The impact of migration on the cross-border M&A: Some evidence for Japan

Ivan Etzo [1] and Sumiko Takaoka [2]

[1] Department of Economics and Business, University of Cagliari, Cagliari
Email: ietzo@unica.it
[2] Faculty of Economics, Seikei University, Tokyo
Email: takaoka@econ.seikei.ac.jp

Abstract

Facing the rapid aging and shrinking market at home, Japanese firms are expanding the outbound M&A activity at a record pace. This paper examines the determinants of Japanese outbound M&A activity and the link between the migrants, which refer to both immigrants and Japanese citizens residing abroad, and Japanese outbound cross-border M&A activity in order to test whether immigrants alleviate the informational problems and stimulate the cross-border M&A activity with their host countries. Our results suggest that both immigrants and Japanese citizens residing abroad increase the probability of acquiring the asset in a potential target country. Moreover, both stocks have also positive effects on the number of outbound M&A deals and the value of outbound M&A deals.

JEL classification numbers: F21, F22, G34

Keywords: Cross-border M&A, Japan, Migration

1. Introduction

Home bias is the puzzling phenomenon of the international capital markets. Since the seminal work of French and Poterba (1991), documenting the home bias in equities, this phenomenon has been observed across different types of assets (see Coeurdacier and Rey (2013) for a survey). Coeurdacier and Rey (2013) summarize three classes of explanations: (i) hedging motives in frictionless financial markets, (ii) asset trade costs in international financial markets, and (iii) informational frictions and behavioral biases. Among these three classes of explanations, this paper focuses on the informational frictions in the flow of capital, and explores a positive association between the migration and the cross-border mergers and acquisitions (M&A) activity to test whether the migration mitigate the informational friction.

Many studies show that not only the formal trade barriers such as transportation costs and tariffs but also the informational barriers such as potential market opportunities are important. The role of ethnic networks or migrant networks in overcoming the contractual and informational barriers are shown in the literature (see among the others, Gould (1994), Head and Ries (1998), Rauch and Trindade (2002), Combes et al. (2005), Peri and Requena-Silvente (2010), Javorcik et al. (2011), Bansak et al. (2015), and Felbermayr et al. (2015)). Javorcik et al. (2011) find that US FDI is positively correlated with the presence of migrants from the host country using a quasi-panel dataset that includes the stock of migrants in the U.S. in 1990 and 2000, and data for 56 host countries. Their results confirm empirically the anecdotal evidence for the importance of migrant networks for FDI. Kugler et al. (2013) investigate the impact of migration on financial flows and show the role of migration in reducing information frictions between home and host countries. As recent studies showed, the role of migration is found to be important not only in the case of manufactured goods but also of financial flows.

This paper examines the link between the migrants, which refer to both immigrants and natives living abroad, and outbound cross-border M&A activity to test whether the migrants alleviate the informational problems and boost the cross-border M&A activity with their host countries. Facing the rapid aging and shrinking market at home, Japanese firms accelerate their buying of overseas assets. The informational problem in the cross-border M&A activity is critical, because M&A is, in a sense, a mutual matching between the acquiring company and the overseas target company which in addition requires the

acquisition of knowledge of different market structures, different financial and institutional regulations which overall give rise to larger information asymmetries than domestic M&As. The number of both immigrants in Japan and Japanese residing abroad have been increasing significantly during the last decades, although the immigrants population shares in Japan is small among developed countries. At the same time Japanese firms have been expanding business overseas, which accompanied their Japanese workers engaging in the acquired business. To examine this mutual matching, we collect the data on inbound and outbound M&A deals. The coverage of acquirer's nation in the inbound M&A deals is limited, hence we focus on the outbound M&A deals to cover the larger number of nations in the dataset. We use the data on the value of outbound M&A deal and the number of outbound M&A deals to measure the outbound M&A activity. The estimation results reveal that both immigrants and Japanese nationals living in the target country have the positive effects on the value of outbound M&A deal and the number of outbound M&A deals. One of the contributions of this paper is to show that emigrant information spillover effect is also important as well as the immigrant network.

The hypothesis proposed in this paper highlights the informational problem, focusing on the information spillovers effects on the sector in which the outbound M&A activity deal has taken place. The information effect is found to be important both in the manufacturing and non-manufacturing sectors. Then, the M&A deals are grouped by the R&D intensity in order to test whether the information effect is different between the high R&D sectors and low R&D sectors. It can be assumed that the information is more valuable for the high R&D sectors which are characterized by firm-specific assets. We find that both immigrants and emigrants exert strong effects on the number of outbound M&A deals for both sectors.

As Javorcik et al. (2011) point out, the problem that the existing literature has largely ignored so far is the endogeneity that arises since M&A flows and immigrants can influence each other. The derived reverse causality bias can be both positive and negative. Outbound M&A flows have opposite effects on the migration decision. That is, on the one hand, entry of multinationals can increase employment, provide better job opportunities and higher wage, which lower the incentive to migrate. On the other hand, the presence of multinational firms might facilitate both the acquisition of information regarding job opportunities in the destination country and the acquisition of skills evaluated more in the

destination country (e.g., language) which in turn lowers the migration costs and increase the returns to migration. The net bias depends also on the skill level of immigrants, the low skilled immigrants (or potential immigrants) have less incentive to invest in the acquisition of skills evaluated mostly in the destination country (e.g. education and language), thus the bias for them is likely to be negative. Assuming that most of the immigrants in Japan are low skilled we argue that the prevailing bias is negative. The comparison between the OLS and the 2SLS estimates shows that, in fact, after correcting for the endogeneity of migration, results explicitly present both higher magnitude of effects and higher statistical significance. We are also concerned about the possible reverse causality existing between the stock of Japanese citizens residing abroad and the outbound M&A activity, therefore, we explicitly take account of the endogeneity problem for both migration variables. Estimation results not only provide evidence that both immigrants and Japanese citizens residing abroad are important determinants of Japanese outbound M&A activity after controlling for the endogeneity problem, but they also suggest that the bias is negative for the stock of immigrants.

We explore the migration impact conditioning on the possible determinants of cross-border M&A suggested by the relevant literature (see Bodvarsson et al (2015) for a survey); growth of GDP per capita, inflation rate, country risk and exchange rate. Prior studies on a link between exchange rate and cross-border M&A generated mixed results. On the one hand, the depreciation of the home currency increases the cost to acquire overseas assets. On the other hand, repatriating the revenues from acquired assets, the present discounted profits of the acquired assets will increase. The asset acquisition hypothesis in Blonigen (1997) that the asset is transferable assuming the market segmentation or imperfect markets for goods, suggests that home currency depreciations theoretically can lead to increased acquisitions, particularly of firms that have firm-specific assets. Using data on Japanese acquisitions in the United States, Blonigen (1997) provides also some empirical evidence and shows that US dollar depreciations make Japanese acquisitions more likely in high R&D manufacturing sectors. Our results support this hypothesis that the depreciation of Japanese yen decreases the number of outbound M&A deals in the high R&D sectors, when we explore the nexus between the Japanese residing in the target country and the number of M&A deals.

In some countries, Japanese outbound M&A deals are made every year, but in other countries, we do not observe the constant deal making. We test the Cragg's specification for the outbound M&A deal value model and the hurdle model for the number of outbound M&A deals in terms of two decisions. One decision is whether to be a participant, that is, whether to invest in a potential target country or not. The second decision is how much money to invest or how many deals to make, in a target country, given that the value is positive. The test results suggest that we estimate separately two decisions. Hence, in addition to estimations for the value of M&A deals and the number of outbound M&A deals, we examine the decision choice model whether to make a deal in a potential target country. Our results suggest that the immigrant stock and the number of Japanese citizens residing abroad increase the probability of acquiring the asset in a potential target country. This result contributes to the debate on the importance of migration for the foreign direct investments. Existing literature on the cross-border M&A does not consider this participation stage, that is whether to undertake M&A deal or not in a potential target country. Furthermore, our results shed some light on this new aspect regarding the migration effects on cross-border M&A deals.

The plan of this paper is as follows. Section 2 provides some backgrounds on Japanese cross-border M&A activity and migration. Section 3 describes our data, and details the model to be estimated and empirical methodology. The empirical results are contained in Section 4. The final section provides some concluding remarks.

2. Backgrounds: Japanese cross-border M&A activity and migration

2.1 Trends in Japanese cross-border M&A activity

A confluence of business circumstance on Japanese firms including the rapid aging society, global reorganization in the industry and shrinking market at home, makes Japanese firms buying overseas assets at a record-breaking pace. One of unique characteristics of Japanese M&A activity is the big gap between the inbound and the outbound M&A activity with respect of the number of M&A deals and the value of M&A deals as shown in Figure 1 and Figure 2. From Figure 1, which shows the number of inbound and outbound M&A deals, it emerges that the gap is very large. The coverage of acquirer's nation in the inbound M&A deals is limited. For this reason, we focus on

Japanese outbound M&A deals for the complete panel of nations where M&A deals are made.

[Figure 1 around here]

[Figure 2 around here]

Existing literature explains why a firm invests in foreign assets, indicating among the main determinants the exchange rate movements (Blonigen (1997) and Georgopoulos (2008)), the synergies generated by managerial advantages, the superior marketing ability, and technological advantages (see Caves (1971), Graham and Krugman (1995)). Blonigen (1997) suggests that real dollar depreciations make Japanese acquisitions more likely in U.S. industries, and Georgopoulos (2008) uses bilateral Canadian-U.S. industry level count data on cross-border M&A to show that a real dollar depreciation of the home currency led to an increase in the probability of foreign M&A only in high R&D sectors. Prior studies on the link between the exchange rate and FDI provide evidence for the existence of a correlation between them. In particular, the model assuming the informational imperfections in Froot and Stein (1991) reveal that a depreciation of the home currency increases the relative wealth of foreign firms, enabling them to outbid domestic firms in acquiring corporate assets. However, the trend shown in Figure 1 and Figure 2 illustrates that the Japanese outbound M&A activity is expanding regardless of the exchange rate movements (yen/dollar). Although the slide in Japanese yen makes overseas acquisitions more expensive, we observe the increasing trend in the outbound M&A activity reaching a new record high, with total value worth JPY 10.5 trillion (US$87.6 billion) in 2015 when Americas targets were mostly acquired by Japanese firms (US$38 billion).

These stylized facts suggest that the Japanese outbound M&A activity might be influenced not only by the exchange rate but also by other factors including the demographic effects such as the migration. It should be noted that we analyze the impact of the exchange rate between Japanese yen and the local currency in the target country. We will carefully investigate the determinants of Japanese outbound M&A activity in the following section.

2.2 Background on migrants in Japan

As reported by official statistics (Ministry of Justice, Japan), the number of registered foreign nationals residing in Japan has approximately doubled in the past 20 years, reaching 2.69 million as of the end of 2015. The main sending country is China (32.9%) including Taiwan, followed by Korea (19.3%), the Philippines (9.4%), Brazil (6.5%), Vietnam (5.6%) and the United States (3.2%). In 2015, the immigrants regularly registered represented the 2.1% of total Japanese population. This percentage is still far below the ones reported for the same year in other developed countries like the United States (14.3%), Canada (27.7%), Germany (11.9%), United Kingdom (12.4%), France (11.6%), Spain (13.8%) and Italy (9.4%). That is probably why Japan is generally considered to be ethnically homogeneous than almost any other developed country. However, many researchers argue that the modern Japan is already a multiethnic country, for example Lie (2001). Moreover, the Japanese government has identified in mass immigration the main solution to both stop the demographic decrease and the aging of the population.

Japanese firms which face the problem of operating in a mature market have been expanding business overseas. Accordingly, Japanese workers engaging in their overseas business reside abroad. The number of registered Japanese nationals residing outside Japan has also roughly doubled in the past 20 years, reaching 1.3 million as of the beginning of October 2014. The main destination country is the United States (32.1%), followed by China (10.4%), Australia (6.6%), the United Kingdom (5.2%), Thailand (5.0%) and Canada (4.9%). The top sending countries and destination countries are not symmetric, but the number of both registered foreign born people residing in Japan and registered Japanese natives residing outside Japan is increasing. In this paper, we consider as immigrants the number of (working age) foreign born people residing in Japan, and registered Japanese natives residing outside Japan as Japanese emigrants. Figure 3 plots the number of immigrants in Japan and the number of Japanese emigrants. The shaded vertical bars represent recession periods as defined by the Cabinet Office, the government of Japan.

[Figure 3 around here]

Figure 3 illustrates that the number of immigrants in Japan decreased after the global financial crisis stemming from 2007 U.S. subprime mortgage crisis, then they grew again substantially during the last few years. In contrast, the number of Japanese emigrants has been increasing regardless of the business cycle in Japan. These trends suggest that there

is a clear correlation between migration and Japanese outbound M&A activity. The purpose of the next section is to investigate whether there is also a causal relationship.

3. Model and hypotheses

3.1 Data

We use a panel dataset to empirically investigate whether or not and to what extent the migration affects Japanese outbound M&A deals. The data used to construct this panel dataset are based on several sources. Data on Japanese outbound M&A deals by individual firms that includes the deal value (millions US dollars), the announcement date of the deal, the details of both the acquiring company and the target company, such as nationality and sector, are taken from the Thomson Reuters' Thomson One database. The sample period for M&A deals runs from January 1, 2000 to December 31, 2014. We exclude the M&A deal with missing value from our dataset. We aggregate the amount of all individual M&A deal values in order to obtain the country level panel dataset.

The figures on immigrant stock and the stock of Japanese citizens residing abroad come from the official statistics published annually by the Ministry of Justice, Japan, which include the sending country and destination country information. The data on immigrants also contain information about the immigrant's age, which allowed us to calculate the number of immigrants of working age. We matched data on immigrant stock (working age) and the stock of Japanese citizens residing abroad with the M&A deal country level panel dataset.

The information on characteristics for each country in the dataset includes the growth rate of the real GDP per capita (constant local currency) of the target country, inflation rate as measured by the annual growth rate of the GDP implicit deflator, country risk as measured by the index up to 10 (lowest risk), distance between the main city (capital) in the target country and Japan, and official exchange rate. Figures on the growth rate of the real GDP per capita (constant local currency), inflation rate as measured by the annual growth rate of the GDP implicit deflator and annualized official exchange rate are from *World Development Indicators* of the World Bank (2016, retrieved March, 2016). We

calculated the (yen/ target country currency) exchange rate[1] using the official exchange rate (local currency units relative to the US dollar) and the official exchange rate (US dollar to Japanese yen).

The data on the distance between the main city (capital) in the target country and Japan come from the GeoDist database http://www.cepii.fr/anglaisgraph/bdd/distances.htm which is available online. The detailed information about GeoDist database is documented in the Notes on CEPII's distances measures by Mayer and Zignago (2011)

The country risk variable is an index taking the value from 2 (highest risk) to 10 (lowest risk) based on the Country Risk Survey conducted by Rating and Investment Information, Inc. (R&I). The information is available in the semiannual report R&I Country Risk Survey and based on a questionnaire referring to expected risks in terms of politics, society, economy and international relations. The respondent is mainly from banks, trading companies, manufacturing companies, and research firms/academics based in Japan. We collect the country risk index for each country and matched with our country level panel dataset.

In order to investigate whether the effect of migrants is equal across sectors, we use the target company's sector information in the individual M&A deal to aggregate outbound M&A deal value and the number of outbound M&A deals by sector. Sectors are classified into manufacturing/non-manufacturing sectors based on the Japan Standard Industrial Classification and high R&D/low R&D sectors based on the R&D intensity published in Report on the Survey of Research and Development by Ministry of Internal Affairs and Communications. The sector with R&D intensity above average is assigned to the subsample of high R&D sectors.

Table 1 shows the between and within descriptive statistics for variables used in the estimation. The variable M&A dummy is a 0-1 dummy variable taking the value unity if the outbound M&A deal is made in a country and zero otherwise. The sample period runs from the year 2000 to 2013. The end point was determined by the availability of data used in the estimation.

[1] Blonigen (1997) noted that specifications using real exchange rate and nominal exchange rate yielded almost identical results.

3.2 Empirical methodology

In the full dataset of 826 observations on aggregated amounts of M&A deal value for each country, about half the observations are reported as being zero (see Table 1). However, it is not possible to distinguish whether these observations refer to countries with zero value or countries for which data on M&A deal is actually missing. In addition to this problem, there is a large gap between the M&A deal value that are reported to be zero and those that are reported to be non-zero.

To deal with these problems and to investigate the robustness of the estimated results, Cragg's (1971) model for censored data is adopted. This model assumes that the impact of an explanatory variable on the acquiring firm's decision of making a deal or not is different from its impact on the decision of how much to spend on the M&A deal, once the firm has decided to make a deal.

The model considers two equations: a decision equation and a regression equation for the nonlimit observations. The decision equation is assumed to be

$$\begin{aligned} \text{Prob}[\text{M\&A}_{it}^{*} > 0] &= \Phi(\gamma' \mathbf{x}_{it}), \\ \text{Prob}[\text{M\&A}_{it}^{*} \le 0] &= 1 - \Phi(\gamma' \mathbf{x}_{it}), \end{aligned} \tag{1}$$

where γ is a vector of unknown coefficients, $\mathbf{x}_{it}$ is a set of factors that influence the decision, $\text{M\&A}_{it}^{*}$ is an unobserved variable, and Φ is the cumulative density function for the normal distribution. When $\text{M\&A}_{it}^{*} > 0$ the firm makes a deal, and when $\text{M\&A}_{it}^{*} \le 0$ the firm does not make a deal.

When $\text{M\&A}_{it}^{*} > 0$, the expected value for $\text{M\&A}_{i}$ for the nonlimit observations is

$$\text{E}[\text{M\&A}_{it} \mid \text{M\&A}_{it}^{*} > 0] = \beta' \mathbf{x}_{it} + \sigma \lambda_{it}, \tag{2}$$

where β is a vector of unknown coefficients, and λ_{it} is the inverse Mills ratio. The model is a combination of a univariate probit model (1) and the truncated regression model (2). A likelihood ratio test can be used to test if $\gamma = \beta / \sigma$, namely, whether the restrictions of the Tobit model (the parameters in (1) and (2) are same) are appropriate by estimating the truncated regression model, the Tobit model, and the probit model separately. The

computed likelihood ratio statistic[2] in our model (p-val=0.00) strongly suggests that we estimate the decision model (1) and M&A deal value model (2) separately. We also examined the sample selection problem in our models. The result was that the coefficients of the sample selection terms are not significantly different from zero (p-val=0.48). Hence, equations (1) and (2) will be estimated separately.

The number of Japanese outbound M&A deals is a non-negative integer variable. Again, there is a specification problem that the zero or nonzero value of the outcome is the result of a separate decision whether or not to invest in a country. A hurdle model is the specification test corresponding to Cragg's (1971) model in continuous data (see Greene (2011) for the explanation),

$$\begin{aligned} &\text{Prob}[\text{M\&A}_{it} = 0 \mid \mathbf{x}_i] = e^{-\theta}, \\ &\text{Prob}[\text{M\&A}_{it} = j \mid \mathbf{x}_{it}] = (1-e^{-\theta})\frac{\exp(-\lambda_{it})\lambda_{it}^{j}}{j![1-\exp(-\lambda_{it})]}, \ j = 1,2,.... \end{aligned} \tag{3}$$

where $\text{M\&A}_{it}$ is the number of Japanese outbound M&A deals. The test result returns a p-val=0.00, which is strongly in favor of estimating two equations for the decision model and the nonzero value of the outcome (the number of Japanese outbound M&A deals) separately compared to the pooled Poisson model.

The Poisson model is commonly used to explain non-negative integer dependent variable, but the Poisson assumption that the mean equals the variance has been criticized. The negative binomial model has served as the most common extension of the Poisson model to allow for overdispersion. Hence, we will estimate the model to explain the number of Japanese outbound M&A deals by the negative binomial model assuming the distribution of $\text{M\&A}_{it}$ is left truncated at zero and GMM in the Wooldridge form (see Greene (2012) for the estimation details).

---

[2] The likelihood ratio statistic can be computed as $\lambda = 2[\log L_{TR} + \log L_P - \log L_T]$, where L_{TR}, L_P and L_T are the maximized values of the log-likelihood function for the truncated regression model, the probit model and the Tobit model, respectively. The degrees of freedom of this test are given by the dimension of β. (see Greene (2011) for the detailed explanation)

4. Estimation results

The first model in this analysis is the decision equation whether to make a deal or not in a potential target firm's country. The variables that are assumed to influence the decision are the following: LN IMMIGRANTS (2-YEAR LAG) is the log of the two year lag of the total stock of immigrants from each target country present in Japan; LN JAPANESE (2-YEAR LAG) is the log of the two year lag of the total stock of Japanese citizens residing abroad in each target country; GROWTH OF GDP PER CAPITA is the growth rate of GDP per capita, used as a proxy for the productivity in the potential target country; INFLATION is the inflation rate, which serves to capture the macroeconomic stability in the target country; COUNTRY RISK is the country risk index, a measure of the risk that the Japanese firm faces in the target country with respect to politics, society, economy and international relations; and EXCHANGE RATE is the exchange rate to control Japanese buying power of assets in the target country.

Table 2 reports estimates of the marginal effects and their *t*-statistics for the variables that are assumed to influence the decision whether to make a deal or not in a potential target firm's country. The estimation results by Logit model and Probit model are qualitatively similar. Vuong's (1989) statistic for testing the null hypothesis[3] that the two models are equally close to the true data generating process is reported in the Table 2, and the null hypothesis is not rejected. The variable of interest, that is LN IMMIGRANTS and LN JAPANESE are positively correlated, thus each model uses a different migration variable in the estimation. The migration variables are statistically significant in both models (logit and probit). An increase in the stock of immigrants in Japan from a potential target country raises the probability of that country to be invested in by Japanese firms. The information from Japanese residing in the target country is found to be important as well as from the immigrants when the firm makes a decision whether to invest or not in a potential target country. The positive relationship between the stock of Japanese citizens residing abroad and cross-border M&A decision is consistent with the intuitive prediction, but the existing literature does not shed light on this effect as much as that of immigrants.

As a measure of Japanese outbound M&A activity, we employ two variables: the aggregate amounts of individual M&A deal value and the number of M&A deals in a

[3] The alternative is that one model is closer, here large positive values (larger than 1.96) favor the probit model while large negative values (less than -1.96) favor the logit model.

target country. We begin our analysis for outbound M&A deal value with an OLS model and present the results for five different sample groups: whole sample, manufacturing sectors, non-manufacturing sectors, high R&D sector and low R&D sector.

The reason why we consider different sample groups is that the information asymmetries existing between countries might differ within the same target country across sectors where the target companies operate. Moreover, the information spillover between each acquiring firm and its employed foreign workers might play an important role in reducing the informational problem. If foreign born workers are not distributed homogeneously among sectors in Japan, as it happens in the other developed countries, then immigrants might affect the M&A activity differently depending on the specific sector. Moreover, differences in the skill level composition between the communities of immigrants living in Japan and Japanese citizens living in the target nation might affect the impact of immigrants on M&A activity as well. If, for example, the Japanese living abroad are more skilled than immigrants living in Japan, it is possible that the effect of the former on M&A will be higher in the high skilled intensive sectors. Thus, both the distribution of foreign workers among sectors in Japan and their skill level might affect the impact of immigrants on M&A value. Unfortunately, data regarding the skill level of immigrants in Japan are not available, let alone data regarding the skill level of foreign born workers by sector. We thus employ two different subsamples: the first differentiates between M&A deal value in the manufacturing sectors and in the non-manufacturing sectors (columns 3-6), while the second considers high R&D sectors and low R&D sectors (columns 7-10).

The results obtained from the OLS estimation are shown in Table 3-a. The outcomes when considering the overall M&A deal value (columns 1 and 2) show that both the stock of immigrants living in Japan and the stock of Japanese living in the target nations positively affect the M&A deal value in these countries. The overall positive impact of migration is confirmed when only the deals in the manufacturing sectors are considered (columns 3 and 4). However, immigrants seem not to affect the M&A deal value when the target company is not a manufacturing firm (column 5), while the effect of Japanese communities living in the target nations is positive and statistically significant (column 6). According to the OLS estimates, both the stock of immigrants and the Japanese abroad do not affect the M&A deal value in the high R&D sectors (columns 7

and 8), while only the stock of Japanese in the target nations seems to affect the M&A deals in the low R&D sectors (columns 9 and 10).

Overall these results provide evidence of a positive impact of migration on the M&A value, but as we explained before they might be biased due to the reverse causality running from M&A deals to immigrants. However, the bias could be either negative or positive. On the one hand, potential immigrants in the target nations might have less incentive to migrate to Japan because the M&A deals rise job opportunities in the origin countries, and immigrants living in Japan might decide to return to their origin country and work in the acquired companies. The resulting bias in this case would be negative. On the other hand, more M&A deals might stimulate the return migration also for the Japanese living abroad, but more Japanese could be sent to work abroad in the acquired company. Which one of the two opposite effects will prevail might vary depending on several factors (e.g., the destination country, the type of immigrant and their skill level). Thus, for the stock of Japanese living abroad the sign of the bias appears to be less predictable.

In order to correct for the endogeneity bias we apply the 2SLS method. Following Ortega and Peri (2009; 2014), we construct the instrument for the stock of immigrants residing in Japan by predicting the yearly flows of immigrants determined only by exogenous factors, namely by the non-economic time variant determinants, by the (pulling effect of) pre-existing national communities and by other fixed bilateral migration costs[4]. Likewise, the instrument for the stock of Japanese living abroad has been constructed by estimating the exogenous determinants for the outflows of Japanese which is not explained by economic factors[5].

---

[4] The exogenous immigration flows have been predicted by estimating the following model:

$$\ln\_m_{i,t} = \ln\_imm_{i,1980} + \ln\_pop_{i,t} + \ln\_dist_i + D_i + D_t + \varepsilon_{i,t}$$

where, the dependent variable is (the log of) the number of immigrants from the *i-th* origin country, $ln\_imm_{i,1980}$ is the number of citizens from the *i-th* origin country residing in Japan in 1980, $ln\_pop_{i,t}$ measures the population size of the *i-th* origin country in year *t*, ln_dist_i is the distance between the *i-th* origin country and Japan, D_i and D_t indicate the country and year dummies, respectively.

[5] The exogenous emigration flows have been predicted by estimating the following model:

$$\ln\_m_{i,t} = \ln\_jap_{i,1980} + \ln\_pop_{i,t} + \ln\_dist_i + D_i + D_t + \varepsilon_{i,t}$$

where, the dependent variable is (the log of) the number of emigrants from Japan to the i-*th* destination country, $ln\_jap_{i,1980}$ is the number of Japanese citizens residing in the *i-th* destination country in 1980, ln_dist_i is the distance between Japan and the *i-th* destination country, D_i and D_t indicate the country and year dummies, respectively.

The results from the first stage in Table 3-b show that the estimated coefficients for the instruments are always positive with a high statistical significance. Moreover, the F-test is always highly significant and the F-statistics of excluded instrument are well above the threshold of ten suggested by Staiger and Stock (1997). The results from the second stage report some noticeable differences with respect to the previous OLS results. First, the impact of migration on the total amount of M&A deals is confirmed to be positive for both immigrants and Japanese living abroad, however the estimated coefficients (columns 1 and 2) are bigger than the OLS coefficients. Second, the previous results are confirmed also for the manufacturing sectors, but the estimated impacts (columns 3 and 4) are bigger and more statistically significant than the OLS counterparts. Third, the impact of immigrants estimated by 2SLS is positive and statistically significant also for the non-manufacturing sectors, and the impact of the Japanese residing abroad is bigger than the one estimated by OLS. Fourth, also with regards to the low R&D sectors the 2SLS estimates now show that the stock of immigrants exerts a positive effect on the M&A deal value, and that the effect for the Japanese living abroad is higher than the one estimated with the simple OLS estimator. Finally, the results from the 2SLS estimator confirm that migration does not affect the M&A deal value in the high R&D sectors. Thus, after correcting for the endogeneity bias the impact of migration on the M&A deal value on the whole appears to be higher than the one estimated by simple OLS and the bias seems to be particularly strong and of negative sign for the impact of immigrants living in Japan.

Then, we employ another measure for Japanese outbound M&A activity, namely the number of outbound M&A deals in a target country. The results in Table 4 show the overall effect of factors which may affect the number of outbound M&A activity. The variables of interest are the two migration variables, and their coefficients in columns 1-4 are statistically significant and positive. The results for the other explanatory variables vary across the estimation methods partly due to instruments in GMM estimation, where we use instruments for migration variables and the one year lag of other explanatory variables as instruments. However, the coefficients of interest are robust across estimation methods, and show the positive effect of migrants on the number of Japanese outbound M&A deals. This result also implies that the larger presence of immigrants from the target country and Japanese communities in the target country alleviate the informational problems and stimulate Japanese outbound M&A activity.

Table 5 contains the estimated coefficients for the subset of manufacturing sectors and non-manufacturing sectors. Greene (2012) states that the experience has been that the fixed effects model produces considerable instability in the negative binomial, so the fixed effects model is not used in the sectoral analysis with the smaller sample size. Instead, we include a set of country dummies. The estimated coefficients for the migration variables tell essentially the same story. Both the presence of immigrants from the target country and Japanese communities in the target country are important determinants for Japanese outbound M&A activity. In addition, the country risk has significant effects on Japanese outbound M&A activity. Firms are investing more in the countries with lower country risk, which is consistent with the intuitive prediction that the higher country risk can reduce the expected return on the assets invested in that country. The results so far imply that the significance of the estimated coefficient for the number of Japanese outbound M&A deals is similar across manufacturing sectors and non-manufacturing sectors once firms decide to make a deal in a target country.

Estimation results for the subset of low R&D sectors and high R&D sectors are presented in Table 6. The coefficients of interest, immigrant stock and Japanese stock, are significantly positive both in low R&D sectors and high R&D sectors. In contrast to the Table 5, the impact of Growth of GDP per capita is different between the two groups. Firms buy more assets in the high R&D sectors of the country with higher growth of GDP per capita. It can be interpreted that the information on innovative technology in high R&D sectors will be more important in those countries where the high growth of GDP per capita tends to reflect an increase in productivity, and that the technology over a worker's output is substantial. The negative coefficients for exchange rate in high R&D sectors confirm the Blonigen's (1997) hypothesis that the asset is transferable assuming the market segmentation or imperfect markets for goods, which suggests that home currency depreciations theoretically can lead to increased acquisitions, particularly of firms that have firm-specific assets (empirically, high R&D manufacturing sectors). The impact of factors for low R&D sectors and high R&D sectors is different, but both the immigrant stock and Japanese stock are important determinants for both high R&D sectors and low R&D sectors.

In sum, we confirm the positive relationship between migration, which refers to the immigrants in Japan and Japanese citizens residing in the target country, and Japanese

outbound M&A activity. Because the M&A deal value and the number of M&A deals have different features, results for R&D intensity groups are different depending on the measure of M&A activity. However, overall results suggest the positive link between the migration and outbound M&A activity.

5. Conclusion

This study investigates empirically the role of immigrants in Japan and Japanese communities abroad in Japanese outbound M&A activity. Facing the rapid aging and shrinking market at home, Japanese firms are buying overseas assets at a record pace regardless of the exchange rate movements. One of obstacles in the cross-border M&A activity is the informational problem. Although immigrant population share in Japan is still small compared to other developed countries, it has been growing during the recent decades and our estimates provide evidence in favor of the hypothesis that both networks of immigrants and Japanese citizens living abroad alleviate the informational problems and stimulate Japanese outbound M&A activity, even if the different channels through which these networks operate cannot be easily disentangled due to lack of data. Our results suggest that the migrant networks facilitate Japanese outbound M&A activity, in a sense, a matching between the acquiring company and the overseas target company.

Sectoral analysis also supports this hypothesis, but one might think the detailed information on immigrant workers such as education might be important. Since the information regarding the educational attainment of both immigrants in Japan and Japanese residing abroad is not available, it remains for future research, that is when more disaggregated data will be available, to further analyze how differences in migrants' characteristics, such as the skill level, affect the nexus between the migration and the cross-border M&A activity.

We also find the significant role of immigrants and Japanese citizens residing abroad in firm's decision making whether to make a deal in a potential target country or not. This decision stage is not fully examined in the existing literature. Our results further imply that networks of immigrants and Japanese communities abroad could be more important and have more positive links with the firm's cross-border M&A deals through various stages of firms' activities and decisions.

ACKNOWLEDGMENTS

Both authors gratefully acknowledge the financial assistance provided by the Zengin Foundation for Studies on Economics and Finance for a project on “The Demographic effects on Cross-border M&As in Japan”.

REFERENCES

Bansak, C., Simpson N.B., and Zavodny, M. (2015). *The Economics of Immigration*. Routledge, UK.

Blonigen, B.A. (1997). Firm-Specific Assets and the Link between Exchange Rates and Foreign Direct Investment. *American Economic Review*, 87(3), 447-465.

Bodvarsson, Ö.B., Simpson N.B., and Sparber, C. (2015). Migration Theory, In: Chiswick, B.P. and P.W. Miller (Eds.) Handbook of the Economics of International Migration. Elsevier, pp. 3-51, Volume 1A, Chapter 1.

Caves, R.E. (1971). International Corporations: The Industrial Economics of Foreign Investment, *Economica*, 38 (149), 1-27.

Coeurdacier, N. and Rey, H. (2013). Home Bias in Open Economy Financial Macroeconomics. *Journal of Economic Literature* 51 (1), 63-115.

Combes, P.-P., Miren, L., and Mayer, T. (2005). The Trade-Creating Effects of Business and Social Networks: Evidence from France. *Journal of International Economics* 66 (1), 1–29.

Felbermayr, G.J., Grossmann, V., and Kohler, W. (2015). Migration, International Trade, and Capital Formation: Cause or Effect? In: Chiswick, B.P. and P.W. Miller (Eds.) Handbook of the Economics of International Migration. Elsevier, pp. 913-1025, Volume 1B, Chapter 18.

French, K.R. and Poterba J.M. (1991). Investor Diversification and International Equity Markets. *American Economic Review* 81 (2), 222–226.

Froot, K.A. and Stein, J.C. (1991). Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach. *Quarterly Journal of Economics* 106(4), pp. 1191–1217.

Georgopoulos, G.J. (2008) Cross-border Mergers and Acquisitions: Does the Exchange Rate Matter? Some Evidence for Canada. *Canadian Journal of Economics* 41 (2), 450–474.

Gould, D.M. (1994). Immigrant Links to the Home Country: Empirical Implications for U.S. Bilateral Trade Flows. *Review of Economics and Statistics* 76 (2), 302–316.

Graham, E.M. and Krugman, P.R. (1995). Foreign Direct Investment in the United States, 3rd Ed. Washington, DC: Institute for International Economics.

Greene, W.H. (2011). *Econometric Analysis*, 7th edition, Prentice Hall, Upper Saddle River, NJ.

Greene, W.H. (2012). *LIMDEP Version 10.0 - Econometric Modeling Guide,* 2012, Econometric Software, Plainview, NY.

Head, K. and Ries, J. (1998). Immigration and Trade Creation: Econometric Evidence from Canada. *Canadian Journal of Economics* 31 (1), 47–62.

Javorcik, B.S., Özden, C., Spatareanu, M., and Neagu, C. (2011). Migrant Networks and Foreign Direct Investment. *Journal of Development Economics* 94 (2), 231-241.

Kugler, M., Levintal, O., and Rapoport, H. (2013). Migration and Cross-Border Financial Flows. IZA Discussion Paper No. 7548.

Lie, J. (2001). Multiethnic Japan. Cambridge, MA: Harvard University Press.

Mayer, T., and Zignago, S. (2011). Notes on CEPII's Distances Measures: The GeoDist Database, CEPII Working Paper 2011- 25 ,December 2011, CEPII.

Ortega, F., and G. Peri (2009). "The Causes and Effects of International Migrations: Evidence from OECD Countries 1980-2005," NBER Working Papers 14833, National Bureau of Economic Research, Inc.

Ortega, F., and G. Peri (2014). Openness and Income: The Roles of Trade and Migration. Journal of International Economics, 92 (2), 231-251

Peri, G. and Requena-Silvente, F. (2010). The Trade Creation Effect of Immigrants: Evidence from the Remarkable Case of Spain. *Canadian Journal of Economics* 43 (4), 1433-1459.

Rauch, J. and Trindade, V. (2002). Ethnic Chinese Networks in International Trade. *Review of Economics and Statistics* 84 (1), 116–130.

R&I Country Risk Survey (Semiannual Publication) R&I Country Risk Survey. Tokyo: Rating and Investment Information, Inc., various issues.

Staiger, D. and J. Stock (1997). Instrumental Variables Regression with Weak Instruments. Econometrica, 65(3),557-586.

Vuong, Q. (1989). Likelihood Ratio Tests for Model Selection and Non-nested Hypotheses. *Econometrica*, 57, pp. 307–334.

Wooldridge, J.M. (1997). Multiplicative Panel Data Models Without the Strict Exogeneity Assumption. *Econometric Theory*, 13, pp 667-678.

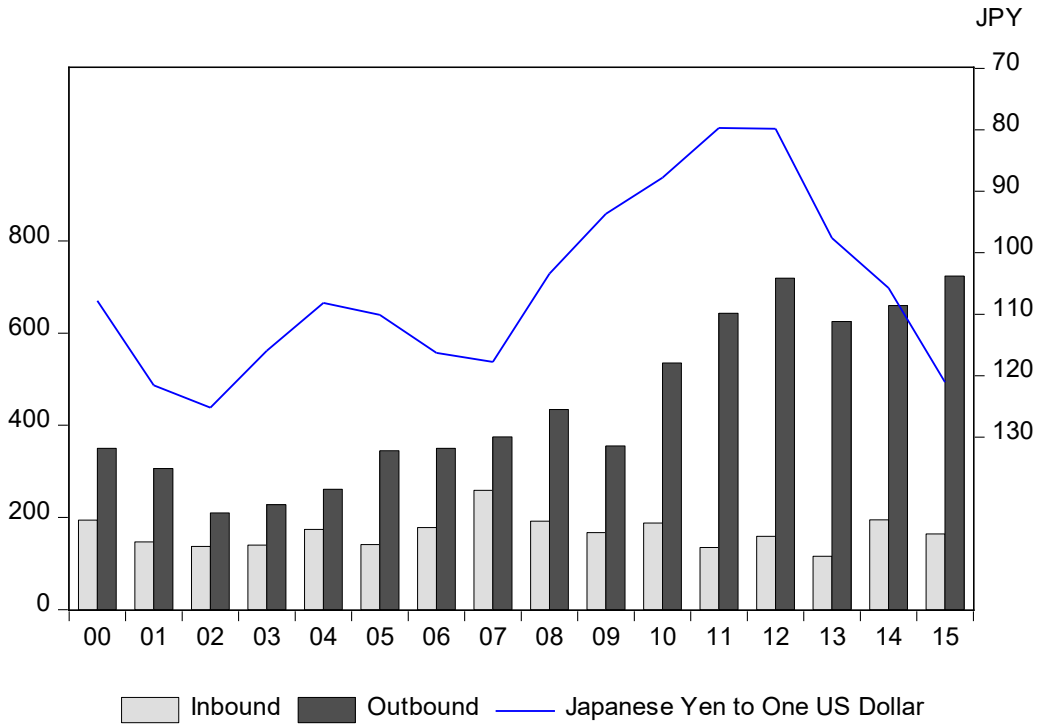

Figure 1. The Number of Cross-border M&A Deals and the Exchange Rate

Sources: Thomson Financial, Federal Reserve Bank of St. Louis

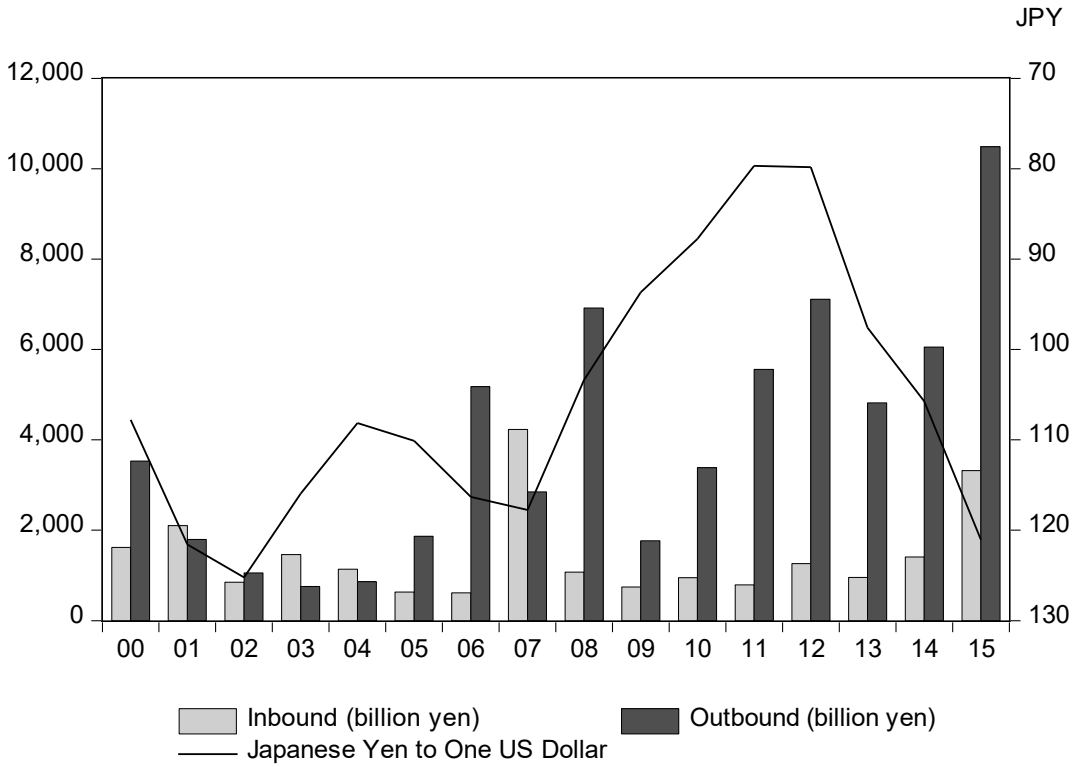

Figure 2. Cross-border M&A Deal Value and the Exchange Rate

Sources: Thomson Financial, Federal Reserve Bank of St. Louis

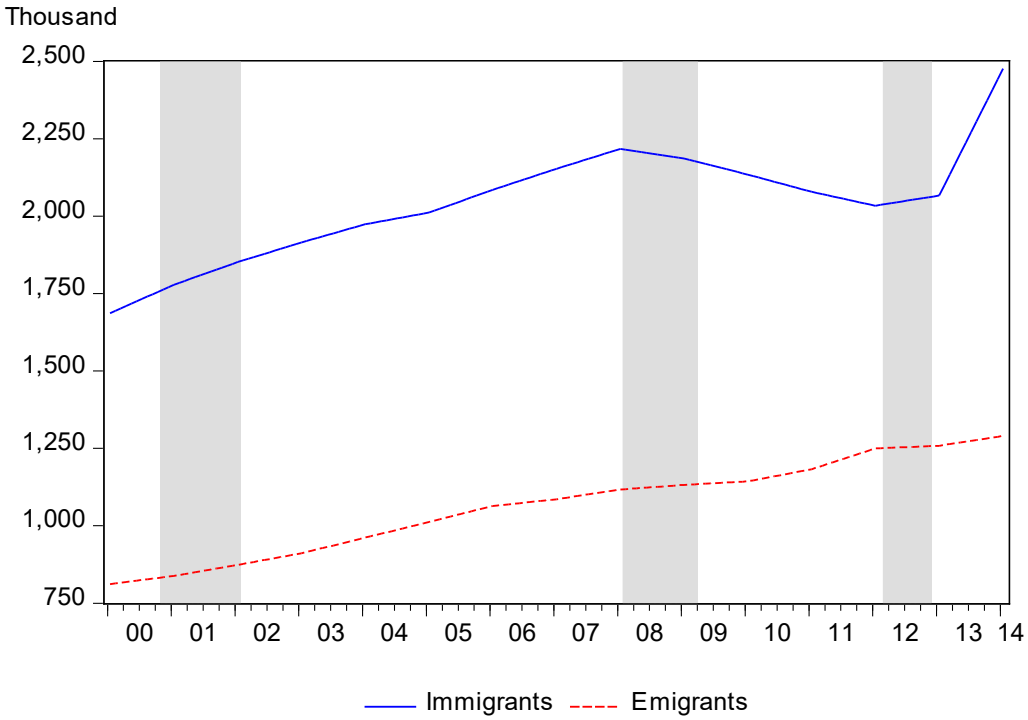

Figure 3. Trends in Migrants (Stock) and the Business Cycle in Japan

Notes: Sample period: 2000-2014. The figure plots the number of foreign nationals residing in Japan (Immigrants) and the Japanese citizens residing overseas (Emigrants). The shaded vertical bars represent recession periods as defined by the Cabinet Office, the government of Japan.

Sources: Ministry of Foreign Affairs in Japan, Ministry of Justice in Japan

Table 1. Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations		
M&A dummy	overall	0.5	0.5	0	1	N	=	826
	between		0.3	0.1	1	n	=	59
	within		0.4	-0.5	1.4	T	=	14
Value of M&A deals	overall	422276	2109714	0	43100000	N	=	826
	between		1302813	250	9785747	n	=	59
	within		1667429	-9106818	33800000	T	=	14
Number of outbound M&A deals	overall	4	11	0	113	N	=	826
	between		10	0.0714286	54	n	=	59
	within		5	-25.81598	65	T	=	14
Non-manufacturing M&A value	overall	281853	1606063	0	32300000	N	=	826
	between		973288	0	7362783	n	=	59
	within		1283384	-6974175	25200000	T	=	14
Manufacturing M&A value	overall	126645	752706	0	14000000	N	=	826
	between		355918	0	2413072	n	=	59
	within		664744	-2218947	13000000	T	=	14
Low R&D sector M&A value	overall	322248	1797367	0	38600000	N	=	826
	between		1072968	0	8106427	n	=	59
	within		1448244	-7675424	30800000	T	=	14
High R&D sector M&A value	overall	86250	623189	0	13700000	N	=	826
	between		263966	0	1669428	n	=	59
	within		565495	-1515698	12700000	T	=	14
Immigrants	overall	28067	93337	6	629469	N	=	826
	between		92606	14	509970	n	=	59
	within		16467	-186047	147566	T	=	14
Japanese	overall	15107	41584	20	303216	N	=	826
	between		41788	37	302771	n	=	59
	within		3242	-6470	37084	T	=	14
Growth of GDP per capita	overall	2.51	4.00	-15.15	33.03	N	=	766
	between		2.42	-3.95	11.04	n	=	59
	within		3.20	-13.13	27.47	T	=	13
Inflation Rate	overall	5.60	7.93	-25.13	103.82	N	=	823
	between		4.43	0.77	18.92	n	=	59
	within		6.60	-29.74	90.50	T	=	14
Country risk	overall	7.22	2.20	2.30	10.00	N	=	754
	between		2.17	3.56	9.95	n	=	55
	within		0.57	4.20	9.00	T	=	14
Exchange rate (Yen/Local currency)	overall	55.68	66.37	0.004	333.48	N	=	826
	between		64.61	0.006	278.30	n	=	59
	within		17.18	-10.42	152.15	T	=	14

Note: The number of various M&A values is divided by a thousand.

Table 2. Determinants of the M&A decision: bivariate choice

			Marginal Effects	
Variable	(1)	(3)	(2)	(4)
ln immigrants (2-year lag)	0.162***	0.171***		
	(4.83)	(5.30)		
ln Japanese (2-year lag)			0.197***	0.196***
			(4.42)	(4.87)
Growth of GDP per capita	-0.008	-0.008	-0.003	-0.004
	(-1.19)	(-1.21)	(-0.54)	(-0.59)
Inflation	0.001	0.001	0.001	0.001
	(0.35)	(0.28)	(0.40)	(0.30)
Country risk	-0.013	-0.014	-0.026	-0.030
	(-1.06)	(-0.61)	(-1.11)	(-1.31)
Exchange rate	0.001	0.001	0.0001	0.0002
	(1.02)	(1.31)	(0.09)	(0.20)
Estimation method	Logit	Probit	Logit	Probit
Log likelihood	-237.92	-237.267	-235.91	-234.92
McFadden Pseudo R^2	0.47	0.47	0.47	0.48
Vuong's (1989) statistic	0.93		1.48	
Number of Observations	646	646	646	646

Notes: The values of the *t*-statistics are in parentheses.
All equations include a constant, country dummies and year dummies. Marginal effects of these variables and their *t*-statistics are not reported.
*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Table 3-a. Amount of M&A and Migration OLS

	TOTAL		MANUFACTURING		NON-MANUFACTURING		HIGH R&D SECTORS		LOW R&D SECTORS	
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln Immigrants	1.760 ***		1.343 *		0.537		0.858		1.433	
(2-year lag)	(2.18)		(1.70)		(0.51)		(0.64)		(1.39)	
ln Japanese		2.664 ***		1.522 *		1.662 **		1.413		1.998 ***
(2-year lag)		(5.49)		1.74		(2.59)		(1.48)		(3.00)
Growth of GDP per capita	-0.053	-0.027	0.048	0.062	-0.036	-0.027	-0.032	-0.025	-0.016	0.004
	(-1.03)	(-0.57)	(0.48)	0.62	(-0.73)	(-0.69)	(-0.41)	(-0.33)	(-0.30)	(0.09)
Inflation	0.034	0.019	0.124 **	0.104	0.051	0.040	0.112 *	0.103	0.022	0.014
	(0.80)	(0.50)	(2.13)	1.66	(1.07)	(0.87)	(1.73)	(1.50)	(0.51)	(0.33)
Country risk	0.106	0.097	-0.023	-0.019	0.173	0.181	-0.423	-0.416	0.151	0.110
	(0.63)	(0.53)	(-0.09)	-0.08	(0.84)	(0.90)	(-1.26)	(-1.38)	(0.74)	(0.50)
Exchange rate	-0.016	-0.019 *	-0.021 *	-0.022 *	-0.025 *	-0.027 *	0.012	0.011	-0.014	-0.016
	(-1.64)	(-1.77)	(-1.96)	-1.79	(-1.94)	(-1.92)	(0.61)	(0.53)	(-1.15)	(-1.32)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	317	317	223	223	254	254	170	170	282	282

Notes: t-statistics computed using robust standard errors in parentheses.

*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Table 3-b. Amount of M&A and Migration_2SLS

	TOTAL		MANUFACTURING		NON-MANUFACTURING		HIGH R&D SECTORS		LOW R&D SECTORS	
I STAGE										
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(11)
Instrument Imm	0.762 ***		0.642 ***		0.703 ***		0.659 ***		0.761 ***	
	(9.14)		(5.59)		(8.03)		(5.74)		(9.28)	
Instrument Em		0.723 ***		0.710 **		0.713 ***		0.685 ***		0.723 ***
		(8.63)		(6.70)		(7.12)		(5.79)		(7.78)
F-statistic of excluded instrument	83.62	74.40	31.26	44.91	64.42	50.64	32.98	33.57	86.20	60.46
(p-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
II STAGE										
ln Immigrants	5.216 ***		8.018 ***		6.631 ***		4.280		6.096 ***	
(2-year lag)	(3.18)		(2.67)		(3.25)		(1.40)		(3.62)	
ln Japanese		6.129 ***		6.011 ***		7.722 ***		3.066		7.462 ***
(2-year lag)		(3.82)		(2.72)		(3.83)		(1.28)		(4.22)
Growth of GDP per capita	-0.069	-0.011	0.086	0.124	-0.143 *	-0.032	-0.020	-0.012	-0.071	0.012
	(-1.03)	(-0.17)	(0.85)	(1.25)	(-1.66)	(-0.40)	(-0.18)	(-0.12)	(-1.01)	(0.17)
Inflation	0.045	0.002	0.124 *	0.046	0.011	-0.010	0.085	0.084	-0.008	-0.034
	(1.00)	(0.04)	(1.78)	(0.63)	(0.18)	(-0.17)	(1.09)	(1.08)	(-0.16)	(-0.62)
Country risk	0.068	0.066	-0.062	-0.030	0.209	0.223	-0.362	-0.391	0.131	-0.022
	(0.30)	(0.29)	(-0.19)	(-0.09)	(0.71)	(0.75)	(-1.00)	(-1.11)	(0.53)	(-0.08)
Exchange rate	-0.016	-0.022 *	-0.021	-0.027 *	-0.033 **	-0.036 **	0.009	0.009	-0.016	-0.022 *
	(-1.33)	(-1.84)	(-1.40)	(-1.85)	(-2.30)	(-2.47)	(0.56)	(0.59)	(-1.25)	(-1.66)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	317	317	223	223	254	254	170	170	282	282

Notes: t-statistics computed using robust standard errors in parentheses.

*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Table 4. Determinants of the number of Japanese outbound M&A deals

Variable	(1)	(2)	(3)	(4)
ln immigrants (2-year lag)	0.259***		2.042***	
	(2.69)		(5.70)	
ln Japanese (2-year lag)		0.302***		1.847***
		(2.64)		(5.85)
Growth of GDP per capita	-0.033*	-0.027	0.128	0.118
	(-1.73)	(-1.49)	(0.96)	(1.07)
Inflation	0.003	0.002	0.275*	0.276*
	(0.16)	(0.10)	(1.65)	(1.80)
Country risk	0.134	0.120	0.472	0.476
	(1.55)	(1.45)	(1.29)	(1.42)
Exchange rate	0.005	0.004	0.317**	0.305***
	(1.47)	(0.72)	(2.02)	(2.87)
Year dummies	YES	YES	YES	YES
Estimation method	FE NEGBIN		GMM	
Number of Observations	317	317	317	317
Dispersion parameter (*p*-value)	0.53 (0.00)	0.42 (0.00)		
Overidenfication test			1.00	1.00
Log likelihood	-590.16	-588.15	28.19	28.17

Notes: The values of the *t*-statistics are in parentheses.
*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Table 5. Determinants of the number of Japanese outbound M&As: Manufacturing and Non-Manufacturing sectors

	Manufacturing		Non-Manufacturing	
Variable	(1)	(2)	(3)	(4)
ln immigrants (2-year lag)	0.508***		0.326***	
	(11.17)		(4.68)	
ln Japanese (2-year lag)		0.566***		0.407***
		(10.01)		(5.03)
Growth of GDP per capita	-0.027	-0.005	-0.021	-0.004
	(-0.74)	(-0.16)	(-0.84)	(-0.13)
Inflation	0.026	0.016	0.010	0.002
	(1.12)	(0.77)	(0.52)	(0.08)
Country risk	0.366**	0.146*	0.179***	0.045
	(4.50)	(1.78)	(3.26)	(0.55)
Exchange rate	0.003	-0.004	-0.001	-0.004**
	(0.78)	(-1.15)	(-0.68)	(-2.07)
Country dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Estimation method	NEGBIN		NEGBIN	
Number of Observations	223	223	254	254
Dispersion parameter (*p*-value)	0.10 (0.01)	0.07 (0.04)	0.07 (0.04)	0.08 (0.03)
Log likelihood	-440.73	-426.65	-508.64	-507.10

Notes: The values of the *t*-statistics are in parentheses.
All equations include a constant, country dummies and year dummies. Coefficients of these variables and their *t*-statistics are not reported.
*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.

Table 6. Determinants of the number of Japanese outbound M&A deals:
High R&D sectors and Low R&D sectors

	High R&D		Low R&D	
Variable	(1)	(2)	(3)	(4)
ln immigrants (2-year lag)	0.252***		0.190***	
	(5.26)		(4.63)	
ln Japanese (2-year lag)		0.313***		0.380***
		(4.51)		(5.74)
Growth of GDP per capita	0.068**	0.092***	0.029	0.014
	(2.26)	(2.88)	(1.50)	(0.64)
Inflation	0.020	0.003	-0.004	-0.016
	(0.74)	(0.10)	(-0.27)	(-0.95)
Country risk	0.101	0.045	0.174**	0.041
	(0.88)	(0.32)	(3.93)	(0.71)
Exchange rate	-0.001	-0.007***	0.003*	-0.0001
	(-0.36)	(-2.19)	(1.85)	(-0.05)
Country dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
Estimation method	NEGBIN		NEGBIN	
Number of Observations	170	170	282	282
Dispersion parameter (*p*-value)	0.13 (0.01)	0.17 (0.01)	0.06 (0.04)	0.06 (0.01)
Log likelihood	-332.43	-339.21	-566.68	-563.28

Notes: The values of the *t*-statistics are in parentheses.
All equations include a constant and country dummies. Marginal effects of these variables and their *t*-statistics are not reported.
*, ** and *** denote significance at the 10%, 5% and 1% significance levels, respectively.