

Repositório ISCTE-IUL

Deposited in *Repositório ISCTE-IUL*:

2020-11-25

Deposited version:

Accepted Version

Peer-review status of attached file:

Peer-reviewed

Citation for published item:

Horta, H., Jung, J. & Santos, J. M. (2020). Mobility and research performance of academics in city-based higher education systems. *Higher Education Policy*. 33 (3), 437-458

Further information on publisher's website:

10.1057/s41307-019-00173-x

Publisher's copyright statement:

This is the peer reviewed version of the following article: Horta, H., Jung, J. & Santos, J. M. (2020). Mobility and research performance of academics in city-based higher education systems. *Higher Education Policy*. 33 (3), 437-458, which has been published in final form at <https://dx.doi.org/10.1057/s41307-019-00173-x>. This article may be used for non-commercial purposes in accordance with the Publisher's Terms and Conditions for self-archiving.

Use policy

Creative Commons CC BY 4.0

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a link is made to the metadata record in the Repository
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Mobility and research performance of academics in city-based higher education systems

Abstract

This study assesses how four types of mobility, which are analysed simultaneously, is associated with the current research output quality and visibility of academics working in the city-based higher education systems of Hong Kong and Macau. Transnational educational mobility is associated with the academics' educational path, whilst intrasectoral job mobility, intersectoral job mobility and transnational job mobility are related to their professional careers. The research output, quality and visibility of academics are based on three indicators pertaining to the publications of these academics in international, peer-reviewed and indexed journals: the number of publications, the cumulative SCImago journal rank (SJR) of these publications (which measures quality from an output perspective) and the citations obtained by these publications (which measures visibility). The results show that different mobilities have different effects on research output, quality and visibility, and that often these effects can be beneficial to one indicator but concurrently detrimental to another. Nested analyses of science, technology, engineering and mathematics (STEM) and non-STEM academics, and by sex, offer further insight into the associations of these mobilities with knowledge output and outcomes.

Keywords: Mobility, Research Output, Quality and Visibility, STEM/Non-STEM, Male/Female

Introduction

Mobility in academia is generally seen as positive for academics and for universities (Jacob and Meek, 2013). The reasoning is that the academics' embodiment of scientific and technical human capital (Bozeman et al., 2005)¹ can be boosted by mobility experiences that expose them to environments that can stimulate their creativity and foster their social and professional networks, cultural awareness, knowledge accumulation and prestige (Cañibano et al., 2008). When mobile academics are employed by universities, they may be able to use the scientific and technical human capital gained through their mobility experiences to be more productive, engage in scholarly activities with higher levels of quality and visibility and add to the organisational pool of knowledge using new theoretical, methodological and societal approaches (Horta, 2013). Universities and other organisations hosting mobile academics are expected to benefit from their knowledge through interactive processes associated with knowledge production and exchange, which are difficult to acquire otherwise because of their tacit nature (Kim, 2010). However, other factors affect the potential benefits of mobility. The transaction costs of mobility such as cultural and career shocks, periods of adaptation, stereotypes and identity searching should also be considered, as they are relevant to and associated with tensions that need to be negotiated and overcome for the expected positive effects of mobility to be realised (Gopaul and Pifer, 2016). Nevertheless, the

¹ Scientific and technical human capital is defined as a researcher's aggregate technical skills and professional network.

belief that mobility brings positive outcomes is widespread, and governments and universities (through funding schemes, but also through recruitment and career incentives) encourage it (Kim, 2017). Academics know that mobility has become essential for those seeking to establish themselves in globalised academic labour markets dominated by mixed collaborative and competitive internationalisation trends (Jacob and Meek, 2013).

In this context, this study assesses the effects of past mobilities on current research output, output quality and academic visibility. The concurrent focus on four types of mobility rather than a single type is to stress the important effects that several mobilities may have on research output (publications and their quality) and outcomes (visibility as measured through citations) and to embed the need to consider multiple mobilities as relevant and potentially impactful to academic work, as argued by Hoffman (2009) and Ackers (2008). The analysis focuses on two aspects of transnational mobility – mobility during the educational path and mobility during the career – because these types of mobility have been relevant to academia since its infancy and there has been a growing emphasis on such mobility since the broadening and opening of global academic labour markets (Welch, 1997). The present analysis concurrently uses job mobility within the academic sector (intrasectoral mobility), measured by the number of jobs in academia, and job mobility outside the academic sector (intersectoral mobility), measured by the number of jobs outside academia. Job mobility is increasingly scrutinised by policymakers and researchers because of its potential to foster knowledge exchange and because intersectoral mobility is closely aligned with the idea of universities contributing to economic development (Veugelers, 2016). These mobilities have been associated with research outputs and outcomes, with mixed results, but rarely in an integrated form. A focus on publication-related information to assess the potential effects of mobilities is appropriate because publications (i.e., research published after a review process) are the tangible results of knowledge production successes and are an indirect proxy for a potential transformation of intangibles through mobility (e.g., growth in cultural awareness or tacit knowledge of academics) that is difficult to measure directly.

The main analysis is implemented for two groups of interest – science, technology, engineering and mathematics (STEM) and non-STEM academics – because mobilities are expected to have different degrees of importance for academics belonging to these communities. The education of STEM academics tends to be more international than that of non-STEM academics. In addition, STEM academics tend to use two global languages of science (English and mathematics) rather than national languages for their education and publications, and compared with their non-STEM counterparts, require more frequent mobility to access laboratory equipment located in other countries (for example, physicists and engineers going to the European Organization for Nuclear Research (CERN)) (Yonezawa et al., 2016). It is expected that the mobilities of female and male academics are also different and that their mobility-related constraints and benefits may be dissimilar. There are arguments in the literature that females are at a disadvantage in relation to males because female academics are less mobile than males and because mobility may not grant females as many benefits as it does males (see Jonkers, 2011).

This study adds to the literature by focusing on the impact of mobilities on the research-related work of academics currently in city-based higher education institutions in East Asia. Most recent studies of the mobility of academics have focused on countries in North America and Europe. However, interest in the

topic has grown in Asia and it is attracting the attention of researchers and policymakers alike. Thus far, studies on the topic in Asia have mainly focused on assessing state-sponsored 'reverse brain drain' policies, such as China's Thousand Talents Plan (e.g., Yang and Marini, 2019; Lu and Zhang, 2015), or on how Asian academics that have done their doctoral studies abroad perform in relation to those trained in their home country (Lin and Chiu, 2014). Only a few have considered the association between this educational mobility and the current research activities of academics (see Shin et al., 2014). Even fewer studies have analysed the association between the mobility of academics and their research output and visibility in city-based higher education institutions. However, it is becoming increasingly apparent that cities are not only drivers of economic development worldwide but also knowledge production and circulation poles in a global economy that is dependent on knowledge for innovation (Collins and Ho, 2014). Thus, this study focuses on academics working in Hong Kong and Macau, cities known for their cosmopolitanism and multiculturalism. Located in the Pearl River estuary, these multilingual and postcolonial cities are geographically close to each other. As special administrative regions of China, they enjoy a degree of freedom and openness to the rest of the world that other cities in mainland China do not. They differ in population size and land dimension, international renown, main economic drivers (insurance, banking and trading in Hong Kong; gambling and tourism in Macau) and the development stage of the higher education system. Their official spoken languages also differ, due to the influence of different colonisers: Hong Kong has English as one of its official languages, whilst Macau has Portuguese (Chou, 2012). In this study, academics working in these cities are analysed together, as the aim is not to compare the two cities or the academics working in one city in relation to the other, but to examine how mobilities affect academics' research output, quality and visibility in city-based higher education systems.

The article is organised as follows. The next section contains a literature review that discusses issues pertaining to the different mobilities of academics and covers empirical findings relating mobility to research output, quality and visibility. The methods section follows, in which the data and the methodology are explained. The subsequent section presents the findings, which are discussed in the final section, which concludes the article and presents some policy implications arising from the findings.

Literature review

The growing relevance of mobility to academic careers reflects the fact that scholarly activities (particularly research) are becoming increasingly international in scope and breadth under the growing influence of global and neoliberal agendas and the rise of metrics as evaluative tools in academia and science (Ackers, 2008). It also reflects the need for academics to network and to maintain a constant presence and visibility within their relevant communities as part of the negotiation of their scientific positioning within their universities and these communities (Storme et al., 2017). This growing relevance of academic mobility is also contextualised by knowledge production, dissemination and application processes, assuming that overlapping global, national and local characteristics and motivators mirror the growing complexity of science and technological development, including the associated incentives (Holm-Nielsen, 2018). Two main types of mobility have been highlighted in analyses of the mobility of academics: transnational mobility, which presupposes migration and cross-border elements (Teichler, 2015), and job

mobility, which can involve changes of job within the same sector of activity (in this case, the higher education sector) and job changes between higher education institutions (mostly universities) and the business, government or not-for-profit (e.g., NGO) sectors (Horta et al., 2018).

The attention given to these two types of mobility is associated with the increased internationalisation of academic careers and activities and the expected benefits of mobility for individuals (greater technical human capital, personal development, exposure to broader influences and learning, and access to new knowledge, among others) and the universities that host them (increased creativity, absorptive capacity, updated knowledge and access to state-of-the-art knowledge flows). Academics, particularly those in the younger generations, are increasingly sensitive to the need to be mobile (and internationalised) to be able to obtain professional rewards (Marini, 2018). One key factor related to (expected to result from) mobility and the internationalisation of academic work is publishing. In academia, it is becoming increasingly common for academics to publish in the English-language dominated international peer-reviewed literature to heighten chances of recruitment and career progression (even in the social sciences and humanities: Sivertsen, 2016) and to participate in international conferences and obtain co-authorship on international research projects and publications (Kosmutzky, 2018). Thus, universities worldwide are increasingly engaging in the isomorphic policy of borrowing perceived successful practices, norms and values from universities located at the centres of academic and scientific power that rely heavily on mobility and internationalisation and adopting them, sometimes with variations, which can create tensions and disruptions (Oleksiyenko, 2018). However, the perception is that the mobility of academics is good and desirable. International organisations such as the OECD and World Bank, and supra-national organisations such as the European Union have promoted mobility – particularly transnational mobility – as essential for boosting and optimising knowledge processes (Kim, 2017).

However, the findings regarding the effects of mobility on research output and outcomes are mixed. Most studies have underlined the idea that mobility tends to be beneficial, sometimes even in cases in which this relation is not empirically observed. Even when positive effects are not demonstrated, it is argued, mobilities give rise to opportunities that in the long run can augment the learning potential and the resulting activities of those who are mobile (although this may not be true for those not engaged in mobility) (Cañibano et al., 2008). Most relevant studies have found positive relations between transnational mobility and several indicators of research output and outcomes such as publications, citations and international co-authorship (Fangmeng, 2016; Aksnes et al., 2013). Yet there have been studies in which this positive relationship was not found, such as the study by Hunter et al. (2009) of the most highly cited physicists in the world, which found no statistically significant differences between the h-indexes of international movers and stayers. Similarly, Bolli and Schlapfer (2015) found that overseas experience was not related to research output and outcomes. Studies by Cañibano et al. (2008) and Shin et al. (2014) reported similar findings, although the latter found important differences between academics working in STEM and non-STEM fields. The authors of these studies suggested that the lack of relation between transnational mobility and research outputs and outcomes may be associated with the context and dependent on issues such as working conditions or available resources (see Jonkers, 2011). Others, such as Bolli and Schlapfer (2015), highlighted the possibility that other mobilities (such as virtual mobility;

see Hoffman, 2009) may be replacing the need for physical mobilities due to advances in information and communication technologies (ICT) and the lower costs of communication.

Somewhat inconclusive results have been reported concerning job mobility, but most point towards a positive relationship. Some studies have suggested that academics who are never mobile and remain working at the university that conferred their PhD tend to produce fewer publications than those who move between universities (e.g., Horta, 2013). Other studies have reported similar results but found that the relationship between job mobility and research outputs and outcomes is not linear and that as the number of jobs increases, the gains from mobility in relation to research output and outcome indicators decrease (Horta et al., 2018). However, some studies, such as that by Alipova and Lovakov (2017), have found no differences in research output and outcomes between academics that have never moved between universities and those that have. Studies on job mobility between non-academic sectors and academia have also presented mixed results. For example, whilst Zucker et al. (1997) found that mobility between industry and academia has positive effects on the research output and outcomes of academics, Dietz and Bozeman (2005) found exactly opposite results. The latter authors explained their findings by the 'replacement effect' that working in industry has on the preferred outputs of research by academics: patents and prototypes become more relevant than academic publications. This argument was also put forward by Toole and Czarnitzki (2010), who stressed the influence of socialisation processes that remain ingrained even as academics move from industry to academia, making them less interested in traditional academic research publication venues although they continue to use know-how gained outside academia to engage in activities related to knowledge transfer and the commercialisation of knowledge.

The general explanation for these mixed results for transnational/job mobility and research output and outcome indicators is that the experiences and influences gained by mobility are bound to change according to the academics' own characteristics (Crespi et al., 2007). The experience of mobility may not be rewarding or positive and can even be exploitative (Cantwell and Lee, 2010). It is also strongly affected by the systemic and institutional characteristics that define the places where academics work and their positioning in them (Hoffman, 2009). Thus, mobility is expected to differently influence the work attitudes, skillsets and outputs of those working in STEM fields, which are characterised by internationalism starting from the education years. STEM academics must read and eventually write articles in English, whilst those in the social sciences and humanities may not have to do so. Academics in STEM fields also need to access laboratories and other infrastructure, which requires them to be more internationally mobile (Yonezawa et al., 2016).

Similarly, differences are expected for women and men. Female academics tend to be less internationally mobile than male academics, not only for long-term overseas stays but also for short-term visits and conferences (Jons 2017). Being less internationally mobile makes female academics less integrated into international networks and less visible in the global academic community. Female academics also often have to cope with 'work versus family' dynamics putting them at a disadvantage compared with males concerning mobility opportunities (Schaer et al., 2017). Females are also usually the ones to follow their partners or spouses when a family mobility decision is made, and some mobilities may relate to non-career motifs and thus not be the most appropriate for career advancement (Tzanakou, 2017). In addition, female academics often experience more mobility constraints than their male colleagues do, including

greater difficulties in obtaining career benefits derived from mobility (Netz and Jaksztat, 2017). In contrast, several studies have suggested that transnational mobile experience provides more positive effects for female academics, as they are more likely than males to adapt to new research environments and to collaborate in their 'mobile places' (Rhoten and Pfirman, 2007). Once they return to their places of origin, however, they face challenges because the benefits from their mobile experiences are highly vulnerable due to social and cultural environments that do not encourage women to utilise resources (Mahlck, 2018). This discussion needs to be conducted within a framework that takes account of the fact that according to empirical studies, female academics still underperform in research output and outcomes compared with male academics (Leišytė, 2016).

These differences highlight that mobility is a complex process and that there is a need to account for mobilities as a part of increasingly non-linear academic trajectories. Rather than consider each mobility in isolation, acknowledging and considering different mobilities may permit a better understanding of the effects that these mobilities have on knowledge creation and dissemination activities (see Fontes, 2013).

Methods

Data

This study's data are the responses received to an online questionnaire that was live between December 2015 and February 2016 and sent to all academics working in universities in Hong Kong and Macau. After the respondents signed an informed consent form and agreed to participate in the study, they were asked to respond to a set of questions about demographics, education and employment trajectories. Initially, 1,035 respondents agreed to participate, but only 487 completed the questionnaire. The effective size of the analysed data is slightly lower due to critical non-imputable non-survey missing data (e.g. publications), as the publication data for the survey respondents were extracted from Scopus after the survey had been conducted. The distribution of Hong Kong and Macau academics from each university was reasonably balanced, meaning that the sample is generally representative of the population under consideration.

Procedure and variables

The analysis is based on three dependent variables. The first two are output variables: *Publications*, referring to the number of articles published during the previous three years (2014 to 2016), and *Publication Quality*, referring to the cumulative h-index of the journals in which these articles were published. The first variable serves as a proxy for publication output and the second for the quality of the output. These two measurements are used frequently in the literature (e.g., Bacini et al., 2014). The third dependent variable, *Citations*, is an outcome variable because it is associated with visibility, which may entail a positive, neutral or negative reception of the articles by the scientific community. This variable has been frequently used in studies focusing on mobility and research outputs and outcomes (e.g., Aksnes et al., 2013). The descriptive data show that academics in Hong Kong and Macau published an average of 4.3 articles from 2014 to 2016, with a standard deviation of 8.3, for a publication h-index of 1184.8 with a standard deviation of 4715.3. These articles received an average of 7.5 citations, with a standard deviation of 23.4. The relation between the means and the standard deviations is skewed, meaning that

some academics are more prolific, publish in higher quality journals and receive many more citations than others. Because all of the dependent variables are non-negative count data (i.e., integers) with an over-dispersed error term, a negative binomial regression is used, as it is the most appropriate analytical model given the characteristics of the dependent variable (see Hilbe, 2011)². The first analysis specifies three models, one for each dependent variable. In the following analyses, the initial models are subdivided into nested models. The exploratory variables for job changes are *Academic Job Count* (intra-sectoral mobility) and *Non-academic Job Count* (inter-sectoral mobility). Two quadratic terms referring to each of these explanatory variables are included because of the previous finding of non-linearity in the relation between job changes and research outputs (Horta et al., 2018). The exploratory variables concerning transnational mobility are *Transnational Educational Change* and *Transnational Job Changes*. The former is a dummy variable that refers to the eventual change of country during the educational path, whilst the latter refers to a job change that also involved a change of country, whether the job change was intrasectoral or intersectoral. Academics in Hong Kong and Macau had had on average 2.39 academic jobs (intrasectoral mobility), 0.48 non-academic jobs (intersectoral mobility) and 0.66 transnational job changes; 44% of them had also studied abroad. No mobility is the baseline for all these variables.

The analysis includes a set of control variables that are commonly used in the literature to assess the relation between mobility and research outputs and outcomes: sex (39% female), fields of knowledge (58% non-STEM academics), career research profile (number of citations divided by total number of publications; 8.2 on average), time since first job (16 years on average), changing fields of knowledge during education (41% of the sample did so), publications during PhD study (2 publications on average), perceived PhD-level skills (average of a set of 17 5-point Likert-scale skill block items used in the OECD's Careers of Doctorate Holders 2012 survey; the mean value for the sample was 3.95, indicating confidence about competences acquired during PhD studies), number of children (0.86 on average), whether they were local (0.38 were natives of Hong Kong or Macau), current working location (85% of the academics were working in Hong Kong) and the Herfindahl–Hirschman index of fields of career publications (mean of 0.21, suggesting that most of the academics were focused on a single field).

The models were all assessed by the most widely used diagnostic for multicollinearity, the variation inflation factor (VIF). The results show that multicollinearity was well within acceptable limits (below the commonly used threshold of 5). The mean VIF was around 1.41, with the highest variable value found for the natural and exact sciences (2.15). These values led to the dismissal of multicollinearity as a concern.

Results

The main findings in Table 1 show that mobilities are predictors of current research outputs and outcomes. The effects of these mobilities vary substantially depending on the knowledge creation and use perspectives: output, quality and visibility. Concerning knowledge outputs, the findings show that intrasectoral mobility leads to an increase of publications, but only up to a certain threshold, at which the benefits of this type of mobility start to decline. Intersectoral mobility only assumes a negative effect on publications when the number of non-academic jobs exceeds a threshold, but a one-time move to work

² For all models, the Likelihood-Ratio test of alpha was run. Based on the significant evidence of over-dispersion in all models, the negative binomial regression model is preferred to the Poisson regression model.

in the government, a firm or another organisation outside academia does not seem to have an impact compared with academics who have never worked in a non-academic job. These two results are aligned with the previous findings in the literature (e.g., Horta et al., 2018). Intrasectoral mobility does not seem to play a role in publication quality, but intersectoral mobility assumes a negative effect up to a determined number of jobs outside academia, after which there is a reverse trend associated with having held several of these jobs. It is possible that this finding is explained by exposure during the initial non-academic jobs to different cultural and social mindsets and experiences which is at first problematic, but which after some experience starts to shape the academic to engage with 'real life' challenges that more easily warrant publications in higher tier journals (see Harman, 2001). The only effect of transnational education is on publication quality. This effect is negative, but transnational job changes has a positive effect on both publications and publication quality, which underlines the greater importance of international mobility during the career stage compared with the educational stage in terms of the impact on research outputs and outcomes (as in Fangmeng, 2016). Although not analysed in this study, it is important to note that even if the effect of international education on publication quality is negative, other studies have demonstrated that being mobile during the educational stage influences the decision to work abroad (Parey and Waldinger, 2011), and transnational mobility exerts a positive effect on publication quality. Publication visibility seems to be affected by intrasectoral mobility only, and this effect is comparable to the association of this mobility with the number of publications. This finding is possibly explained by the networks created by academics in various places as they move between academic jobs, enhancing the visibility of their work and increasing its citation frequency (aligned with the idea of 'share and survive', which complements the 'publish or perish' paradigm; see Lee, 2004). This positive impact of academic job mobility on citations is in line with studies highlighting the relevance of integrating larger networks and 'advertising' one's research to achieve increased citations (highlighting that not only intellectual recognition but other 'non-scientific' factors play roles when publications are cited; see Bornmann and Hans-Dieter, 2008).

The results of the control variables are aligned with the findings expected from the literature. They show that demographic variables such as the number of children have positive effects on the research output and outcomes of academics (see Aiston and Jung, 2015). Publishing during the PhD has a positive effect on the number of publications (as found by Horta and Santos, 2016) but a negative impact on the quality of these publications, a phenomenon that the literature has not yet investigated. This seems to suggest that a focus on publishing during PhD work may lead to a socialisation of research focused on number of publications rather than one focused on publication quality. Perceived skillset by the end of the PhD is negatively associated with number of publications and citations, which suggests the presence of the Dunning-Kruger effect (see Kruger and Dunning, 1999). International academics publish more and are more cited than local academics, which aligns Hong Kong and Macau with higher education systems that recruit high-quality academics who are focused on research, and they thus contribute to local research capacity building (Kuzhabekova and Lee, 2018). However, the publication quality of these international academics is similar to that of local academics. Academics based in Hong Kong received more citations than those based in Macau, but both have similar publication patterns in terms of both number and quality. In terms of the career characteristics of the academics' research productivity, citations per publication are only associated with a higher number of citations, whilst the academics' ability to publish in journals affiliated with different disciplinary fields is a strong predictor of their ability to publish in quality journals. This is an interesting dynamic because similar to the effects of transnational mobility

during education and career, a multidisciplinary education leads to a negative association with publication quality, whilst multidisciplinary during an academic's career has the opposite effect. Finally, differences between fields of knowledge and gender are apparent (for example, female academics are found to under-perform compared with male academics in all dependent variables, making the nested analyses of these two groups of relevance).

<i>Variables</i>	Publications	Publication quality	Citations
Transnational Education Change	-0.100 (0.206)	-0.861** (0.419)	-0.265 (0.231)
Academic Job Count	0.293*** (0.104)	-0.203 (0.422)	0.305** (0.130)
Academic Job Count^2	-0.031* (0.016)	0.032 (0.051)	-0.041** (0.019)
Non-Academic Job Count	0.228 (0.197)	-1.041*** (0.219)	-0.069 (0.212)
Non-Academic Job Count^2	-0.223*** (0.079)	0.159*** (0.018)	-0.102 (0.095)
Transnational Job Changes Count	0.125** (0.063)	0.660** (0.266)	0.178 (0.124)
Female	-0.347*** (0.126)	-1.387** (0.655)	-0.348** (0.154)
Citations per Publication (Career)	0.001 (0.006)	-0.0004 (0.013)	0.036*** (0.010)
Time Since First Job	-0.001 (0.007)	-0.031 (0.037)	-0.016** (0.007)
Multidisciplinary Education	0.001 (0.105)	-1.307* (0.689)	-0.218 (0.144)
Pre-PhD Publications	0.026** (0.011)	-0.173*** (0.033)	0.016 (0.011)
Perceived PhD Skills	-0.248** (0.116)	0.426 (0.736)	-0.360*** (0.135)
Number of Children	0.134* (0.073)	-0.060 (0.221)	0.292*** (0.063)
Local	-0.374*** (0.130)	-0.099 (0.794)	-0.462** (0.183)
Working in Hong Kong	0.278 (0.217)	0.271 (0.546)	0.623* (0.365)
HHI for Field Career Publications	-0.101 (0.210)	23.28*** (0.872)	-0.065 (0.250)
Social Sciences	1.428*** (0.185)	2.621*** (0.513)	3.075*** (0.259)
Natural and Exact Sciences	2.269*** (0.224)	-1.335** (0.639)	4.353*** (0.388)
Medical and Health Sciences	2.439*** (0.236)	-0.102 (0.847)	4.533*** (0.509)
Engineering	2.607*** (0.169)	2.232*** (0.402)	4.483*** (0.412)
Constant	-0.218 (0.630)	-1.327 (2.693)	-1.942*** (0.752)
Observations	408	408	407

Notes. Clustered robust standard errors for the universities where academics are working are shown in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 2 shows the results for the research output and outcomes for academics in STEM and non-STEM fields. The most interesting finding is that transnational educational mobility and transnational job changes have mostly positive effects on research output and outcomes for academics working in STEM

fields (the former for publication quality and the latter for number of publications, publication quality and visibility). In contrast, for academics in non-STEM fields, transnational education mobility has a negative impact on publication quality, and transnational job changes have no statistically significant effects on research output or outcomes. Changing jobs in academia (intrasectoral mobility) plays a less important role, as it only influences the number of publications for academics in non-STEM fields and only affects the ability of academics in STEM fields to publish in more quality journals after a substantial number of job changes in the academic sector. In terms of intersectoral mobility, for academics in STEM fields, an excessive number of jobs in the non-academic sector lead to fewer publications and citations, but a smaller number of jobs outside academia enables them to publish more articles in quality journals. For academics working in non-STEM related fields, having worked in jobs outside academia does not affect the number of citations received, but whilst a smaller number of jobs in the non-academic sector has a positive effect on the number of articles published, it negatively affects the number of publications in high-quality journals. A larger number of jobs outside academia is beneficial for publication quality, but negatively affects number of publications.

These results highlight the need to consider the importance of different mobilities for STEM and non-STEM fields in terms of their impacts on research output and outcomes and they underline the relevance of field-specific factors influencing this association. For example, the relevance of international mobility for research output and outcomes in STEM fields may be related to the fact that these disciplines are already highly internationalised during the education stage and the need for international mobility increases throughout STEM careers, as research is reported in English in international venues and conferences, and research processes may require access to instrumentation and laboratories located abroad (Yonezawa et al., 2016). Intersectoral mobility seems to impact academics' research output and outcomes in both STEM and non-STEM fields. Although the findings can be straightforwardly explained for those academics in STEM fields (see Toole and Czarnitzki, 2010), the interpretation for non-STEM fields is more nuanced. The effect of intersectoral mobility on the output and outcomes in non-STEM fields may relate to two factors: the first is that non-academic jobs held by non-STEM academics are more likely to be in the government or in the not-for-profit sector and may involve dynamics, socialisations and ways of acting and performing that may differ from those reported in the literature, which is mostly focused on firms in the private sector (e.g., Dietz and Bozeman, 2005). The second is that the results suggest that a smaller number of jobs in the non-academic sector for academics in non-STEM fields may lead to a substitution effect, with a preference for more publications rather than publications in high-quality journals. This substitution effect is reversed when these academics have a larger number of jobs in the non-academic sector, which may be related to increased experience, more confidence and maturity and a broader understanding of issues that are more relevant to the requirements of publishing in top-tier journals.

Some of the control variables have similar effects for both STEM and non-STEM academics, such as citations per publication during the career, which positively affects the number of citations received for both groups, or the positive effect that publishing in journals from different fields has on the likelihood of publishing more in high-quality journals. Other selected control variables show radically different effects, such as the number of children, which is always positive for all of the research output and outcome variables for academics working in STEM fields, but it is not statistically significant for number of publications and citations for academics working in non-STEM fields, and it is detrimental to these

academics' ability to publish in quality journals. Finally, female academics underperform in relation to male academics only in STEM fields (where the general proportion of female to male academics is also more unequal).

Table 2 – Mobilities' associations with number of publications, publication quality and visibility (number of citations) in STEM and non-STEM fields

<i>Variables</i>	STEM			Non-STEM		
	Publications	Publication quality	Citations	Publications	Publication quality	Citations
Transnational Education Change	-0.237 (0.149)	1.653*** (0.471)	-0.671*** (0.226)	0.041 (0.330)	-1.962*** (0.505)	-0.205 (0.405)
Academic Job Count	-0.070 (0.075)	0.248 (0.921)	0.140 (0.182)	0.582* (0.313)	0.315 (0.806)	0.457 (0.361)
Academic Job Count^2	0.009 (0.014)	0.211** (0.083)	-0.043 (0.027)	-0.048 (0.040)	-0.058 (0.105)	-0.019 (0.050)
Non-Academic Job Count	0.186 (0.306)	3.131*** (0.532)	0.167 (0.420)	0.449** (0.223)	-1.550*** (0.542)	0.375 (0.385)
Non-Academic Job Count^2	-0.369*** (0.077)	-1.025*** (0.383)	-0.409** (0.179)	-0.205*** (0.079)	0.260*** (0.059)	-0.102 (0.098)
Transnational Job Changes Count	0.226** (0.109)	-3.091*** (0.646)	0.335** (0.137)	-0.086 (0.125)	0.748 (0.524)	-0.037 (0.186)
Female	-0.344** (0.168)	-2.221*** (0.640)	-0.478** (0.196)	0.037 (0.235)	0.054 (0.482)	0.486 (0.314)
Citations per Publication (Career)	-0.0013 (0.004)	0.014 (0.014)	0.027*** (0.007)	0.033 (0.022)	0.010 (0.053)	0.123*** (0.044)
Time Since First Job	0.006 (0.014)	-0.189*** (0.033)	0.005 (0.019)	-0.016* (0.009)	-0.024 (0.047)	-0.057*** (0.013)
Multidisciplinary Education	0.058 (0.140)	-0.890 (1.223)	0.195 (0.242)	0.287 (0.194)	0.496 (0.597)	0.472 (0.406)
Pre-PhD Publications	0.017*** (0.004)	-0.210*** (0.016)	0.009** (0.004)	0.175*** (0.046)	-0.020 (0.130)	0.167** (0.079)
Perceived PhD Skills	-0.469*** (0.121)	0.496 (0.450)	-0.614*** (0.182)	0.057 (0.227)	0.442 (0.976)	-0.210 (0.337)
Number of Children	0.288*** (0.109)	0.577*** (0.210)	0.513*** (0.092)	-0.046 (0.143)	-1.162*** (0.391)	0.031 (0.159)
Local	-0.287** (0.127)	0.031 (0.621)	-0.269 (0.196)	-0.441 (0.274)	-0.734 (0.822)	-0.793** (0.396)
Working in Hong Kong	0.041 (0.251)	0.105 (0.568)	0.473 (0.360)	0.370 (0.325)	1.034** (0.458)	0.895* (0.459)
HHI by Field Career publications	0.287 (0.408)	24.70*** (1.718)	-0.077 (0.344)	-0.369 (0.329)	20.30*** (1.361)	0.019 (0.366)
Constant	3.412*** (0.428)	-3.740** (1.687)	3.338*** (0.709)	-1.089 (1.233)	0.598 (3.813)	-1.091 (1.759)
Observations	186	186	186	222	222	221

Notes. Clustered robust standard errors for the universities where academics are working are shown in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

The analysis of how mobilities affect the research output and outcomes of female and male academics (Table 3) again shows the complex and nuanced effects that different mobilities can have on indicators associated with knowledge production, dissemination and use. Transnational job mobility leads to greater similarity between female and male academics, as it benefits females on publication quality and males on number of publications. The other mobilities show substantially different impacts by sex. Transnational

education mobility does not influence the research output or outcomes of female academics but has a negative effect on male academics' ability to publish in high-quality journals. Intrasectoral mobility is relevant for both sexes but much more relevant for female academics. Female academics with more jobs in different universities are more productive and have more visible research output than female academics who have not been mobile, although with decreasing marginal gains after a certain threshold of job changes. There is an inverse effect for female academics concerning the quality of publications. For male academics, the effect of intrasectoral mobility seems only to increase the visibility of their work, but there are diminishing returns if this mobility passes a threshold.

Considering the literature that identifies the higher participation of male academics compared with female academics in university–industry collaborations and mobility patterns (Tartari and Salter, 2015), it is perhaps surprising that intersectoral mobility seems to play a more important role for female academics than for male academics. Taking jobs in the non-academic sector leads female academics to be more productive than non-mobile female academics up to a threshold, and there is an inverse effect for publication quality. This means that intersectoral mobility has the potential to improve the research output of females, even if the effects change according to the intensity of job changes within the non-academic sector (where there seems to be a substitution effect: as more jobs are taken, the effect seems to shift from production to quality). Male academics only obtain positive effects on their research output after several jobs in non-academic sectors, which has the same substitution effect: having experienced one job in the non-academic sector has no statistically significant effects on their research production, quality or visibility.

Some of the control variables provide interesting findings. It is important to note that publishing during PhD work is particularly important for females, as those who have done so tend to have a greater ability to achieve more publications and visibility, although it is to the detriment of publishing quality. Male academics who published before PhD work tend to publish in lower-quality journals than male academics who did not publish during their doctoral studies. Male academics seem to be susceptible to the Dunning-Kruger effect, believing that they possess greater skills after their PhD than may in fact be the case (see Kruger and Dunning, 1999), whilst female academics do not appear to be susceptible to this effect. The number of children does not seem to affect female academics' research output and outcomes, but it does boost the output and visibility of male academics. However, the findings on the number of children should be interpreted with caution because no information is available about when these children were born, and the birth of a child may or may not affect mobility decisions.

Time since first job positively influences the number of publications and publication quality of female academics and negatively influences the visibility of the research published by male academics, which suggests that work experience and maturity are greater determinants for female academics than for male academics. Finally, although multidisciplinary education does not affect female academics' research output and outcomes, it negatively affects male academics' publication quality and research visibility. Publishing in a wider range of disciplines influences academics from both sexes in terms of publishing in quality journals, although it seems to be more relevant for female academics because it also boosts their research visibility.

Table 3 – Mobilities' associations with number of publications, publication quality and visibility (number of citations) for female and male academics

Variables	Female academics			Male academics		
	Publications	Publication Quality	Citations	Publications	Publication quality	Citations
Transnational Education Change	-0.132 (0.183)	0.011 (0.465)	-0.246 (0.236)	-0.053 (0.204)	-1.389*** (0.436)	-0.161 (0.265)
Academic Job Count	1.068** (0.444)	-2.840*** (0.676)	1.156** (0.485)	0.111 (0.109)	0.647 (0.607)	0.259** (0.117)
Academic Job Count^2	-0.179** (0.073)	0.409*** (0.134)	-0.242*** (0.079)	-0.005 (0.014)	0.035 (0.053)	-0.023* (0.013)
Non-Academic Job Count	0.835** (0.405)	-3.642*** (0.774)	0.634 (0.512)	0.119 (0.218)	-0.385 (0.499)	-0.003 (0.248)
Non-Academic Job Count^2	-0.493*** (0.183)	1.194*** (0.326)	-0.415* (0.224)	-0.168* (0.093)	0.170*** (0.055)	-0.090 (0.091)
Transnational Job Changes Count	-0.084 (0.170)	1.017*** (0.389)	0.180 (0.238)	0.193** (0.086)	-1.015 (0.624)	0.147 (0.140)
Citations per Publication (Career)	0.013 (0.012)	-0.051*** (0.012)	0.043*** (0.009)	0.001 (0.007)	-0.012 (0.015)	0.031** (0.013)
Time Since First Job	0.014* (0.008)	0.041** (0.020)	-0.018 (0.018)	-0.009 (0.008)	-0.035 (0.036)	-0.018** (0.007)
Multidisciplinary Education	-0.112 (0.302)	0.668 (0.708)	0.095 (0.447)	-0.098 (0.219)	-3.431*** (1.302)	-0.471** (0.225)
Pre-PhD Publications	0.028** (0.012)	-0.121* (0.069)	0.018** (0.007)	0.029 (0.025)	-0.167*** (0.019)	0.013 (0.029)
Perceived PhD Skills	-0.166 (0.305)	0.675 (0.446)	-0.588 (0.374)	-0.257** (0.117)	-0.413 (0.658)	-0.244** (0.107)
Number of Children	0.057 (0.181)	-0.088 (0.322)	0.176 (0.204)	0.171** (0.072)	-0.180 (0.270)	0.345*** (0.104)
Local	-0.511** (0.203)	0.737 (0.533)	-0.534* (0.298)	-0.480*** (0.171)	-0.657 (0.871)	-0.632*** (0.163)
Working in Hong Kong	-0.093 (0.205)	4.628*** (0.582)	0.081 (0.340)	0.386 (0.311)	-1.764* (0.991)	0.844* (0.471)
HHI by Field Career Publications	0.435 (0.384)	23.44*** (1.636)	1.061** (0.437)	-0.384 (0.318)	20.66*** (1.430)	-0.593 (0.408)
Social Sciences	1.528*** (0.382)	3.914*** (0.397)	2.843*** (0.686)	1.312*** (0.165)	1.203 (1.000)	3.088*** (0.419)
Natural and Exact Sciences	2.356*** (0.436)	0.839 (1.058)	3.841*** (0.733)	2.224*** (0.198)	-2.065 (1.411)	4.502*** (0.554)
Medical and Health Sciences	2.352*** (0.480)	0.733 (1.143)	3.741*** (0.616)	2.573*** (0.332)	0.857 (1.346)	5.123*** (0.694)
Engineering	2.980*** (0.429)	3.077*** (1.108)	4.161*** (0.871)	2.488*** (0.250)	-0.550 (1.293)	4.582*** (0.462)
Constant	-1.625 (1.486)	-8.708*** (2.428)	-1.555 (1.876)	0.126 (0.448)	5.440* (3.196)	-2.562*** (0.779)
Observations	146	146	145	262	262	262

Notes. Clustered robust standard errors for the universities where academics are working are shown in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Conclusion

This study contributes to the literature by analysing the association of transnational and job mobilities with knowledge output (number and quality of publications) and knowledge outcomes (visibility of publications as measured by citations). The main findings of the study are that although the mobility of academics has mostly positive effects on research endeavours, the associations are complex and nuanced.

The first main finding is that associations between mobilities and knowledge outputs and outcomes are often nonlinear, meaning that in some cases, mobility is positive until a certain threshold, at which point the initial benefits start to decline, whilst in other cases, mobility may be mostly detrimental and a substantial increase of mobility intensity may be required for this trend to change. The second finding is that a mobility type can be positively associated with one aspect of knowledge processes, such as the number of publications, whilst simultaneously being detrimental to another, such as publication quality. This suggests that mobilities may be closely associated with dynamic trade-offs, with one type of mobility benefitting one dimension of the knowledge process in one way but damaging the same process in a different way.

The findings of this integrated analysis also clarify the reasons why previous studies have had mixed findings – albeit mostly positive – regarding the relation between different mobilities and research productivity. Context and environmental changes may play key roles in explaining these findings (e.g., Cañibano et al., 2008), but this study clarifies that mobilities do not have to benefit all of the elements of the research process to contribute positively to knowledge outputs and outcomes. The analysis also suggests that the presence of substitution effects, such as the number of jobs taken outside academia, may lead to an increased ability to publish in top-tier journals but simultaneously to a decrease in publications. This means that mobilities have important effects on knowledge outputs and outcomes, but they cannot boost everything; decisions related to publication opportunities, targets and the increasingly important commodities of time and energy also play their roles (Kwiek, 2016). A third finding is that the study empirically validates arguments, such as that made by Shin et al. (2014), that transnational educational mobility may be beneficial in many ways for those who undertake it but it is not essential for becoming prolific in terms of number of publications, publication quality and visibility. In this respect, the relevance of transnational career mobility is much more evident.

The nuances and complexities concerning the association between mobilities and knowledge output and outcomes are also evident in the groups analysed. Transnational career mobility seems to be important for academics in STEM fields but is apparently less so for those in non-STEM fields, which may be because academics in STEM fields tend to be more internationally oriented, whilst the socialisation of academics in non-STEM fields tends to be contextualised and sensitive to national culture and society, and to rely more on national languages. Benefits of intrasectoral mobility to knowledge outputs and outcomes are present but relatively minor for both STEM and non-STEM fields. Intersectoral mobility has greater relevance for both groups. The relevance of this mobility was known previously and has been extensively studied for academics in STEM fields (e.g., Dietz and Bozeman, 2005), but it remains understudied for academics in non-STEM fields. For the latter, because non-academic jobs are taken by non-STEM field academics in the government and not-for-profit sectors, the dynamics that lead to this this mobility and its effects merits further research. This study contributes to this line of research by showing that intersectoral mobility can have clear positive effects on the knowledge output and outcomes of academics in non-STEM fields. Policymakers, national funding agencies, and university managers can take this into consideration in the development of schemes for intersectoral mobility for academics (including those in early academic careers) in these fields.

Differences between female and male academics also highlight the importance of key mobilities to each group: transnational career changes are beneficial for the knowledge output and outcomes of both female and male academics, whilst intrasectoral and intersectoral mobility mostly benefit female academics. These findings underline Singh's (2018) argument that mobile experience provides key comparative advantages for female academics, as fewer female academics have mobile experiences compared with their male peers. Such experiences enable female academics to substantially strengthen their scientific and technical human capital in a way that increases the quantity and quality of their scholarly work. Given the underperformance of female academics in relation to male academics in terms of knowledge output and outcomes (particularly in STEM fields), universities should consider implementing conditions that allow female academics to experience mobility to other universities and organisations in the non-academic sector to foster their research production, quality and visibility.

The study's analysis has some limitations. The first relates to the lack of accurate information about the duration and location of the mobilities investigated. Both are relevant as they could provide a finer analysis of how mobility characteristics can influence the research output and outcomes of academics. The second is that the analysis is correlational rather than causal (in common with most studies on the topic). It is therefore not possible to discern specific relationships such as identifying the initial driver in the relation between the mobility of academics and their research output and outcomes. This study instead departs from the common assumption used in the literature focusing on the effects of mobility of academics associated with research outputs and outcomes. The study also offers some insights for potential future studies. One of them is a better understanding of the dynamics between mobility during education, mobility during the career, and research and scholarly achievements, as well as between multidisciplinary during education, multidisciplinary during the career, and research and career achievements. It seems that during education the direct association with research and scholarly achievements is one of loss, but this changes substantially during the career stage, and it is likely that engaging in mobility during the career and multidisciplinary is strongly driven by similar experiences during education. There is also potential to build on the existing model but focusing on collaborations, considering co-authors, institutions and countries, rather than on knowledge output, quality and visibility. Such analyses could yield further insights into the effects that mobilities may have in driving scholarly work in contemporary academia.

References

- Ackers, L. (2008). Internationalisation, mobility and metrics: A new form of indirect discrimination? *Minerva* 46: 411-435.
- Aiston, S.J., & Jung, J. (2015) Women academics and research productivity: An international comparison. *Gender and Education* 27(3): 205-220.
- Aksnes, D.W., Rorstad, K., Piro, F.N., & Sivertsen, G. (2013) Are mobile researchers more productive and cited than non-mobile researchers? A large-scale study of Norwegian scientists. *Research Evaluation* 22: 215-223.
- Alipova, O., & Lovakov, A. (2017) Academic inbreeding and publication activities of Russian faculty. *Tertiary Education and Management* 24(1): 66-82.

- Bacini, A., Barabesi, L., Cioni, M., & Pisani, C. (2014) Crossing the hurdle: The determinants of individual scientific performance. *Scientometrics* 101: 2035-2062.
- Bolli, T., & Schlapfer, J. (2015) Job mobility, peer effects, and research productivity in economics. *Scientometrics* 104: 629-650.
- Bornmann, L., & Hans-Dieter, D. (2008) What do citation counts measure? A review of studies on citing behaviour. *Journal of Documentation* 64(1): 45-80.
- Cañibano, C., Otamendi, J., & Andújar, I. (2008) Measuring and assessing researcher mobility from CV analysis: The case of the Ramón y Cajal programme in Spain. *Research Evaluation*, 17(1): 17-31.
- Cantwell, B., & Lee, J.J. (2010) Unseen workers in the academic factory: Perceptions of neoracism among international postdocs in the United States and the United Kingdom. *Harvard Educational Review* 80(4): 490-516.
- Chou, B. (2012) The paradox of educational quality and education policy in Hong Kong and Macau: A postcolonial perspective. *Chinese Education and Society* 45(2): 96-110.
- Collins, F.L., & Ho, K.C. (2014) Globalising higher education and cities in Asia and the pacific. *Asia Pacific Viewpoint* 55(2): 127-131.
- Crespi, G. A., Geuna, A., & Nesta, L. (2007) The mobility of university inventors in Europe. *Journal of Technology Transfer* 32: 195-215.
- Dietz, J. S., & Bozeman, B. (2005) Academic careers, patents, and productivity: Industry experience as scientific and technical human capital. *Research Policy* 34(3): 349-367.
- Fangmeng, T. (2016) Brain circulation, diaspora and scientific profess: A study of the international migration of Chinese scientists, 1998-2006. *Asian and Pacific Migration Journal* 25(3): 296-319.
- Fontes, M., Videira, P., & Calapez, T. (2013) The impact of long-term scientific mobility on the creation of persistent knowledge networks. *Mobilities* 8(3): 440-465.
- Gopaul, B., & Pifer, M. J. (2016) The conditions of movement: A discussion of academic mobility between two early career scholars. *Higher Education Quarterly* 70(3): 225-245.
- Harman, G. (2001) University–industry research partnerships in Australia: Extent, benefits, and risks. *Higher Education Research and Development* 20(3): 245-264.
- Hilbe, J.M. (2011) *Negative binomial regression*. Cambridge: Cambridge University Press.
- Hoffman, D. M. (2009) Changing academic mobility patterns and international migration: What will academic mobility mean in the 21st century? *Journal of Studies in International Education* 13(3): 347-364.
- Holm-Nielsen, L.B. (2018) Universities: From local institutions to global systems? Implications for students, staff, and institutions. *European Review* 26(S1): S124-S148.
- Horta, H. (2013) Deepening our understanding of academic inbreeding effects on research information exchange and scientific output: New insights for academic based research, *Higher Education* 65(4): 487-510.
- Horta, H., & Santos, J. M. (2016) The impact of publishing during PhD studies on career research publication, visibility, and collaborations. *Research in Higher Education*, 57(1): 28-50.

- Horta, H., Jung, J., & Santos, J.M. (2018) Effects of mobilities on the research output and its multidisciplinary of academics in Hong Kong and Macau: An exploratory study. *Higher Education Quarterly* 72(3): 250-265.
- Hunter, R.S., Oswald, A.J., & Charlton, B.G. (2009) The elite brain drain. *The Economic Journal* 119(538): F231-F251.
- Jacob, M., & Meek, L. (2013) Scientific mobility and international research networks: Trends and policy tools for promoting research excellence and capacity building. *Studies in Higher Education* 38(3): 331-344.
- Jonkers, K. (2011) Mobility, productivity, gender and career development of Argentinian life scientists. *Research Evaluation* 20(5): 411-421.
- Jons, H. (2017) Feminizing the university: The mobilities, careers, and contributions of early female academics in the University of Cambridge, 1926-1955. *The Professional Geographer* 69(4): 670-682.
- Kim, T. (2010) Transnational academic mobility, knowledge, and identity capital. *Discourse: Studies in the Cultural Politics of Education* 31(5): 577-591.
- Kim, T. (2017) Academic mobility, transnational identity capital, and stratification under conditions of academic capitalism, *Higher Education* 73(6): 981-997.
- Kosmutzky, A. (2018) A two-sided medal: On the complexity of international comparative and collaborative team research. *Higher Education Quarterly* 72(4): 314-331.
- Kruger, J., & Dunning, D. (1999) Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology* 77(6), 1121-1134.
- Kuzhabekova, A., & Lee, J. (2018) International faculty contribution to local research capacity building: A view from publication data. *Higher Education Policy* 31(3): 423-446.
- Kwiek, M. (2016) The European research elite: A cross-national study of highly productive academics in 11 countries. *Higher Education* 71(3): 379-397.
- Lee, S.Y. (2004) Carpe diem. Retooling the "publish or perish" model in the "share and survive" model. *Plant Physiology* 134: 543-547.
- Leišytė, L. (2016) New public management and research productivity: A precarious state of affairs of academic work in the Netherlands, *Studies in Higher Education* 41(5): 828-846
- Lin, E.S., & Chiu, S.-Y. (2014) Can a doctoral degree be completed faster overseas than domestically? Evidence from Taiwanese doctorates. *Higher Education* 68(2): 263-283.
- Lu, X., & Zhang, W. (2015) The reversed brain drain: A mixed-method study of the reversed migration of Chinese overseas scientists. *Science, Technology & Society* 20(3): 279-299.
- Mahlck, P. (2018). Vulnerability, gender and resistance in transnational academic mobility. *Tertiary Education and Management* 24(3): 254–265.
- Marini, G. (2018) A PhD in social sciences and humanities: Impacts and mobility to get better salaries in an international comparison. *Studies in Higher Education*, online first, <https://doi.org/10.1080/03075079.2018.1436537>

- Netz, N., & Jaksztat, S. (2017) Explaining scientists' plans for international mobility from a life course perspective. *Research in Higher Education* 58: 497-519.
- Oleksiyenko, A. (2018) Zones of alienation in global higher education: Corporate abuse and leadership failures. *Tertiary Education and Management* 24(3): 193-205.
- Parey, M., & Waldinger, F. (2011) Studying abroad and the effect on international labour market mobility: Evidence from the introduction of ERASMUS. *The Economic Journal* 121(551): 194-222.
- Schaer, M., Dahinden, J., & Toader, A. (2017) Transnational mobility among early-career academics: gendered aspects of negotiations and arrangements within heterosexual couples, *Journal of Ethnic and Migration Studies* 43(8): 1292-1307.
- Shin, J. C., Jung, J., Postiglione, G., & Azman, N. (2014) Research productivity of returnees from study abroad in Korea, Hong Kong, and Malaysia. *Minerva* 52(4): 467-487.
- Singh, V. (2018) Comparing research productivity of returnee-PhDs in science, engineering, and the social sciences. *Scientometrics* 115(3): 1241-1252.
- Sivertsen, G. (2016) Patterns of internationalization and criteria for research assessment in the social sciences and humanities. *Scientometrics* 107(2): 357-368.
- Storme, T., Faulconbridge, J.R., Beaverstock, J.V., Derudder, B., & Witlox, F. (2017) Mobility and professional networks in academia: An exploration of the obligations of presence. *Mobilities* 12(3): 405-424.
- Tartari, V., & Salter, A. (2015) The engagement gap: Exploring gender differences in university–industry collaboration activities. *Research Policy* 44(6): 1176-1191.
- Teichler, U. (2015). Academic mobility and migration: What we know and what we do not know. *European Review*, 23(S1): S6-S37.
- Toole, A.A., & Czarnitzki, D. (2010) Commercializing science: Is there a university “brain drain” from academic entrepreneurship? *Management Science* 56: 1599-1614.
- Tzanakou, C. (2017) Dual career couples in academia, international mobility and dual career services in Europe. *European Educational Research Journal* 16(2-3): 298-312.
- Veugelers, R. (2016) The embodiment of knowledge: Universities as engines of growth. *Oxford Review of Economic Policy* 32(4): 615-631.
- Welch, A.R. (1997) The peripatetic professor: The internationalization of the academic profession. *Higher Education* 34(3): 323-245.
- Yang, L., & Marini, G. (2019). Research productivity of Chinese Young Thousand Talents. *International Higher Education* 97: 17-18. <https://doi.org/10.6017/ihe.2019.97.10944>
- Yonezawa, A., Horta, H., & Osawa, A. (2016) Mobility, formation and development of the academic profession in science, technology, engineering and mathematics in East and South East Asia. *Comparative Education* 52(1): 44-61.
- Zucker, L. G., Darby, M. R., & Torero, M. (1997). *Labor mobility from academe to commerce*. National Bureau of Economic Research. Massachusetts: United States.