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# International human capital mobility and FDI: Evidence from G20 countries

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# International human capital mobility and FDI: Evidence from G20 countries *

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### Abstract

Human talent will be (or is already) scarce. We view international students as the source of high-skilled labour force, which satisfies the skill and task requirement of firms, particularly those anticipating overseas expansion, and argue whether the international student stock in a country is an indication of positive future prospect for the acquiror country in cross-border mergers. Using the international students' stocks between pairs of acquiror countries of origin and target firms' countries for bilateral mergers and acquisitions (M&A) activities, we exploit the within variation of both bilateral M&A activities and bilateral international student stocks between G20 countries. The formation of human capital signals that potential acquirors can access skilled workers and boosts the bilateral M&A activities. Results further indicate that the marginal effect of international students from target country in acquiror country has larger impact than that from acquiror country in target country.

*JEL classification:* F21, F22, G34

*Keywords:* FDI, G20, International students mobility

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# 1  Introduction

Human talent will be (or is already) scarce. When the young become more and more mobile, the competition for talent is intense in the global economy. Notable trends of a mobile young generation are the increasing degree of geographic dispersion as well as the growth in the number of international students, which has substantially increased, from 2 million in 2000 to more than 5.3 million in 2017 (UNESCO, 2019), which attracts the attention of policy makers because they are the source of high-skilled labour (immigrants) in the future. On the other hand, firms struggle to hire the labour force to maintain their business expansion for sustainable growth. The rapid growth of international students' inflow implies that destination countries can obtain new talent to accelerate innovation for economic growth. Moreover, the sending countries of international students also benefit from brain regains in the long run because a substantial proportion of students often return with human capital that they could not have acquired at home (Kaushal and Lanati (2019)).

We view international students as the source of high-skilled labour force, which satisfies the skill and task requirement of firms, particularly those anticipating overseas expansion. In this context, this study empirically examines whether there is a relationship between international human capital mobility and cross-border M&A activities by focusing on the bilateral cross-border M&A activities and international students stock in G20 countries. Cross-border M&A is a form of foreign direct investment (FDI), a major driver of increase in FDI between G20 countries (UNCTAD, 2019); hence, we focus on the cross-border M&A in this study. Figure 1 provides graphical evidence for this assertion. The upper panel graphs the number of international students from target country to acquiror country of origin (hereafter, 'acquiror country'; it also refers to 'acquiror country of origin') and the value of cross-border M&A deal values between G20 countries from 2000 to 2017. When the number of students from target country to acquiror country is larger, the value of bilateral M&A deals is higher. The opposite applies when the number of students from target country to acquiror country is low. The lower panel of Figure 1 graphing the number of international students from acquiror country to target country reflects the same nexus. We present detailed econometric evidence of the relation in Figure 1 using two aspects of M&A activities, namely the extensive margin (the number of M&A deals) and total M&A value.

In this context, we view international students as the source of high-skilled labour force, which

satisfies the skill and task requirement of firms. This formation of human capital can be an indication of positive future prospects for the potential acquirors, which favours business expansion plans. We begin with international students between pairs of acquiror country of origin and target firms' countries for M&A and exploit the within variation of both bilateral M&A activities and bilateral international student stocks. While conditioning the migration stocks in both acquiror country and target country, which control for the information asymmetry problem in Kugler and Rapoport (2007), Javorcik et al. (2011), and Etzo and Takaoka (2018), we test the prediction of the human capital model underpinning the signalling effect of international student stock to potential acquirors. This approach is novel, allowing us to link bilateral M&A activities and bilateral international student stocks in the G20 countries to shed light on its clear linkage.

We observe a strong positive relation between bilateral international student stock and bilateral cross-border M&A activities. This relation holds true when we measure the bilateral cross-border M&A activities by the number of deals and the total deal values. Results are obtained by employing a two-step model: the first part is the participation model, whether the bilateral M&A deal occurs in the potential target country. The second part is the model for a positive outcome to explain the number of M&A deals and determine total M&A values. Marginal effects data obtained for G20 countries indicate that an increase of international student stocks from target (acquiror) country in acquiror (target) country boosts the bilateral M&A activities. When comparing the magnitudes of their impacts on bilateral M&A activities, the international students from target country in acquiror country provoke more bilateral activities than those from acquiror country in target country. This result suggests that the international student stock is viewed as a fundamentally important factor in the M&A decision for potential acquirors.

This study contributes to the growing literature on M&A and migration that includes international students. Studies on migration include Gould (1994), Head and Ries (1998), Rauch and Trindade (2002), Combes et al. (2005), and Peri and Requena-Silvente (2010), who have presented the role of migrants network on mitigating the information friction in bilateral international trade. Kugler and Rapoport (2007), Javorcik et al. (2011), and Etzo and Takaoka (2018) have considered the relation between migration network and FDI. Park (2004) and Le (2010) have reported that international student flows as a channel of cross-border R&D spillovers. Kaushal and Lanati (2019) considered the determinants of international student mobility. A large body of literature on FDI has explored its determinants; for example, Froot and Stein (1991), Blonigen (1997), Georgopoulos

([2008](#)) have considered the link with exchange rate. [Erel et al.](#) ([2012](#)) studied the determinants of cross-border M&A demonstrating that weaker performing economies tend to make its firms targets. The novelty of this study is that it provides evidence that the formation of human capital measured by the international student stock is a determinant of cross-border M&A activities. Furthermore, this study shows that the international student stock in acquiror country from target country as well as those in target country from acquiror country tend to boost bilateral M&A activities.

The remainder of the paper is organised as follows: Section 2 briefly discusses trends in bilateral cross-border M&A activities and international students between G20 countries in our dataset. Section 3 explains theoretical hypothesis and empirical strategy of this study. Section 4 describes our data for G20 country-pairs. We test our theoretical predictions and report results in Section 5. Section 6 presents the conclusions. The paper also includes appendices providing details on the data and the comparison with results in previous studies.

# 2 Trends in cross-border M&A and international students between G20 countries

## 2.1 M&A activities

The rising costs of R&D and intensified competition in the global markets have kept cross-border M&A deals active in recent years, even with the fluctuations and offsets by the geopolitical risks. In 2018, cross-border M&A deals increased by 18% in deal values, in particular, 21% in developed countries according to [UNCTAD](#) ([2019](#)). Figure [2](#) shows the bilateral cross-border M&A values by acquiror countries of origin between G20 countries during our sample period. Likewise, The cross-border M&A values by target country are displayed in Figure [3](#). Notably, the variation of M&A values in each country, in each country-pair, and composition of country-pair is substantial and the movement is volatile. The surge in M&A deal values was caused by mega deals. However, the long-run trend of M&A activities in three big major regions indicates positive growth: Asian countries, European countries, and North American countries.

The top ten M&A countries in our data suggest that a same set of countries are both in top ten acquiror and target countries: Australia, Canada, China,[1] France, Germany, India, Italy, Japan,

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[1]M&A deals related to Hong Kong, Macau, and Taiwan are counted as belonging to China. Following the custom, we aggregate overseas territories into the sovereign state. Please refer to the detailed definitions in Appendix A.

United Kingdom (UK), and United States (US). However, their M&A activities are not symmetric. For example, Japan has been more enthusiastic about buying overseas assets than selling own assets. On the other hand, the US is enthusiastic about both buying and selling the assets. Another pattern of cross-border M&A appears when the intraregional investment is high between European countries.

In our dataset, when we consider the number of cross-border M&A, the top ten M&A countries are same as when we consider the value of cross-border M&A. The long-run trend of number of cross-border M&A is same as the M&A deal values; however, the number of M&A is less dominated by the mega deals. Hence, our analysis of M&A activities considers both the number and the value of cross-border M&A deals. Variations in the number of cross-border M&A between G20 countries are also large. The number and value of cross-border M&A deals share some common features.

We analyse bilateral M&A activities by combining it with bilateral international students' data in each country-pair. Figures 2 and 3 suggest the presence of substantial country heterogeneity even between G20 countries. We include acquiror country and target country fixed effects, in addition to time fixed effects, and the observed country characteristics of acquiror and target countries in order to absorb any observed and unobserved heterogeneity across countries. Moreover, in accordance with the focus of our analysis and the variation of our data, we cluster standard errors at acquiror country and target country levels.

## 2.2  International students mobility

The students have become more and more mobile. The number of international students is increasing globally. The UNESCO Institute for Statistics, the OECD, and Eurostat define international student mobility as follows: "international mobile students" are students who have crossed a national or territorial border for the purpose of education and are now enrolled outside their country of origin (UNESCO Institute for Statistics, online glossary). The country of origin is defined according to the students' education prior to entering tertiary education.

The sending and destination countries are geographically more diverse. The recent geographic dispersion in international student mobility is substantial, and its impact on the education system in the destination country is not negligible. In some countries, international students represent a high share of the total student population; a typical example is that of Australia, one of the most popular

destination countries for international students; it has a 97% entry rate of bachelor's programmes, which would drop to 78% without international students, according to the OECD (2019). In addition, the growth in international students has had a positive economic impact in the destination country. For the US, the top destination country of international students, NAFSA, the Association of International Educators, showed that the more than 1 million international students studying at US colleges and universities contributed $39 billion to the US economy and supported more than 455,622 jobs during the 2017-2018 academic year.[2]. The International Institute of Education's (IIE) Project Atlas[3] released in 2017 that top ten host countries for international students are US, UK, China, Australia, France, Canada, Russia, Germany, Japan, and Spain. The number of international students in the US is nearly twice as more as those in the UK.

Figures 4 and 5 plot the number of international students in our dataset by origin country and destination country, respectively. These figures show the increasing trend of the number of foreign students across countries in G20. However, the composition changed within a home or destination country. For example, Japan was the third largest sending country of international students to the US in 2000/2001 academic year (46,497 students), but ranked 8th in 2016/2017 academic year (18,780 students), according to the *Open Doors*$^{\circledR}$. The changes in the share of each sending or destination countries indicate that the traditional top sending or destination countries may decrease their share. Kaushal and Lanati (2019) stated that the rising quality in tertiary education is enabling Asian countries to compete with traditional English speaking destinations. These facts suggest that the heterogeneity in international students and time effects should be controlled in the estimate specifications.

# 3  Theoretical hypothesis and empirical strategy

## 3.1  Theoretical hypothesis

The cross-border M&A deals are implemented in a situation of imperfect information, where the presence of imperfect information can discourage transactions. Theory by Froot and Stein (1991) on informational imperfections which generates a link between FDI and the real exchange rate, led to a large body of literature examining the exchange rate as a determinant of acquisition,

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[2]https://www.nafsa.org/about/about-nafsa/new-nafsa-data-international-students-contribute-39-billion-us-economy, accessed 24 October 2019

[3]https://www.iie.org/Research-and-Insights/Project-Atlas

e.g. Blonigen (1997). Another promising line of research would be the role of migrant networks on mitigating the information friction in bilateral international trade in Gould (1994), Head and Ries (1998), Rauch and Trindade (2002), Combes et al. (2005), and Peri and Requena-Silvente (2010), among others. Furthermore, the importance of migrants – overcoming informational barriers of FDI including cross-border M&A – has been emphasised in Kugler and Rapoport (2007), Javorcik et al. (2011), and Etzo and Takaoka (2018).

Therefore, this study focuses on the human capital as a determinant of cross-border mergers. Human talent will be (or is already) scarce. At the same time, people are more mobile, and the younger generation, in particular students, are becoming more and more mobile. The mobility of students and its impact on the economy warrant attention, one of the reasons for this is that they are potential high-skilled workers. As Javorcik et al. (2011) emphasised, among the migration stock, the high-skilled works play an important role in boosting the FDI.

We test whether the international students signal for acquiring firms that they can access the high-skilled labour force in the target country, that is, the formation of human capital. Hence, the presence of international students boosts the cross-border M&A in the country with the source of high-skilled labour force, which satisfies the skill and task requirement of acquiring firms.

Recent studies have focused on students' mobility, especially on its determinants and impacts. Parey and Waldinger (2011) observed that the access to the mobility programmes increases the international labour market mobility by showing that those who studied abroad are about 15% more likely to work abroad. Gérard and Uebelmesser (2014) documented the connection between the international students and the migration of the highly skilled workers across developed countries. This inter-relation is supported by the fact that student migration can facilitate long-term stay in the country of study after graduation; students who remain in the destination country contribute to its economy. Theoretical model in Demange et al. (2014) with the mobile skilled worker and students highlighted the impact of a changed financial regime on the number of students; they found that the countries may choose partial tax-financing for higher education, or else the number of students would be too low due to credit market restrictions. Overall, recent studies have suggested that some international students work in the country of study (destination country) after graduating, and then they will provide benefits to the destination country, including fiscal benefit. Moreover, Murphy (2014) pointed out the potential benefit that international students who return to their home countries are more likely to consume goods and services from firms they became acquainted with

in their time studying in the destination country.

Regarding the sending country of international students, there is a concern about the brain drain as having a negative effect on the sending country. However, as Park (2004) and Le (2010) have emphasised, the sending countries can expect the cross-border R&D spillovers, arising from international student flows, as a channel. This beneficial effect is recognised because the international students who acquire R&D-induced technological knowledge through education and post-schooling job experience in their destination country of study may contribute to the productivity increase in their sending country when they return. Recent trends of international students were analysed in Kaushal and Lanati (2019), suggesting that for English-speaking countries, persisting large flows are indicative of the rising demand to acquire tertiary skills rather than to migrate for permanent settlement. Therefore, the human capital obtained from studying abroad is beneficial to both destination and sending countries.

## 3.2 Empirical strategy

Data on cross-border M&A activities at country level are characterised by the presence of many zeroes, even when we restricted the sample to only the G20 countries. In other words, our response variable, measured either as the number or value of M&A deals, can take any non-negative value but has positive probability of a zero outcome. Another characteristic of the distribution is to have a heavy right-hand tail (i.e. skewness). In presence of these two features, that is a mass of zero and skewness, ordinary least squares estimation is biased and inefficient. In this case, a two-part model (Duan (1983); Duan et al. (1984); Manning et al. (1987)) represents a widely used alternative. We observed the bilateral M&A activities between G20 country-pairs, but for each of them, the outcome might be zero (i.e. no M&A deal) for one or more years of our sample period. For a positive outcome, the response variable was a continuous variable. Thus, for every G20 acquiror country $i$, with $i = 1, ..., 20$ we modelled the two parts separately: participation equation and intensity equation. The first one regarded the probability to observe an M&A deal between each country-pair and was described by the following model:

$$\phi(y > 0) = Pr(y > 0 | \mathbf{x}) = F(\mathbf{x}\boldsymbol{\delta}) \tag{1}$$

where the probability of observing a deal (i.e. $y > 0$) conditional on a vector of explanatory variables $\mathbf{x}$ is equal to $F$, that is the cumulative distribution function of an independent and identically

distributed error term, and $\delta$ is the vector of parameters to be estimated. The second part was conditional on observing an M&A deal and is represented by the following model:

$$\phi(y|y > 0, \mathbf{x}) = g(\mathbf{x}\boldsymbol{\gamma}) \tag{2}$$

where $\mathbf{x}$ is a vector of explanatory variables, $\boldsymbol{\gamma}$ is the vector of parameters to be estimated and $g(\cdot)$ is the density function. We used the probit regression model for the first part and the Gamma generalised linear model (GLM) with a log link function (McCullagh and Nelder (1989)) for the second part in the analysis of M&A values. For the analysis of the number of M&A, the variable is discrete with a distribution that places probability mass at non-negative integer values only, that is, count data. In the second part, the Poisson density is generally too restrictive, hence we employed the negative binomial model which is a more general specification.[4]

An important feature of the two-part model is that the error terms in the two equations do not need to be independent to obtain consistent estimates of the parameters $\delta$ and $\boldsymbol{\gamma}$. The latter differentiate the two-part model from the Heckman selection model (Heckman (1979)). Ultimately, the two-part model allowed us to obtain predictions of $y_i$ by multiplying predictions from the first part and from the second part, as follows:

$$\hat{y}_i|\mathbf{x}_i = (\hat{p}_i|\mathbf{x}_i) \times (\hat{y}_i|y_i > 0, \mathbf{x}_i) \tag{3}$$

where $\hat{p}_i|\mathbf{x}_i$ is the predicted probability of observing an M&A deal for a specific G20 country-pair. More specifically, we defined $y_{ijt}$ the M&A activity observed between the acquiror country $i$ and the target country $j$ in year $t$, with $t = 2000, ..., 2017$. We were primarily interested in estimating the marginal effects of the covariates measuring the international students. Accordingly, our main covariates measured the bilateral international student mobility in tertiary education between acquiror and target countries. The other control variables considered in our regressions are defined as follows. Following Javorcik et al. (2011) and Etzo and Takaoka (2018), who have reported that immigrants favour cross-border M&A activity for US and Japan, respectively, we considered the bilateral stock of immigrants for each acquiror-country pair. In order to avoid the potential endogeneity of the stock of immigrants, we lagged the variables by five years. The overall business attractiveness of target country depends on the regulatory system, political stability, and other important aspects related to the governance. At the same extent, good governance can stimulate firm

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[4]Cameron and Trivedi (2013) provides the detailed discussions.

expansion beyond the national borders. In order to capture these effects we followed Javorcik et al. (2011) and used the average of the following governance indicators developed by Kaufmann et al. (2010): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. Yearly idiosyncratic productivity shocks are captured by the GDP growth rate. Finally, we included the real exchange rate among our controls, though studies have discussed its controversial effects, e.g. Blonigen (1997) and Georgopoulos (2008).

For this purpose, we specified the econometric model for M&A activities (the number or value of M&A) as follows:

$$
\begin{aligned}
y_{ijt} = \ & \alpha_i + \alpha_j + \alpha_t + \beta_1 ln(STUDENT_{jit}) + \beta_2 ln(STUDENT_{ijt}) \\
& + \beta_3 ln(IMMIGRANT_{jit-5}) + \beta_4 ln(IMMIGRANT_{ijt-5}) + \gamma Controls_{ijt} + \varepsilon_{ijt},
\end{aligned}
\tag{4}
$$

where $\alpha_i$, $\alpha_j$, and $\alpha_t$ represent acquiror country, target county, and time fixed effects respectively, $ln(STUDENT_{jit})$ is the number of international students from target country to acquiror country at time $t$ defined as the logarithm, $ln(STUDENT_{ijt})$ is the number of international students from acquiror country to target country at time $t$ defined as the logarithm, $IMMIGRANT_{jit-5}$ is the number of immigrants from target country to acquiror country at time $t-5$ defined as the logarithm, $IMMIGRANT_{ijt-5}$ is the number of immigrants from acquiror country to target country at time $t - 5$ defined as the logarithm, and $Controls_{ijt}$ is a vector of variables intended to capture the relationship with economic growth, governance, and exchange rate movements in the acquiror country $i$ and target country $j$ at time $t$.

## 4 Data

Our data for G20 country-pairs from 2000 to 2017 are taken from several sources, which we described in detail in the Appendix A. We collected information on individual cross-border merger deals from the Thomson Reuters' Thomson One database. From this database, we obtained information on deals: acquiror country of origin, target country, deal value, and characteristics of acquiror/target companies. The individual M&A deal value was summed up in the aggregate value for each acquiring company's nation to construct the country level panel dataset. The number of M&A deals for each G20 country was also similarly summed up.

Annual data on the G20 international students from origin country to destination country are mainly from the UNESCO database, which does not include some country pairs for some years,

in particular China. We integrated data from OECD and JASSO (Japan Student Services Organization), which was selected to match with the definition of international students in UNESCO. Please refer to the Appendix A for further explanations.

The figures on annual bilateral immigrant stock among G20 countries were mainly obtained from OECD International Migration Database. For countries which are not included in OECD database, we obtained data from The United Nations database. We mitigated the concern about the potential endogeneity of the stock of immigrants by collecting the data from the year 1995 and employed lagged values for immigrant stock by five years. The information on sending country and destination country was used to merge with the acquiror-target country pair in M&A deals.

Our specifications explaining cross-border M&A activity also included acquiror/target country characteristics to control for the economic fluctuations, governance, and exchange rate movement. To capture the economic fluctuations in acquiror and target countries, we included GDP per capital growth (annual %) from World Bank Development Indicators databank. As a measure of quality of investment climate and business environment, we drew data from the dataset provided by The Worldwide Governance Indicators project. Among their data, we employed a same set in Javorcik et al. (2011): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption, and use the mean value of these scores for each year. The higher values correspond to higher quality of governance in the country. Then, the last variable is the real exchange rate to capture the relationship between the investment and exchange rate. We used the annual real exchange rates (local currency per USD).

The descriptive statistics for all variables in our panel dataset are presented in Table 1. It reports means and standard deviations for panel data by decomposing them into between and within components.

# 5 Results

This section presents our estimates for cross-border M&A activities: the number of bilateral cross-border M&A deals and the value of bilateral cross-border M&A deal values. We estimated the participation model with probit specification in the first part, and the number of M&A and M&A deal values in the second part.

First, we examine the number of bilateral M&A deals as a M&A activity measure in this

subsection. The value of M&A deal is a high-profile item among M&A deal information. However, the total value of bilateral M&A deals can be dominated by one or a few mega deals, which would overstate the bilateral M&A activities. Using the bilateral cross-border M&A deal count data, we can avoid this issue.

Then, we examine the values of bilateral M&A deals as another M&A activity measure. The reason for using both the number of deals and the value of deals as M&A activity measures is that they are able to capture two different aspects of the relation between international students and M&A activity, namely, the extensive margin (the number of M&A deals) and total M&A value. An increase in international students could have the effect of rising only the number of M&A deals (extensive margin), but not the overall value. Both of them are, in fact, equally important measures for the M&A deals in the practical business and the academic research.

## 5.1   Results for the number of M&A

Bilateral count data on the number of M&A deals are estimated by a two-part model. The first part (participation model) whether the bilateral M&A deal occurs in the potential target country (binary outcome) is modelled through a probit regression. The probit regressions in columns (1)-(5) of Table 2 indicate that two covariates of interest, international students from target country in acquiror country and those from acquiror country in target country, are statistically significant determinants of the probability whether to make a deal in a potential target country.  Column (6) reports the estimates excluding variables related to international students and immigrants. To compare the fit of the model, the values of AIC and BIC obviously favour the specifications with variables with international students and immigrants.

Results in columns (1)-(5) document that international students from target country in acquiror country as well as those from acquiror country in target country significantly increase the probability of the bilateral cross-border occurrence. Estimates support the hypothesis that the international students signal for acquiring firms that they can access to the high-skilled labour force in the potential target country.

In a second part, we considered the model for the positive counts.  The dependent variable, number of bilateral M&A deals, is discrete with a distribution that places probability mass at nonnegative integer values only, that is count data.  Then, we employed a GLM with the long link and negative binomial distribution in the second part. Surprisingly, the variables relating to

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immigrants are neither significant in a first nor second part. Appendix B.1 provides a comparison with the prior studies. Results for the second part show that estimates in columns (1)-(5) indicate that the increase in the international students boost the number of bilateral M&A deals. These results also support the hypothesis that the formation of human capital is attractive for the acquiror so that the bilateral M&A activities in number become more active.

Table 3 reports the marginal effects for the number of bilateral M&A deals. Our variables of interest, which are bilateral international students, show that both of them significantly increase the number of bilateral M&A deals. When comparing the magnitudes of their impacts on the number of bilateral deals, the international students from target country in acquiror country provoke more bilateral deals than those from acquiror country in target country.

Estimates for other control variables document that the marginal effect of governance is significant in the acquiror country but not in the target country. This result suggests that the business climate at home facilitates the bilateral M&A deals that requires a complicated procedure until the deal is made. Moreover, the GDP per capita growth in the acquiror country pushes the bilateral M&A deals, not in the target country. Both results imply that the active economy in the acquiror country raises the bilateral M&A deals in number. The exchange rates in both acquiror and target country are found significant factors, and their impacts are consistent with those reported in the previous studies.

We focus our analysis on top 10 acquiror countries to examine the bilateral M&A trends in countries where M&A activities have been constantly active. Table 4 reports results obtained from the two-part model with specifications (1)-(5) in Table 2 by limiting a sample to top 10 acquiror countries, and Table 5 shows the marginal effects. The estimates produced qualitatively similar results. The notable difference relating to the variables of interest is that the marginal effect of international students from acquiror country in target country is about half in the top 10 acquiror country. However, the marginal effects of international students from target country in acquiror country in Tables 3 and 5 are similar.

## 5.2   Results for the value of M&A

The model for bilateral M&A deal values is also estimated by a two-part model, which differs from the number of bilateral M&A deals in the second part where the Gamma GLM with a log

link function is employed.[5] Table 6 reports the estimates from the two-part model.

The probit regressions in columns (1)-(5) of Table 6 indicate that two variables of interest, international students from target country in acquiror country and those from acquiror country in target country, are statistically significant determinants. In the second part, estimates indicate that the international student from target country in acquiror country is statistically significant, but the international student from acquiror country in target country is significant at 10% level in columns (3)-(5). Column (6) reports the estimates excluding variables related to international students and immigrants. To compare the fit of the model, the values of AIC and BIC obviously favour the specifications with variables with international students and immigrants.

Table 7 reports the marginal effects for the values of bilateral M&A deals. Our variables of interest, which are bilateral international students, show that both of them significantly increase the values of bilateral M&A deals. When comparing the magnitudes of their impacts on the value of bilateral deals, the international students from target country in acquiror country provoke more bilateral deals than those from acquiror country in target country. Tables B.2 and B.3 show estimates obtained from OLS to compare with estimates by two-step model. Results of linear regression differ substantially from those of the two-step model. In the linear regression for value of M&A deals, none of the coefficients on international students from acquiror country in target country are significant, even at 10% level. Furthermore, variables, real exchange rate in acquiror country and target country, which are significant in the two-step models are not significant in the linear model for the number of M&A deals. This difference appears to stem from the estimation methodology, because linear regression is not appropriate to explain our data.

Then, we focus our analysis on the top 10 acquiror countries to examine the bilateral M&A values between countries where M&A activities have been constantly active. Table 8 reports results obtained from the two-part model with specifications (1)-(5) in Table 6 by limiting a sample to top 10 acquiror countries, and Table 9 shows the marginal effects. While the marginal effects of international students from target country in acquiror country are similar to those from full sample. However, none of marginal effects of international students from acquiror country in target country is significant. These marginal effects are significant in Table 5 for the number of M&A deals, hence

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[5]Another feature is that the value of M&A is not report for some deals. On the other hand, the number of bilateral M&A deals is observable even without information on transaction value. Hence the observations for positive outcomes of the number of M&A deals are larger, which means less variation between countries where the bilateral M&A is active. This results in less observation that can be used for the first part and the calculation of marginal effects from two-part model.

international students from acquiror country in target country stimulate only the extensive margin but international students from target country in acquiror country favour also the total values of bilateral M&A.

# 6   Conclusions

The issue of how the human capital values in the global market has become of fundamental importance for the firms. For firms aspiring for global business development, the presence of human capital will be a pressing question. This study examines this issue with bilateral data on M&A and international students between G20 countries from a novel perspective, by analysing international students as the formation of human capital in a country.

We found that the formation of human capital in a country can signal positively that firms have access high-skilled workers who satisfy their skill and task requirements; international students are the source of such labour force. The rapidity of innovation drives the business acquisitions, which in turn induces more acquisitions of firms with promising technology. Thus, firms require labour force with specific skills that satisfies their business developments in the target country and home country. International students migrate to a country of study to acquire skills and credentials that they cannot acquire in their home country. Numerous international students return to their origin country after studying because their stay in the country of study is not for permanent settlement. Thus, a labour force with such skills and credentials meets the human capital that potential acquiror firms seek in home country as well as in the target country.

These results provide a number of important insights into the potential effects of international student stocks. Top countries related to the student mobility and cross-border M&A activity are of G20 member countries, which underpins the focus of this study. In the future, the student mobility will be are much more geographically diverse. The direct effects of international students are discussed in the matter of costs and benefits, such as fiscal problem and their contribution to its economy. Our results from the two-step model suggest that firms, including those yet searching for a target country, may perceive that the international student stock from target (acquiror) country in acquiror (target) country is an indication of positive future prospects. The public policy to facilitate student mobility can be essential in the global economy where the competition for talent is intense.

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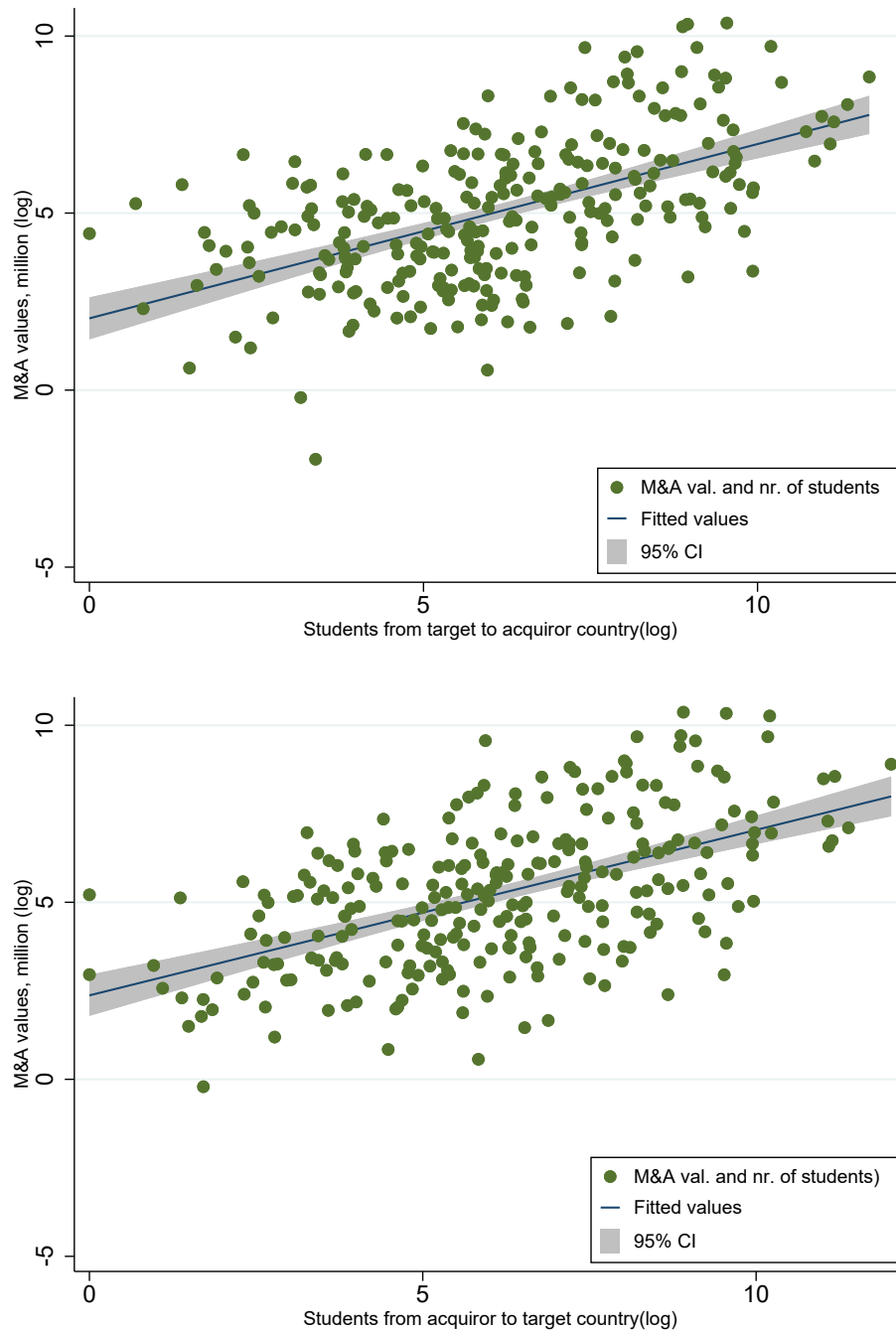
Figure 1: Cross-border M&A values and international students

*Notes*: The upper panel plots the (log) weighted mean values for the M&A deals using the number of deals as weights ($y$ axis) against the (log) number of students from acquiror's country of origin to target country ($x$ axis). The lower panel plots The figure plots the (log) weighted mean values for the M&A deals using the number of deals as weights (y axis) against the (log) number of students from target country to acquiror's country of origin (x axis). Figure 1 refers to G20 countries and sample period 2000-2017.
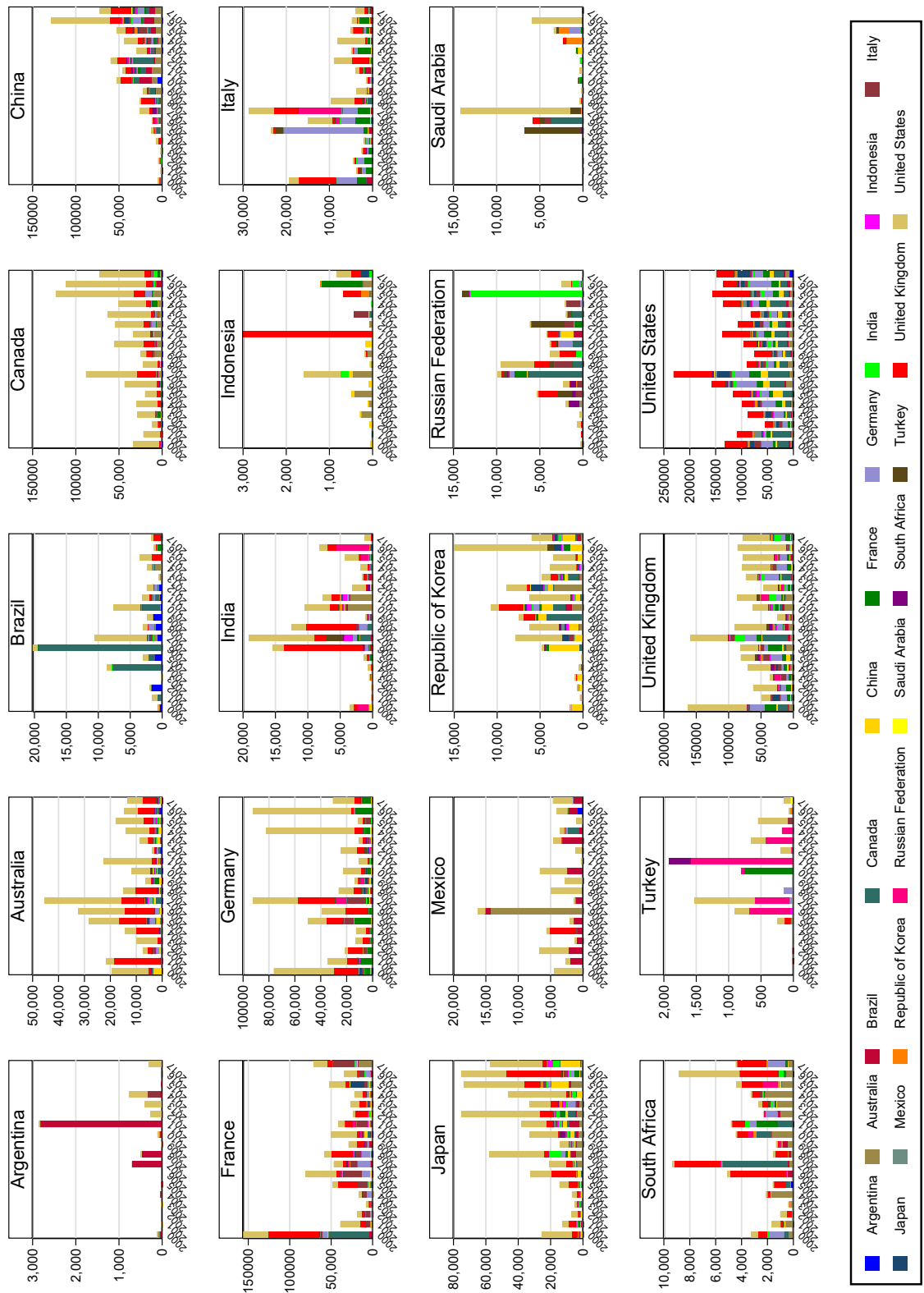
Figure 2: Cross-border M&A values by acquiror's country of origin

*Notes*: Sample period: 2000-2017. This figure demonstrates the cross-border M&A deal values in million USD by acquiror's country of origin.
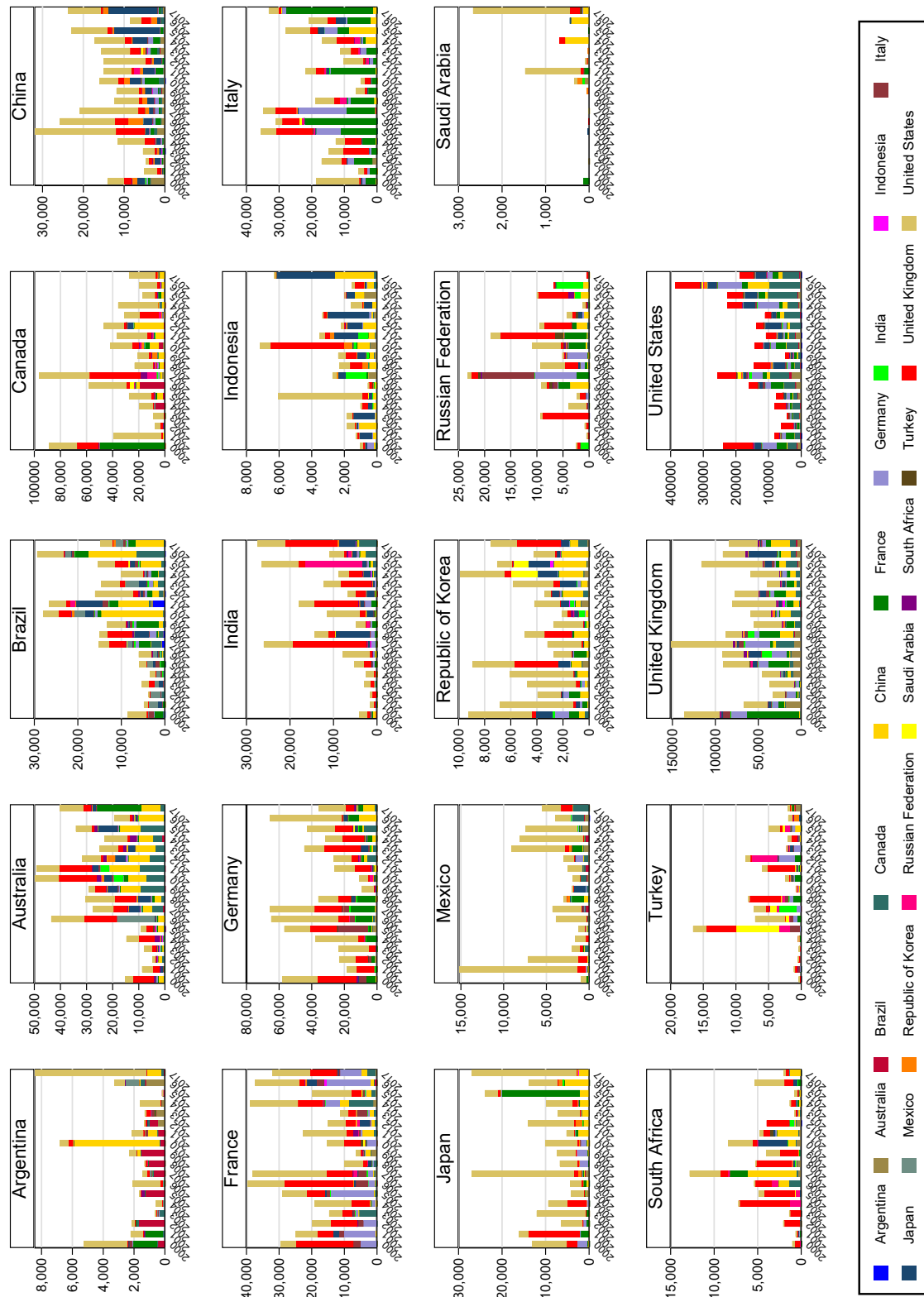
Figure 3: Cross-border M&A values by target country

*Notes*: Sample period: 2000-2017. This figure demonstrates the cross-border M&A deal values in million USD by target country.
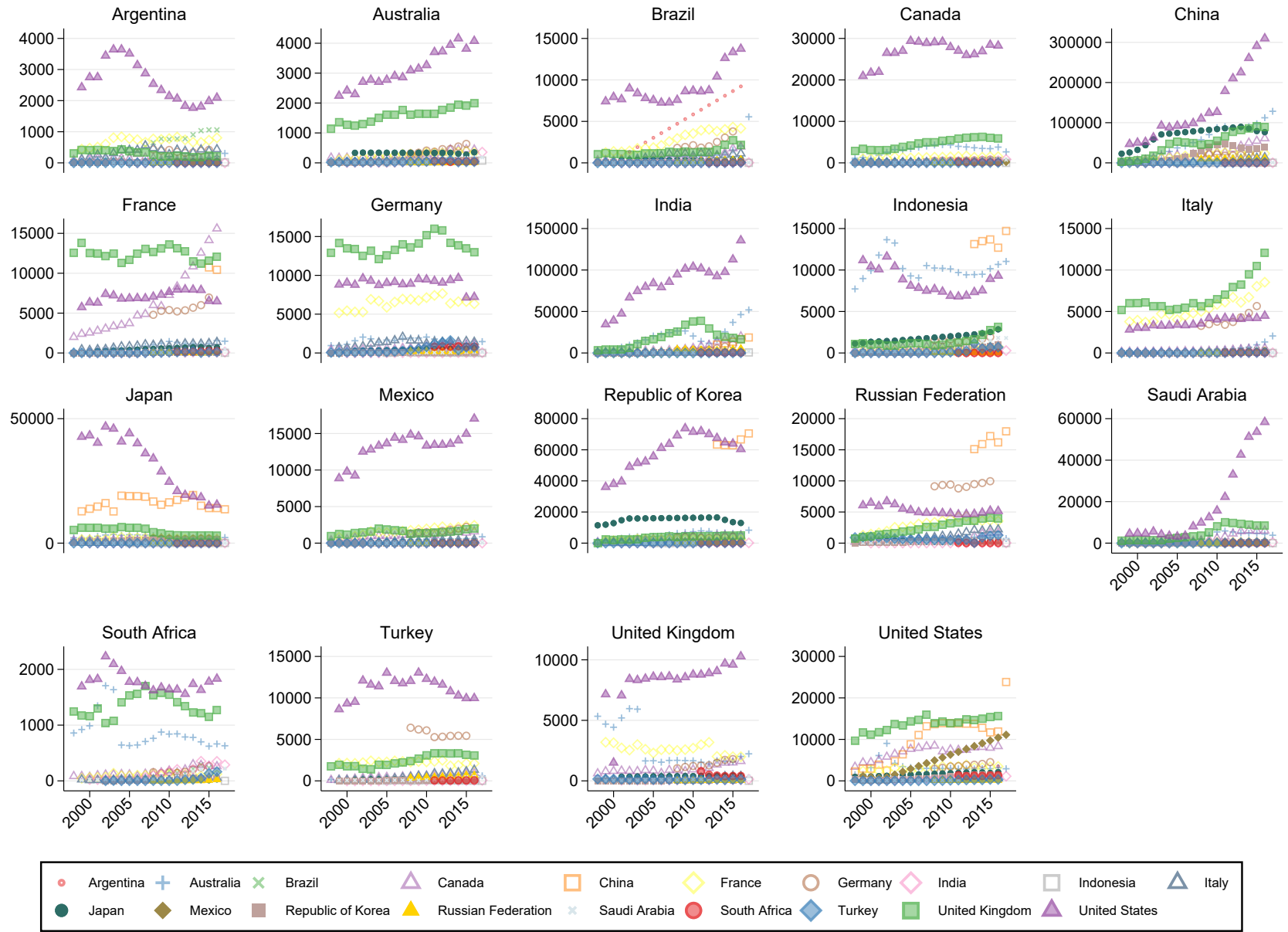
Figure 4: International students by origin country

*Notes*: Sample period: 2000-2017. This figure plots the number of international students by origin country.
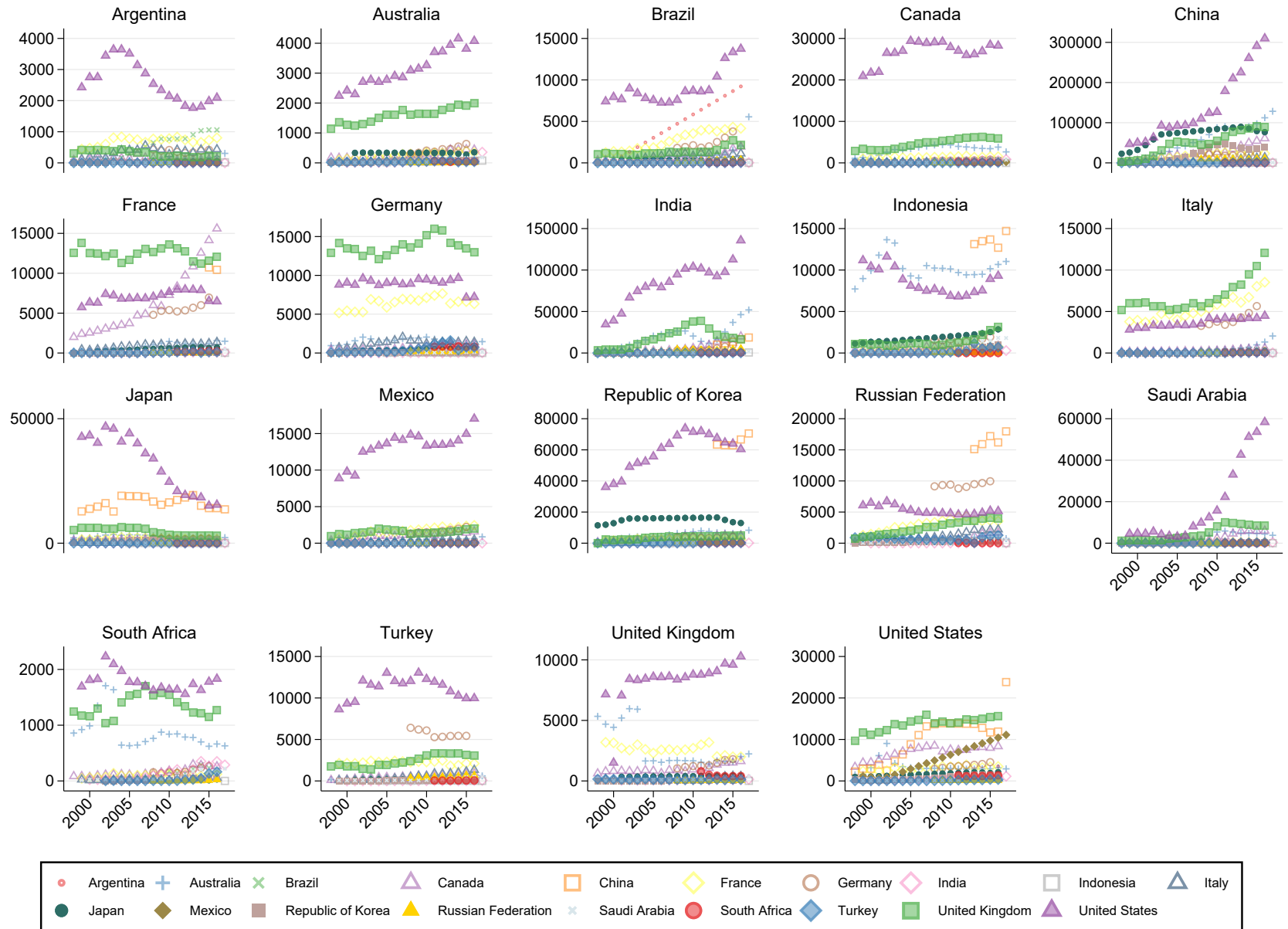
Figure 5: International students by destination country

*Notes*: Sample period: 2000-2017. This figure plots the number of international students by destination country.

Table 1: Descriptive statistics

|  |  | Mean | Std. Dev. | Min | Max | $N/n/\bar{T}$ |
|---|---|---|---|---|---|---|
| M&A deal values | overall | 1324.14 | 5286.86 | 0 | 92236.2 | 6156 |
|  | between |  | 4083.00 | 0 | 35831.66 | 342 |
|  | within |  | 3365.42 | -29625.55 | 60599.68 | 18 |
| Number of M&A deals | overall | 14.41 | 42.07 | 0 | 499 | 6156 |
|  | between |  | 40.68 | 0 | 388.78 | 342 |
|  | within |  | 10.92 | -121.70 | 156.80 | 18 |
| International students | overall | 4508.21 | 15622.8 | 1 | 309837.3 | 4194 |
|  | between |  | 13024.65 | 1 | 145223.3 | 312 |
|  | within |  | 6736.37 | -90434.05 | 169122.3 | 13.44 |
| Immigrants | overall | 119516 | 611426.1 | 0 | 12683066 | 5382 |
|  | between |  | 596574.1 | 28.33 | 9795607 | 306 |
|  | within |  | 105132.6 | -1349083 | 3006975 | 17.59 |
| Governance | overall | .46 | .82 | -.91 | 1.68 | 5814 |
|  | between |  | .81 | -.72 | 1.62 | 342 |
|  | within |  | .10 | .05 | .79 | 17 |
| Real exchange rate | overall | 673.14 | 2586.88 | .52 | 16997.09 | 6156 |
|  | between |  | 2543.22 | .62 | 11392.97 | 342 |
|  | within |  | 491.78 | -2133.52 | 6277.27 | 18 |
| GDP per capita growth | overall | 2.26 | 3.38 | -11.85 | 13.64 | 6156 |
|  | between |  | 2.03 | .04 | 8.67 | 342 |
|  | within |  | 2.70 | -10.98 | 10.18 | 18 |

$Notes$: The table reports the summary statistics for the sample from 2000-2017 period. N, n, and $\bar{T}$ refer to the observations with country-years data, the number of country-pairs, and the average number of years a country.

Table 2: Number of M&A and international students

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **probit** | | | | | | |
| ln Students from target country in acquiror country | 0.169*** | 0.209*** | 0.211*** | 0.205*** | 0.205*** | |
| | (0.042) | (0.055) | (0.058) | (0.059) | (0.059) | |
| ln Students from acquiror country in target country | 0.180*** | 0.179*** | 0.198*** | 0.194*** | 0.193*** | |
| | (0.044) | (0.062) | (0.061) | (0.062) | (0.062) | |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.0111 | -0.0190 | -0.00808 | -0.00995 | |
| | | (0.065) | (0.065) | (0.066) | (0.066) | |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.0508 | 0.0466 | 0.0492 | 0.0506 | |
| | | (0.060) | (0.061) | (0.062) | (0.062) | |
| Governance in acquiror country | | | 0.446 | 0.316 | 0.276 | 0.440* |
| | | | (0.640) | (0.644) | (0.654) | (0.259) |
| Governance in target country | | | 0.192 | 0.0263 | 0.0103 | -0.439* |
| | | | (0.629) | (0.643) | (0.646) | (0.259) |
| GDP per capita growth in acquiror country | | | | 0.0653*** | 0.0659*** | 0.0160 |
| | | | | (0.022) | (0.022) | (0.011) |
| GDP per capita growth in target country | | | | 0.0610** | 0.0614*** | 0.000365 |
| | | | | (0.024) | (0.024) | (0.010) |
| Real exchange rate (acquiror country) | | | | | -0.000135 | 0.000138** |
| | | | | | (0.000) | (0.000) |
| Real exchange rate (target country) | | | | | -0.0000763 | 0.0000526 |
| | | | | | (0.000) | (0.000) |
| **glm** | | | | | | |
| ln Students from target country in acquiror country | 0.253*** | 0.259*** | 0.272*** | 0.272*** | 0.271*** | |
| | (0.039) | (0.056) | (0.057) | (0.057) | (0.057) | |
| ln Students from acquiror country in target country | 0.150*** | 0.142*** | 0.158*** | 0.157*** | 0.156*** | |
| | (0.039) | (0.042) | (0.041) | (0.041) | (0.041) | |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.0226 | -0.0288 | -0.0280 | -0.0238 | |
| | | (0.050) | (0.050) | (0.050) | (0.050) | |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.0618 | 0.0476 | 0.0483 | 0.0457 | |
| | | (0.045) | (0.044) | (0.044) | (0.044) | |
| Governance in acquiror country | | | 1.389*** | 1.361*** | 1.355*** | 1.309*** |
| | | | (0.251) | (0.254) | (0.254) | (0.196) |
| Governance in target country | | | -0.0785 | -0.103 | -0.141 | 0.124 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | (0.222) | (0.224) | (0.224) | (0.170) |
| GDP per capita growth in acquiror country | | | | 0.0182* (0.010) | 0.0183* (0.010) | -0.0140* (0.008) |
| GDP per capita growth in target country | | | | 0.0114 (0.009) | 0.0121 (0.009) | 0.00325 (0.006) |
| Real exchange rate (acquiror country) | | | | | 0.000102** (0.000) | 0.000204*** (0.000) |
| Real exchange rate (target country) | | | | | -0.000281*** (0.000) | -0.000162*** (0.000) |
| Observations | 2916 | 1929 | 1864 | 1864 | 1864 | 5814 |
| AIC | 17735 | 16146 | 15561 | 15555 | 15561 | 29647 |
| BIC | 18392 | 16758 | 16181 | 16197 | 16224 | 30434 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 3: Number of M&A and international students - marginal effects

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 4.820*** | 3.622*** | 3.774*** | 3.766*** | 3.743*** | |
| | (0.807) | (0.843) | (0.852) | (0.856) | (0.855) | |
| ln Students from acquiror country in target country | 2.899*** | 2.016*** | 2.223*** | 2.214*** | 2.193*** | |
| | (0.798) | (0.598) | (0.589) | (0.590) | (0.590) | |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.312 | -0.398 | -0.381 | -0.326 | |
| | | (0.683) | (0.677) | (0.677) | (0.681) | |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.864 | 0.665 | 0.675 | 0.640 | |
| | | (0.628) | (0.608) | (0.610) | (0.611) | |
| Governance in acquiror country | | | 18.93*** | 18.48*** | 18.37*** | 17.00*** |
| | | | (3.711) | (3.724) | (3.722) | (2.699) |
| Governance in target country | | | -0.958 | -1.368 | -1.896 | 1.185 |
| | | | (3.013) | (3.036) | (3.026) | (2.171) |
| GDP per capita growth in acquiror country | | | | 0.278** | 0.280** | -0.163 |
| | | | | (0.132) | (0.133) | (0.099) |
| GDP per capita growth in target country | | | | 0.185 | 0.194 | 0.0415 |
| | | | | (0.119) | (0.120) | (0.080) |
| Real exchange rate (acquiror country) | | | | | 0.00130** | 0.00271*** |
| | | | | | (0.001) | (0.001) |
| Real exchange rate (target country) | | | | | -0.00382*** | -0.00201*** |
| | | | | | (0.001) | (0.000) |
| Observations | 2916 | 1929 | 1864 | 1864 | 1864 | 5814 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 4: Top 10 acquiror countries: number of M&A and international students

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **probit** | | | | | |
| ln Students from target country in acquiror country | 0.299*** (0.074) | 0.329** (0.161) | 0.414** (0.173) | 0.440** (0.173) | 0.419** (0.175) |
| ln Students from acquiror country in target country | 0.0559 (0.078) | 0.111 (0.098) | 0.152* (0.090) | 0.104 (0.083) | 0.0639 (0.085) |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.00798 (0.135) | -0.0257 (0.133) | 0.0329 (0.128) | 0.123 (0.122) |
| ln Immigrants in target country from acquiror country (5year lag) | | -0.0859 (0.101) | -0.124 (0.100) | -0.123 (0.102) | -0.150 (0.102) |
| Governance in acquiror country | | | 1.500 (1.770) | 1.022 (1.890) | 0.756 (2.002) |
| Governance in target country | | | 2.128** (0.857) | 1.860** (0.872) | 1.761** (0.869) |
| GDP per capita growth in acquiror country | | | | 0.214*** (0.064) | 0.184*** (0.061) |
| GDP per capita growth in target country | | | | 0.0803** (0.040) | 0.0916** (0.041) |
| Real exchange rate (acquiror country) | | | | | -0.0517** (0.021) |
| Real exchange rate (target country) | | | | | -0.00205 (0.002) |
| **glm** | | | | | |
| ln Students from target country in acquiror country | 0.334*** (0.053) | 0.345*** (0.075) | 0.364*** (0.076) | 0.364*** (0.076) | 0.363*** (0.076) |
| ln Students from acquiror country in target country | 0.0833* (0.045) | 0.0757* (0.043) | 0.0906** (0.041) | 0.0904** (0.041) | 0.0891** (0.042) |
| ln Immigrants in acquiror country from target country (5year lag) | | 0.00937 (0.060) | 0.00442 (0.059) | 0.00452 (0.059) | 0.00863 (0.059) |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.0157 (0.054) | -0.00180 (0.051) | -0.000524 (0.052) | -0.00419 (0.052) |
| Governance in acquiror country | | | 1.526*** (0.266) | 1.516*** (0.271) | 1.473*** (0.277) |
| Governance in target country | | | -0.0463 | -0.0639 | -0.103 |

|  |  |  |  | (0.219) | (0.222) | (0.216) |
|---|---|---|---|---|---|---|
| GDP per capita growth in acquiror country |  |  |  |  | 0.00482 (0.013) | 0.00498 (0.013) |
| GDP per capita growth in target country |  |  |  |  | 0.00908 (0.010) | 0.00999 (0.010) |
| Real exchange rate (acquiror country) |  |  |  |  |  | 0.000693 (0.004) |
| Real exchange rate (target country) |  |  |  |  |  | -0.000353*** (0.000) |
| Observations | 1437 | 735 | 699 | 699 | 699 |
| AIC | 13933 | 13178 | 12620 | 12615 | 12613 |
| BIC | 14396 | 13569 | 13015 | 13029 | 13046 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 5: Number of M&A and international students: Top ten acquiror countries - marginal effects

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 6.383*** | 3.519*** | 3.775*** | 3.776*** | 3.759*** |
| | (1.185) | (0.841) | (0.875) | (0.877) | (0.877) |
| ln Students from acquiror country in target country | 1.583* | 0.794* | 0.964** | 0.934** | 0.903** |
| | (0.865) | (0.418) | (0.412) | (0.413) | (0.415) |
| ln Immigrants in acquiror country from target country (5year lag) | | 0.0858 | 0.0296 | 0.0604 | 0.144 |
| | | (0.582) | (0.583) | (0.583) | (0.583) |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.102 | -0.0832 | -0.0658 | -0.114 |
| | | (0.521) | (0.503) | (0.504) | (0.506) |
| Governance in acquiror country | | | 15.69*** | 15.31*** | 14.78*** |
| | | | (3.143) | (3.170) | (3.226) |
| Governance in target country | | | 0.673 | 0.292 | -0.150 |
| | | | (2.199) | (2.212) | (2.163) |
| GDP per capita growth in acquiror country | | | | 0.153 | 0.138 |
| | | | | (0.130) | (0.131) |
| GDP per capita growth in target country | | | | 0.128 | 0.142 |
| | | | | (0.101) | (0.102) |
| Real exchange rate (acquiror country) | | | | | -0.0183 |
| | | | | | (0.038) |
| Real exchange rate (target country) | | | | | -0.00445*** |
| | | | | | (0.001) |
| Observations | 1437 | 735 | 699 | 699 | 699 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 6: Value of M&A and international students

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **probit** | | | | | | |
| ln Students from target country in acquiror country | 0.174*** | 0.210*** | 0.223*** | 0.219*** | 0.218*** | |
|  | (0.038) | (0.053) | (0.056) | (0.056) | (0.056) | |
| ln Students from acquiror country in target country | 0.173*** | 0.232*** | 0.264*** | 0.260*** | 0.258*** | |
|  | (0.037) | (0.048) | (0.051) | (0.051) | (0.051) | |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.008 | -0.015 | -0.011 | -0.007 | |
|  | | (0.058) | (0.057) | (0.057) | (0.058) | |
| ln Immigrants in target country from acquiror country (5year lag) | | -0.044 | -0.064 | -0.062 | -0.065 | |
|  | | (0.052) | (0.052) | (0.052) | (0.052) | |
| Governance in acquiror country | | | 1.409*** | 1.323** | 1.320** | 0.709** |
|  | | | (0.537) | (0.535) | (0.544) | (0.279) |
| Governance in target country | | | 0.517 | 0.433 | 0.336 | -0.195 |
|  | | | (0.551) | (0.555) | (0.569) | (0.247) |
| GDP per capita growth in acquiror country | | | | 0.042** | 0.042** | -0.005 |
|  | | | | (0.020) | (0.020) | (0.011) |
| GDP per capita growth in target country | | | | 0.033 | 0.034 | 0.013 |
|  | | | | (0.023) | (0.023) | (0.009) |
| Real exchange rate (acquiror country) | | | | | -0.000 | 0.000** |
|  | | | | | (0.000) | (0.000) |
| Real exchange rate (target country) | | | | | -0.001 | 0.000 |
|  | | | | | (0.000) | (0.000) |
| **glm** | | | | | | |
| ln Students from target country in acquiror country | 0.242*** | 0.196** | 0.197** | 0.203** | 0.201** | |
|  | (0.065) | (0.083) | (0.083) | (0.081) | (0.080) | |
| ln Students from acquiror country in target country | 0.089 | 0.086 | 0.120* | 0.116* | 0.115* | |
|  | (0.056) | (0.070) | (0.068) | (0.068) | (0.067) | |
| ln Immigrants in acquiror country from target country (5year lag) | | 0.121* | 0.082 | 0.086 | 0.093 | |
|  | | (0.068) | (0.066) | (0.066) | (0.065) | |
| ln Immigrants in target country from acquiror country (5year lag) | | -0.049 | -0.054 | -0.058 | -0.062 | |

|  |  |  | (0.066) | (0.063) | (0.064) | (0.063) |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Governance in acquiror country |  |  |  | 2.404*** | 2.368*** | 2.618*** | 1.867*** |
|  |  |  |  | (0.770) | (0.782) | (0.737) | (0.471) |
| Governance in target country |  |  |  | 1.475** | 1.540*** | 1.510*** | 0.799** |
|  |  |  |  | (0.585) | (0.582) | (0.581) | (0.351) |
| GDP per capita growth in acquiror country |  |  |  |  | 0.010 | 0.010 | -0.018 |
|  |  |  |  |  | (0.036) | (0.035) | (0.027) |
| GDP per capita growth in target country |  |  |  |  | -0.024 | -0.021 | -0.011 |
|  |  |  |  |  | (0.025) | (0.025) | (0.017) |
| Real exchange rate (acquiror country) |  |  |  |  |  | 0.001*** | 0.000 |
|  |  |  |  |  |  | (0.000) | (0.000) |
| Real exchange rate (target country) |  |  |  |  |  | -0.000** | -0.000 |
|  |  |  |  |  |  | (0.000) | (0.000) |
| Observations | 2916 | 2328 | 2244 | 2244 | 2244 | 5814 |  |
| AIC | 33472 | 31069 | 29910 | 29910 | 29896 | 53266 |  |
| BIC | 34124 | 31713 | 30556 | 30578 | 30594 | 54053 |  |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 7: Value of M&A and international students: marginal effects

|  | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 457.1*** (124.774) | 460.7** (189.766) | 473.6** (192.190) | 488.3*** (189.092) | 485.4*** (188.223) | |
| ln Students from acquiror country in target country | 183.6* (101.271) | 220.6 (155.637) | 304.5* (155.350) | 295.3* (154.947) | 293.8* (154.535) | |
| ln Immigrants in acquiror country from target country (5year lag) | | 266.9* (152.127) | 184.0 (149.447) | 193.3 (149.419) | 211.9 (148.439) | |
| ln Immigrants in target country from acquiror country (5year lag) | | -113.7 (147.118) | -129.8 (143.394) | -139.1 (145.200) | -149.1 (144.457) | |
| Governance in acquiror country | | | 5606.5*** (1814.103) | 5533.1*** (1854.061) | 6120.8*** (1778.179) | 2398.1*** (621.797) |
| Governance in target country | | | 3398.1** (1377.269) | 3545.9*** (1375.378) | 3479.0** (1377.590) | 942.1** (437.858) |
| GDP per capita growth in acquiror country | | | | 27.31 (80.499) | 27.95 (80.148) | -22.60 (33.142) |
| GDP per capita growth in target country | | | | -51.07 (56.412) | -44.55 (56.458) | -11.69 (20.283) |
| Real exchange rate (acquiror country) | | | | | 2.276*** (0.352) | 0.200 (0.230) |
| Real exchange rate (target country) | | | | | -0.725*** (0.280) | -0.0518 (0.115) |
| Observations | 2916 | 2328 | 2244 | 2244 | 2244 | 5814 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 8: Top 10 acquiror countries: M&A values and international students

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **probit** | | | | | |
| ln Students from target country in acquiror country | 0.228*** | 0.335*** | 0.378*** | 0.375*** | 0.372*** |
| | (0.060) | (0.085) | (0.088) | (0.089) | (0.091) |
| ln Students from acquiror country in target country | 0.108** | 0.188*** | 0.231*** | 0.225*** | 0.212*** |
| | (0.052) | (0.057) | (0.057) | (0.058) | (0.063) |
| ln Immigrants in acquiror country from target country (5year lag) | | -0.0773 | -0.0686 | -0.0643 | -0.0502 |
| | | (0.091) | (0.084) | (0.085) | (0.087) |
| ln Immigrants in target country from acquiror country (5year lag) | | -0.158** | -0.208*** | -0.203*** | -0.214*** |
| | | (0.073) | (0.073) | (0.073) | (0.074) |
| Governance in acquiror country | | | 2.844*** | 2.733*** | 3.112*** |
| | | | (0.892) | (0.911) | (0.967) |
| Governance in target country | | | 1.605** | 1.513** | 1.457* |
| | | | (0.770) | (0.759) | (0.750) |
| GDP per capita growth in acquiror country | | | | 0.0488 | 0.0350 |
| | | | | (0.039) | (0.041) |
| GDP per capita growth in target country | | | | 0.0514 | 0.0492 |
| | | | | (0.034) | (0.034) |
| Real exchange rate (acquiror country) | | | | | -0.0337* |
| | | | | | (0.019) |
| Real exchange rate (target country) | | | | | -0.000248 |
| | | | | | (0.000) |
| **glm** | | | | | |
| ln Students from target country in acquiror country | 0.292*** | 0.224** | 0.244** | 0.234** | 0.242** |
| | (0.079) | (0.098) | (0.095) | (0.096) | (0.094) |
| ln Students from acquiror country in target country | 0.0907 | 0.0514 | 0.0821 | 0.0855 | 0.0807 |
| | (0.061) | (0.074) | (0.072) | (0.072) | (0.071) |
| ln Immigrants in acquiror country from target country (5year lag) | | 0.140* | 0.102 | 0.106 | 0.0949 |
| | | (0.073) | (0.067) | (0.068) | (0.068) |
| ln Immigrants in target country from acquiror country (5year lag) | | -0.00538 | -0.0159 | -0.0206 | -0.0174 |
| | | (0.074) | (0.067) | (0.068) | (0.068) |
| Governance in acquiror country | | | 3.170*** | 3.243*** | 3.519*** |
| | | | (0.712) | (0.718) | (0.750) |
| Governance in target country | | | 1.930*** | 1.951*** | 1.931*** |

|  |  |  |  | (0.580) | (0.586) | (0.581) |
|---|---|---|---|---|---|---|
| GDP per capita growth in acquiror country |  |  |  |  | -0.0392 (0.037) | -0.0415 (0.037) |
| GDP per capita growth in target country |  |  |  |  | -0.0165 (0.027) | -0.0150 (0.026) |
| Real exchange rate (acquiror country) |  |  |  |  |  | -0.0168** (0.008) |
| Real exchange rate (target country) |  |  |  |  |  | -0.000115 (0.000) |
| Observations | 1542 | 1331 | 1277 | 1277 | 1277 |
| AIC | 26324 | 25270 | 24154 | 24158 | 24153 |
| BIC | 26805 | 25753 | 24638 | 24668 | 24684 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 9: Value of M&A and international students: Top ten acquiror countries - marginal effects

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 452.8*** (121.860) | 418.8** (172.095) | 471.6*** (175.750) | 455.6** (177.147) | 473.1*** (174.982) |
| ln Students from acquiror country in target country | 144.1 (90.369) | 105.1 (129.480) | 166.5 (131.867) | 173.2 (132.831) | 164.3 (131.358) |
| ln Immigrants in acquiror country from target country (5year lag) | | 238.7* (128.877) | 180.1 (123.823) | 188.7 (125.634) | 170.4 (126.136) |
| ln Immigrants in target country from acquiror country (5year lag) | | -22.31 (129.282) | -44.60 (121.588) | -52.86 (124.356) | -48.10 (125.620) |
| Governance in acquiror country | | | 5969.2*** (1406.586) | 6132.3*** (1437.874) | 6696.6*** (1512.565) |
| Governance in target country | | | 3624.7*** (1093.561) | 3679.0*** (1111.961) | 3655.0*** (1108.793) |
| GDP per capita growth in acquiror country | | | | -67.99 (68.620) | -73.61 (68.006) |
| GDP per capita growth in target country | | | | -26.24 (48.744) | -23.89 (48.513) |
| Real exchange rate (acquiror country) | | | | | -33.44** (15.056) |
| Real exchange rate (target country) | | | | | -0.229 (0.197) |
| Observations | 1542 | 1331 | 1277 | 1277 | 1277 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

Acquiror country fixed effects, target country fixed effects and time fixed effects are included.

*** significant at 1%, ** significant at 5%, * significant at 10%.

# A    Definition and sources of Data

This appendix describes the details of the definition and sources of data used as explanatory variables in this study.

**1. Number of M&A.** The number of M&A deals per a country by a year is calculated as the sum of cross-border M&A deals retrieved from the Thomson One database whose acquiror country of origin and target country are both G20 member countries, that is, Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom, and the United States. M&A deals related to Hong Kong, Macau, and Taiwan are counted as China. Following the custom, we aggregate British overseas territories such as Anguilla, British Virgin Islands into the United Kingdom. Same rule applies to the other countries.

**2. Value of M&A** The value of M&A deals per a country by a year is calculated as the sum of 'Value of Transaction ($million) ' in cross-border M&A deals retrieved from the Thomson One database whose acquiror country of origin and target country are both G20 member countries. 'Value of Transaction ($million) ' is the total value of consideration paid by the acquiror, excluding fees and expenses. According to Thomson One definition, the dollar value includes the amount paid for all common stock, common stock equivalents, preferred stock, debt, options, assets, warrants, and stake purchases made within six months of the announcement date of the transaction. M&A deals related to Hong Kong, Macau, and Taiwan are counted as China. Following the custom, we aggregate British overseas territories such as Anguilla, British Virgin Islands into the United Kingdom. Same rule applies to the other countries.

**3. International students** The number of international students whose origin country is a G20 member country and whose destination country is a G20 member country. Data are from various sources, but mainly from the UNESCO database. We fill the missing data using OECD data after we compared non-missing data and confirmed that they are identical (no differences in the number of students). From OECD database, we selected data which refer to 'Non-resident students of reporting country' in order to be closer to the UNESCO data. Data is also obtained from Institute of International Education, and JASSO (Japan Student Services Organization).

**4. Immigrants** The stock of immigrants by nationality in a G20 member country for a given year is retrieved mainly from OECD International Migration Database. For countries which are

not included in OECD database, we obtain data from The United Nations database. For countries whose data provided for a limited number of year, we have linearly interpolated observations to fill in missing values in intermediate years following the literature.

**5. Governance** Data on Governance for a given country is provided by the Worldwide Governance Indicators, 2018 Update - Aggregate Governance Indicators 1996-2017. We use a same set of indicators selected in Javorcik et al. (2011): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. We use the average of the above governance indicators, that is the same variable definition in Javorcik et al. (2011) for the updated sample period in this study. Original data is the composite measures of governance that are in units of a standard normal distribution, with mean zero, standard deviation of one, and running from approximately -2.5 to 2.5, with higher values corresponding to better governance. Please refer details of methodology at `www.govindicators.org`.

**6. Real exchange rate** Annual Real Exchange Rates (local currency per USD) are used. Data is obtained from United States Department of Agriculture, Economic Research Service.

**7. GDP per capita growth** Data on annual percentage growth rate of GDP per capita based on constant local currency [NY.GDP.PCAP.KD.ZG] for G20 member countries is retrieved from World Bank Development Indicators databank.

# B    Comparison with results in literature

As a robustness test, this appendix shows the results using the observations only when the acquiror's country of origin is US or Japan to compare with results obtained in Javorcik et al. (2011) for US and Etzo and Takaoka (2018) for Japan. They showed that the presence of migrants stimulates FDI by promoting information flows and FDI abroad is positively correlated with the presence of migrants from the target country. The observations for the number of M&A deals when the acquiror's country of origin is US or Japan have not more than a few counts of zero each year. Thus we use negative binomial model with the same specification of logged explanatory variables instead of two-part model.

Table B.1 tells essentially the same story across four specifications, indicating that the migration networks, particularly in the acquiror country of origin, have a positive effect on investment destined for the migrants' country of origin. Insofar as these results are consistent with the litera-

ture, the results in this paper are not sensitive to observations with G20 bilateral matchings.

In addition, we also find that the migration networks in the target country from the acquiror country of origin have the positive effects on investment destined for the migrants' country of origin, that is the acquiror country of origin. This finding complements the discussion about migrant networks in the literature, which mainly demonstrates the role of migrant networks from the target country.

Table B.1: The number of M&A deals and Migration: US and Japan

| | Negative binomial: average marginal effects (AMEs) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| ln Immigrants in acquiror country from target country (5year lag) | 16.76*** (1.609) | | 12.81*** (2.504) | |
| ln Immigrants in target country from acquiror country (5year lag) | | 18.12*** (2.793) | | 3.758 (3.674) |
| ln Students from target country in acquiror country | | | 10.45*** (3.333) | 16.81*** (3.135) |
| ln Students from acquiror country in target country | | | 6.327** (3.007) | 9.106*** (2.976) |
| Governance in acquiror country | 96.48*** (19.421) | 122.4*** (21.668) | 116.6*** (24.823) | 137.8*** (25.871) |
| Governance in target country | -13.54 (18.343) | -18.07 (19.394) | -26.94 (20.371) | -19.19 (21.729) |
| Real exchange rate (acquiror country) | -0.125 (0.221) | -0.363 (0.233) | -0.307 (0.272) | -0.448 (0.277) |
| Real exchange rate (target country) | -0.00810 (0.005) | -0.00768 (0.005) | -0.0130** (0.006) | -0.0128** (0.006) |
| GDP per capita growth in acquiror country | 0.273 (2.576) | 0.794 (2.767) | 0.463 (3.102) | 0.332 (3.163) |
| GDP per capita growth in target country | -0.481 (0.634) | -0.322 (0.672) | 0.947 (0.893) | 0.985 (0.915) |
| Observations | 557 | 559 | 403 | 402 |
| Acquiror/target country dummies | YES | YES | YES | YES |
| Year dummies | YES | YES | YES | YES |

*Notes*: Robust standard errors in parentheses.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table B.2: The number of M&A deals (OLS results)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 4.260* (2.184) | 6.444** (2.905) | 6.761** (2.926) | 6.748** (2.933) | 6.742** (2.936) |
| ln Students from acquiror country in target country | 3.313 (2.303) | 5.123* (2.669) | 5.532** (2.721) | 5.526** (2.723) | 5.520** (2.726) |
| ln Immigrants in acquiror country from target country (5year lag) | | -1.410 (3.830) | -1.654 (3.780) | -1.660 (3.784) | -1.644 (3.805) |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.406 (4.008) | 0.079 (3.941) | 0.102 (3.947) | 0.098 (3.965) |
| Governance in acquiror country | | | 40.934*** (12.737) | 40.654*** (12.902) | 40.975*** (12.955) |
| Governance in target country | | | 7.172 (10.149) | 6.571 (10.408) | 6.555 (10.540) |
| GDP per capita growth in acquiror country | | | | 0.202 (0.361) | 0.195 (0.362) |
| GDP per capita growth in target country | | | | 0.304 (0.357) | 0.301 (0.357) |
| Real exchange rate (acquiror country) | | | | | 0.004 (0.003) |
| Real exchange rate (target country) | | | | | -0.000 (0.004) |
| Time FE | Yes | Yes | Yes | Yes | Yes |
| Acquiror coutry FE | Yes | Yes | Yes | Yes | Yes |
| Target coutry FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 2253 | 2030 | 1965 | 1965 | 1965 |
| Adjusted $R^2$ | 0.476 | 0.494 | 0.494 | 0.493 | 0.493 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

*** significant at 1%, ** significant at 5%, * significant at 10%.

Table B.3: Value of M&A deals (OLS results)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| ln Students from target country in acquiror country | 0.389*** (0.086) | 0.451*** (0.107) | 0.461*** (0.106) | 0.456*** (0.106) | 0.455*** (0.106) |
| ln Students from acquiror country in target country | 0.086 (0.078) | 0.066 (0.087) | 0.104 (0.087) | 0.106 (0.087) | 0.104 (0.087) |
| ln Immigrants in acquiror country from target country (5year lag) | | 0.013 (0.082) | -0.014 (0.081) | -0.018 (0.081) | -0.015 (0.081) |
| ln Immigrants in target country from acquiror country (5year lag) | | 0.030 (0.082) | 0.020 (0.079) | 0.025 (0.079) | 0.025 (0.079) |
| Governance in acquiror country | | | 3.017*** (0.739) | 3.060*** (0.749) | 3.118*** (0.736) |
| Governance in target country | | | 0.888 (0.616) | 0.776 (0.612) | 0.761 (0.619) |
| GDP per capita growth in acquiror country | | | | -0.006 (0.035) | -0.008 (0.035) |
| GDP per capita growth in target country | | | | 0.046 (0.029) | 0.045 (0.029) |
| Real exchange rate (acquiror country) | | | | | 0.001*** (0.000) |
| Real exchange rate (target country) | | | | | -0.000 (0.000) |
| Time FE | Yes | Yes | Yes | Yes | Yes |
| Acquiror coutry FE | Yes | Yes | Yes | Yes | Yes |
| Target coutry FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 1945 | 1802 | 1739 | 1739 | 1739 |
| Adjusted $R^2$ | 0.491 | 0.491 | 0.496 | 0.496 | 0.497 |

*Notes*: Robust standard errors clustered by acquiror-target countries in parentheses.

*** significant at 1%, ** significant at 5%, * significant at 10%.