization of knowledge and the mobility of engineers in regional networks. Management Science, 45, 905–917.

Azoulay, P, Zivin, J.S.G. and Sampat, B.N. (2012) The diffusion of scientific knowledge across time and space: Evidence from professional transitions for the superstars of medicine. In: Lerner, J. and Stern, S. (2012) The Rate and Direction of Inventive Activity Revisited. NBER, University of Chicago Press.

Becker, G. S. (1962) Investment in human beings. Journal of political economy, 70, 9–49.

Burris, V. 2004. The academic caste system: Prestige hierarchies in PhD exchange networks. American Sociological Review 69(2) 239–264.

Camblin, L.D, Steger, J.A., 2000. Rethinking faculty development. Higher Education, 39, 1-18.

Canibano, C., Bozeman, B., 2009. Curriculum vitae method in science policy and research evaluation: the state-of-the-art. Research Evaluation, 18 (2), 86–94.

Canibano, C., Otamendi, J., Andujar, I. 2008. Measuring and assessing researcher mobility from cv analysis: The case of the ramon y cajal programme in spain. Research Evaluation, 17: 17-31.

Canibano, C., Otamendi, F. J., Solis, F. 2011. International temporary mobility of researchers: A cross-discipline study. Scientometrics, 89: 653-675.

Centra, J.A., 1978. Types of faculty development programs. The Journal of Higher Education, 49 (2), 151-162.

CNUFM (Center for National University Finance and Management), 2009. Research on Tuition and Expenses for Basic Education and Research at National Universities. Chiba, Japan.

Colquitt, J. A., LePine, J. A., Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. Journal of Applied Psychology, 85, 678–707.

Crane, D., 1965. Scientists at major and minor universities. A study of productivity and recognition. American Sociological Review, 30, 699–714.

Crane, D., 1970. The academic marketplace revisited: a study of faculty mobility using the Carter ratings. The American Journal of Sociology, 75, 953–964.

Cruz, L., Sanz, L. 2010. Mobility versus job stability: Assessing tenure and productivity outcomes. Research Policy, 39: 27-38.

Franzoni, C., Scellato, G., Stephan, P. (2012). The Mover's Advantage: Scientific Performance of Mobile Academics. NBER Working Paper 18577.

Enders, J. 2005. Border crossings: Research training, knowledge dissemination and the transformation of academic work. Higher Education 49: 119-133.
Enders, J., and Weert, E. 2004. Science, training and career: changing modes of knowledge production and labour markets. Higher Education Policy 17: 135-152.
European Commission. 2001. High-level Expert Group on improving mobility of researchers. Luxembourg: Office for Official Publications of the European Communities
European Commission. 2010. Europe 2020. A European strategy for smart, sustainable and inclusive growth. Luxembourg: Office for Official Publications of the European Communities.
Glanzel, W., Debackere, K., and Meyer M. (2008) 'Triad' or 'Tetrad'? On global changes in a dynamic world. Scientometrics 74(1): 71-80.
Griffiths, A., 2004. The Japanese employment system: image and reality in an evolving labour market. Economia, 55 (2), 1–30.
Hargens, L.L. and Farr, G.M. (1973) An examination of recent hypotheses about institutional inbreeding. American Journal of Sociology, 78, 1381–1402.
Horta, H. 2009. Holding a post-doctoral position before becoming a faculty member: Does it bring benefits for the scholarly enterprise? Higher Education, 58: 689-721.
Horta, H., Veloso, F.M., Grediaga, R., 2010. Navel gazing: Academic inbreeding and scientific productivity. Management Science, 56, 414-429.
Horta, H., Sato, M., Yonezawa, A., 2011. Academic inbreeding: exploring its characteristics and rationale in Japanese universities using a qualitative perspective. Asia Pacific Education Review, 12, 35–44.
Hunter, R. S., Oswald , A. J., Charlton, B. G. (2009). The Elite Brain Drain. The Economic Journal, 119, F231–F251.
Inanc, O., Tuncer, O. 2011. The effect of academic inbreeding on scientific effectiveness. Scientometrics, 88, 885-898.
Johnson, J.M., and Regets, M.C. 1998. International Mobility of Scientists and Engineers to the United States. Brain Drain or Brain Circulation? National Science Foundation Issue 22: 98-316.
Jonkers, K. 2011. Mobility, productivity, gender and career development of argentinean life scientists. Research Evaluation, 20: 411-421.
Jons, H. 2009. 'Brain circulation' and transnational knowledge networks: Studying long-term effects of academic mobility to Germany, 1954-2000. Global Networks-A Journal of Transnational Affairs, 9: 315-338.
Light, D., 1974. The structure of the academic profession. Sociology of Education, 47 (1), 2–28.
Long JS, Allison PD, McGinnis R., 1993. Rank advancement in academic careers: Sex differences and the effects of productivity. American Sociological Review, 58, 703-722.
Mahroum, S. 2001. Europe and the immigration of highly skilled labour. International Migration 39(5):27-42.
Melin, G. 2005. The dark side of mobility: Negative experiences of doing a postdoc period abroad. Research Evaluation, 14: 229-237.
MEXT (1980) Kyoiku Hakusho (Education White Paper), Tokyo; http://www.mext.go.jp/b_menu/hakusho/html/kyouiku.htm (*in Japanese)*
MEXT (2003) For the development of researchers for the global competition. Tokyo: MEXT *http://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu10/toushin/03063001.htm* (*in Japanese)*
MEXT (2009) For the development of human resources driving the knowledge-based society. Tokyo: MEXT

*http://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu10/toushin/attach/1287784.htm* (*in Japanese)*
Musselin, C. 2004. Towards a European academic labour market? Some lessons drawn from empirical studies on academic mobility. Higher Education, 48: 55-78.
OECD (2000) Mobilising human resources for innovation. Paris: OECD.
OECD (2008) The global competition for talent: Mobility of the Highly Skilled. Paris: OECD.
Oyer, P. (2008) Ability and employer learning : Evidence from the economist labor market. Journal of Japanese and International Economies, 22, 268-289
Parent, D., 1999. Wages and mobility: The impact of employer-provided training. Journal of Labor Economics, 17, 298-317.
Pezzoni, M., Sterzi, V., Lissoni, F., 2009. Career progress in centralized academic systems: an analysis of French and Italian physicists. Working paper.
Robins, J.M. (1999) Association, causation, and marginal structural models. Synthese, Vol. 121, pp. 151-179.
Saxenian, A. L. 2005. From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China. Studies in Comparative International Development, 40 (2), 35-61.
Scellato, G., Franzoni, C., Stephan, P. (2012). Mobile Scientists and International Networks. NBER Working Paper 18613.
Su, X., 2011. Postdoctoral training, departmental prestige and scientists' research productivity. The Journal of Technology Transfer, 36 (3), 275-291.
Statistics Bureau, 2012. Japan statistical yearbook. Tokyo: Statistical Research and Training Institute, Ministry of Internal Affairs and Communication.
Shimbori, M., 1981. The Japanese academic profession. Higher Education, 10, 75–87.
Stephan, P. (2012) How economics shapes science. Harvard University Press: Cambridge.
Stephan, P.E., Ma, J. (2005). The Increased Frequency and Duration of the Postdoctorate Career Stage. The American Economic Review, 95, 71-75.
Takahashi, S., Takahashi, A.M., 2009. Gender promotion differences in Economics Departments in Japan: a duration analysis. GSIR WP no. EAPO 09-4.
Takahashi, S., Takahashi, A.M., 2010. The effect of refereed articles on salary, promotion and labor mobility: The case of Japanese economists. Economics Bulletin, 30 (1), 330–350.
Tsuji, N. 2010. Transition of objectives of research abroad in modern Japan. Tokyo: Toshindo Publishing.
Zellner, C. 2003. The economic effects of basic research: evidence for embodied knowledge transfer via scientists' migration. Research Policy 32: 1881-1895.
Zinovyeva, N., Bagues, M., 2012. It's not what you know, but who you know: The role of connections in academic promotion. Mimeo.
Zubieta, A. F. 2009. Recognition and weak ties: Is there a positive effect of postdoctoral position on academic performance and career development? Research Evaluation, 18: 105-115.
Zumeta, W.M. (1985) Extending the educational ladder: The changing quality and value of postdoctoral study. Lexington: Lexington Books.

## Appendix A: Propensity Score Matching

We use propensity score matching to find a match for each researcher. Matching is based on observable characteristics before the move and controls are chosen so that (1) treated researchers have no differential publication, citation and funding records, (2) job experience distribution is similar for both groups, (3) year and PhD year distribution is similar, (4) postdoc and prior mobility is equally distributed, and (5) treatment and control group are similarly distributed across different institution types (quality ratings) and PhD rankings. Researchers that have not yet participated in research stays but do so after their promotion can serve as control group for researchers that participated before their promotion. We further restrict the matching to researchers at assistant professor level for measuring the impact on promotion to associate and to assistant and associate professor levels for promotion to full professor.

We match the 56 researchers that have visited another university while they were assistant professors with a colleague that remained in the university. Figure A.1 shows propensity scores of treated and untreated groups before and after matching. The matching returned two groups that are not statistically different in any of the matching criteria. Table A.1 displays descriptive statistics for the mobile and immobile group. Similarly, a control group is selected for those 67 researchers that were a visiting fellow before their promotion to full professor.

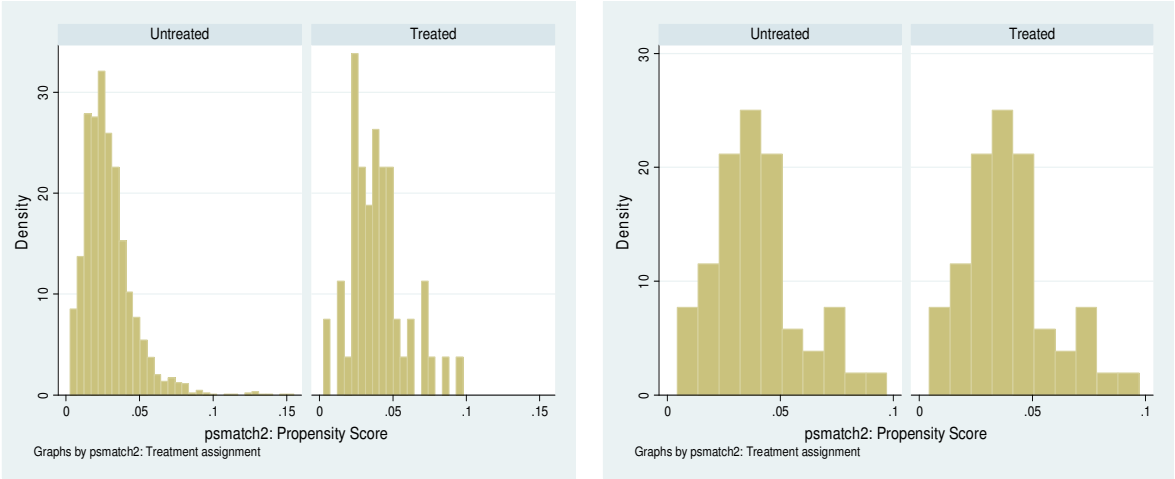


**Figure A.1: Propensity scores of treated and untreated groups before and after matching**

**Table A.1: Descriptive statistics of pre-treatment variables**

| | mean | sd | min | Max |
|---|---|---|---|---|
| Untreated | | | | |
| Experience | 4.98 | 3.82 | 0.0 | 16 |
| Female | 0.00 | 0.00 | 0.0 | 0 |
| Avgcit | 26.24 | 25.64 | 0.0 | 152 |
| Stockpub | 26.96 | 61.43 | 0.0 | 459 |
| Stockfund | 2.48 | 3.55 | 0.0 | 17 |
| PhdYear | 1985.41 | 5.61 | 1975.0 | 1997 |
| Postdoc Abroad | 0.02 | 0.13 | 0.0 | 1 |
| Postdoc Japan | 0.09 | 0.29 | 0.0 | 1 |
| Mobility | 0.21 | 0.41 | 0.0 | 1 |
| Med degree | 0.20 | 0.40 | 0.0 | 1 |
| Rank of Current Institution | 0.29 | 0.38 | 0.0 | 1 |
| Rank of Phd Institution | 0.50 | 0.37 | 0.0 | 1 |
| Year | 1989.45 | 6.16 | 1975.0 | 2002 |
| Treated | | | | |
| Experience | 4.55 | 2.40 | 1.0 | 12 |
| Female | 0.02 | 0.13 | 0.0 | 1 |
| Avgcit | 26.81 | 22.26 | 0.0 | 110 |
| Stockpub | 23.77 | 31.79 | 0.0 | 218 |
| Stockfund | 1.76 | 2.23 | 0.0 | 13 |
| PhdYear | 1984.88 | 5.62 | 1972.0 | 1996 |
| Postdoc Abroad | 0.05 | 0.23 | 0.0 | 1 |
| Postdoc Japan | 0.11 | 0.31 | 0.0 | 1 |
| Mobility | 0.14 | 0.35 | 0.0 | 1 |
| Med degree | 0.16 | 0.37 | 0.0 | 1 |
| Rank of Current Institution | 0.37 | 0.34 | 0.0 | 1 |
| Rank of Phd Institution | 0.53 | 0.33 | 0.0 | 1 |
| Year | 1988.95 | 5.46 | 1976.0 | 2001 |

## Appendix B: DD of Postdoc and Control Sample

To further check if research stays are desired over postdoctoral stays, we perform a DD analysis for postdoctoral mobility, matching the 29 researchers participating in international postdoctoral stays with 29 researchers that did not participate in such placements based on pre-mobility characteristics. We find that postdocs abroad do not reduce the time until promotion significantly, but neither do they delay promotion. The mean comparison test in Table B.1 shows that the difference in promotion is insignificant. We find the same results if instead we perform a Poisson regression that controls for university rank and year effects.

**Table B.1: Difference-in-Difference results (International Postdoc)**

| | Treated | Untreated | TT=b-a |
|---|---|---|---|
| Years until promotion to associate professor (29) | 9.27 (0.52) | 10.00 (0.53) | 0.72 |
| Years until promotion to full professor (29) | 16.41 (0.76) | 16.83 (0.86) | 0.41 |