Chinese Interpreting Studies:
Structural determinants of MA students' career choices

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Abstract
During the last 30 years, the growth of the interpreting industry in China has been outstanding. Increasing economic and political collaboration has driven the demand for interpreters to bridge the linguistic and cultural divides that exist between China and the West. With the creation of master's and bachelor's degrees in Interpreting and Translation all over China, hundreds of graduates from various universities have since undertaken distinctly different career paths. Using an exhaustive corpus of Masters' theses and a combination of logistic regression and Targeted Maximum Likelihood Estimation (TMLE) to establish causalities, this paper focuses on some of the structural determinants of graduate students' career choices. The paper examines to what extent university affiliations, thesis advisors, research methodology and thesis content influence the choice to pursue an academic career. The research reveals that graduating from a top university makes students less likely to become academics, and studying under a top advisor does not necessarily increase an individual's chances of securing an academic post. By contrast, writers of empirical theses or ones that are about training are more likely to enter the academic sphere.

Background

The enlargement of the European Union (EU) and increasing integration of the world economy has given rise to a growing demand for interpreting services and contributed to the creation of numerous interpreter training programs worldwide over the past two decades. At the turn of the millennium more than 230 schools in over 60 countries offered different levels of training, with EU nations taking the lead, accounting for more than half of the total (Niska 2005).

In the 21st century the landscape has changed significantly, with China rising to prominence as a major global power, more closely linked with the rest of the world than ever before. This expanding political and economic interaction has led to an increase in demand for interpreters, to help break down the linguistic and cultural barriers that for so long hindered communication and cooperation between China and the 'outside world'. As a consequence, the interpreting industry of the People's Republic has obtained for itself a significant position in the world market for professional training: as of early 2013 there were Master's programs in Translation and Interpreting at 159 Chinese universities (Chai 2012), compared with a single university just 20 years earlier.

Whereas formal training in interpreting is still a relatively new phenomenon in China, in the West it has a much longer history, allowing it time to develop into a mature academic discipline (Moser-Mercer 2011). The first Western school for interpreter training was established in 1941 at the University of Geneva (Moser-Mercer 2005), almost four decades before its Chinese counterpart. By 2013 a total of 69 programs worldwide met the Association Internationale des Interprètes de Conférence's (AIIC) standards for interpreter training, but only one of these was in China.

Western research into the subject has gone through several phases since its inception in the 1950s, and is increasingly characterised by empirical research and an interdisciplinary approach. Early Western interpreter training courses focused heavily on practice (Moser-Mercer 2005), but today their curricula commonly feature elements of research and theory. While interpreter education in China is still practice-driven, all students, unlike their predecessors, are now required to produce theses before they can be awarded master's, resulting in a new trend toward academic research.

There is general agreement among academics that graduate students in any discipline should master two types of knowledge in their training (Becher 1989): obviously they must know their subject matter, but they need also to learn the code and culture of their chosen discipline. Becher observed that this second stream of knowledge acquisition, the ultimate aim of which is to produce professionals who know how to conduct themselves appropriately in their work, begins as early as the undergraduate level and continues through postgraduate education. The culmination of this dual-track process is the thesis, which marks a student's training completion and readiness to work as a fully-qualified professional (Kushkowski, Parsons & Wiese 2003).

This description of graduate education as a process of knowledge accumulation and professional socialisation undoubtedly applies in the case of interpreter training. However, certain unique features set interpreting apart from other disciplines. Unlike neighbouring areas of academic enquiry such as linguistics or psychology, a PhD in interpreting studies is not a prerequisite for becoming a professional practitioner or a faculty member teaching or engaged in research, and indeed a master's is often the highest qualification a student obtains before venturing out into the world of paid work.

In the field of Chinese Interpreting Studies (CIS), the first master's thesis was produced in 1994, when the conference interpreter training program at Beijing Foreign Studies University (BFSU) was upgraded and granted its own formal graduate school (Wang 2006). In this new incarnation it began to offer theoretical instruction in addition to practical training. Since then, as part of the requirements for graduation laid down by the Chinese National Degree Commission, all MA students throughout China must complete a thesis in addition to passing performance-based exams in interpreting before they can be awarded a master's degree. As of 2015, a large number of teachers and academics in CIS—and no fewer than 12 of the 20 most active MA advisors—do not have PhDs. It should be pointed out that CIS theses may be written in either Chinese or English.

Moser-Mercer (2011) argues that interpreting studies, despite its youth relative to more established disciplines (chemistry, physics, etc.), now stands at the beginning of what Shneider (2009) describes as the third stage of a discipline's evolution, that in which most of its 'stock' of knowledge is produced and understanding of the subject deepened, largely thanks to new research. The progress of a discipline cannot be separated from the research contributions of its scholars. New graduates in interpreting who take up careers in academia represent the future of the field, so understanding the factors that contribute to their choice of an academic or a professional career would help institutions and those who frame educational policy make informed decisions on how to better shape the development of the field, for example by allocating funds in the direction of research topics that ought to promise that more students will enter the academic sphere.

The primary focus of this paper is to examine whether students' academic affiliations or particular features of their theses can serve to predict the type of career they are likely to pursue after graduating. The emphasis is therefore on factors that may be termed 'structural' rather than 'social' (students' social and economic background, gender, etc.), though the two can sometimes be difficult to disentangle.

Research questions
This paper examines the role played by four structural factors in whether or not students decide to pursue an academic career after completing their master's degree. The first two factors relate to the students themselves; the other two are thesis-related.

1. *How does attending a top-ranking university influence a student's likelihood of undertaking an academic career?*

   Despite the scientific community's meritocratic tendencies, a scholar's career prospects can be adversely affected by the university he attended (Long & Fox 1995). Furthermore, numerous studies have shown a strong correlation between the academic reputation of a scholar's doctoral program and his first academic position (Caplow & McGee 1965; Cole & Cole 1973). In the field of interpreting, AIIC produces a directory listing the names of interpreter training schools that meet its rigorous standards.

   Given that in interpreting studies, as in other academic disciplines, not all schools or training programs are created equal, one is justified in asking if students from certain schools might find it easier to secure academic posts than others. To answer this, the present study examines the effect of CIS students' academic affiliations on their career prospects immediately after qualifying, and why graduates from top-flight universities

are more likely to pursue academic careers than their colleagues from lower-ranking interpreter training schools.

2. *Can a student's career path be predicted from his choice of thesis advisor?*

Thesis advisors are certainly one of the most important sources of influence over students' academic and professional progress. Advisors share technical knowledge of the subject matter and provide a first line of quality assurance before a thesis is presented to review committee for final approval (Cone & Foster 1993). Also, though an MA student generally has to provide the labour and perform sometimes repetitive and tedious chores, as the thesis progresses and his research skills evolve and mature so does the advisor's input frequently increase, sometimes to the point where the collaboration develops into a full-blown co-authorship (Long & McGinnis 1985). Consequently when the thesis is completed, the advisor's name is listed alongside that of the author, making it doubly important that the work be of the best possible standard. It is important, also, that advisors act as sponsors, inducting students into the social network of a scientific community (Brown 1967; Merton 1973). Advisors—in particular those with a well-established reputation to maintain—do not take their role lightly: they seek to ensure that they introduce to the elite academic club of scholars only those who are able to contribute to the knowledge fund and be accepted as credible new members. Finally, as suggested in Long & McGinnis's study of biochemists (1985), advisors' own academic performances have a positive effect on the placement of their student collaborators, though this effect does not exist for sole-authorship students.

The present study examines these various aspects of 'the advisor effect' on students' career paths, and hypothesises that the most frequently engaged advisors are the most likely to influence students in their choice of whether or not to pursue an academic career.

3. *To what extent does an emphasis on empirical compared to non-empirical thesis work help predict the course of a student's subsequent career?*

Numerous scholars from the international interpreting community (e.g. Lambert 1994; Gile 1994; and Pöchhacker & Shlesinger 2002) have recognised the value of empirical research, and there has been an increasing call within the CIS community in particular (e.g. Tang 2010; Zhang 2011) for scholars to conduct more data-driven studies. Empirical research generates evidence-based knowledge that can then be shared with other scholars and with professionals seeking to improve their skillsets. The empirical approach is especially valuable in interpreting studies, which was started by practising interpreters who relied on intuition and ratiocination to develop theories. As Lambert (1994) observed, the interpreting process is a complex one, making it difficult to design studies for which enough willing and competent participants can be mustered and, above all, which are as close to failsafe as it is possible to be. Against this background it can be hypothesised that students whose theses employ the empirical approach must be highly motivated in that direction and that consequently they are more likely to pursue academic careers than their non-empirical colleagues.

4. *Do research topics influence career choice?*

Selecting the right research topic is the essential first step when it comes to writing a successful MA thesis. Students should not, however, overlook the fact that their decision may influence their long-term interests as professional researchers in the field, as well as their career prospects as academics or otherwise. An on-trend mainstream topic may provide them with a wide choice of thesis advisors and open the doors to a well-established community of researchers; it may even make it easier to secure funding. Conversely, those who opt for paths less trodden may subsequently have difficulty in finding a PhD advisor willing to pursue the same line of research; should they set their sights on faculty positions, an esoteric choice of MA topic may fail to pique the interest of—and may even actively prejudice—potential employers. Though creativity and originality are frequently rewarded in the world of scientific thinking, this is much less the case in the IS community, where leading researchers such as Gile (1998) strongly encourage the replication of pioneering studies. It can therefore be hypothesised that students who produce theses that deal with mainstream research topics are more likely to pursue academic careers.

Methods

Data collection

Considerable effort was made to procure, analyse and investigate a broad range of CIS theses produced at universities in both mainland China and Taiwan as it was felt that a large and representative sample of data was necessary to draw robust and meaningful conclusions. The comprehensive—near exhaustive—size of the collection removed from the present work a data-based limitation that was to be found in previous exploratory studies such as Zhao's (2009). For instance, a corpus of close to 1,300 MA papers was examined for the present study. The texts were obtained through the official Chinese repositories of electronic theses (the China Knowledge Resource Integrated Database—CNKI, Wanfang, and the National Digital Library of Theses and Dissertations in Taiwan) In certain cases, library visits were made when theses were only available for review at the universities themselves. Of the 1,290 theses in the dataset, 70 were available only as abstracts; 22 were embargoed, i.e. only their titles were available; and one was collected through citation analysis.

It should be noted that a small number of schools in China, such as the Shanghai International Studies University (SISU) and the University of International Business and Economics (UIBE), offer two-year graduate-level training courses, which lead to a certificate (not a degree) in interpreting and which do not require students to write theses. Also, some universities, such as the Middlebury Institute of International Studies at Monterey and those in the United Kingdom, do not insist on their students writing theses as a condition for graduation. The combined student population of the aforementioned non-thesis-writing schools is rather small—SISU and UIBE, for example, produce fewer than 10 graduates per year—so excluding their data from the present analysis did not affect the extent to which the conclusions reached could be applied to the whole CIS student population.

Coding schemes
    Student profiling
To find out what types of student enter the ranks of academics after earning their MAs, an initial manual search was performed on the Internet and on the CNKI academic database to identify the post-graduation career paths of the authors in the dataset, each student being labelled according to subsequent career path: scholar, practicing interpreter, both, or unknown. The results show that 20% of the students were found to have pursued an academic career. In addition, each student's academic affiliation and thesis advisors were identified.

    Thesis content labelling
Scholars traditionally relied on the keywords supplied by papers' authors to investigate various features of and connections between scholarly works (Yi & Choi 2012; Yoon, Lee & Lee 2010; Hofer, Smejkal, Bilgin & Wuehrer 2010). However, insufficiencies and inconsistencies in the authors' labelling make it sometimes difficult to identify important features. In addition, there is a danger of generating too many categories which could distract researchers from seeing the bigger picture.

To avoid this kind of pitfall the present study used qualitative data analysis and examined the actual content of each and every thesis rather than relying solely on the authors' keywords. CIS authors investigate a wide array of subjects in their theses. To identify them the theses were given a first pass in search of a large number of keywords describing the topics addressed in each. These keywords were then grouped into the major themes of CIS employing an adaptation of the classification scheme used by Gile (2000). The adapted scheme was conceptually simple and minimised overlap between categories. The theme categories created shown in Table 1—examples of selected thesis titles[1] or research questions follow each.[2] The results of inter-rater reliability are presented in supplementary material.

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[1] For the sake of authenticity, no editing was made to the English titles created by the original authors.

[2] It came as something of a surprise to find that a large number of theses had no specific research question: many gave historical overviews of the field, or a meta-analysis of existing literature. In such cases, the title was taken to represent the most succinct description of the central theme of the thesis.

Table 1. Categories of themes

Theme	Examples
Training	What is the present situation of intercultural communication training for English majors in the universities in China? (Feng 2012)
	Can training on specific noise-abating techniques and skills effectively improve interpreting quality in terms of fidelity of the output product? (Ma 2009)
Professional	What are the differences between the interpretation users' expectations towards monologic mode and dialogic mode respectively? Why? (Tang 2011)
	An initial investigation of interpreters' work values and job satisfaction in Taiwan (Chen 2008)
Language	Coping with English Accent in English-Chinese Interpreting (Zhao 2012)
	The Exploration and Analysis of the Interpreting Strategies from the Perspective of Meta-discourse Theory (Zhang 2012)
Socio-cultural	A Study on Handling Culturally Loaded Words in Chinese-English Consecutive Interpretation (Jin 2011)
	Redefining the specific role of liaison interpreters (Bao 2009)
Cognitive	An analysis of information storage and retrieval process in consecutive interpretation from the perspective of long term working memory (Zhang 2009)
	Construction of idealized cognitive models in simultaneous interpreting (Li 2007)
	The schema theoretic approach to interpretation and interpretation teaching (Gao 2008)
Miscellaneous	The Philosophical and Aesthetic Meanings of Interpretation (Shen 2010)
	An Analysis of Intern Practice in Twenty-Sixth Shenzhen Universiade (Liu 2012)

In addition, based on the nature of their research methodologies, all the theses were grouped into two broad categories: empirical and theoretical. The former arrives at conclusions based on data collected from experiments or observations, while the latter discusses ideas or theories from existing literature with the aim of expanding, confirming or refuting them (Xu, 2015).

Statistical model fitting
    Bi-level group regularization for logistic regression
Logistic regression with bi-level group regularisation was conducted to test whether students from certain universities, with certain advisors, writing empirical or theoretical papers, and using particular themes and keywords were more or less likely to enter the academic sphere and whether they had become more or less likely to do so with passing time.

The technique of bi-level group regularisation is performed at two levels: group and in-group. Let us take the example of keywords. In practice there are grouped variables—within the keywords variable there will be numerous sub-variables such as 'skills acquisition' and 'learner motivation', i.e. the keywords in question. The technique is instrumental in addressing two questions:

1. Are the keywords of a student's master's thesis relevant when it comes to predicting whether or not she will pursue an academic career? (regularisation at group level).
2. If the answer to question (1) is yes, are some keywords more relevant than others? When it comes to analysing keywords for predicting career paths, some may be relevant, others not. (regularisation at in-group level).

The goal of regularisation in generalised linear models is to reduce the model size—i.e. the number of predictors—by keeping only the most relevant. In this study dummy variables were used to encode the predictors:

- 'University' was encoded by ten dummy variables with each corresponding to one of the top ten universities. The value of the variable was set at 1 for students who attended one of the top ten, and 0 for those who did not. The situation "did not attend a top ten university" was encoded by setting all ten dummy variables at zero.
- 'Advisor' was encoded by 10 dummy variables for the ten busiest advisors, in the very same way as 'University'.
- 'Empirical' was encoded as a single dummy variable.
- 'Year of publication' of the MA thesis was encoded as a continuous variable.
- Since there were six theme categories, they were also encoded by six dummy variables.
- Each keyword was encoded by a dummy variable.

It should be noted that most of the predictors in this study were associated with more than one dummy variable. Unfortunately most of the common model selection methods such as Lasso, Elastic Net and Ridge are unable to perform the selection of categorical predictors represented by several dummy variables, such as the aforementioned predictor 'University'; instead they perform selection at the level of the individual dummy variable. As a result, regularisation methods suitable for selecting variables at the group level were the most apt for the current study.

In addition, it was also important to rule out some variables inside groups because the keywords group, for instance, has some 650 dummy variables (the same as the number of unique keywords available). As a result, the bi-level selection method was adopted, making it possible to select the most relevant predictors and, for each, its most important dummy variables. For example, in the keywords group, those most predictive of students' career paths were selected as predictors.

To eliminate the non-significant dummy variables in the bi-level analysis, the logistic regression models were fit with a cMCP penalty. Those covariates which received non-zero coefficients using this penalty would be predictive of students' career choices. The goodness of fit (GOF)—i.e. the model's capacity to describe observations—was evaluated using the Hosmer-Lemeshow test, a classical method of evaluating the results of a logistic regression.

> *Variation in the probability of an individual's becoming an academic, explained by covariates*

The bi-level group regularisation with cMCP penalty did not pass the GOF test (p-value=3.3e-10), indicating that a more powerful statistical measurement was called for. Even though the results from bi-level group regularisation were not statistically significant, they helped to determine which covariates were potentially meaningless indicators; when certain covariates were rendered coefficients of zero by cMCP, it indicated that they had no predictive power. The bi-level group

regularisation technique can be used to find which variables are relevant to predicting whether students become academics or not. These variables are those which the algorithm has not assigned a zero coefficient to. The sign of the coefficient can also be used to ascertain whether the variable in question has a positive or negative impact on choice of an academic career; but as the p-value is weak, the results are not conclusive. We can only get an idea of the impact of each variable—this has to be verified later with other tests. Therefore Targeted Maximum Likelihood Estimation (TMLE), which functions as an integrated propensity score method, was adopted for this study.

Unlike traditional modelling techniques such as logistic regression, which can only be used to build associations between responses and covariates, TMLE can ascertain whether a covariate is a causal factor of the target variable, and is doubly robust for modelling misspecification (Rose & van der Laan 2011; Schnitzer, Moodie & Platt 2012). Moreover, where logistic regression proposes a model in which only a vector of real parameters has to be estimated, meaning the model has to belong to a certain 'small' family, TMLE starts with far fewer preconceptions on the model and allows all kinds of models to be subjected to the data and therefore the best model to be chosen. There are consequently far more choices than in logistic regression, so the model will fit better to the data under consideration.

For this study the outcome of a student's career was assigned the notation Y; Y=1 denotes a student who became an academic, Y=0 one who did not. For example, to analyse the influence of the variable 'Empirical', the confounding factors were adjusted by the baseline covariates 'University', 'Year', 'Advisor', 'Themes', and 'Keywords'. The vector of baseline covariates was assigned the notation W, and that of non-baseline ones A.

TMLE was adopted to compare the expected probabilities of various groups of students becoming academics, viz. those who carried out empirical research and those who did not; those who attended a certain university or studied under a particular advisor; and those who wrote about a particular theme or used a certain keyword. Thus, to quantify—for example—the effect of carrying out empirical research, we needed to evaluate the probabilities of becoming an academic of those who have and have not done so, and then consider the difference between those two probabilities. This can be described by the following formula (where the variable A is equal to 1 if the student's research was empirical, 0 otherwise):

$$\Psi(P_0) = E[E[A = 1, W] - E[Y|A = 0, W]]$$

where P_0 is the probability distribution of (*Y, A, W*).

TMLE allows the above quantity to be estimated non-parametrically from data, confidence intervals to be computed robustly, and statistical significance to be assessed. It yields an asymptotically efficient estimator, i.e. its asymptotic variance is as small as or smaller than the variance of any other possible estimator (van der Laan & Rubin 2006). The packages 'TMLE' and 'super learner' in 'R' (Gruber & van der Laan 2012), alongside some auxiliary ones such as 'random forest', were adopted for the present analysis.

Causal effect study

To avoid repetition, only the methodology for drawing inferences between 'Empirical' and 'Become Academic' is detailed in this section. Exactly the same approach was followed for analysing the relationships between the other covariates and 'Become Academic'.

$\Psi(P_0)$ measures the causal effect of 'Empirical' on the probability of becoming an academic under the following assumptions:

- None of the baseline covariates included in W is causally influenced by 'Empirical'.
- There are no unmeasured confounders.

It may well be asked whether CIS students wishing to carry out empirical studies are more likely to seek advisors and institutions renowned for that type of research. As a matter of fact they do not do so—their decisions are mostly based on overall reputation. In fact the schools and advisors which enjoy high academic prestige are divided between the empirical and theoretical camps: some favour the former, others lean towards the latter, and some have produced both (see Table 3).

In sum, it can reasonably be claimed that TMLE is ideal for estimating causal effect for the purposes of this study because there is little chance of its violating either of the above-mentioned assumptions.

Results and discussions
Logistic regression with bi-level group regularisation

Given that it is difficult to interpret coefficient values obtained by applying bi-level group regularisation, the tables that follow show only the positive or negative character of each statistically significant predictor's association with students' career choices. Fortunately, the fact that the coefficient of a variable is positive still means that the probability of the target variable increases when the variable increases; for a binary variable, 'increase' means a rise from 0 to 1: in the case of research methodology, 0 indicates that a thesis was non-empirical, 1 empirical. When the coefficient for research methods is positive, it demonstrates that having conducted an empirical thesis has a positive influence on students' pursuit of an academic career.

Table 2. Influence of statistically significant predictors on the pursuit of an academic career

Variables	*cMCP* **Positive/ Negative Association**
Gong Longsheng	Negative
Beijing Foreign Studies University	Negative
Shanghai International Studies University	Negative
Xiamen University	Negative
University of International Business and Economics	Negative
Empirical_num	Positive
Year	Negative
Professional Theme	Negative

When it comes to the publication year effect, the results in Table 2 suggest that the more recently students published their MA theses, the less likely they were to have become academics, and that those who produced empirical papers were more likely to have done so. Some of this effect may result from the fact that graduates are not obliged to take up academic careers immediately after earning their MAs: those who graduated several years ago may be more likely to have become academics simply because they have had more time and opportunity to do so. However, in Asia students who want to pursue such a career typically commit to doing so fairly early, in fact almost immediately after graduating from their MA programs; it is actually rare for someone to work for a few years and subsequently become an academic. This possibility is therefore unlikely to have confounded the present analysis. A more likely explanation is that as CIS has expanded, competition has increased for a limited number of teaching jobs, making students less likely to embark on academic careers.

The regression in Table 2 shows that BFSU, SISU, XU and UIBE students were less likely to become academics than those from other schools. These large effects may be due to their being top-tier universities for interpreter training and strategically located in Beijing, Shanghai and Xiamen, China's largest markets for international conferences. Naturally their graduates are highly sought after in the private market and have greater opportunities for becoming established in conference interpreting circles. At the same time, research and teaching may not be financially attractive enough to induce them to pursue academic careers (Pearl 1995). Even if remuneration is not their primary concern, many of their graduates go on to have successful careers as interpreters at the Ministry of Foreign Affairs or the overseas offices of other central or local government agencies.

The *cMCP* analysis also revealed that almost none of the 405 thesis advisors had a conclusive impact on whether or not their students went on to pursue an academic career. This finding suggests that rather than expending needless effort on securing high-profile advisors, students' time would be better spent on improving their interpreting performance and research skills, which may be more important for their future professional development in the long run.

By contrast, those who produced empirical theses were more likely to pursue academic careers than those who conducted theoretical analysis. It is worth mentioning that the advisors with the largest number of advisees seem to have a direct influence on whether or not students carry out empirical research. Among those with 20 or more students, for example, the correlation between the number supervised and the proportion of their theses that are empirical is quite large at 0.53—there is relatively strong evidence to reject the null hypothesis of no correlation since the p-value for the two-sided test is 0.062.

To focus on a few advisors (see Table 3): Wang Lidi is the most active advisor with a total of 60 theses supervised, of which 88% were empirical; in second place, a hefty 89% of Li Changshuan's total of 53 fall into the empirical category. By contrast, the percentage for the third most popular supervisor (Mei Deming) bucks the trend at a low 28%. Wang and Li work at BFSU's Graduate School of Translation and Interpretation (GSTI) where they are involved in the actual training of interpreters, whereas Mei is employed at SISU's School of English Studies, which does not offer any interpreter training. It may be much easier for Wang and Li to assist their students in conducting empirical research (seeking out experimental subjects, accessing the right information, etc.) given the vast network of interpreters and wealth of resources readily available in their department.

Gagnon's observation (1982) that conceptual researchers have certain advantages over their empirical colleagues in not having to confront problems such as these is, in fact, a double-edged sword: by the opposite token, students who know from the start that they will face serious problems if they opt for empirical subjects are far more likely to shrug and 'make do' with pursuing more conceptual studies.

Table 3. Proportion of MA theses supervised by each advisor that are empirical

Name of the Advisor	Empirical Proportion	Students
WANG Lidi	88%	60
LI Changshuan	89%	53
MEI Deming	28%	50
CHEN Jing	39%	36
CHAI Mingjiong	32%	31
ZOU Weining	20%	30
GONG Longsheng	24%	29
LEI Tianfang	30%	27
ZHONG Weihe	65%	26
QI Weijun	17%	24
XIAO Xiaoyan	77%	22
SUN Xinwei	32%	22
ZHANG Yan	25%	20

Another important factor to be considered is that of whether a student's MA thesis has a bearing on the likelihood of his following an academic career path. cMCP analysis shows that students who wrote MA theses on a Professional theme were significantly less likely to take up academic careers. This is perfectly understandable: students concerned with the more business-oriented aspects of interpreting would very reasonably be expected to work in industry rather than academia.

TMLE analysis of the probability of individuals' becoming academics
 Impact of having attended a top ten university
While numerous universities are represented in the data, most of the theses issue from only a few. As a matter of fact, nearly 70% of the total are produced by just ten universities: SISU (21%), BFSU (15%), XU (9%), UIBE (8%), GUFS (6%), OUC (3%), NTNU (2%), CSU (2%), Sichuan ISU (2%) and SU (2%). TMLE was conducted to compare the expected probabilities of pursuing an academic career of students who did and did not go to these top ten universities. Insofar as the present study is concerned, A=1 denotes "attended a top ten university", A=0 denotes "did not do so."

Table 4. Impact of having studied at a top ten university (Statistically significant covariates are in bold)

Additive causal effect	Variance of additive causal effect	Confidence Intervals
-0.0826	**0.0028**	**-0.1157—-0.0495**

Table 4 shows that the estimated parameter was negative and statistically significant, which indicates that having attended a top ten university makes a student less likely to become an academic. With China's economy now accounting for a much larger share of global activities, highly competent graduates from these top-flight schools are in high demand worldwide, making them less likely to pursue academic careers.

To identify the individual impacts of the top ten we also estimated the probabilities that students attending each one would choose an academic career (encoded by A=1) and compared them with those of students attending universities outside the top ten (encoded by A=0).

Table 5. Individual impacts of having studied at a particular top ten university (Statistically significant covariates are in bold)

University	Additive causal effect	Variance of additive causal effect	Confidence Intervals
SISU	**-0.0890**	**0.0003**	**-0.1227 — -0.0553**
BFSU	**-0.0514**	**0.0004**	**-0.0889 — -0.0140**
XU	**0.1020**	**0.0014**	**0.0275 — 0.1764**
UIBE	**-0.1731**	**0.0002**	**-0.1991 — -0.1471**
GUFS	0.0172	0.0002	-0.0136 — 0.0480
OUC	-0.0358	0.0005	-0.0803 — 0.0088
CSU	**-0.1283**	**0.0001**	**-0.1478 — -0.1089**
Sichuan ISU	**0.2102**	**0.0016**	**0.1316 — 0.2889**
SU	-0.0286	0.0005	-0.0732 — 0.0160
NTNU	**0.0571**	**0.0003**	**0.0216 —0.0927**

This result (see Table 5) partially confirms the finding made by bi-level group regularisation in Section 4.1. Both analyses identified a negative association between an individual's having studied at BFSU, SISU or UIBE and becoming an academic, but they yielded conflicting results on the career choices of students at XU, which should be treated as a marginal case. The effects for BFSU, SISU and UIBE were large, and statistically significant at below the 0.005 level; for UIBE the effect was dramatic: a student graduating from there was 17% less likely to pursue a career in academia than a comparable student graduating from one of the schools outside the top ten. The

probability for students from CSU was almost as large as for their UIBE colleagues: the same figure for them was 13%.

At the opposite end of the scale, graduates from Sichuan ISU and NTNU were more likely to secure academic positions than their peers from non-top-ten universities. Of particular note, the probability for Sichuan ISU graduates was 21% higher. CSU, unlike SISU, BFSU and UIBE, is situated in a less economically developed region of China: the demand for interpreting services there is inevitably not as strong as in economic centres such as Beijing and Shanghai. Though the daily rate for a professional interpreter can be quite high, if they could find only a few days' work per year, they would still have trouble making ends meet. As a result, finding jobs that guarantee a regular income is likely to be the number one priority of CSU students. NTNU, on the other hand, is situated in Taiwan, whose residents are deemed by the Education First English Proficiency Index to have a better level of English skills than those of mainland China. According to Tseng (2005), Taiwan's interpreting industry is monopolistic: she found the professionals she surveyed to be most afraid of irregular income due to market saturation. These factors may explain why NTNU graduates are motivated to seek teaching positions.

Influence of advisors

Table 6. Impact of having studied under top ten advisors

Additive causal effect	Variance of additive causal effect	Confidence Intervals
-0.0187	0.0002	-0.0477 — 0.0103

Another determinant to be considered is that of whether MA students advised by one or another advisor are more or less likely to become academics. TMLE was used to examine the expected probabilities of students becoming academics—to compare those of ones who studied under top ten advisors with those of ones who did not. In line with the findings in Section 4.1, the results here suggest that studying under a top-ranking advisor does not increase the likelihood of a student's securing an academic position (see Table 6).

A more detailed analysis was conducted to examine the individual influence of each of the top ten advisors' on their students' career choices (see Table 7).

Table 7. Individual influence of top ten advisors (Statistically significant covariates are in bold)

Advisor	Additive causal effect	Variance of additive causal effect	Confidence Intervals
Chen Jing	**-0.0990**	**0.0003**	**-0.1317 — -0.0663**
Mei Deming	**0.2163**	**0.0007**	**0.1636 — 0.2691**
Chai Mingjiong	-0.0351	0.0004	-0.0745 — 0.0043
Zou Weining	**-0.17243**	**0.0001**	**-0.1956 — -0.1493**
Gong Longsheng	**-0.2073**	**0.0001**	**-0.2301 — -0.1845**
Lei Tianfang	**-0.1346**	**0.0001**	**-0.1557 — -0.1134**
Qi Weijun	**-0.2014**	**0.0001**	**-0.2241 —0.1787**
Xiao Xiaoyan	**-0.1152**	**0.0001**	**-0.1363 — -0.0941**
Zhong Weihe	0.0195	0.0006	-0.0285 — 0.0674
Sun Xinwei	**0.0448**	**0.0004**	**0.0058 — 0.0838**

The TMLE analysis shows that while students who studied under the majority of the top ten were statistically less likely to become academics, two—Mei Deming and Sun Xinwei—stood out as having a positive impact: those who studied under Mei, the former dean of the English School, were 21% more likely to secure academic posts than those with non-top-ten thesis advisors; students of Sun, the former dean of the School of Continuing Education, were nearly 5% more likely to enter the academic sphere.

The empirical thesis factor
TMLE was applied to counterbalance the limitations of using logistic regression and to better understand the causal effect of predictors on CIS students' career choices.

Table 8. Impact of using the empirical research method (Statistically significant covariates are in bold)

Additive causal effect	Variance of additive causal effect	Confidence Intervals
0.0529	**0.0006**	**0.0017—0.1041**

TMLE was used to examine whether the research approach students select for their theses is a probable contributory factor to their going on to pursue academic careers. On estimating the probability of individuals' becoming academics, there was found to be a positive difference between those who conducted empirical research and those who did not. The data revealed that the probability of undertaking an academic career was 5.3% higher for empirical than for non-empirical approaches. This result confirms the finding made using bi-level group regularisation in Section 4.1—both identify a feature of students' theses that has strong predictive power of their future career paths.

The thesis topic factor

Another important question to be explored is whether a student's MA thesis topic has a bearing on the likelihood of following an academic career path. Once again TMLE was put to work, with the same methodology as described in previous sections.

Table 9. Impact of themes on an individual's probability of becoming an academic (Statistically significant covariates are in bold)

Themes	Additive causal effect	Variance of additive causal effect	Confidence Intervals
Training	**0.1411**	**0.0001**	**0.1194 — 0.1628**
Professional	**-0.1876**	**0.0001**	**-0.2102 — -0.1650**
Socio-cultural	**-0.0896**	**0.0001**	**-0.1093 — -0.0698**
Cognitive	**-0.0232**	**0.0001**	**-0.0424 — -0.0041**
Language	**-0.0667**	**0.0001**	**-0.0859 — -0.0474**
Miscellaneous	**-0.1671**	**0.0001**	**-0.1895 — -0.1448**

Table 9 confirms the findings of Section 4.1 that those who write about 'professional' themes are less likely to become academics. As a matter of fact, the difference in probability between them and those who write about other themes was 18%. The only theme that would make a student more rather than less likely to pursue an academic career is Training: those who covered this topic were 18% more likely to enter the world of academia. With an increasing number of universities offering bachelor's and master's degrees in interpreting (Ministry of Education 2013), and more emphasis being placed on the practical aspects of interpreting in their curriculum design (Liu 2008), employers are perhaps more likely to offer positions to those who have produced training-related theses.

Conclusion

As CIS continues to grow and mature, the factors governing the choices students make between academic and professional careers are becoming ever more complex. They are now less likely to

select the first option than their predecessors in the 1990s, a situation similar to that in other maturing disciplines in which the number of graduates that universities produce gradually comes to outstrip the quantity of academic posts available.

The data analysis in this paper reveals that some variables may help predict CIS students' career choices. Those whose theses were empirical in nature were far more likely to secure academic positions than those whose work was primarily conceptual or theoretical. Those who wrote about training in their theses were much more likely to take up academic careers, while those who covered professional issues more often than not opted for work in the private sector.

It is natural that students should seek eminent professors as their thesis directors—the ten busiest CIS advisors in the data-set are all scholars of very high standing in the field. However, the data suggest that they were no more instrumental in influencing the academic placements secured by their students than their colleagues who took on fewer advisorships: of the top ten, only two had a positive impact on the placement of their students in academic positions. Advisors assume multiple and often subtle roles, influencing the professional development of their protégés. Those students who choose advisors on the basis of their eminence in the hope that it will afford them a better chance of embarking on an academic career may have to re-evaluate their advisor selection criteria.

However, in this regard and indeed throughout this investigation, two important factors need to be taken into account. Firstly, the field of CIS is still at a relatively early stage of in its development, as can be seen from the fact that numerous eminent professors do not have doctoral degrees. This situation is likely to change in the future: an increasing number of advisors will have obtained doctoral degrees and will therefore take a greater interest in pure research rather than concentrating solely on producing skilled professional interpreters.

The other important factor is that working as an interpreter is a far more lucrative enterprise than teaching, so the professional market will always lure new graduates away from academia. For this reason it came as little surprise to learn that graduates from the majority of CIS' most prestigious schools were far less likely to become academics than those from others of the top ten thesis-producing universities.

It should be borne in mind that no attempt was made in this study to assess the quality of the research contained in the theses that make up the dataset: an entirely separate and altogether different study would be required to explore the connection—if there be any—between an advisor's popularity and the quality of his students' work.

Traditional statistics are concerned with identifying correlations, and this is typically the route most scientometric researchers have taken to determine the factors that influence students' career choices (e.g. Long & McGinnis 1985; Pinheiro et al. 2014; Van der Weijden et al. 2015). Given all the possible variables that can have a bearing on career outcome, and considering the correlations that potentially exist between them, it is very difficult to identify accurately which variable has a direct impact and to what extent it does so. This study provides new avenues for research in this area by introducing TMLE, a powerful statistical technique which allows multiple models to be tested simultaneously for pinpointing the effect of every relevant parameter on the target variable.

The purpose of this paper was to examine four factors—structural determinants—which influence the choice made by master's students to take up academic careers after completing their courses.

That structural factors alone were scrutinised is not to say that social factors are not without their importance—in fact they may even be more important (see for instance the work conducted by Bourdieu 1989). Clearly more research is needed to gauge the relative importance of different types of factors on students' career choices. Such a study would be particularly interesting—not to mention ground-breaking—in the case of China, given its unique socio-economic system.

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Supplementary material
Inter-rater reliability test
Though Gile's coding scheme was applied to Interpreting Studies as a whole, its ability to cover all CIS research and its reliability as a means of assessing the literature needed to be evaluated scientifically. An inter-rater reliability (IRR) test was conducted to judge its suitability as a tool for labelling CIS publications. IRR is ideal for ensuring the scientific soundness of a newly developed labelling system. In addition to the present author, another rater was recruited and trained prior to data collection. Having been fully instructed in how the classification scheme worked, both raters came to the task with exactly the same store of knowledge regarding the labelling of keywords.

After the rater's training, a pilot study was conducted in which he and the present research investigator did some preliminary labelling. The potential pitfalls and discrepancies were examined and discussed. During this pilot study and the actual IRR assessment procedure, the raters acted entirely independently, to ensure that the results of their assessments were arrived at separately.

The database for this study contains a total of some 650 unique keywords. For the purposes of IRR assessment, a sample selection from these was made completely at random—each keyword had an equal chance of being chosen—and then assigned to the raters. Both were presented with the question: Does this keyword belong to one of the six pre-agreed themes? (e.g. "Does the keyword 'ethics' belong to 'Cognitive issues'?")—Answer: Yes/No. Once all the samples had been labelled by both raters the results underwent statistical analysis. The aim of the exercise was to measure the extent to which the raters' answers matched. A potential drawback to this method resides in the binary nature of the replies, as a result of which matches might occur purely by chance. To illustrate this let us imagine a hypothetical example in which two raters answered 100 individual questions each: their answers are shown in Supplemental Table 1.

Supplemental Table 1: Answers given by two raters over 100 questions

Scenarios	Cases	Frequency
1	Questions answered "**Yes**" by both raters	30
2	Questions answered "**No**" by both raters	30
3	Questions answered "**Yes**" by rater 1 & "**No**" by rater 2	15
4	Questions answered "**Yes**" by rater 2 & "**No**" by rater 1	25

Rater 1 answered Yes 30+15 times, i.e. 45% of the time; Rater 2 answered Yes 30+25 = 55% of the time. Thus the probability that both raters would simultaneously answer 'Yes' at random was 45%×55%=24.75%; the same figure for random 'No' was 55%×45%=24.75%; therefore the probability that both would randomly give the same answer was 24.75%+24.75%=49.5%. This result of chance is known as the probability of random agreement, noted as *Pr(e)*. To measure whether an observed proportionate agreement is higher than the probability of random agreement, *Pr(e)* must be subtracted from the observed proportionate agreement, noted as *Pr(a), Pr(a) - Pr(e)*

in our hypothetical case 30 + 30 = 60% of answers. The results are then normalised: *Pr(a) - Pr(e)* divided by *1 - Pr(e)*. When *Pr(a) = 1*, it means that both raters always give the same answer. From this is obtained a quantity between 0 and 1 that measures the true rather than coincidental similarity between raters' answers, known as Cohen's kappa:

$$\kappa = \frac{Pr(a) - Pr(e)}{1 - Pr(e)}$$

In our hypothetical example kappa is equal to 0.21, which is quite low.

Landis and Koch (1977) developed benchmarks, now in wide use, for describing the relative strength of agreement between raters: ranges of κ values between 0.00 and 0.20 indicate slight, 0.21–0.40 fair, 0.41–0.60 moderate, 0.61–0.80 substantial, and 0.81 to 1.00 near unanimity.

The final results of all these calculations for the present study are shown in Supplemental Table 2: the two raters demonstrated a high degree of consensus on how the keywords should be labelled.

Supplemental Table 2: Inter-rater reliability scores for grouping keywords into various thematic categories

Group	Cohen's Kappa
Training	0.9866651
Cognitive issues	0.9844985
Professional issues	0.8953596
Miscellaneous	0.9564445
Language issues	1
Socio-cultural issues	0.9728657