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Education ties and investments abroad. Empirical evidence from the US and UK[#]

Marina Murat[*]

Abstract. This paper analyses the impact of university student ties on the FDI of the US and UK into 167 countries during the period 1999-2010. University ties are measured by international students flows and alumni associations worldwide. Studies on transnational social networks suggest that effects should be higher on the FDI directed to the developing economies. The paper's main findings are that international student flows and alumni associations abroad exert a positive influence on the FDI from the US and UK into the students' home countries. More specifically, their influence is strong and significant in the group of developing countries. Results, similar for the US and UK, are robust to different regressors and econometric specifications.

JEL classification: F14, F20, I23, J24.

International students, alumni, bilateral FDI, education networks.

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1. Introduction.

In 1863, five young Japanese noblemen secretly fled their country to study at university in Britain. At that time Japan was completely closed to the rest of the world and travelling abroad was strictly forbidden. A few years later, on their return home, the five students helped the country undergo a profound transformation. They prompted the reforms that opened Japan to the world and, in particular, to trade with Britain and other Western economies.[1]

This outcome was remarkable, but it was not entirely fortuitous, nor was it unique. The five young Japanese were only a tiny fraction of the foreign students studying at British universities at the time, and only a few of those who returned home and actively sought to build links between Britain and their homeland. The British government was aware that during their years at university students typically develop strong and enduring ties of friendship and trust and an attachment with the university and host country, and that these ties can improve relations with the students' home countries.

Since then, the numbers of people studying abroad and the number of countries involved in these exchanges have greatly increased. According to UNESCO's definition and statistics, international students are students that move to a foreign country for the purpose of tertiary studies. There were 2.1 million in 2002 and 3.4 million in 2010. International students have become an important topic in the debate on globalization, but their full implications are still poorly understood. Student flows are often seen as a a consequence of globalization, rather than as a previously existing and very significant source of political, cultural and economic interactions between countries. Economic studies, in particular, have focused on the incentives of students to study abroad, the motives for universities to attract students (Bessey, 2012; Beine, 2012; Kahanec and Králiková, 2011; Haupt et al., 2011; Van Bouwel and Veugelers, 2010), and the ensuing brain gains and losses for the receiving and sending countries (Le, 2010; Chellaraj et al., 2008; Freeman, 2010) but not, to my knowledge, on the crucial increases in bilateral trade and foreign investments that the movements of students are likely to determine.

The main thesis of this paper is that international students positively affect economic exchanges between the countries of education and origin. Specifically, their influence on the foreign direct investments (FDI) of the US and UK during 1999-2010, the world's two main receiving countries, in 167 home countries of international students is considered.

Back in the nineteenth and early twentieth century, Britain hosted students from all over the world: settlement countries, Europe, colonies and other less developed economies. Students from

[1] The five young Japanese, known as "the Choshu-Five", studied at University College London. Today, two monuments celebrate their enterprise, one in the grounds of UCL, and another at Yamaguchi University, Japan.

poorer countries were accepted in lower numbers, but their bridging potential was considered the most important and precious, since relations with rich and settlement countries already existed (Pietsch, 2009). Conversely, these students moved to Britain with the aspiration of securing prestigious jobs, especially in the professions, commerce and bureaucracy. In adulthood, several of them became rulers, scholars, businessmen, and experts in various fields. In later years, during decolonization, some became leaders of independence.

Subsequently, during the Cold War period, other powerful countries began hosting foreign students with the aim of fostering relations with their home countries. With the world divided into two separate and competing blocks, the main powers within each block offered scholarships and fellowships to attract foreign students and scholars and adopted less restrictive entry conditions (Perraton, 2009). The US became the world's main destination country, surpassing the UK. It competed in particular with the rival superpower, the USSR, for students from Third World countries considered politically unstable and at risk of being attracted into the opposing block. As before, the main goal was an improvement in relations with students' home countries, but with the political and strategic dimension being paramount, overshadowing any other consideration, even economic. At the same time, many of the sending economies perceived the advantage of having at home a pool of skilled nationals educated abroad, and started offering scholarships to study abroad and incentives to return after graduation. All this meant that new and wider doors were opened to international students, within each block.

Since the fall of the Berlin Wall and the end of the division of the world into two contending blocks, the political and economic scenario has gradually become more and more heterogeneous and fragmented. The direct interest of governments in attracting foreign students has faded, while the direct players, students and universities, have come to the centre of the debate. There is no reason, however, to expect the influence of international student flows on interactions between countries to have vanished. On the contrary, it can still be strong and, given the higher number of countries involved, more widespread than ever. The foundation for this influence remains unchanged: the robust network ties that students tend to establish with each other during their university years, and their attachment to the university and host country. Furthermore, the cultural, institutional, and economic differences between rich and poor countries that made education ties crucial in the past still exist and are important. All this suggests that the influence of international students should still be both positive and substantial. In particular it should affect the interactions between the two main destination economies, the US and UK, which in 2010 attracted 21% and 12% of world student flows, respectively (UNESCO), and the students' home countries.

To measure the influence of international students on bilateral FDI, I used different sources of data. First, the statistics published by UNESCO as a homogeneous series since 1998, which I utilized for the period 1999-2010. Secondly, as students on average are relatively young, and the influence on FDI of graduates and former students is also of interest,[2] I utilized lagged data on foreign students, specifically regarding years 1970 and 1971. These statistics are published by the Institute of International Education for the US and the British Council for the UK. On average, these former students would be in their fifties and early sixties during the database time span. A third, more direct, indicator of university ties is the existence of alumni associations. They are a common phenomenon in English-speaking countries, with branches often extending outside the university country. As no official statistics on them exist, I collected the available evidence on alumni associations of US and UK universities in the 167 partner countries. Most of these data are accessible on universities websites.

The main findings of this paper are that education networks positively and strongly affect FDI from the US and UK into students' home countries. As in the past, these effects are particularly significant for the less developed economies. Similarly, alumni associations abroad strongly affect the FDI from the US and UK, especially into developing countries. Furthermore, links established by people who studied in the US and UK during the Cold War still significantly affect present-day FDI, particularly into Third World economies. These findings, similar for the US and UK, are robust to different specifications involving variants of regressors and estimation techniques. The remainder of the paper is organized as follows. Section two presents the literature on social and education networks. Section 3 presents the statistics of the variables of interest and indicates the data sources. Section 4 concerns the estimation strategy, developed in successive steps. Section 5 presents and discusses the results. Section 6 gives the conclusions.

2. Concepts and literature

International education networks are founded on ties of friendship and mutual trust between skilled individuals developed during their years at university. More generally, they are social networks. The base assumption of networks theory is that social interactions between individuals lower the informal fixed costs of market transactions which, on an international level, are generated by social, cultural, and institutional dissimilarities between countries. By smoothing out dissimilarities, network links boost bilateral trade and FDI (Rauch, 1999; 2001). Several empirical

[2] The twelve-year time span covered by the database means that by the second half of the period almost all students in the first half would have graduated or ended their studies. They would, however, still be at the beginning of their professional career .

studies, focusing mostly on migrants, provide support for this hypothesis (Gould, 1994; Head and Ries, 1998; Rauch and Trindade 2002; Wagner et al., 2002; Gao, 2003; Tong, 2005; Combes et al., 2005; Herander and Saavedra, 2005; Blanes and Martín-Montaner, 2006; White, 2007; Tadesse and White, 2008; Bandyopadhyay et al., 2008; Buch et al. 2006; Peri and Requena 2010; Aleksynska and Peri, 2012; Egger et al., 2012; Felbermayr and Toubal, 2012). In particular, it is found that FDI are more likely to be promoted by networks of skilled individuals (Docquier and Lodigiani, 2010; Javorcik at al., 2011; Flisi and Murat, 2011). Moreover, in agreement with the base assumption, some studies find that the effects of social transnational links tend to be stronger as countries are more dissimilar (Girma and Yu, 2002; Dunlevy, 2006; Kugler and Rapoport, 2007; Tong, 2005).

Another literature, focusing on networks of university students, shows that university ties, based on friendship and trust, are particularly robust (Marmaros and Sacerdote 2006; Mayer and Puller, 2008; Arcidiacono et al., 2011; Baker et al., 2011; Neri and Ville, 2008). Cohen et al. (2008) find that university links are also enduring and, through time, may evolve into business ties. The authors empirically measure the investment decisions of economic agents, finding that investors tend to trust their former university more than other people and prefer to invest with them. The empirical data collected for the present paper show that the international alumni associations of US and UK universities extend all over the world and, hence, that university network ties can be persistent not only through time but also space.

International students, differently from immigrants, move to the foreign country to invest in education, not for labour reasons, and may therefore more easily establish friendship relationships with natives and people from other countries. Immigrants, directly competing with natives in the labour market, may instead develop a stronger tendency to form ethnic networks. Moreover, during their university years, students typically travel home frequently, which keeps links with their country of origin alive. These factors suggest that education networks should be characterized by ties that are open and inclusive and, as such, conducive of valuable economic information interactions (for open or 'weak' ties, see Granovetter, 1973).

3. Data and descriptive statistics.

The detailed sources of all variables and data utilized in this paper are listed in Table A.4, in Appendix. Table 1 shows that student inflows to both the UK and US originate mainly from other developed countries, while the inflows from developing economies (including emerging and transition economies) have registered the most rapid growth rates. Specifically, from 1999 to 2010, the average number of students from developed economies in the US (6,982) was more than twice the inflow of students from developing countries (2,599), while in the UK this proportion was about

four to one (4,622 and 1,127 respectively). Inflows from developed countries increased at a rate of about 3% per year to both the US and UK, and inflows from developing countries increased at a rate of 11.2% to the US and 9.75% to the UK. The UK, in particular, has experienced a rapid increase in students from Eastern Europe, originating especially from the more recent EU member countries.

The associative activity of university alumni is more widespread and an older tradition in the English-speaking world than in other countries. In the US, in particular, the alumni associations of some universities are as old as the universities themselves.[3] For the purpose of this investigation, I collected the available data on the foreign branches of the alumni associations of 62 US and 50 UK universities existing in each partner country. The foreign associations of these universities number 1759 for the US and 1895 for the UK. Some of these associations include thousands of affiliates.[4] Table 1 also contains summary statistics on the FDI of the US and UK during the period considered. As for international students, the higher levels of outward FDI are directed to developed countries, but the higher growth rates correspond to developing economies.

5. Estimation strategy

The basic question I seek to examine is whether international students in the US and UK influence the volume of FDI from the US and UK to the students' home countries. To do so, I firstly estimate the following gravity (Bergstrand, 1985) base model

$$ln\ FDI_{ct} = \alpha + \delta\ international\ education\ networks_{ct} + X_{ct}\Pi + \alpha t + \varepsilon_{ct} \qquad (1)$$

where the dependent variable is the stock of FDI of the US or UK in country *c* at time *t*, in the log form.[5] The two countries' regressions are run separately. The explanatory variable of interest is

[3] Among others, the following alumni associations exist since year: 1792, Yale (http://aya.yale.edu/content/history); 1840, Harvard, (http://alumni.harvard.edu/about-haa/history); 1875, MIT (http://libraries.mit.edu/sites/mithistory/institute/committees/association-of-alumni-and-alumnae-of-the-massachusetts-institute-of-technology/); 1870, Penn State University (http://alumni.psu.edu/about_us/history); 1872, University of Berkeley(http://alumni.berkeley.edu/about-caa); 1889, University of Washington (http://www.washington.edu/alumni/about/history.htm); 1897, California Institute of Technology (https://alumni.caltech.edu/history);1906, University of Florida (http://www.ufalumni.ufl.edu/about/); 1927, Texas Tech (http://www.texastechalumni.org/s/1422/3col.aspx?sid=1422&gid=1&pgid=449); 1875, Virginia Tech (http://www.alumni.vt.edu/about/history.html); 1925, UCLA (http://alumni.ucla.edu/alumni-association/history/default.aspx); 1907, Cal Poly (http://alumni.calpoly.edu/content/about_cpaa/cpaa_history); 1878, Iowa State University (http://www.isualum.org/en/about_us/association_history/).

[4] Data on associations abroad were collected from all university websites that provide this information. The staff of Manchester university (UK) kindly provided data. The databases on US and UK foreign branches of alumni associations are available from the author on request.

[5] The FDI variables contain a few zeroes and negative values. Zeroes have been used to substitute the latter and one has been added before taking logs. All regressions in the paper have been also run without this adjustment. It has been

educational networks. Depending on the specification, the variable is the logarithm of the flows of students from country *c* at time *t* present in the US or UK, or the logarithm of the stocks of alumni associations of US and UK Universities in country *c*.

The control variables included, specific to the partner country *c*, are commonly used on literature regarding FDI determinants. They are: log of the population size to capture the potential market size of the country, log of *GDP* to proxy for the purchasing power of consumers in the partner country, the average inflation in country *c* at time *t* to control for macroeconomic stability, the log of distance of the country from the US or UK to capture transaction costs related to travel, communications and cultural distance, a time-varying index of the quality of institutions, to capture the bureaucratic and political costs of transactions, the proportion of people speaking English, to denote cultural dissimilarities and difficulties of obtaining information about business conditions, and a dummy with value 1 for developed countries (OECD members in 1999) and zero otherwise, which should summarize other social, institutional and cultural similarities of the education economies with the partner countries. The model includes time dummies, α_t.

Due to the potential endogeneity of the presence of international students in the two receiving countries and alumni associations abroad, I subsequently use the instrumental variables approach. Alumni clubs, groups and associations in stocks, represent a longer-term phenomenon than student flows and, hence, should be less subject to problems of endogeneity. However, in most cases the information available on associations mentions their existence but not their foundation dates, which implies that some of them might still be of recent constitution, and in some way influenced by US or UK investments in the country. The instruments used for the US are: first, the rate of *Literacy* in the partner country. A higher rate of literacy is generally positively related to tertiary studies and hence should positively affect the probability of studying abroad. A second instrument is the presence of alumni associations of universities of the *other* main receiving country, the UK, in the partner economy. The presence of alumni linked to UK universities, or more generally of associations of Anglo-Saxon tradition, may positively influence the decisions of international students to study abroad, not just in the UK, but also in the other main English-speaking destination, the US.

The instruments used for the UK regressions are, first: the proportion of rejected applications from the partner country during the period 1999-2010, a time-varying variable. The *Universities and Colleges Admissions Service* (UCAS) of the UK provides these statistics. A potential shortcoming of this variable is that it concerns applications to undergraduate courses,

found that coefficients in the adjusted version are slightly inflated, but do not differ significantly from the non-adjusted one.

while the data on international students used in this paper include students at all levels, graduate and undergraduate. It can be reasonably assumed, however, that acceptance ratios at all levels are influenced by the degree of similarity between the educational system of the UK and that of the sending country, and are therefore positively correlated with each other. Higher rates of rejection for a country supposedly have a negative impact on the decisions of students from that country to move to the UK. The second instrument used is a dummy variable taking the value of one if the country is a former UK colony and zero otherwise. As seen above, at the time of the British Empire, the UK government and universities maintained a preferential acceptance policy for students originating from settlement countries and colonies (The Universities Bureau of the British Empire, 1914; Pietsch, 2013). What is more, Britain directly exported its educational system to the colonies, making university programs and curricula, as well as school programs for children of the more wealthy classes in society, homogeneous with those at home. For decades after decolonisation, scholarships and fellowships were preferably assigned to Commonwealth countries (Perraton, 2009). However, even the educational systems of ex-colonies that did not join the Commonwealth maintained some similarity with education in the UK. Hence, the use of the instrument *UK-ex colonies* is based on the expectation that old links between Britain and former colonies still affect the inflows of students into the UK.

5. Results

5.1. Base specification

The results of Table 2 concerning the baseline, OLS, specification show that there is a remarkable difference between the impact of students from developing and developed economies (regressions on the complete database are in Table A.1). While those from developing countries have a positive and strong influence on FDI from both the US and UK into their home economies, students from developed countries have none (Models 1 and 4 on developed economies; 7 and 10 on developing countries). These results were expected and provide empirical evidence to the hypothesis that network ties are more effective when countries differ more. More specifically, the pro-FDI influence of international students from developing countries on the outward FDI is quite similar for the US and UK: an increase of 1% of international students from the partner country corresponds to an increase of almost 0.3% in the FDI from the US or UK into the country (Models 7 and 10).

The dependent variable, FDI, in stocks, contained a few negative values and zeroes. In order to maintain the original number of observations, the variable has been adjusted by substituting zeroes for the negative values and adding 1 to all observations before taking logarithms. All

regressions have been run also without the adjustment. In this case, coefficient values are slightly deflated, but do not differ significantly from those obtained with the adjustment.

Interestingly, foreign students who were at university in the two receiving countries about thirty years before the beginning of the database time span, specifically during 1970 in the US and 1971 in the UK, still substantially affect the two countries' outward FDI. Moreover, as in more recent times, their influence is strong and significant only on investments into developing economies (Models 8 and 11 and, for the developed economies, 2 and 5). Given the interest of the two Western powers on students from Third World economies during the Cold War period, this result is not surprising, but stronger than expected. Particularly in the US regressions, the influence of students registered during 1970 is practically equal to that of students of recent times (Models 8 and 7). For the UK, the influence of the former students is also significant, but smaller (Models 10 and 11). This can be explained by the more radical modifications of this country's composition of student inflows and investments abroad after of the enlargement of the European Union. Hence, despite the major structural changes induced by the fall of the Berlin Wall, and the subsequent substantial new inflows of students from countries previously closed to the West, the ties established during the Cold War period are still robust. In fact, the people enrolled in the early seventies must have been on average in their fifties and early sixties during the time span considered in the database and so presumably at the peak of their working and professional carriers, which suggests that they were fully able to influence US investments in their home countries. Regarding the *Alumni associations* variable, coefficients are highly positive and significant both for the developed and developing countries (Models 3, 6, 9 and 12). These associations are a more direct indicator of networking activity than the students variable, and many members are businesspeople.[6] This may explain this initial difference in results. It will be seen below, however, that, the OLS coefficients on the alumni associations of developed countries are not robust to other specifications.

For both countries, the signs of the control variables, *GDP*, *Population*, *Distance*, *English language* and *Quality of institutions* are as expected. A difference between the two economies concerns the values of the coefficients of the *Distance* variable in the developing countries subsample. Coefficients are strongly negative and significant in regressions on US data (Models 7-9), and positive and significant in those on UK data (Models 10-12). The opposite signs may follow from the fact that most developing economies, in Asia, Africa, and Latin America, are far from the UK, without this deterring the country's investments abroad, while the developing countries of

[6] The data collected on the Associations' organizations abroad, show that many of the people who behave 'contacts' or 'ambassadors' are graduates in Economics (including MBA), Engineering, Sciences, and in a lesser proportion, in the Humanities.

Latin America, where a good proportion of US investments are concentrated, are not as far from the US. The top twenty countries in a ranking of US and UK investments abroad, inflows of international students, and alumni associations are provided in Table A.3.

5.2 Instrumental variables.

The instrumental variables approach is used to control for potential endogeneity. The results from the first stage (restricted to coefficients on IVs to save space) suggest that the instruments utilized perform well in the regressions on the overall sample (Table A.2) and in the sub-sample of the developing economies (Table 3), where they explain a significant portion of the variation in the flows of international students and the presence of alumni associations abroad (Models 5-8). The first stage *F-Statistics* (varying from 35.43 in Model 8, to 66.98 in Model 7) and the over-identification tests also confirm that the estimations do not suffer from a weak instrument or endogenous instrument problem. On the other hand, their performance is less satisfactory in the regressions for the developed countries, failing the *F-Statistics* in three cases out of four (Models 1, 3 and 4).

All instruments bear the expected signs in the first stage regressions on the developing countries subsample. Concerning the US, the inflows of international students are positively and significantly related to the rate of literacy and the presence of alumni associations of UK universities in the partner country (Model 5). Also, the *Alumni associations* of US universities in the partner country are strongly and positively correlated with the alumni associations of UK universities, and to a lesser degree, with the rate of literacy in the country (Model 6). The strong positive relations between the presence of US and UK alumni associations in the partner country, and between UK associations and the flow of partner country students into the US, suggest a substantial degree of complementarity between the two educational systems, which influences their patterns of attraction of students from abroad.

Concerning the UK, as expected, the rates of rejection of students willing to study in the UK, the *UCAS* variable, which may be interpreted as an indicator of educational distance between the UK and the sending country, is negatively correlated with both the flow of students into the UK and the number of UK alumni associations in the country, while a colonial past, conversely indicating a similarity of educational institutions and a historical tradition of students moving to Britain for their studies (Perratton, 2009; Pietsch, 2013), has a positive influence on both the flows of students and the number of alumni associations (Models 7 and 8). The results on the two variables, *UCAS* and *UK ex-colonies*, are significant at the 1% level.

Moving on to second stage regressions, results show that the education networks of students and alumni have strong and positive effects on the bilateral FDI of the two receiving countries, US

and UK. As above, in the OLS model, this holds for the developing economies (Models 5-8). More specifically, the coefficients of international students, in Models 5 and 7, are significantly higher than in the OLS specification (Table 2, Models 8 and 11), indicating that a certain degree of endogeneity was likely to affect the OLS results. As expected, the differences between the TSLS and OLS coefficients on *Alumni associations* are lower, because they regard a longer-term phenomenon. In the TSLS model of Table 3, a 1% increase in *International students* from a country corresponds with a 1.28% increase in outward FDI from the US to the same country, and a 0.53% increase in outward FDI from the UK, while the coefficients on *Alumni* are 1.39 for the US and 1.05 for the UK. Significance is at 1% in all cases except for *International students* into the UK, where it is at 5% (Model 7).

The coefficients of the variables of interest of the regressions for the developed countries subsample do not have any significance, in this case also as regards alumni associations, which were significant in the OLS specification of Table 2 (Models 2 and 4, Table 3). These latter results, however, should be considered with caution, given that, in general, instruments are less reliable in this subsample.

5.3. Robustness checks

Two further model specifications are utilized in order to test the robustness of the above results. For brevity, only the regressions on the overall data are presented below. The first of these specifications adds fixed effects. The covariates of the models used up to now capture relevant economic, cultural and institutional characteristics of partner countries, but other country-specific factors, correlated with the variables of interest, could still be missing. To control for this possibility, countries' fixed effects are included in the regressions. This determines the exclusion of the time-constant variables, *Alumni associations*, among the variables of interest, *Distance*, *English Language,* and the *OECD* dummy, among the other regressors, and *UK Alumni associations*, (US regressions) and *UK ex-colonies* (UK regressions) among the instruments. Table 4 presents the results of two-stage least squares fixed effects estimations, in which the instruments are now, in the US regression: the number of international students in UK universities and the proportion of rejected students by UK universities *(UCAS)*. While the first instrument substitutes the longer-term variable *UK-Alumni*, the second is expected to positively influence the presence of students in the US because of a substitution effect: students applying to UK universities can be supposed to be generally willing to study in an English-speaking country and hence to opt for US universities, perhaps of lower prestige, as an alternative to those in the UK. The instruments in the UK equation are: the proportion of rejected applications *(UCAS)*, as above, and the number of Internet users in countries, a time-varying variable. Internet is an important vehicle for diffusion of information

about foreign cultures, institutions and, specifically, on universities and education, which also greatly eases the university application process. Hence, a positive relation is expected between the use of Internet in countries and the presence of students from those countries in the UK.

The results of Table 4 (where the first stage reports only the coefficients of the variables of interest) show that the new instruments perform well for both the US and the UK. Specifically, the *F-statistics* of excluded instruments and the over identification tests confirm that the estimations do not suffer from a weak or endogenous instrument problem. Also with this specification, as expected, international students have a positive and strong influence on the outward FDI of the US and UK. The coefficients on this variable are positive and significant at the 5% level in both countries' regressions. Moreover, coefficient values are very similar to those obtained in the TSLS regressions of Table A2 (on the overall database): a 1% increase in the flows of international students increases the bilateral outwards US FDI by 0.62% and the UK bilateral FDI by 0.82%.

The second specification is used to consider the possibility that students move to foreign countries where the presence of immigrants from their home countries is higher. In that case, if immigrant stocks influence student flows, then the coefficients of the above regressions might be affected by a missing variable bias. To check for this possibility, I re estimated the regressions with the inclusion of the numbers of immigrants from the partner country during the period considered. Table 5 shows results from the OLS and TSLS specifications. Coefficients, however, should be considered with caution because data on immigrants during 1999-2010 are incomplete or missing for several countries: the observations available are about 2/3 of those of the former specifications for the US and only about 1/3 for the UK. Once this is taken into account, it can be seen in the Table that all OLS coefficients on *Immigrants* (Models 1, 3, 5 and 7) provide evidence of a lack of influence of immigrants on the FDI to their countries of origin. In particular, in Model 3, concerning the US, the relation between immigrants and FDI is negative and significant at the 10% level. At the same time, except in Model (1) where significance is below 10%, *International students* and *Alumni associations* positively and significantly affect the bilateral FDI, in both the US and UK regressions.

However, immigrant stocks could also be affected by endogeneity. The TSLS specification controls for this further possibility by also instrumenting the *Immigrants* variable, along with *International students* and *Alumni*. Therefore, data on immigrant numbers in the US or UK during 1970 are introduced along with the other instruments. For brevity, Table 5 includes only the results on the coefficients of interest, both for the first and second stages. The other instruments used in the US regressions are the same as the previous specifications: *Literacy* and *UK-Alumni* associations. For the UK, the instruments that performed well above (Tables 3 and 4) are non-appropriate with

this more restricted number of observations. Hence, the alternative instrumental variables used now are: *International students in 1999*, the initial year of the period considered, the number of pupils attending secondary school in the partner countries, *Secondary school pupils*, and also, (in Model 6), the number of *Internet users* in the countries of origin.[7]

The tests indicate that, both in the US and UK regressions, the instruments perform well (Models 2, 4, 6, 8). Interestingly, the first-stage regressions for the US, where results are more reliable because of the lower number of missing observations, the flows of *International students* and the stocks of *Alumni associations* are uncorrelated with the stocks of *Immigrants*. Also in the UK, despite the few observations available, the correlations among the two former variables and *Immigrants* are small or nil. More importantly, the second stage coefficients show that the networks of *International students* and *Alumni* always have positive and significant effects on the US and UK bilateral FDI (strengthening the OLS results), while the coefficients on *Immigrants* are negative and non-significant. Hence, in general, it can be said that the influence of students and alumni on the US and UK bilateral FDI appears to be non-correlated with the stocks of immigrants in the two destination countries and that when both the immigrant networks and the education networks are considered, only the latter do effectively boost the bilateral FDI of the US and UK.

More generally, international students and alumni have strongly positive and significant effects on the outward bilateral FDI of the US and UK, which are robust to different specifications. Moreover, disaggregated results show that these effects entirely depend on the educational networks linked to developing countries.

6. Conclusions

This paper has investigated the influence of education network ties on the FDI of the US and UK in the home countries of students. Developed and developing countries have been considered separately.

By employing OLS, TSLS and fixed effects specifications, I find that education networks positively and strongly influence the bilateral FDI of the US and UK in developing economies. Results hold and are robust when I use international students, lagged values of international students or alumni associations as proxies of education networks. These findings contribute to the literature on FDI determinants, but more generally to the debate on the effects of international student movements. In the past, the governments of powerful nations saw the flows of international

[7] Unlike the international students of 1970 and 1971, the immigrants of 1970 do not affect the recent FDI. Less intuitively, while the students of 1970 do not constitute a good instrument in both the US and the UK regressions, those of 1999 turn out to be an appropriate instrument in the UK regressions. This result can be explained by the recent changes in the composition of student inflows into the UK.

students as useful means for boosting political, institutional, and economic interactions with less developed countries. In more recent times, their interest has receded to the point of classifying these flows as temporary migration and, after 9/11 in the US, and more recently in the UK, even of restricting them. Several universities in the US and UK have objected that slowing student inflows may negatively affect the accumulation of human capital in the receiving country. While these consequences are likely, this paper shows that there are also other very important effects, which involve the economic interactions between countries and are positive for both parts, receivers and senders, and in particular for developing economies. More generally, not only economic but also cultural, institutional, and political relations between countries may be diminished by restrictions on the movements of international students.

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Table 1. Summary statistics of some variables of interest

		Developed				***Developing***			
		US		**UK**		**US**		**UK**	
		mean	std.dev	mean	std.dev	mean	std.dev	mean	std.dev
Outward FDI in partner countries	Overall	60,743.5	93,662.0	37,575.0	73,149.0	3,324.8	9,543.3	1,905.7	5,231.5
	Between		85,045.0		70,936.0		7,836.1		3,669.1
	Within		41,293.0		20,781.0		3,980.4		2,774.4
	Growth(%)		12.17		17.32		22.15		47.01
International Students	Overall	6,925.8	12,680.0	4,622.7	5,357.4	2,599.3	10,169.0	1,127.4	4,090.9
	Between		12,581.0		5,227.9		9,719.5		3,583.0
	Within		2,741.4		1,495.5		3,031.2		1,995.7
	Growth(%)	3.10		3.56		11.20		9.75	
Alumni associations in partner countries	Overall	25.62	18.56	31.17	51.45	7.36	14.2	7.18	13.59

Developed countries: OECD economies in 1999. FDI: outward stocks in partner countries (mil. of US$). International students: flows in US and UK. Alumni associations: stock of associations of graduates at USA and UK Universities in partner countries. Years 1999-2010.

Table 2.a - US and UK FDI in developed countries (OLS)

Dependent variable: outward stocks of US/UK FDI												
	US						**UK**					
	(1)		(2)		(3)		(4)		(5)		(6)	
International students	-0.374						0.223					
	(0.304)						(0.224)					
International students1970/71			-0.178						0.001			
			(0.124)						(0.138)			
US (UK) Alumni associations in partner countries					0.955	**					1.116	**
					(0.330)						(0.516)	
Gdp	1.754	**	1.819	**	0.991	**	-0.055		-0.026		0.032	
	(0.600)		(0.626)		(0.475)		(0.128)		(0.133)		(0.088)	
Population	-0.404		-0.635		-0.501		0.747	**	0.865	***	0.223	
	(0.790)		(0.808)		(0.758)		(0.292)		(0.238)		(0.446)	
Distance	-0.707	**	-0.661	**	-0.493	**	-0.538	***	-0.614	***	-0.732	***
	(0.213)		(0.201)		(0.229)		(0.138)		(0.118)		(0.123)	
Inflation	0.003		0.003		-0.009		-0.004		-0.011		-0.013	
	(0.017)		(0.017)		(0.016)		(0.016)		(0.017)		(0.017)	
English language	0.011		0.015	*	0.007		0.025	**	0.028	**	0.015	
	(0.009)		(0.009)		(0.008)		(0.010)		(0.009)		(0.011)	
Quality of Institutions	-0.164		-0.275		0.237		0.840		0.795		0.466	
	(0.862)		(0.826)		(0.717)		(0.557)		(0.517)		(0.597)	
Constant	-0.409		-1.151		2.446		2.652		3.359		7.540	**
	(3.349)		(3.602)		(4.311)		(3.364)		(3.594)		(4.280)	
N° observations (Clusters)	330	(29)	330	(29)	330	(29)	318	(28)	318	(28)	318	(28)
R^2	0.624		0.617		0.641		0.561		0.552		0.670	

*Variables in logs except OECD, English language, Governance. Time dummies in all regressions. Robust (HAC) standard errors; ***, **, *: significant at 1%, 5%, 10%. OECD: member countries in 1999. International students: flows in USA and UK from 1999 to 2010. International students 70/71: US data, year 1970 , UK data, year 1971. Alumni: stock of associations of graduates at USA and UK Universities in partner countries.*

Table 2.b - US and UK FDI in developing countries (OLS)

Dependent variable: outward stocks of US/UK FDI												
	US						**UK**					
	(7)		(8)		(9)		(10)		(11)		(12)	
International students	0.285	**					0.277	***				
	(0.141)						(0.085)					
International students1970/71			0.286	***					0.184	**		
			(0.069)						(0.067)			
US (UK) Alumni associations in partner countries					0.993	***					0.609	***
					(0.207)						(0.165)	
Gdp	1.215	***	1.197	***	0.957	***	0.509	***	0.586	***	0.436	**
	(0.215)		(0.203)		(0.217)		(0.153)		(0.153)		(0.154)	
Population	-0.085		-0.117		-0.155		0.457	***	0.501	**	0.407	**
	(0.246)		(0.234)		(0.197)		(0.178)		(0.175)		(0.171)	
Distance	-1.325	***	-1.190	***	-1.145	***	0.856	***	0.635	**	0.761	***
	(0.252)		(0.239)		(0.224)		(0.244)		(0.249)		(0.234)	
Inflation	0.015	***	0.016	***	0.018	***	-0.001		0.000		-0.001	
	(0.004)		(0.004)		(0.005)		(0.003)		(0.004)		(0.004)	
English language	0.011	**	0.008		0.012	**	0.020	***	0.019	**	0.020	***
	(0.006)		(0.005)		(0.005)		(0.005)		(0.006)		(0.005)	
Quality of Institutions	0.630		0.630		0.218		1.338	***	1.469	***	1.154	***
	(0.429)		(0.419)		(0.364)		(0.294)		(0.288)		(0.295)	
Constant	3.942	*	3.746	*	5.679	**	-13.944	***	-12.297		-11.405	***
	(2.153)		(2.007)		(1.899)		(2.135)		(2.135)		(2.258)	
N° observations (Clusters)	1231	(135)	1233	(135)	1233	(135)	755	(110)	755	(110)	755	(110)
R^2	0.595		0.619		0.635		0.647		0.650		0.655	

*Variables in logs except OECD, English language, Governance. Time dummies in all regressions. Robust (HAC) standard errors; ***, **, *: significant at 1%, 5%, 10%. OECD: member countries in 1999. International students: flows in USA and UK from 1999 to 2010. International students 70/71: US data, year 1970, UK data, year 1971. Alumni: stock of associations of graduates at USA and UK Universities in partner countries.*

Table 3. US and UK FDI in developed and developing countries (TSLS)

	Developed				***Developing***			
	US		**UK**		**US**		**UK**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stage I dependent variable	I. Students	Alumni a.	I. Students	Alumni a.	I. Students	Alumni a.	I. Students	Alumni a.
Literacy	-0.017	-0.009			0.008 **	0.015 ***		
	(0.050)	(0.019)			(0.003)	(0.003)		
UK Alumni associations	0.266	0.748 ***			0.609 ***	0.436 ***		
	(0.182)	(0.069)			(0.078)	(0.074)		
UK ex-colonies			1.083 *	0.924 **			1.696 ***	0.896 ***
			(0.562)	(0.290)			(0.182)	(0.118)
Proportion of rejected applications (UCAS)			-3.358 **	-1.717 **			-1.527 ***	-0.582 **
			(1.534)	(0.751)			(0.335)	(0.191)
Stage II dependent variable	US and UK outward FDI stocks in partner countries							
International students	0.650		0.476		1.283 ***		0.535 **	
	(1.519)		(0.500)		(0.373)		(0.171)	
Alumni associations in partner countries		0.294		1.126		1.391 ***		1.050 ***
		(0.542)		(0.693)		(0.364)		(0.321)
Gdp	1.524 **	1.470 **	-0.088	0.033	0.937 ***	0.822 ***	0.400 **	0.294
	(0.585)	(0.517)	(0.145)	(0.086)	(0.253)	(0.241)	(0.148)	(0.157)
Population	-1.220	-0.678	0.612	0.218	-0.726 **	-0.257	0.342	0.290
	(1.832)	(0.778)	(0.434)	(0.510)	(0.266)	(0.190)	(0.207)	(0.198)
Distance	-0.423	-0.577 *	-0.452 **	-0.733 ***	-0.539 **	-0.984 ***	0.901 ***	0.737
	(0.480)	(0.210)	(0.222)	(0.127)	(0.324)	(0.250)	(0.251)	(0.238)
Inflation	-0.004	-0.001	0.003	-0.013	0.016 ***	0.019 ***	0.000	0.001
	(0.022)	(0.018)	(0.023)	(0.017)	(0.005)	(0.005)	(0.004)	(0.004)
English language	0.007	0.007	0.021	0.014	-0.001	0.012 **	0.016 **	0.017
	(0.012)	(0.011)	(0.014)	(0.014)	(0.008)	(0.005)	(0.006)	(0.005)
Quality of Institutions	-0.130	-0.003	0.890	0.464	0.079	-0.010	1.181 ***	0.946
	(0.837)	(0.715)	(0.631)	(0.575)	(0.381)	(0.362)	(0.346)	(0.370)
Constant	0.036	0.955	1.856	7.576 **	-1.221	5.793 **	-13.720 ***	-9.532
	(4.894)	(4.769)	(2.923)	(4.522)	(2.353)	(1.900)	(2.225)	(2.607)
N° observations (Clusters)	318 (28)	318 (28)	318 (28)	318 (28)	1231 (135)	1233 (135)	746 (109)	746 (109)
R^2	0.436	0.592	0.55	0.63	0.519	0.627	0.641	0.657
Partial R^2	0.030	0.715	0.13	0.17	0.228	0.286	0.398	34.100
First stage F-stat of exluded ir	1.38	65.60	4.55	7.60	36.370	47.150	66.980	35.430
Overidentification test - Hanse	2.48	0.42	4.06	1.56	0.040	1.707	0.580	0.182
Chi sq (.) p-value	0.29	0.52	0.04	0.21	0.842	0.191	0.446	0.670

*Variables in logs except OECD, English language, Governance. Time dummies in all regressions. Robust (HAC) standard errors; ***, **, *: significant at 1%, 5%, 10%. OECD: member countries in 1999. International students: flows in USA and UK from 1999 to 2010. Alumni: stock of associations of graduates at USA and UK Universities in partner countries.*

Table 4- Sensitivity analysis. *Fixed effects TSLS*

	US		**UK**	
Stage I dependent variable	International students			
Proportion of rejected applications (UCAS)	0.005		-0.317	***
	(0.073)		(0.092)	
International students in UK	0.221	***		
	(0.030)			
Internet users in countries			0.141	***
			(0.031)	
Stage II dependent variable	Outward FDI			
International students	0.619	**	0.811	**
	(0.309)		(0.314)	
Gdp	0.078		0.153	
	(0.111)		(0.132)	
Population	-1.597	**	0.757	
	(0.721)		(0.621)	
Inflation	0.000		-0.003	
	(0.002)		(0.005)	
Quality of Institutions	0.362		0.405	
	(0.255)		(0.284)	
N° observations (Clusters)	1549	(163)	1053	(127)
R^2	0.025		0.098	
First stage F-stat of excluded instruments	27.400		16.670	
Overidentification test - Hansen J stat.	2.258		0.048	
Chi sq (.) p-value	0.133		0.826	

*Variables in logs except Governance, UCAS. Time and countries fixed effects. Robust standard errors. ***, **, *: significant at 1%, 5%, 10%.*

Table 5- Sensitivity analysis. *Immigrant stocks (OLS and TSLS)*

	US				UK			
	(2)		(4)		(6)		(8)	
Stage 1 dependent variab	International students		Alumni associations		International students		Alumni associations	
Immigrant stock 1970	-0.053		0.016		0.100	*	0.050	**
	(0.039)		(0.030)		(0.040)		(0.025)	
UK-Alumni associations	0.520	***	0.499	***				
	(0.093)		(0.086)					
Literacy	0.010	*	0.008	**				
	(0.004)		(0.004)					
International students 1999					0.552	***	0.374	***
					(0.072)		(0.039)	
Secondary school pupils					0.187		0.324	**
					(0.123)		(0.138)	
Number of Internet users					0.089			
					(0.097)			
Stage 1 dependent variable	Immigrants		Immigrants		Immigrants		Immigrants	
Immigrant stock 1970	0.272	***	0.271	***	0.265	***	0.254	***
	(0.042)		(0.042)		(0.041)		(0.046)	
UK-Alumni associations	0.194		0.193					
	(0.125)		(0.126)					
Literacy	0.001		0.001					
	(0.007)		(0.007)					
International students 1999					0.104		0.118	*
					(0.066)		(0.071)	
Secondary school pupils					0.172		0.073	
					(0.112)		(0.130)	
Number of Internet users					-0.351	**		
					(0.134)			
Stage 2 dependent variable	US and UK outward FDI stocks in partner countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
International students	0.241	0.952 **			0.326 *	0.955 ***		
	(0.152)	(0.398)			(0.129)	(0.284)		
Alumni associations			1.311 ***	1.089 **			0.934 ***	1.271 ***
			(0.233)	(0.409)			(0.175)	(0.364)
Immigrants	-0.050	-0.046	-0.292 *	-0.288	0.090	-0.244	0.051	-0.042
	(0.117)	(0.333)	(0.114)	(0.291)	(0.167)	(0.301)	(0.139)	(0.285)
N° observations (Clusters)	1192 (123)	1180 (121)	1193 (123)	1181 (121)	279 (61)	276 (60)	279 (61)	276 (60)
R^2	0.721	0.680	0.764	0.755	0.756	0.709	0.794	0.783
First stage F-stat Students/Alumni		17.85		15.01		38.96		36.98
First stage F-stat Internat. Immigrants		16.47		16.14		21.28		16.09
Overidentification test - Hansen J stat.		1.458		2.171		1.455		0.127
Chi sq (.) p-value		0.227		0.141		0.483		0.722

Variables in logs, except Literacy. Robust (HAC) standard errors; ***, **, *: significant at 1%, 5%, 10%. Time dummies in all regressions. Models (1), (3), (5), (7): OLS.

Table A1 - Outward FDI of US and UK in partner countries (World): OLS

Dependent variable:	US and UK outward FDI stocks in partner countries											
	US						**UK**					
International students	0.201	*					0.336	***				
	(0.119)						(0.083)					
International students1970/71			0.256	***					0.237	***		
			(0.064)						(0.064)			
US (UK) Alumni associations in partner countries					1.008	***					0.742	***
					(0.197)						(0.166)	
Gdp	1.231	***	1.195	***	0.929	***	0.289	**	0.361	**	0.266	**
	(0.215)		(0.201)		(0.214)		(0.119)		(0.123)		(0.100)	
Population	-0.081		-0.140		-0.185		0.591	***	0.636	***	0.457	**
	(0.229)		(0.225)		(0.188)		(0.143)		(0.144)		(0.150)	
Distance	-1.140	***	-1.012	***	-0.940	***	0.046		-0.089		-0.133	
	(0.228)		(0.217)		(0.205)		(0.152)		(0.150)		(0.157)	
Inflation	0.015	***	0.015	***	0.017	***	-0.003		-0.001		-0.004	
	(0.004)		(0.004)		(0.005)		(0.004)		(0.004)		(0.004)	
English language	0.012	**	0.008	*	0.012	**	0.018	***	0.016	**	0.017	***
	(0.005)		(0.004)		(0.004)		(0.004)		(0.005)		(0.005)	
Quality of Institutions	0.636		0.613		0.234		1.452	***	1.588	***	1.156	***
	(0.401)		(0.393)		(0.335)		(0.244)		(0.244)		(0.266)	
Constant	2.583		2.490		4.319	**	-6.101	***	-4.759		-2.442	
	(2.014)		(1.863)		(1.811)		(1.670)		(1.625)		(1.980)	
N° observations (Clusters)	1561	(164)	1563	(164)	1563	(164)	1073	(138)	1073	(138)	1073	(138)
R^2	0.706		0.721		0.738		0.733		0.727		0.733	

*Variables in logs except OECD, English language, Governace. Time dummies in all regressions. Robust (HAC) standard errors; ***, **, *: significant at 1%, 5%, 10%. OECD: member countries in 1999. International students: flows in USA and UK from 1999 to 2010. International students 70/71, US data: 1970 , UK data: 1971. Alumni: stock of associations of graduates at USA and UK Universities in partner countries.*

Table A.2- Outward FDI of US and UK in partner countries (World): TSLS.

	US				UK			
	(1)		(2)		(3)		(4)	
Stage I dependent variable	I. Students		Alumni a.		I. Students		Alumni a.	
Literacy	0.010	***	0.014	***				
	(0.003)		(0.003)					
UK Alumni associations	0.552	***	0.460	***				
	(0.075)		(0.066)					
UK ex-colonies					1.656	***	0.919	***
					(0.164)		(0.114)	
Proportion of rejected applications (UCAS)					-1.885	***	-0.708	***
					(0.367)		(0.197)	
Stage II dependent variable	US and UK outward FDI stocks in partner countries							
International students	1.144	***			0.638	***		
	(0.357)				(0.162)			
Alumni associations in partner countries			1.205	***			1.213	***
			(0.335)				(0.303)	
Gdp	0.945	***	0.859	***	0.184		0.177	**
	(0.255)		(0.239)		(0.113)		(0.103)	
Population	-0.652	**	-0.230		0.447	**	0.275	
	(0.249)		(0.184)		(0.163)		(0.183)	
Distance	-0.458		-0.873	***	0.115		-0.192	
	(0.286)		(0.211)		(0.155)		(0.155)	
Inflation	0.015	**	0.017	**	-0.001		-0.002	
	(0.006)		(0.006)		(0.004)		(0.004)	
English language	0.004		0.012	*	0.014	**	0.013	**
	(0.006)		(0.004)		(0.005)		(0.005)	
Quality of Institutions	0.236		0.139		1.270	***	0.882	**
	(0.357)		(0.331)		(0.283)		(0.331)	
OECD	0.264		-0.364		0.196		0.302	
	(0.637)		(0.429)		(0.425)		(0.403)	
Constant	-1.876		4.470	**	-6.125	***	-0.237	
	(2.078)		(1.832)		(1.624)		(2.153)	
N° observations (Clusters)	1549	(163)	1551	(163)	1064	(137)	1064	(137)
R^2	0.639		0.807		0.713		0.729	
Partial R^2	0.186		0.299		0.343		0.291	
First stage F-stat of exluded ins	37.68		52.18		75.99		39.34	
Overidentification test - Hansen	0.025		0.358		0.62		0.03	
Chi sq (.) p-value	0.875		0.550		0.43		0.86	

*Variables in logs except OECD, English language, Governance. Time dummies in all regressions. Robust (HAC) standard errors.***, **, *: significant at 1%, 5%, 10%. International students: flows in USA and UK from 1999 to 2010. Alumni: stock of associations of graduates at USA and UK Universities in partner countries.*

Table A.3. First 20 non-OECD countries.

US					
FDI		Students		Alumni associations	
Singapore	64737.3	China	86593	China	110
Brazil	39087.6	India	74277	India	81
Hong Kong	37197.8	Thailand	9592	Hong Kong	46
China	25790.8	Indonesia	9003	Brazil	42
Chile	13853.4	Brazil	7934	Singapore	38
Bahamas	13805.5	Hong Kong	7731	Thailand	36
Argentina	13147.9	Colombia	6812	Argentina	30
Indonesia	11489.3	Malaysia	6766	Philippines	27
Venezuela	10369.4	Saudi Arabi	6663	United Aral	27
India	9968.6	Pakistan	6249	Israel	26
Malaysia	9718.2	Kenya	6234	Malaysia	24
Thailand	8356.7	Nepal	5712	Colombia	23
Russian Fe	8106.2	Russian Fe	5555	Saudi Arabi	23
Israel	7317.2	Nigeria	5311	Indonesia	21
Philippines	5694.9	Viet nam	5239	Russian Fe	21
Panama	5577.7	Venezuela	4965	Chile	21
Kazakhstan	5483.3	Jamaica	4024	Pakistan	20
Egypt	5394.7	Singapore	3935	Viet nam	18
Saudi Arabi	5109.9	Philippines	3508	Peru	18
Algeria	4691.8	Peru	3235	South Afric	17
UK					
Hong Kong	30045.1	China	34801	India	100
South Afric	15973.2	India	16762	China	77
Singapore	11865.5	Malaysia	11218	Malaysia	46
United Aral	7919.0	Hong Kong	9306	Hong Kong	46
Russian Fe	7052.5	Nigeria	7587	Pakistan	45
Brazil	6165.2	Cyprus	6297	Singapore	39
India	5378.2	Pakistan	5654	Nigeria	36
China	4757.6	Singapore	3966	United Aral	31
Argentina	2965.1	Thailand	3645	Thailand	28
Egypt	2823.6	Saudi Arabi	2915	Cyprus	24
Kazakhstan	2796.4	Kenya	2604	South Afric	19
Colombia	2684.9	Sri Lanka	2332	Kenya	18
Malaysia	2510.5	Zimbawe	2230	Argentina	18
Malta	2280.4	Russian Fe	1992	Brazil	17
Chile	2177.8	Ghana	1974	Ghana	16
Nigeria	2142.8	Bangladesh	1930	Mauritius	16
Indonesia	2052.9	United Aral	1743	Indonesia	16
Thailand	2013.0	Iran	1694	Sri Lanka	15
Saudi Arabi	1982.3	Mauritius	1530	Saudi Arabi	14
Mauritius	1450.1	South Afric	1384	Bangladesh	14

Averages over 1999-2010.

Table A.4. Variable definitions and sources

Variable	Definition	Source
International students	International students: left their country of origin and moved to another country for the purpose of study. Number of students enrolled refers to the count of students studying in the reference period.	*UNESCO*. International flows of mobile students at the tertiary level (ISCED 5 and 6)
Alumni	Alumni groups and associations in partner countries of graduates, respectively, from US or UK Universities.	Own databases. Data collected during 2012 from US and UK Universities' websites or provided by Central offices of Alumni associations. Includes only officially recognized groups from 50 UK and 62 US universities.
International students in US - 1970		*Institute of International Education – Open Doors Data*.
International students in UK - 1971		*British Council*
FDI	Stocks, in US $, millions.	OECD Statistics.
GDP	In US $, millions.	IMF – Statistics
Population	Number of people, millions.	IMF – Statistics
Distance	Great circle distance between capital cities and Washington or London (Km).	http://www.chemical-ecology.net/java/capitals.html
Language	Proportion of people speaking English over total population.	Melitz and Toubal (2012) *CIA World Factbook.*
Quality of institutions	Worldwide Governance Indicator. Includes six dimensions of governance: Voice and accountability Political stability and absence of violence; Government effectiveness; Regulatory quality; Rule of Law; Control of corruption.	*World Bank.* Developed by Kaufmann et al. (2009). The six indicators are measured in units ranging from about -2.5 to 2.5, with higher values corresponding to better governance outcomes.
Immigrants	Stock of foreign born population by country of birth in UK and US.	*OECD.* International Migration Database
Immigrants in 1970	Stock of foreign born population by country of birth in 1980 in US.	*World Bank*. Statistics.
UCAS	Rate of rejected applications on the total number of applications from each given partner country to undergraduate programs of UK Universities, from 1999 to 2010.	Time-varying. *UCAS* Statistics.
UK Ex-colonies	Dummy with value 1 for countries that in the past have been colonies or territories of the United Kingdom or Great Britain, zero otherwise.	*Encyclopaedia Britannica*, Wikipedia.
Secondary school enrolment	Total enrolment of secondary students in countries, 1999.	*UNESCO*. Statistics on Education.
Literacy	National adult literacy rates (15+).	*UNESCO* and *World Bank* Statistics on Education
Internet users	People with access to the worldwide network. Total numbers in countries,	International Telecommunication Union,

	period 1999-2010.	World Telecommunication/ICT Development Report and database.
Countries: Afghanistan Albania Algeria Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium Belize Benin Bolivia Bosnia and Herzegovina Botswana Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cambodia Cameroon Canada Cape Verde Central African Chile China Colombia Congo, Republic Congo, Dem. Rep Costa Rica Cote d'Ivoire Croatia Cyprus Czech Republic Denmark Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guyana Haiti Honduras Hong Kong Hungary Iceland India Indonesia Iran Iraq Ireland Israel Italy Jamaica Japan Jordan Kazakhstan Kenya Korea, Republic Kuwait Kyrgyzstan Latvia Lebanon Lesotho Liberia Libyan Arab Jam Liechtenstein Lithuania Luxembourg Macao Macedonia, FYR Madagascar Malawi Malaysia Maldives Malta Mauritania Mauritius Mexico Moldova, Rep. Mongolia Morocco Mozambique Myanmar Namibia Nepal Netherlands New Zealand Nicaragua Niger Nigeria Norway Oman Pakistan Panama Papua New Guinea Paraguay Peru Philippines Poland Portugal Qatar Romania Russian Federation Rwanda Saint Lucia Saint Vincent Saudi Arabia Senegal Serbia and Montenegro Seychelles Sierra Leone Singapore Slovak Republic Slovenia Somalia South Africa Spain Sri Lanka Sudan Suriname Swaziland Sweden Switzerland Syrian Arab Republic Tajikistan Tanzania Thailand Togo Trinidad and Tobago Tunisia Turkey Turkmenistan Uganda Ukraine United Arab Emirates United States Uruguay Uzbekistan Venezuela Vietnam Yemen Zambia Zimbabwe.		

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