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Bonding and Bridging Social Capital: The Determinants of English Language Fluency and Its Effects on the Labour Market Outcome of International Students in Ireland

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Abstract: This study investigates the extent to which social capital influences the English fluency of international students in Ireland and how language skills affect their earnings in the Irish labour market upon graduation. Two different forms of social capital are identified: 'Bonding' refers to the connections within international students' co-national groups; 'Bridging' is used in reference to the ties these students create with those beyond their national communities, such as with the host country's locals or other international students. The main findings suggest that: (1) Bridging social capital with Irish people is found to have a significant positive effect on international students' English fluency. (2) English fluency, bonding social capital with co-nationals, as well as bridging social capital with Irish are all found to have positive effects on graduates' monthly salary after correcting for endogeneity. In closing, implications are discussed.

I BACKGROUND

In the literature on global migration, the term 'international student' has been understood as a form of highly-skilled migrants (Salt, 1997). A growing area of research both in Europe (King and Ruiz-Gelices, 2003) and North America (Guruz, 2011) has been the general dynamics of developing-to-developed world movement

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and the determinants of students' global flow within this. Much less attention has been devoted to the labour market integration and performance of international students who stay and work in their host societies. Even less attention was given to how fluency in a host country's language impacts the labour market integration of international graduates. This study pays special attention to international students' language fluency and focuses on two research questions which have largely been ignored by the current literature: (1) How does the social capital of international students influence their language competency? (2) How does this competency impact their performance in the Irish labour market?

Existing studies on immigrants' language fluency and labour market outcomes (i.e. possibility of employment, income) have focused on low-skilled labour migrants (Chiswick and Miller, 1996; Van Tubergen and Wierenga, 2011) or refugees (Auer, 2017) rather than student migrants. A high level of fluency in the local language is often taken as a prerequisite for university enrolment; as such, linguistic barriers are usually not considered as a factor that influences students' labour market performance. However, evidence from applied linguistics studies have shown that language difficulties do appear to be a challenging issue for international students (Huebner, 1995; Mori, 2000; Kinginger, 2011). Birrell (2006) found that international students' language fluency did not improve over the course of their university studies in Australia. Indeed, when the results of identical language tests – one taken before completion of university, one taken after – found that some students showed little or no improvement in their fluency; questions arose as to how these students gained entry to university and how they managed to graduate without improving their English skills (Watty, 2007; Bretag, 2007).

Language is an important component of human capital (Pendakur and Pendakur, 2002). As such, it influences individual labour supply and labour market allocation. Communication is often an integral aspect of an occupation (e.g. sales assistant, consulting), hence language may have a direct effect on productivity. On the other hand, the effect of language fluency upon labour market success may be reinforced through its interaction with other determinants of productivity, such as education, training and labour-force experience (Lindemann and Kogan, 2013). Deficient fluency in a host country's language – an inability to communicate adequately with local students and university staff – not only affects international students' academic learning (Bretag, 2007), but also hinders their process of integrating into campus life and a host society (Sawir *et al*., 2012). It may furthermore influence their labour market performance if they stay and work in the host country. Not only is language fluency likely to be used by employers as a screening device in employment decisions; those who are more fluent in the host country language are also better equipped to communicate their qualifications to potential employers (Arkoudis, *et al*., 2009). The current study aims to bridge the gap in the existing research by exploring how social networks and social capital influence the English fluency of international students in Ireland. It also examines

the extent to which English language fluency can contribute to higher post-graduation income in the Irish labour market.

To date, there exists a robust body of literature concerning the determinants of immigrants' host-country language fluency and its impact on their earnings. However, whilst scholars have looked into the cases in the US (Dávila and Mora, 2000; Yang, 2005), UK (Dustmann and Fabbri, 2003), Australia (Chiswick *et al.*, 2004), Israel (Chiswick, 1998), Japan (Takenoshita, 2006), China (Gao and Smyth, 2011), Germany (Dustmann, 1994; Dustmann and Soest, 2001), the Netherlands (Yao and van Ours, 2015), as well as other mainland European countries, Ireland has thus far been ignored. There are, at the time of writing, no peer-reviewed publications yet published on the case in Ireland.

Being one of the six core English-speaking countries in the world and the only country in the EU where English is the main native language after Brexit, Ireland – as a host to 23,127 tertiary international students (HEA, 2017) – has become an emerging player in the international education market (Finn and Darmody, 2017; Groarke and Durst, 2019). The rapid decline of the unemployment rate and the increase in the employment rate since 2014 (CSO, 2019) witnessed the recovery of the Irish economy from its post-2008 economic downturn. The promising labour market prospects serve as strong incentives for both international and EU students to study and work in Ireland. The Irish government has also implemented incentives for international graduates to stay and work in Ireland by establishing new graduate scheme policies (INIS, 2017). If we can gain an insight into the contributing factors towards labour market success for graduating international students – especially the role that English language fluency plays in helping graduates succeed in the Irish labour market – then we may be able to make recommendations for future Irish immigration and labour market policies, in order to improve the post-graduation prospects of international students within the Irish labour market.

This study contributes to the literature in five aspects: (1) It adds empirical evidence to the literature of international students as global migrants; (2) It highlights the impact of social capital, especially the distinction between bonding and bridging social capital, on immigrants' host-country language fluency; (3) Data were collected on all four aspects of language fluency, that is speaking, listening, reading and writing, and the study examines to what extent social capital influences verbal and literal skills differently; (4) It uses both subjective and objective measurements of language fluency; and (5) It serves as the first empirical study on the relationships between social capital, language fluency and graduates' income in the Irish context.

II THEORY AND LITERATURE REVIEW

2.1 Theory and Previous Findings

The literature on the *economics of language* for immigrants (Chiswick, 2009) has primarily focused on two research questions: Firstly, the determinants influencing immigrants' language proficiency; secondly, the economic effect of immigrants' language proficiency on their labour market outcomes – particularly on immigrants' earnings, and on the immigrant-native wage gap.

Drawing from Chiswick and Miller's seminal works (Chiswick and Miller, 1992; 1995; 1996; 1997), the determinants of immigrants' host-country language fluency can be classified into three categories, the so-called the three 'E's theory: Exposure to the language in home and host country; Economic incentives for acquiring these skills; and Efficiency in converting the economic incentives and exposure into language skills. As for operationalising the three 'E's in empirical studies, 'Exposure' often pertains to determinants such as duration or years since migration, colonial history, minority language concentration, family and marital information. 'Economic incentives' include factors such as professions, education and types of immigrants. 'Efficiency' relates to age, education, linguistic distance and motive for migration. A detailed overview of the three 'E's theory can be found in Chiswick (2009).

Empirically, studies on determinants of immigrants' language proficiency seem to yield similar results across different countries. Being a male, married with a local, years of residence in host country, having higher degrees all leads to better language proficiency while age, being a female, age at immigration, numbers of children, married with co-ethnic, ethnic concentration often negatively correlated with one's language host-country fluency (Dustmann, 1997; Chiswick and Miller, 1996; 1997; Chiswick, 1998; Dávila and Mora, 2000; Dustmann and Soest, 2001; Chiswick, Lee and Miller, 2004; Yang, 2005; Casale and Posel, 2011; Yao and van Ours, 2015).

The literature has also examined the economic effect of immigrants' language fluency on their labour market outcomes. Most statistical models are estimated using the human capital earnings function, a standard statistical technique in labour economics that regresses the natural logarithm of earnings on a set of explanatory variables, typically including host-country language fluency, human capital items such as schooling and experiences, as well as other socio-demographic controls (Kossoudji, 1988; Dustmann, 1994; 1997; Chiswick, 1998; 2009; Dustmann and Fabbri, 2003; Bleakley and Chin, 2004). Other studies have similarly concluded that fluency in the host country's language leads to an increased possibility of employment as well as higher earning. In a general overview of the economics of language literature, Chiswick (2009) drew a relatively unambiguous picture, with the positive effect of language proficiency on immigrants' earnings estimated at between 5 per cent to 30 per cent.

One of the key challenges among the existing studies is the validity of the Ordinary Least Square (OLS) estimation of immigrants' earnings on their host-country language fluency, mainly due to the endogeneity of language fluency to earnings and the measurement error in the language fluency variable (Chiswick and Miller, 1995). In the first case, language fluency itself may be endogenous to income; that is, there is unobserved heterogeneity that is correlated with both immigrants' second-language skills and income, such as learning ability. Those individuals with the ability to speak multiple languages may also have other characteristics that allow them access to higher income, such as the ability to learn more quickly and efficiently. The endogeneity problem may also originate from the reverse dependence of language on expected income. Immigrants who gain greater benefit from their host-country language fluency are also more likely to invest in their language skills since they know that by doing so, this will help them benefit even more.

The current literature has been using the instrumental variable (IV) method to address this problem. A wide range of instrumental variables are proposed, such as: the number and age of children in the household; whether they were married overseas; minority language concentration in the area (Chiswick and Miller, 1996; 1997); the language used during the interview (Shields and Price, 2002; Lindley, 2002); and their father's level of education (Dustmann and van Soest 2001; 2002). In this study, following the tradition, the IV approach is also adopted. The variable parent's highest education obtained is used as the instrument to minimise the endogeneity of international students' English fluency on their income.

In the latter case, measurement error from survey data using language self-assessment often leads to an underestimation of the effect of language proficiency on earnings. Dustmann and van Soest (2001; 2002) estimated the impact of measurement error in self-reported speaking fluency using the German Socio-Economic Panel data, and they found that people tended to over-report rather than under-report their German speaking fluency. Deumert and Mabandla (2006) also found over-reporting of English fluency among residents in low-income areas in Cape Town, South Africa. Lindemann and Kogan (2013) found that language skills are essential for the labour market access of immigrants in Estonia, especially for higher status jobs. However, they emphasised that their survey data which captured self-assessed language fluency could be biased and would call for more objective measures of language skills, such as independent language tests. In this study, to minimise measurement errors, international students' English fluency is measured by: (1) the IELTS score used to apply to an Irish university, which is treated as the objective measurement of students' English language fluency; and (2) self-assessment on four five-point scales measuring listening, speaking, writing, and reading fluency, which counts for the subjective measurement.

2.2 Literature Drawbacks and Research Hypotheses

This study contributes to the current literature in five respects. Firstly, while the literature has mainly focused on low-skilled labour migrants or refugees, this study pays special attention to international students and graduates, a group of highly skilled and educated global migrants whose host-country language fluency is often deemed not problematic for integration into their host country and labour market. International students often distance themselves from the traditional stigma of 'migrants as a problem' and self-identify as 'international' or 'visiting' scholars and are referred to as such by their host institutions. Nevertheless, by any conventional definition of international migration – movement from one country to another for a significant period of time, such as a year or more – international students are migrants. Although international students' host country language fluency is in general much better than other types of migrants – labour migrants, for example – the academic courses they undertake and the careers they apply for also require much higher language proficiency levels than, say, manual labour work, where one's reading or writing ability is less pertinent. Thus, the determinants of international students' host country language fluency and to what extent it influences their labour market performance in the host country are worth investigating.

Secondly, while the dominant economics studies often use the three 'E's theoretical framework to construct independent variables to explain an immigrant's language fluency, this study pays special attention to the effect of social capital on language fluency. The effects of social network and social capital have been largely ignored in the literature to date, possibly due to the lack of appropriate data. Scholars from sociology and applied linguistics backgrounds have argued that people's second language fluency is not only affected by pre-migratory exposure, economic incentive and efficiency, but also strongly influenced by the people one socialises with and what language one practices every day (Yeh and Inose, 2003; Isabelli-García, 2006; Dewey *et al.*, 2012; Dewey *et al.*, 2013). A few studies have adopted the social network perspective, using variables such as a spouse's origin language and ethnic geographic concentration as the proxies for the network effect (Chiswick and Miller, 1996; Shields and Price, 2002); these proxies, however, are far from perfect. The mechanisms through which immigrants' social capital and network influence their language fluency have rarely been explored in the existing literature.

Drawing from Granovetter's social network theory (1973; 1983; 1995) and Putnam's social capital theory (2000; 2001), this study distinguishes in particular between two different forms of social capital, that is bonding and bridging social capital. The crucial difference between these two forms of social capital is whether the ties are homogeneous or heterogeneous. According to Putnam (2000), bonding social capital is inward looking and tends to reinforce exclusive identities and homogeneous groups; while bridging social capital, in contrast, connects people or

groups who are different from each other in some way, addressing how social capital facilitates resource acquisition. Unlike bonding social capital where networks are comprised of similar people with presumably similar resources and information, bridging social capital is crucial in acquiring a wider variety of resources and enhancing information diffusion within and between groups.

In a migratory context, bonding often refers to the connections within co-national or co-ethnic groups and bridging applies to connections outside of the national or ethnic communities, such as with the host country's locals or immigrants of other nationalities. In the case of international students, they socialise and establish friendship ties with co-nationals, Irish locals and other international students during their study in Ireland. The types of friends they make influences the different types of social capital they may obtain. Students who often socialise with co-nationals may obtain more bonding social capital, while those whose friends are predominantly Irish locals or international students of other nationalities may gain more bridging social capital. As communication with co-nationals is most likely conducted via one's native language – while English would be used as lingua franca for cross-country communication – it is expected that students with more bridging social capital would have better English language fluency upon graduation than those who obtain more bonding social capital.

Moreover, the literature has found that immigrants with more bridging social capital are more likely to be employed and have higher income than those who lack this form of social capital (Lancee 2010; 2012; 2016; Zhang *et al.*, 2011). Compared with bonding networks where information and resources are repetitive and homogenous, bridging ties are expected to contain useful labour market information and resources that are not available in one's bonding network (Brook, 2005; Cheung and Phillimore, 2014). Thus, it is also hypothesised that bridging social capital is positively associated with students' income from their first job upon graduation.

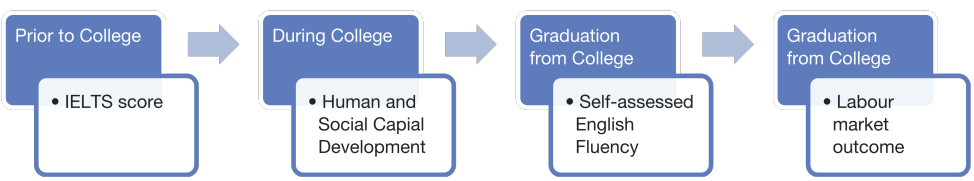
Thirdly, compared with studies which only looked at immigrants' speaking fluency, this study investigates all four aspects of language fluency: reading, writing, speaking and listening. The rationale of doing so is that these four aspects are expected to impact differently on international students' study and work experience in Ireland. For students' human capital and social capital development, literal skills (reading and writing) may have a stronger influence on their knowledge and academic achievement in university, while verbal skills (listening and speaking) seem to be more influential on one's social network establishment and host society integration. As for the labour market performance, at variance with the case of labour migrants – where writing and reading abilities were found to have stronger effects on earnings than other aspects of language ability (Dustmann, 1994; Carnevale *et al.*, 2001) – it is expected that, in the case of international students and graduates, verbal ability may have a stronger impact on their labour market outcomes. While most international students' reading and writing abilities are fairly good due to preparation in classes and exams in their home country, their speaking

and listening abilities were rarely practiced, either in school or everyday life back home. Thus, this lack of practice may lead to lower verbal language fluency, which in turn hinders their study and career development in Ireland, even though literal ability was well-trained in their home schools.

Fourthly, while most studies use either participant self-assessing or interviewer-assessing methods to evaluate immigrant's language fluency – which were subject to measurement error (Dustmann and van Soest, 2001; 2002) – this study uses both objective and subjective measurements. The score of the International English Language Testing System (IELTS), which international students use to apply to Irish universities, is used as an objective measurement of their language fluency. Also, four five-point self-assessing scales are provided, each measuring fluency in speaking, listening, reading and writing. It is worth noting that even though the ITLTS score and self-assessment are both designed to evaluate international students' English fluency, they measure English fluency at different points in time. The IELTS score evaluates students' language fluency prior to university study, while the self-assessing scale evaluates the language fluency after completion of university study. Thus, awareness of the time-specific nature of these two measurements is essential to properly understand the effect of language on human and social capital development during college, as well as the labour market outcome upon completing college (a similar approach can be found in Dewey *et al.*, 2012).

For example, an IELTS score may positively associate with students' learning efficiency during university study, but assuming its association with their labour market outcome would be spurious since students' language fluency may improve during their study in a host country. Also, the language self-assessing scale is expected to be positively associated with students' job income upon graduation, but drawing a correlation between the self-assessing scale and human or social capital development during college would again be spurious because the self-assessing scale measures the English fluency after completion of college study (when the survey was conducted) while human and social capital development happened during college study. Figure 1 provides a brief illustration of the time-specific nature of the two language fluency measurements, as well as the appropriate statistical association directions between language fluency, human and social capital development and labour market outcomes of international students.

Figure 1: Time Line and Appropriate Association Directions



Source: Author's analysis.

Lastly, this study provides the first empirical analysis of the determinants of international students and graduates' English fluency and how this affects their labour market outcome within the Irish context. Considering the increasing number of international students in Irish universities, especially in the post-Brexit era (*The Irish Times*, 2017), and the extension of the Third Level Graduate Scheme from one year to two (INIS, 2017), the findings of this study may inform Irish policymakers on the implications of the internationalisation of Irish higher education and the labour market integration of highly-skilled immigrants in Ireland.

Thus, the following hypotheses are proposed:

H1: Bridging social capital is positively associated with international students' English fluency and wage, while bonding social capital is negatively associated with their English fluency and wage.
H2: English fluency is positively associated with international students' wage upon graduation.
H3: Verbal fluency has a stronger effect on graduates' wage than literal fluency.

III RESEARCH DESIGN

3.1 Data Collection and Sample

Since there are no appropriate datasets available that suit the purpose and scope of this study, an original micro-level dataset was created using SurveyMonkey to conduct a survey of a sample of international graduates from Irish universities. The data were collected over a period of five months, from October 2017 to February 2018. The target population was non-EU/EEA/Swiss Confederation (non-EEA henceforth) graduates of Irish universities who graduated between 2014 and 2016. Although graduates from EEA countries can be considered as migrants, given their international mobility, they are excluded from this study because the current EU regulations on free movement allow them to move freely and to work across the EU. Hence, the regulations governing their mobility and employment differ significantly from those faced by international graduates (Guruz, 2011). The time period of three years post-graduation was chosen because earlier graduates may find it difficult to recall details of their human capital and social capital when responding to the questionnaire.

Data from the Higher Education Authority statistics archive (HEA, 2017) indicate that a total of 10,706 non-EEA students graduated from Irish universities during the years of 2014 to 2016. The sampling frame used in this study consists of the email lists of 2014 to 2016 international alumni maintained by the alumni offices of seven Irish universities. In order to reach the target population, the alumni offices of seven Irish universities were contacted. After rounds of negotiation, only two institutions, University College Dublin and Dublin City University, agreed to

distribute the survey among their international alumni. The initial response rate was 6 per cent. To improve the sample size, a snowball sampling method was also used to increase the sample size by asking questionnaire participants to forward the survey link to other international students of their acquaintance who had graduated from an Irish university in the 2014-2016 time frame. After excluding duplicate and questionable (e.g. half-finished, or finished in less than two minutes) responses, the final usable sample size is 325 graduates. These comprise 179 responses from UCD (54.4 per cent), 109 from DCU (33.3 per cent), and the rest are from University of Limerick (6.4 per cent), Trinity College Dublin (4.6 per cent) and Maynooth University (1.2 per cent).

3.2 Constructing Variables

The key dependent variables for testing H1, H2 and H3 are English fluency and wage. For English fluency, participants were asked to evaluate their English fluency on four five-point scales each measuring their speaking, listening, reading and writing fluency. The scale ranges from 1 poor, 2 somewhat poor, 3 moderate, 4 somewhat good to 5 good. The English fluency variable was then constructed by adding up the four elements. For wage, participants were asked to state the monthly wage (after tax) of their first job upon graduation. After-tax wage was asked rather than before-tax wage because graduates whose jobs are/were not career jobs (such as restaurant waiters/waitresses or sale assistants, which can frequently be paid in cash) may not know their wage before tax.

The key independent variables are social capital for H1 and English fluency for H2/H3. Three five-item scales were used to measure bonding social capital with co-nationals, bridging social capital with Irish and bridging social capital with people who were neither co-national nor Irish (they are referred to as *other internationals* henceforth). The scale for bonding with co-nationals consisted of five items that measure the frequency of socialising with and seeking help from co-nationals, membership in co-national dominated organisations and whether one thinks most of his/her friends are from his/her own country. The scales for bridging with Irish and with other internationals consisted of five items that were similar to these bonding measures, but the subject (co-nationals) was changed to Irish and other internationals (see Table 1). Although international students' network ties with Irish and with other internationals were both bridging by nature, the rationale to separate Irish from other internationals was to treat them as advantaged local network resources which may provide Ireland-specific labour market information that is exceptionally beneficial for international graduates.

Control variables include highest educational degree, field of study, IELTS score, whether one is from a country where English is an official language, linguistic distance to English, age when graduating, gender, years living in Ireland, work experience, internship, parents' highest educational degree, and nationality. It is expected that PhD students have better English fluency than Master's and

Table 1: The Items Used to Measure Bonding and Bridging Social Capital

Bonding with Co-nationals	– Most of my friends were from my own country. – I was a member of organisations/clubs which predominantly consist of people from my own country. – I often hung out with friends from my own country – I used to visit my co-national friends' houses, or they visited my house. – I preferred to seek help from friends from my own country.
Bridging with Irish	– I had lots of local Irish friends. – I was a member of organisations/clubs which predominantly consist of Irish people. – I preferred to seek help from my Irish friends. – I hung out with Irish friends (coffee, movie, drinks) at least once per month. – I used to visit Irish friends' houses, or they visited my house.
Bridging with Other Internationals	– I had lots of friends who were neither from my own country nor Irish. – I was a member of organisations/clubs which predominantly consist of people neither from my own country nor Irish. – I preferred to seek help from my international friends. – I hung out with international friends (coffee, movie, drinks) at least once per month. – I used to visit international friends' houses, or they visited my house.

Source: Author's analysis.
Note: Scale: 1 (disagree) to 5 (agree). Cronbach alpha for bonding social capital with co-nationals is 0.96; for bridging social capital with Irish is 0.89; for bridging social capital with other internationals is 0.94.

undergraduate students. Also, non-STEM (Science, Technology, Engineering and Math) students are expected to have better English fluency than STEM students as non-STEM students more frequently deal with books and words while STEM students predominantly deal with numbers and techniques. Students who come from a country where English is an official language (e.g. India) are expected to possess better English skills than those who are from a country where English is not an official language (e.g. Korea, China). This reflects the 'Exposure' from the three 'E's theory.

Furthermore, linguistic distance is a measure of the distance between English and other languages. Studies have shown that one is more likely to be fluent in

Table 2: Summary Statistics

Variables	*Mean*	*Range*	*Std Dev.*
English fluency	14.08	4-20	4.10
Speaking	2.99	1-5	1.29
Listening	3.16	1-5	1.17
Reading	3.87	1-5	1.03
Writing	4.05	1-5	1.00
Wage after tax (Euro)	2,089.72	170-3,944	550.08
Bonding social capital with Co-Nationals	15.87	5-25	6.53
Bridging social capital with Irish	10.86	5-25	4.80
Bridging social capital with other Internationals	16.43	5-25	5.99
IELTS score	6.62	5.5-9	0.52
English as official language	0.43	0-1	0.50
Linguistic distance	2.26	1.5-3	0.62
Major (STEM)	0.35	0-1	0.48
Age	26.53	20-37	4.48
Gender (Male)	0.47	0-1	0.50
Years living in Ireland	2.73	1-9	1.79
Work experience (by year)	1.09	0-11	2.00
Internship	0.49	0-3	0.70
Parents' highest education (Tertiary)	0.40	0-1	0.49
Degree	*Observation*	*Percentage*	
Undergraduate	39	0.12	
Master's	163	0.50	
PhD	123	0.38	
Origin			
Chinese	101	0.31	
Other Asians except Chinese	103	0.32	
Latin American	23	0.07	
African	65	0.20	
Others (North American, Oceanian and non-EEA European)	35	0.11	

Source: Author's analysis.

Notes: (1) Students from Australia, Canada, New Zealand and the US are excluded from the English fluency variables; (2) Income only includes those whose first job upon graduation is/was in Ireland, and those whose incomes stand more than two standard deviations away from the mean (considered as outliers) are also excluded from the Table and future analysis; (3) For the linguistic distance variable, it ranges from 1-3, lower score indicates further from English while higher score indicates closer to English. In the future analysis, for easier interpretation, it is reversed, with lower score indicating ease of learning for English native speaker and higher score indicating increased difficulty.

English if his/her mother tongue is linguistically close to English (Beenstock *et al.*, 2001; Chiswick and Miller, 2005). In this study, the scale of a language's distance to English was borrowed from School of Language Studies, US Department of State (Hart-Gonzalez and Lindemann, 1993) (see Table 6 in the Appendix). Furthermore, previous studies (Crossley *et al.*, 1997) have suggested that females outperform males on language fluency. The number of years residing in the host country is expected to be positively correlated with host country language fluency (Dustmann and Soest, 2001; Shields and Price, 2002). Students from higher socio-economic background (proxied by parents' highest education) may have better English fluency than those from lower socio-economic background. Lastly, nationality is recategorised into Chinese, other Asians except Chinese, Latin American, African, and others (which include North American, Oceanian and non-EEA European). The summary statistics for all variables are shown in Table 2.

IV RESULTS AND FINDINGS

4.1 Determinants of International Students' English Fluency

In Table 3, international students' English fluency is predicted by bonding and bridging social capital plus the controls by using OLS models. Model 1 includes only the social capital variables as predictors, and Models 2 and 3 add human capital and the controls in the models. For easier interpretation, the linguistic distance variable is transformed to the inverse of the linguistic score shown in Table 6 of the Appendix – that is, language distance = 1/language score. Thus, the lower the score, the closer that language is to English, and vice versa. To account for possible multicollinearity, variance inflation factor (VIF) ratio is calculated. A strong collinearity is found between linguistic distance and area of origin (linguistic distance VIF: 16.63; Pearson's correlation: 0.56). As one might expect, there exists a close correspondence between language and country; e.g. Korean is spoken in Korea, Spanish in Latin America (except Brazil), etc. In order to amend multicollinearity, linguistic distance and area of origin are specified in Models 2 and 3 separately. A model robustness check was conducted on the probability sample (dropping the snowball sample) and no significant differences were detected between the whole sample and the probability sample.

The results in Model 1 reveal that students' English fluency is significantly associated with their social capital, and different forms of social capital have opposite impacts on their English fluency. Bonding social capital is negatively associated with students' English fluency. Each unit increase in bonding social capital is associated with a decrease in the fluency rate of 0.33 point. Bridging social capital with Irish locals and with other internationals both reveal positive associations with English fluency. Each unit increase in bridging social capital with

Irish nationals is associated with a 0.16-point increase in English fluency and bridging social capital with other internationals has similar effect size. In Models 2 and 3 where human capital and control variables are included, the effect sizes of social capital variables attenuate, but most remain significant. Only bridging social capital with Irish in Model 2 lost its significance. But the overall results support the hypotheses that immigrants (in this case international students) who often socialise within their national community or ethnic enclave tend to perform more poorly on their English fluency than those whose social ties reach beyond their co-national/-ethnic network, since English is often used as the lingua franca for cross-national/-ethnic communication.

Table 3: OLS Estimation of English Fluency among International Students in Ireland

	Model 1	*Model 2*	*Model 3*
Bonding Social Capital with Co-Nationals	–0.33***	–0.27***	–0.24***
	(0.03)	(0.04)	(0.04)
Bridging Social Capital with Irish	0.16***	0.06	0.10***
	(0.03)	(0.03)	(0.03)
Bridging Social Capital with other Internationals	0.16***	0.16***	0.14***
	(0.03)	(0.04)	(0.03)
IELTS score		0.90**	0.94***
		(0.31)	(0.27)
English as official language		1.16*	2.56***
		(0.57)	(0.60)
Linguistic distance		0.77	
		(2.10)	
Degree			
Bachelor		Ref.	Ref.
Master's		–0.23	–0.71
		(0.77)	(0.72)
PhD		–0.96	–0.75
		(0.93)	(0.84)
Major (STEM)		–0.55	–0.14
		(0.35)	(0.39)
Age		0.03	–0.04
		(0.06)	(0.06)
Gender		–0.11	–0.21
		(0.31)	(0.31)
Years living in Ireland		0.30**	0.32**
		(0.12)	(0.11)
Parents' highest education (Tertiary)		0.06	–0.01
		(0.32)	(0.32)

Table 3: OLS Estimation of English Fluency among International Students in Ireland (Contd.)

	Model 1	*Model 2*	*Model 3*
Origins			
Chinese			Ref.
Other Asians except Chinese			–1.86**
			(0.66)
Latin American			1.32*
			(0.65)
African			–0.54
			(0.58)
Non-EEA European			1.92**
			(0.70)
Constant	14.99	8.28	9.71
Observations	290	267	267
Adjusted R^2	0.62	0.69	0.70

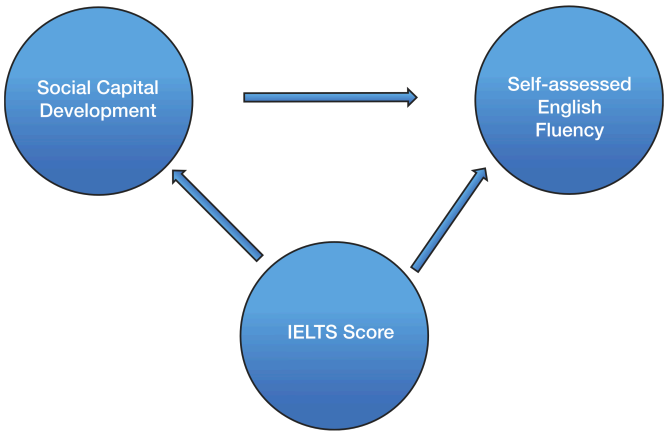
Source: Author's analysis.
Note: *p<0.05, **<0.01, ***<0.001 (two-tailed test). Robust standard errors in parentheses.

The IELTS score used to apply for Irish universities is found to be positively associated with students' English fluency in both Model 2 and Model 3. Each half unit increase in IELTS is associated with an approximately 0.45-point increase in English fluency.[1] It is worth noting that the IELTS score is an important variable that needs to be controlled in the model due to its confounding nature. IELTS score is used as the proxy to indicate students' English ability prior to their study in Ireland. Social capital was measured by asking participants to 'please recall your memory and evaluate your social relationship with co-national/Irish/other internationals during your study in Ireland'. English fluency is also measured by asking participants to 'please evaluate your English ability by the time of your graduation'. Thus, all three variables are time-specific. Chronologically, the IELTS score happens first, then social capital development, followed by self-assessed English fluency.

The casual relationships between IELTS, social capital and self-assessed English fluency are shown in Figure 2. It is clear that students' initial English fluency before joining Irish universities (proxied by the IELTS score) influence both their social capital development during college and their English fluency by the time of their graduation. The confounding nature of the IELTS score – its influencing both the dependent and independent variables – means it presents itself as a key variable to be controlled in the regression model. This helps isolate the effect of English fluency before coming to Ireland on English fluency after

[1] The IELTS band score increases on a half-point basis, for example: 6, 6.5, 7, 7.5, 8, 8.5 and 9.

Figure 2: Relationships Between IELTS Score, Social Capital and English Fluency



Source: Author's analysis.

graduation, reducing or eliminating the possibly spurious association between social capital and English fluency upon graduation.

As for other controls, both Models 2 and 3 show that students from countries where English is the official language were found to be more fluent in English than those who were from countries where English is not the official language. Linguistic distance did not reveal any significant effect in Model 2. It is understandable that for a highly-educated group of students with strong learning abilities, the linguistic distance between English and their mother tongues may not be a strong factor influencing their English fluency. In Model 3, where linguistic distance is replaced by area of origin, some significant effects are detected. Compared with the reference group, Chinese students, students from Latin America and non-EEA Europe are found to have better English fluency while those from Asia excluding China reveal less English fluency than the Chinese. Moreover, years living in Ireland is found to be positively associated with English fluency in both Model 2 and Model 3. Each additional year living in Ireland is associated with an approximately 0.3-point increase in English fluency. This finding is consistent with Chiswick and Miller (1995) and Dustmann and Fabbri (2003) where positive association between immigrants' length of stay in host countries and their host country language fluency was also found.

Additionally, Table 4 presents the OLS regression results of social capital on each English fluency breakdown: listening, speaking, writing and reading.[2]

Studies (Johnson and Creech, 1983; Norman, 2010; Sullivan and Artino, 2013) have shown that ordinal variables with four or more categories can often be used as continuous without any harm to the analysis. In cases like this, researchers usually refer to the variable as an 'ordinal approximation of a continuous variable'.

Table 4A presents the results without the controls, while Table 4B adds in all the controls, including degree, field of study, IELTS score, whether English is an official language in home country, linguistic distance, age, gender, years living in Ireland, and parents' highest education. From the magnitudes and significances of the coefficients shown in Tables 4A and 4B, we can see that listening and speaking English fluency are more likely to be influenced by social capital compared with writing and reading fluency. For example, in Table 4A, while bonding social capital with co-nationals is found to have a significant impact on all four aspects of English fluency, it exhibits stronger influences on listening and speaking than on writing and reading. And in Table 4B, bridging social capital with Irish is only found to have a significant influence on listening and speaking fluency but not on writing and reading.

Table 4: Regression Analysis on English Fluency Breakdowns

A. Without Controls N=290				
	Listening	*Speaking*	*Writing*	*Reading*
Bonding social capital with Co-Nationals	–0.09*** (0.01)	–0.11*** (0.01)	–0.06*** (0.01)	–0.07*** (0.01)
Bridging social capital with Irish	0.06*** (0.01)	0.06*** (0.01)	0.03* (0.01)	0.02 (0.01)
Bridging social capital with other Internationals	0.05*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
B. With Controls N=267				
	Listening	*Speaking*	*Writing*	*Reading*
Bonding social capital with Co-Nationals	–0.07*** (0.01)	–0.09*** (0.01)	–0.04** (0.01)	–0.04*** (0.01)
Bridging social capital with Irish	0.02* (0.01)	0.03* (0.01)	0.02 (0.01)	0.00 (0.01)
Bridging social capital with other Internationals	0.05*** (0.01)	0.03*** (0.01)	0.04*** (0.01)	0.04*** (0.01)

Source: Author's analysis.
Note: *p<0.05, **<0.01, ***<0.001 (two-tailed test). Coefficient and robust standard error are reported.

4.2 English Fluency, Income and Endogeneity

In Table 5, international students' monthly wage from their first job upon graduation is predicted by English fluency, bonding and bridging social capital, human capital variables (degree, field of study, work and internship experience), age, age squared/100 and gender. Students whose first job upon graduation is/was outside of Ireland (for example those who returned to home country upon graduation) are

not included in the analysis. Thus, the sample size reduced from 290 to 190. After deleting those whose income is missing, the final usable sample size is 83. Model 1 includes only the English fluency variable. Model 2 adds bonding and bridging social capital into the analysis. Model 3 includes the human capital variables and Model 4 adds the rest of the controls. In Model 5, English fluency is further broken down into two components, which are verbal fluency and literal fluency.

Model 6 presents the results obtained from two-stage least square regression to correct the possible endogeneity between language and wage. Ideally, a suitable instrumental variable should have the property that it is, to a good extent, correlated with international students' English fluency and not correlated with their wage. Drawing from Dustmann and van Soest (2001; 2002) who used fathers' education as the instrument, the variable parent's highest education (0=below tertiary, 1=above tertiary) is selected as the instrument in this study. The Durbin-Wu-Hausman test revealed a significance level lower than 0.05, which led to rejection of the null hypothesis that English fluency is exogenous, and acceptance of the alternative hypothesis that English fluency is truly endogenous (results shown in Table 6).

The analysis also includes graduates from English-speaking countries. They are treated as perfect English users with English fluency scores of 20. The dependent variable is the natural logarithm of the monthly wage after tax. The main independent variables of interest are English fluency and social capital. The control variables include degree, field of study, working experience, internship experience, age, age squared/100, gender and years living in Ireland upon graduation. Under this interpretation, the earning specification is as follows:

$$\log(\text{income}) = \alpha\,\text{eng} + \beta 1\,\text{socialcapital} + \beta 2\,\text{humancapital} + X\gamma + \varepsilon$$

where eng is English fluency, X is a vector of control variables and ε is the random error term.

As shown in Table 5, in Model 1, English fluency is positively associated with international graduates' monthly income. Each unit increase in English fluency is associated with a 0.02-point increase in the log of monthly income. In Model 2 where bonding and bridging social capital are taken into consideration, English fluency remains significant. Bridging social capital is found to be positively associated with the log of income. Each unit increase in bridging social capital with Irish nationals is associated with a 0.01-point increase in the log of monthly income. This finding supports Putnam's theory that bridging social capital, especially with the locals, help immigrants gain useful non-repetitive information that is not available in one's co-national/-ethnic network and results in better labour market outcomes, such as higher probability of employment, finding a better job and getting a higher salary (Portes 1998; Putnam, 2000; Lancee, 2010; 2012; 2016).

Table 5: OLS Regression Estimate of Monthly Income

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
English fluency	0.015*	0.020*	0.002	0.010		0.069*
	(2.43)	(2.42)	(0.19)	(0.93)		(2.05)
Verbal fluency					0.014	
					(0.55)	
Literal fluency					0.005	
					(0.14)	
Bonding social capital with Co-Nationals		0.01	0.004	0.003	0.004	
		(1.6)	(0.99)	(0.81)	(0.72)	(1.99)
Bridging social capital with Irish		0.01	0.009	0.011**	0.011**	0.012**
		(2.98)	(2.7)	(3.23)	(3.17)	(3.16)
Bridging social capital with other Internationals		–0.01	–0.008	–0.005	–0.005	–0.004
		(–1.13)	(–1.89)	(–1.11)	(–1.12)	(–0.87)
Degree (PhD)			0.227***	0.361***	0.362***	0.265**
			(4.68)	(5.22)	(5.18)	(2.90)
Field of Study (STEM)			0.039	0.067	0.066	0.204*
			(0.75)	(1.36)	(1.32)	(2.24)
Work experience (Number of Years)			0.015	0.036**	0.035**	0.028*
			(1.55)	(3.31)	(3.08)	(2.26)
Internship experience (Number of Times)			–0.030	–0.038	–0.040	–0.116*
			(–1.10)	(–1.37)	(–1.34)	(–2.25)
Age				–0.094	–0.083	–0.087
				(–0.95)	(–0.69)	(–0.80)
Age squared/100				0.118	0.099	0.094
				(0.70)	(0.49)	(0.51)
Gender				0.088	0.086	0.105*
				(1.95)	(1.83)	(2.10)

Table 5: OLS Regression Estimate of Monthly Income (Contd.)

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Constant	7.40	7.21	7.45	8.79	8.64	7.70
Observations	83	83	83	83	83	83
Adjusted R^2	0.067	0.236	0.479	0.574	0.574	0.407

Source: Author's analysis.
Note: *p<0.05, **<0.01, ***<0.001 (two-tailed test). Robust standard errors in parentheses. Coefficients are reported.

Table 6: Durbin-Hu-Hausman Test of Endogeneity

Durbin (score)	*Hu-Hausman*
Chi2(1)	F (1.70)
4.86	4.35
p=0.028	p=0.041
H0: Variables are exogenous.	

Source: Author's analysis.

In Model 3, human capital related variables are added. English fluency lost its significance while bridging social capital with Irish retained the significant effect. Degree is found to be significant. Having a PhD significantly increases the log of monthly income by 0.23 points. Field of study, work and internship experience did not show significant effect. Model 4 includes the rest of the controls. Bridging social capital with Irish nationals and having a PhD remained significant. Work experience is found to have a positive effect on the log of monthly income. In Model 5, English fluency is broken down into two components: verbal and literal fluency. However, both verbal and literal fluency are found to be insignificant. Thus, Hypothesis 3 is rejected.

Finally, in Model 6 where parents' highest education is used as the IV, English fluency regained its significant effect on the log of income, and the effect size increased to a large extent compared with previous models. Bonding social capital with co-nationals, bridging social capital with Irish nationals, having a PhD, majoring in STEM, work experience and being male are all found positively associated with the log of monthly income. Opposite to the common wisdom, internship experience is found to have a negative effect on the log of income. A possible explanation is that students who undertook many internships after graduation may have done so because of other underlying deficits that are not controlled for in this model, but which lead to lower earnings. It is worth acknowledging that the parents' highest education variable may not be the most ideal instrument. Indeed, there are a substantial number of sociological studies on social stratification which argue the positive role socio-economic background plays in one's career pathway (Jencks, 1979; Thomas, 1994; Albert, 2000). Also, there is a weak correlation between parents' highest education and students' English fluency (Pearson's correlation: -0.14) suggesting that parents' highest education is a weak IV. This reflects the typical problem in social science studies that it is very difficult, or sometimes impossible, to find a suitable IV for correcting endogeneity (Martens *et al*., 2006).

V CONCLUSION, LIMITATION AND POLICY IMPLICATIONS

This study investigates the determinants of English language fluency among international students that graduated from Irish universities, and how their levels of English fluency impacted on their first job wages upon graduation in the Irish labour market. The determinants of immigrants' host country language fluency have been classified in the labour economics literature into three broad categories: Exposure to the language in home and host country; Economic incentives for acquiring these skills: and Efficiency in converting the economic incentives into language skills (Chiswick and Miller, 1992; 1995; 1996; 1997). Possibly due to the difficulty in collecting network data, a clear negligence from the existing literature

is the impact of social capital on immigrants' language fluency. Drawing from Putnam's theory, this study distinguishes among three different forms of social capital, which are bonding social capital with co-national, bridging social capital with Irish nationals and bridging social capital with people who are neither co-national nor Irish.

Surveying recent non-EEA graduates from Irish universities from 2014 to 2016, the main findings suggest that different forms of social capital have different, even opposite, influences on international students' English fluency and their earnings upon graduation. Bonding social capital was found to be negatively associated with students' English fluency while bridging social capital with Irish locals revealed a positive effect on their English skills. It was also found that social capital has a stronger influence on students' verbal fluency than their literal fluency. The IELTS score, English as an official language in one's home country, years living in Ireland, and majoring in non-STEM disciplines were also positively associated with students' English fluency.

The second aim of this study is to analyse the effect of language fluency and social capital on graduates' income. An OLS model is used to estimate English fluency and social capital effect on the natural logarithm of graduates' monthly salary of their first job upon graduation from Irish universities (excluding those who returned to home countries or went to other countries upon graduation). Since the OLS estimated coefficients may be biased due to endogenous choice and measurement error, the two-stage least square regression technique was implemented by using the instrumental variable approach. The obtained results suggested that, upon correcting for endogeneity, English fluency has a significant positive effect on international graduates' income. Graduates with better English fluency have higher incomes than those with lower English fluency in their first job upon graduation. Positive associations were also found between bonding social capital with co-nationals, bridging social capital with Irish nationals, and graduates' income.

The findings of this study have to be seen in light of some limitations. The first is the quality of the dataset used. Due to the lack of appropriate secondary data sources, I had to collect first-hand data on international graduates' social contact, English fluency and wage information. Although maximum effort was made for data collection, the final usable sample size 325 is still relatively small. What's more, in order to increase the sample size, I had to use snowball sampling method, which encourages survey participants to forward the survey to their previous classmates. However, the downside of snowball sampling is it introduces non-randomness and self-selection bias into the sample, which furthermore affect the generalisability of the results. Thirdly, more advanced techniques to measure social capital, such as position generator (Lin, 2001) or name generator (Burt, 1997), could be used in future research. These methods capture the complex information in interpersonal network ties better than the traditional Likert scale method used in this study.

The findings of this study have important implications at both the individual and national level. For individual students, this study points to a clear set of factors that can influence their English fluency and future income if they decide to stay and work in Ireland upon graduation. Those who wish to improve their English skills, especially their verbal fluency, should make efforts to befriend and socialise more often with local Irish people and other international students. International students who plan to stay and work in Ireland upon graduation should try to enhance their English skills in order to benefit more from the labour market. From a macro perspective, this study provides the Irish government with a better understanding of foreign students' study-abroad engagement and labour market performance within the Irish labour market. The analysis revealed that university graduates' labour market outcomes are path-dependent on their social engagement in university and pre-migratory experience in home countries. The findings of this paper suggest that language may present an important policy lever to avoid or reduce labour market disadvantages among international graduates working in Ireland. This study also reiterates the importance of English language schools in the Irish education system and their potential role in aiding international students' engagement and development in Ireland.

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APPENDIX

Table A.1: Index of Difficulty of Learning a Foreign Language for English-Speaking People

Language	*Language Score*	*Language*	*Language Score*
Afrikaans	3.00	Greek	1.75
Danish	2.25	Hebrew	2.00
Dutch	2.75	Hindi	1.75
French	2.50	Hungarian	2.00
German	2.25	Lao	1.50
Italian	2.50	Cambodian	2.00
Norwegian	3.00	Mongolian	2.00
Portuguese	2.50	Nepali	1.75
Rumanian	3.00	Polish	2.00
Spanish	2.25	Russian	2.25
Indonesian	2.00	Serbo-Croatian	2.00
Malay	2.75	Sinhala	1.75
Swahili	2.75	Tagalog	2.00
Amharic	2.00	Thai	2.00
Bengali	1.75	Turkish	2.00
Bulgarian	2.00	Vietnamese	1.50
Burmese	1.75	Arabic	1.50
Czech	2.00	Mandarin	1.50
Dari	2.00	Japanese	1.00
Farsi	2.00	Korean	1.00
Finnish	2.00	Cantonese	1.00
Greek	1.75		

Source: Lucinda Hart-Gonzalez and Stephanie Lindemann, School of Language Studies, Foreign Service Institute, Department of State, April 14, 1993.
Note: The language score ranges from 1-3, lower score indicates harder to learn while higher score indicates easier to learn.