What Drives Capital Flows? The Case of Cross-Border M&A Activity and Financial Deepening

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Abstract

What macroeconomic and financial variables play key roles in the foreign direct investment decision of firms? This question is addressed in this paper using a large panel data set of cross-border Merger & Acquisition (M&A) deals for the period 1990-1999. Various econometric specifications are built around the simple "gravity model" commonly used in the trade literature. Interestingly, financial variables and other institutional factors seem to play a significant role in M&A flows. In particular the size of financial markets, as measured by the stock market capitalization to GDP ratio, has a strong positive association with domestic firms investing *abroad*. This result points to the importance of domestic financial conditions in stimulating international investment during the boom years of 1990s, and accords with the significant drop in cross-border M&As in recent years.

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1 Introduction

The 1990s witnessed an explosion in cross-border merger and acquisitions (M&A) activity, as can be seen in Figure 1. Increases in these capital flows partly reflected a shift in the composition of foreign direct investment (FDI) away from "greenfield" investment (i.e., firms started from scratch).[1] These increases were also spurred by the growth in global financial markets that allowed firms to take advantage of investment opportunities at home and abroad.

This increase in M&A activity raises a host of issues. For example, high activity within Europe and European investment in the U.S. has led economists to ask questions such as: Did the growth and merging of financial markets in Europe, sparked by the arrival of the Euro in 1999, lead to the increase in cross-Atlantic investment by European companies? Did the increase in acquisitions of U.S. companies by European firms play a role in the depreciation of the Euro?

At a more general level, these cross-border M&A flows have also allowed firms to diversify their production abroad and have led to increased economic integration across countries. Given the importance of M&A flows and economists' traditional concentration on studying "greenfield" investment, it is only natural to inquire into the determinants of the size and direction of these flows. Furthermore, though there has been a good deal of literature addressing the various consequences and possible causes of domestic M&As, little has been done to examine these financial flows at the international level.[2]

[1]For example, see UNCTAD (2000, 2001) for the experience of industrial countries, and The World Bank (2001) for a discussion on investment in emerging economies during the 1990s.

[2]See Andrade et al. (2001) and Holmstrom and Kaplan (2001) for recent surveys of research on domestic M&A activity. Recently, Evenett (2003) compares the boom in cross-border M&As in the 1990s with the boom of the 1980s, as well as examining the effects of cross-border banking mergers for thirteen industrial countries; Pryor (2001) analyzes some general trends of cross-border M&A

This study uses the gravity model framework to uncover the determinants of the size and direction of international M&A flows. That simple empirical framework has been commonly used in the trade literature and more recently in the asset trade literature. Generally, gross bilateral capital flow data are rare, but I am able to fill this void through the use of a new comprehensive data set of world M&A flows covering the period 1990-1999. According to the data set used in this study, the value of deals announced has increased almost seven fold over the decade, while the value of the deals going into effect during that period has increased ten fold. One can see in Table 1 that the growth in announced M&A deals has not been restricted just to developed country-pairs. They have also proliferated between developing countries, and between developed and developing countries.

I estimate the importance of several macroeconomic, financial and institutional variables in explaining these cross-border M&A flows. The main hypothesis I test in this paper is whether deep financial markets in the acquisition countries are positively associate with cross-border M&As. It is not immediately apparent that this effect should be large for M&A activity, once other more 'traditional' variables that may affect FDI are considered. Therefore, I control for the importance of economic size, distance, information (proxied by telephone calls), a common language, the exchange rate, tax rates in the target country, tax treaties, trade agreements, goods trade, and wage differentials. I also explore the impact of financial market structure in the acquiring country, and the differences between 'Developed-Developed' and 'Developed-Developing' M&A flows.

The gravity model fits the data well as measured by its ability to explain total

flows during the 1990s; and Vasconcellos and Kish (1998) examine Europe-U.S. flows. Work has also been done in the international business literature; e.g., see a special symposium on the "Global Perspectives on Cooperative Strategies" in the *Journal of International Business Studies*, *27* (5), 1996.

variation in the data, though not as spectacularly as when used in estimating trade flow for goods. However, several variables are significant both statistically and economically. The key results are as follows. First, financial market development in the acquiring country matters, with the stock market playing a greater role than credit provided by the sector. The importance of the stock market is particularly strong in market-based vs. bank-based economies. Second, bilateral distance has a negative effect, while telephone traffic has a positive effect. This points to the importance of information and other distance-related investment costs inhibiting M&A flows. Third, consistent with the last finding, a common language has a positive effect. Fourth, bilateral service agreements stimulate deals. Fifth, high tax rates in the target country provides a disincentive, while bilateral capital tax agreements have a positive effect. Finally, some other controls, such as economic size are also significant.

Section 2 discusses some of the key issues that will be considered, and describes some of the underlying theoretical background. Section 3 describes the data and presents the econometric methodology. Section 4 contains the empirical results. Finally, Section 5 summarizes and concludes.

2 Motivation and Theoretical Background

FDI has two major components: greenfield investment in new assets in a foreign country, or acquisition of pre-existing foreign assets. A cross-border M&A falls into the latter category, where a domestic firm acquires another firm in a foreign country.[3] The literature on the incentives for FDI is vast and is not constrained to a particular

[3]A merger can also take place between the two firms where there is no outright acquiring firm. This issue is not dealt with for two reasons. First, the data set always provides a target and an acquiring firm. Second, very often what is announced as a merger initially often turns out to be an acquisition ex post — the recent Daimler-Chrysler deal is a good case in point.

sub-field of economics.[4] Since no all-encompassing model seems feasible, I instead provide some key results from the relevant literature in order to frame the main hypotheses tested below.[5]

2.1 Financial Depth

Financial development plays a prominent role in our understanding of several different phenomena, such as economic growth, financial stabilization and international financial integration.[6] Financially deep markets — whether measured by size or liquidity — provide firms access to capital necessary to undertake investment projects which they might otherwise have to forego. The main hypothesis of this paper addresses this issue with respect to outward foreign investment. That logic has been described in the popular press[7] as well as by the financial sector as a possible reason for the growth of M&A activity in the past decade. For example, in commenting on the factors needed for the revival of cross-border M&A to their 1998 boom-levels, Morgan Stanley highlights the importance of financial factors:

- **More vibrant global equity markets.** We suspect cash will remain the king in terms of financing cross-border transactions over the near-term, although a rebound in world equity markets could increase the viability of using equity to finance deals. In addition, a rebound in equity prices could boost confidence among CEOs to pursue mergers.[8]

Some recent research has examined the impact of capital inflows on the domestic financial system,[9] but my question differs from this line of study in that I am interested

[4] See Markusen and Maskus (2001) for an excellent recent survey.

[5] See the working paper version di Giovanni (2002) for a more complete discussion.

[6] See Caprio and Honohan (2001) and Demirgüç-Kunt and Levine (2001) for excellent recent surveys of this literature.

[7] E.g., see *The Economist*, September 29, 2001, p. 64.

[8] "M&A Update – Nearing a Bottom?", *Global Economic Forum*, November 7, 2001.

`http://www.morganstanley.com/gef/`

[9] For example, see De Gregorio (1998), Klein and Olivei (2001), and Claessens et al. (2002).

in how financial deepening within a country can aid its firms in investing abroad. Analyzing the role of financial deepening in this area seems to be quite novel, though some empirical evidence addressing the financial incentives for cross-border deals has been provided by Vasconcellos and Kish (1998), who examine how relative stock market performance and bond yield differentials affect Europe-U.S. M&A activity. Recent work by Klein et al. (2002) addresses the effect of financing on investment decisions by examining how the banking collapse in Japan affected Japanese FDI in the United States during the 1990s.

Two measures of financial deepening are considered in this study. The first is a measure of stock market size relative to GDP. Testing the significance of this variable directly addresses the influence of growing equity markets on cross-border investment flows. The 1990s witnessed a stupendous growth in stock market size and activity (see Table 2) in the industrial world as well as the launching and growth of new markets in transition and developing economies.[10] However, it is well recognized that the banking sector plays the primary role in providing funds for private sector investment in the developing world, as well as in continental Europe and Japan. Therefore, the second measure of financial deepening considered is the amount of credit provided by banks and other financial institutions to the private sector relative to GDP.

[10]Stock market liquidity and turnover measures were also considered, but results did not vary greatly. The effects of diversification motives were also investigated by including bilateral correlations of the monthly growth in the stock price index of the acquisition and target countries, but results were not significant. It would also be of interest to examine other organized markets, such as the domestic bond market, but bond market capitalization data exist only for a relatively small sample of countries.

2.2 Trade and Information

FDI may be a substitute or a complement to trade in goods. FDI can act as substitute for trade flows because of trade costs, whether they be due to transportation or tariffs.[11] However, a stylized fact is that FDI and trade are positively correlated in the industrial world.[12] This paper addresses the issue of trade costs empirically by using a gravity model. If a cross-border M&A is acting as a substitute for trade then, *ceteris paribus*, a natural result to expect would be a positive coefficient for the distance between two countries (which can be considered as a proxy for physical trade costs). However, the relationship between distance and the cost of trade should be treated as partial at best for it says nothing about trade policy. Furthermore, the cost of investment may also increase with distance, e.g., due to information asymmetries, so one might still find a negative coefficient for the distance variable.

Some of these issues are considered by explicitly controlling for trade flows (though data are only available between 1990-1997), and by using dummy variables representing four different types of regional trade agreements: customs unions, free trade agreements, service agreements, and other trade agreements. They differ in the degree of how "free" trade is between two countries, as well as encompassing different forms of trade. For example, service agreements include opening up financial and

[11] See Mundell (1957) for early theoretical work addressing the relationship between trade and foreign investment in the presence of trade barriers. Economies of scale, firm-specific capital and other considerations are also essential in a firm's investment decision (e.g., see Markusen 1995 for a survey on multinational enterprises).

[12] See an interesting paper by Baldwin and Ottaviano (2001), who present a theory where firms engage in both intra-industry FDI and intra-industry trade simultaneously. Markusen et al. (1996) and Markusen (1997) provide theoretical models, referred to as "knowledge-capital" models, which allow for horizontal and vertical integration of firms across countries in the presence of trade costs and other factors.

telecommunication sectors, as well as facilitating trade in other cross-country services that may have a direct impact on cross-border M&A flows. All trade agreements increased during the 1990s, as can be seen in Table 3, so it seems fruitful to ask what effect the different deals had on M&As over the sample period.

Information costs can play an important role for the investment decision of firms as highlighted in work by Gordon and Bovenberg (1996), who provide a model to explain the Feldstein and Horioka (1980) puzzle that relies on the existence of asymmetric information between investors in different countries.[13] Recent theoretical work by Martin and Rey (2001) shows the importance of information costs in hindering cross-border asset flows, while Portes and Rey (1999) provide strong empirical evidence for this theory in examining gross bilateral equity flows using a gravity model. Portes and Rey argue that the use of distance may capture information costs in a gravity framework, and therefore rely on gross bilateral telephone traffic as a direct proxy for information costs. de Ménil (1999) also recognizes the importance of information costs in analyzing bilateral FDI flows in a gravity set-up, but uses only distance as a proxy for information costs. Given the potential dual interpretation of the effect of distance on M&A flows, i.e., transportation and/or information costs, telephone call traffic is also considered below. A common language is also considered as a potential factor reducing the cost of doing business.

2.3 Taxes, Exchange Rate, and Other variables

Taxes affect the incentives of agents and firms in all areas of economic activity, and FDI is no different. For example, Razin et al. (1998) explore the theoretical implications of taxing different types of capital inflows, and Hines (1997) provides an excellent survey of the empirical research exploring the impact of different forms of

[13]The model concentrates on greenfield investment, rather than on acquisitions of existing firms.

taxation on U.S. direct foreign investment inflows and outflows. There are many issues that should considered (e.g., double taxation), but sufficiently detailed information is not available on a cross-country basis, so the average corporate tax rate of the target country is included as a proxy for tax effects. All else being equal, one would expect that a country with a lower tax rate would attract investment. Another measure of taxes that is subject to less ambiguity is the presence of tax treaties between two countries. These bilateral treaties have almost doubled in number over the 1990s, as seen in Table 3, and may help explain the increased M&A flows over this period. The treaties provide both incentives (e.g., the elimination of double-taxation of multinationals) and disincentives (e.g., decreasing the ability for multinationals to "dodge" taxes by investing abroad) for FDI. Blonigen and Davies (2001) is the only previous work that examines such issues. They find that tax treaties have a negative effect on FDI for the U.S. Both the average corporate tax rate of the target country and a bilateral tax treaty dummy variable are included below given that they capture different effects.

Work by Cushman (1985), Froot and Stein (1991), and Blonigen (1997) present theoretical arguments and empirical evidence to explain why a U.S. dollar depreciation might have encouraged the inflow of foreign capital into the U.S. during the 1980s. The different mechanisms presented in these papers predict that an exchange rate depreciation leads to increased FDI inflows into the depreciating country. Cushman (1985) and Goldberg and Kolstad (1995) model the impact of exchange rate volatility on FDI. The first paper concentrates on long-run volatility and the second on short-run volatility, but both predict that exchange rate volatility should have a positive FDI effect, though this prediction is conditional on different behavioural assumptions and on the types of shock that hit the economy. The effect of exchange rate volatility on M&A flows is ultimately an empirical question. On the one hand, if there are fixed costs involved in the acquisition of a firm, standard option theory predicts that firms

will delay their acquisitions faced with higher exchange rate volatility. Meanwhile, depending on how the home currency equivalent of expected future cash flows from the target firm are correlated with other assets in the acquiring firm's portfolio, high exchange rate volatility may have a positive or negative effect on the investment decision.

The real incomes of the target and acquiring countries are also included (as in a standard gravity model). Basic theory predicts that larger economies invest more in each other. Furthermore, the size of the economy may also act as a proxy for domestic M&A activity. Firms may invest in other countries to take advantage of lower wages for production, so a wage differential between target and acquisition countries is also considered. Finally, the specification considers developed and developing country fixed effects.[14]

3 Data and Econometric Methodology

3.1 Data Description

Several data sources are used in constructing the panel. The cross-border M&A data come from a unique database produced by Thomson Financial Securities Data. In particular, the following daily information is available for all deals in the world (see Appendix A for a list of countries in the sample) between January 1, 1990 and August 13, 2001: (i) announcement date, (ii) date the deal is effective, (iii) target and acquiring firms' names, (iv) target and acquiring firms' country of origin, (v) target and acquiring parent firms' countries of origin, (vi) target and acquiring parent firms' region, (vii) target and acquiring firms' industrial sector, (viii) value of deal in U.S.

[14]Developed countries are defined as OECD members less Greece, Mexico, Portugal, Turkey, and recent members from central Europe.

dollar, (ix) form of payment(s) used in deal, e.g., cash, stocks, etc., and (x) target and acquisition acquiring advisors.

The database began in 1985 and supposedly covers all deals in the world since 1990 involving at least a 5% ownership change in a firm. Thomson's sources include news reports, stock market filings, law firms, and surveys by investment banks and other advisors. The one significant deficiency of this data set is that, since firms do not have to announce the value of a deal, not all deals have values attached to them. Specifically, only 43.70% of the daily deals for my sample period have a value attached to them. I could not detect any patterns of which industry sectors, countries or years, have more missing values than others.[15] Therefore, the number of deals with no values appear to be random given these criteria. I therefore treat whether a value is recorded or not as random and simply aggregate the values which are reported annually.

To investigate the importance of financial deepening I construct a stock market capitalization to GDP ratio. The data were originally compiled by Beck et al. (1999). However their measure takes the average of period t and $t-1$ each year and ends in 1997, and it is not entirely clear that a two-year average of the ratio is the appropriate measure to use when measuring the impact of financial market deepening on M&A activity. Therefore, to avoid potential complications when dealing with lags, I simply create the ratio of stock market capitalization to GDP for each t for the period 1985-1999. The stock market capitalization data are taken from Standard & Poor's (1995, 2000, 2001) and GDP data (denominated in U.S. dollar) are from the World Bank's World Development Indicators (WDI). The private credit to GDP ratio was constructed using data from the IMF's International Financial Statistics (IFS) database. In particular, data for credit provided to the private sector by banks and

[15] I was told by a representative at Thomson Financial that whether a deal is assigned a value or not depends on what appears on the primary source used.

other financial institutions were used for the acquisition country. See the appendix of Beck et al. (1999) for a detailed description of the data used from the IFS. I am also able to classify a sub-sample of the countries according to whether their financial structure is bank- or market-based according to the classification system in Demirgüç-Kunt and Levine (2001). This classification codes 36 countries as bank-based, and 21 as market-based.

Bilateral real exchange rate data are calculated using the end-of-year nominal exchange rate and consumer price indices listed in the IFS database. The depreciation/appreciation rates are calculated by taking the log difference of period t and period $t-1$. The volatility measure of the nominal exchange rate[16] is constructed by first taking the log difference of end-of-month exchange rates calculated from the IFS database. Next, the standard deviation of this measured is calculated for 5 years prior to each period t; thus, a rolling-measure is calculated.

The World Tax Database created by the Office of Tax Policy Research at the University of Michigan Business offers comprehensive information on different tax rates for a sample of 150 countries. Though preliminary and incomplete, these data are used in the estimation below. In particular, the target country's tax rate is used. Furthermore, information on whether two countries share an income or capital tax treaty in a given year is collected from Tax Analysts (2001).

Using information from the World Trade Organization, I construct a time-varying dummy variable that takes a value of one when a country is involved in a regional trade agreement. Additional dummy variables are created representing the type of regional trade agreement in force. The four types are: (i) service agreement, (ii) free trade area, (iii) customs union, and (iv) other.

Real GDP data are taken from the World Development Indicators (World Bank).

[16]Ideally, real exchange rate volatility should be used, but price levels are not available at the monthly frequency for most countries. However, I estimate volatility using month-to-month changes.

A wage variable is constructed by taking the log difference of the target and acquiring countries real GDP per capita (target-acquiring). The surface distance between two countries and a dummy variable indicating whether they share a common language are also included. The coordinates used to calculate distance are taken from the CIA Factbook,[17] and the information on languages is taken from EITI.[18] The trade flow data are taken from World Trade Flows Database (1980-97). The information variable is measured as gross bilateral telephone traffic between two countries (the sum of the two-way traffic). The source for these data is the International Telecommunications Union.[19] These data were available for the period 1990-98 but were quite incomplete, which in the results below halves the sample size for the specifications using this variable.

3.2 The Gravity Model

The gravity model is a simple empirical model which originated in the trade literature. Briefly stated, its main implication is that the gross flow of trade between two countries should depend inversely on the distance between the countries and depend proportionally on their economic size (this is generally measured by the two countries' real GDP). All econometric work will be built around this specification using annual data.

The specification used augments the standard gravity-type variables (i.e., distance and economic size) with other macroeconomic and financial variables. Furthermore, the stock market and private credit variables are lagged one period. This captures the fact that the decisions of firms are not made contemporaneously with the announcement data of the M&A, and that firms rely on past information to make their

[17]See Appendix B for a list of websites where electronic data can be obtained.

[18]EITI is a private firm that offers translation services.

[19]I would like thank Wei-Kang Wong for sharing these data with me.

financing decisions. The model is then

$$\begin{aligned}\ln(\mathrm{MA}_{ij,t}) = \beta_0 &+ \beta_1 \ln\left(\frac{\mathrm{StockMkt}}{\mathrm{Y}^N}\right)_{j,t-1} + \beta_2 \ln\left(\frac{\mathrm{Credit}}{\mathrm{Y}^N}\right)_{j,t-1} + \beta_3 \ln(\mathrm{D}_{ij}) \\ &+ \beta_4 \ln\left(\mathrm{Tel}_{ij}\right)_t + \beta_5 \ln(\mathrm{Trade}_{ij,t}) + \beta_6 \mathrm{Lang}_{ij} + \beta_7 \mathrm{CU}_{ij,t} + \beta_8 \mathrm{FT}_{ij,t} \\ &+ \beta_9 \mathrm{SA}_{ij,t} + \beta_{10} \mathrm{Othert}_{ij,t} + \beta_{11} \ln(\mathrm{Tax}_{i,t}) + \beta_{12} \mathrm{CapTax}_{ij,t} + \\ &+ \beta_{13} \ln(\mathrm{RXR}_{ij,t}) + \beta_{14} \ln(\mathrm{V(e)}_{ij,t}) + \beta_{15} \ln(\mathrm{Y}_i) + \beta_{16} \ln(\mathrm{Y}_j) \\ &+ \beta_{17} \mathrm{Wage}_{ij,t} + \beta_{18} \mathrm{Wage}^2_{ij,t} + \varepsilon_{ij,t},\end{aligned} \tag{1}$$

where i and j denote the countries and t denotes time. The dependent variable is defined as follows:

- $\mathrm{MA}_{ij,t}$: real gross M&A investment flows (deflated by the 1996 U.S. CPI) from country j to country i at year t.

The independent variables are defined as follows:

- Y: real GDP,
- Y^N: nominal GDP (U.S. \$),
- $\mathrm{StockMkt}_j$: stock market capitalization in country j (current U.S. \$),
- Credit_j: credit provided to the private sector by banks and near-banks in country j (current U.S. \$),
- D_{ij}: the distance between i and j,
- Tel_{ij}: total gross telephone traffic between i and j,
- Trade_{ij}: real goods trade flow from country j to i,
- Lang_{ij}: a binary variable equal to 1 if i and j have a common language,
- CU_{ij}: a binary variable equal to 1 if i and j belong to a common customs union,
- FT_{ij}: a binary variable equal to 1 if i and j belong to a common free trade agreement,
- SA_{ij}: a binary variable equal to 1 if i and j belong to a common service agreement,
- Othert_{ij}: a binary variable equal to 1 if i and j belong to other types of common regional trade agreements,
- Tax_i: the average corporate tax rate in country i,

- Capital Tax Treaty$_t$: a binary variable equal to 1 if i and j have a capital tax treaty,
- RXR$_{ij}$: real exchange rate of i w.r.t. j ($P_i * e/P_j$),
- V(e)$_{ij,t}$: volatility of the bilateral monthly nominal exchange rate changes for 5 years prior to t,
- Wage$_{ij}$: log-difference of country i's real GDP per capita and country j's,
- Wage$^2_{ij}$: square of the wage.

Other terms are:

- β_0: a vector of nuisance coefficients (constant, developing/devloping country dummies, and annual dummies),
- $\varepsilon_{ij,t}$: an error term, which is assumed to be distributed $N(0, \sigma^2)$.

Given the discussion in Section 2, one can summarize the expected signs for the coefficients in (1) as:

Variables and Expected Effects

(Stock Market/Y^N)$_j$	+	Free Trade Agr.	+/-
(Credit/Y^N)$_j$	+	Service Agr.	+/-
Distance	+/-	Other Trade Agr.	+/-
Telephone	+	RXR	-
Language	+	V(e)	+/-
Trade	+/-	Y$_i$	+
Tax$_i$	-	Y$_j$	+
Capital Tax Treaty	+/-	Wage	-
Customs Union	+/-	Wage^2	+/-

Equation (1) is estimated by pooling the data and using developed/developing country group fixed effects. The *between* and *within* R^2s are also reported (where grouping is done by country-pairs) to assess the contributions of the cross-sectional and time-series characteristics of the data to the fit of the regressions. The issue of censoring is also dealt with. In particular, there are many cases where there are no deals in a year and therefore no value observed. One must correct for this censoring bias to make consistent inferences about all countries when estimating model (1), or else one can only draw conclusions from the estimated coefficients for the sub-sample of countries where deals are observed. This is done by estimating a Tobit model

Tobin (1958) in two-stages. First, a probit is estimated for whether a deal is observed or not conditional on the same right-hand side variable as in equation (1), and the inverse Mills' ratio is constructed from the predicted values of the model. Second, a regression is run to estimate equation (1) including the inverse Mills' ratio as a regressor. Finally, the standard errors are corrected for heteroscedasticity and the use of an estimated parameter as an exogenous variable (the inverse Mills' ratio) in the second-stage.[20]

It should also be noted that there is a potential concern of a "price effect" corrupting the results of estimating equation (1). Specifically, the rise in stock market capitalization may have corresponded with a rise in the selling price of firms for M&A deals. Therefore, a positive coefficient on the stock market capitalization to GDP ratio may simply be driven by a rise in equity prices. I am able to explore this issue by treating the number of annual deals as the endogenous variable and running a negative binomial model with the same regressors as estimated in the linear gravity model. Results do not vary greatly using this specification, particularly for the key results discussed below, and are therefore not presented.

4 Results

The gravity model is estimated by pooling the data across all countries using four different baseline specifications.[21] The only difference across these specifications is the inclusion of the telephone and/or trade variable. Including these variables (particu-

[20] See Appendix C for a more technical discussion on this point.

[21] The first-stage probit results are not presented. Depending on the specification in the baseline sample, the number of observations used in the probits are between 12,099 and 46,142 observations, and have an average pseudo-R^2 of 0.48. These tables and other omitted results are available in an appendix on my website: `http://socrates.berkeley.edu/~jdigio`.

larly the telephone variable) significantly reduces the data set, so greater attention will be paid to other coefficients from the first specification that do not include these variables. Furthermore, I examine how financial structure affects the financial market coefficients, and explore sub-samples based on developed/developing ('Developed' and 'Developing') countries.

4.1 The Importance of Financial Deepening

Table 4 presents four specifications, and the table has been divided into three groups, where the groups have been ordered by interest. Note that some variables have been omitted for brevity. Turning to the financial variables in the first group, one sees that the coefficient of the stock market variable is positive, large and significant in specifications (1)-(4). In particular, according to specification (1) a one percent increase in the stock market capitalization to GDP ratio in the acquiring country is associated with a 0.955 percent increase in cross-border M&A activity. The credit provided to the private sector has a positive, but insignificant effect in the first specification, where a one percent increase in the acquiring country's credit to GDP ratio is associated with a 0.133 percent increase in cross-border M&A activity. These results conform to the main hypothesis of this paper; that is, the positive association between domestic financial market depth and outward M&A flows. However, the stock market appears to have a greater effect.[22]

Before turning to results for other explanatory variables and further specifications, I shall comment on the contribution of the financial market variables to the overall R^2 in Table 4, as well as briefly discussing and interpreting the size of the between and within R^2s. To access the importance of the stock market and credit ratios,

[22]One explanation for the low significance of the credit variable is that this variable is quite highly correlated with *both* the stock market ratio and the GDP variables of the acquiring country.

I run regressions for specifications (1)-(4) without both financial market variables, dropping each one individually as well as dropping both together. The R^2s from these regressions are then compared to the baseline ones that contain the financial variables. Depending on the specification, the financial market variables account for approximately 11%-14% of the total R^2 in Table 4. For example, the overall R^2 in specification (1) is 0.28 with all variables, and is reduced to 0.24 when both financial market variables are omitted. Therefore, the financial market variables explain 0.04 of the total fit, or accounts for $0.04/0.28 = 14\%$ of the total R^2. Therefore, the financial market variables make a non-trivial contribution to the overall fit of the regressions. [23]

Next, turning to the between and within R^2s, one can see that the cross-sectional dimension of the data is driving the majority of the overall (pooled) fit of the estimation given that the between R^2 is so much bigger than the within R^2.[24] This result also holds for all the other results that are reported. Therefore, the empirical results

[23] Dropping either financial market variable individually in specification (1) yields an R^2 of 0.26. Dropping both financial variables or either one individually yield the following R^2s for the other specifications: (2) 0.25 and 0.26, (3) 0.24 and 0.25, and (4) 0.24 and 0.25.

[24] A small technical point is worth making here. Given the selection model in the first-stage, these R^2s are not completely accurate. In particular, consider the fixed effects (within) regression. The correct specification involves running a probit including the fixed-effects dummies in the first-stage, and then including these fixed effects and the inverse Mills' ratio in the second-stage linear regression. However, note that the estimated inverse Mills' ratio in the fixed effect regression is different than that of the pooled regression (because of the dummies included in the first-stage fixed-effects probit). Therefore, comparing the second-stage R^2s of the pooled and fixed effects second-stage regressions is not completely correct because the estimated inverse Mills' ratio differ in the two regressions. However, the between R^2s are so much larger than the within R^2s, it is safe to say that this small misspecification does not make a large difference.

do not provide very strong evidence that the boom in U.S. acquisitions by European firms was driven by the growth and merging of financial markets in Europe during the 1990s. Further work using firm-level data that analyzes European firms' financing decisions for cross-border M&As might provide additional evidence.

More work can be done to explore the importance of the different financial market variables in this study, however. In particular, it is interesting to note that the type of financing seems to matter. The stock market coefficient is always larger than the private credit coefficient, and the latter is insignificant in all the specifications. This result is relevant because financial structures differ across countries as pointed out in Section 2.1. Therefore, it is reasonable to question whether this result holds across different types of economies. Tables 5 and 6 address this question by breaking down the sample according to whether a country has a bank-based or market-based financial system. Estimations in Table 5 only interact the financial market variables with a 0/1 dummy representing whether a country has a market-based (vs. bank-based) financial system or not. This interaction matters. The coefficient on the stock market variable decreases in all specifications relative to the baseline estimations of Table 4, but much of this decline is picked up when a stock market is interacted with the market-based economy indicator. Therefore, unsurprisingly, stock market size will have its greatest influence in economies where it plays the greatest role in firm financing decisions (e.g., the U.S.). Furthermore, this indicator is always positive (and greater than one-half) and is significant in specifications (1) and (4), so there is also a market-based fixed effect that stimulates cross-border M&As.[25] The coefficients

[25]Multi-collinearity is a concern given that the stock market to GDP ratio is a component used to construct the bank-based and market-based variables. However, the correlation between the stock market to GDP ratio and the market-based variable is only about 0.6 in the four specifications. Furthermore, the stock market variable is time varying, while the financial structure dummies are not. Finally, the standard errors for the stock market and market-based dummy are not huge in

for the private credit variable drops, though most of this change in size is picked up in when the variable is interacted with the market-based dummy variable. However, none of these coefficients are significant.

Table 6 presents the results of estimations of sub-samples based on whether a country is a bank-based or market-based economy. This estimation is equivalent to interacting the market-based dummy variable with all other exogenous variables. Turning first to the stock market variable, one sees that its coefficient is always larger and very significant in the market-based sub-sample. Furthermore, the size of the stock market coefficients relative to those of the credit variable is also much larger in the market-based sub-sample. It is also interesting to note that the stock market variable is significant in the baseline estimation (1) in the bank-based sub-sample. Therefore, equity markets do play a role in bank-based countries, though the relative role is smaller than in market-based countries.[26] Next, turning to the credit variable, one sees that it is still not significant in either sub-sample. But, the coefficient is much larger in the bank-based economies. This fact points to credit playing a more important role for outward investment in the form of M&As for countries such as Germany or Japan, though this conclusion is not strong given the lack of significance in the results. However, these cross-country results do coincide with the work by Klein et al. (2002) who show that the decline of outward investment by Japanese firms was caused by the tighter credit constraints they faced as banks got into trouble during the 1990s.

I also break the data into samples where the acquiring country is developed ('Developed') and the target country is either developed or developing ('Developing') in Table 7. One might expect that financial markets do not matter as much for

Table 5, as would be expected if the variables were very collinear.

[26]The information provided on forms of financing at the firm level in the data set is not very specific, so this issue could not be addressed.

Developed-Developing flows, since the target firms may have been relatively cheap at points during the 1990s (e.g., the "fire-sale FDI" hypothesis put forth by Paul Krugman after the Asian crisis). However, given the high M&A activity between industrial countries during the 1990s, one might expect the opposite result to hold. Results do not vary greatly across specification nor across sub-samples. The one point to note is that the coefficient on the stock market variable is larger in the baseline specification when the target country is developed. However, the credit variable is not significant in any of the specifications. Therefore, it is difficult to draw any strong conclusions concerning the relationship between the mode of financing and the stage of development of the target countries. Furthermore, I did not detect any discernable pattern in the data as to whether a bank- or market-based economy tends to invest more in either rich or poor countries.[27]

4.2 Trade and Investment Costs

I next investigate whether M&As react to trade and investment costs. The baseline results are presented in the second to fifth rows of the first group of variables in Table 4. The distance coefficient is always negative and significant implying the importance of investment costs (e.g., information) across countries in deterring the flows rather than transport costs stimulating the flows. The coefficient in specification (1), **-0.767**, where only distance is larger than the long-term distance elasticities that de Ménil (1999) finds (the estimates of his two specifications are -0.551 and -.594) in his study

[27]I also examined Developing-Developing flows given the increase in these flows in recent years. The numbers of observations are quite small for the four specifications: 382, 187, 222, and 167 respectively. Most coefficients are not significant, however the stock market to GDP ratio coefficient is large (1.428) and statistically significant in specification (1). All results are posted at `http://socrates.berkeley.edu/~jdigio`.

of FDI flows. Meanwhile, the coefficient is smaller (in absolute terms) than the ones Portes and Rey (1999) find in their study of equity flows (their baseline estimates are between -0.8 and -0.9 when ignoring other information variables). It is interesting that my estimated distance coefficient is more similar to that estimated for equity flows rather than for FDI flows. However, one possible explanation for the fairly large difference in distance elasticities compared to de Ménil's finding is that my sample includes both developed and developing countries, whereas de Ménil only examines intra-OECD flows. I shall examine this potential explanation below.[28]

The distance coefficient drops in magnitude when both telephone traffic and trade flows are considered. First, the telephone coefficient is significant in specifications (2) and (4) and quite large relative to the findings of Portes and Rey (the coefficient in (2) is twice as large as in their baseline result). What is interesting is that the distance coefficient remains negative and significant. This implies that the telephone variable is not picking up all the influence of information and other investment costs that may vary with distance. Including trade does have a fairly large impact on the distance coefficient, though. M&A flows are more likely between countries that trade more. This implies that the two flows are complementary. Theories of intra-industry trade discussed in Section 2.2 explain why this may be the case, though there is also the possibility that trade in goods acts as a conduit for information flows — witness the decrease in the telephone coefficient in specification (4). Finally, a common language seems to matter quite a bit for doing business, as the coefficient is always large and positive.

The first three rows of the second group of variables consider the impact of various

[28]It should also be noted that while Portes and Rey normalize their telephone variable by the square-root of the product of the two countries' real GDP, my specifications do not. Rather, the real incomes of two countries are treated as separate (unconstrained) variables. Therefore, the telephone coefficients variables in the two studies are not completely comparable.

trade agreements.[29] If M&A flows are acting as a substitute for trade in goods, one should expect that the coefficients for these agreements be negative. This is indeed the case for the customs union variable as well as the free trade agreement variable in some cases. However, neither variable is significant in the specification (1). What is more interesting is that the coefficient for the service agreement is always positive and significant. This result is not that surprising, though, if one considers some of the sectors included in the General Agreement of Trade in Services (GATS): financial, advertising, legal, and telecommunications. The 1990s witnessed a boom in cross-border bank acquisitions, which would fall under the GATS. The differing effects of various types of trade agreement would be an interesting issue to explore, and sector names provided in the data set can be exploited in this vein. This is, however, beyond the scope of the present paper and is left to future research.

I also consider whether the results for distance, telephone calls and trade differ for the Developed-Developing and Developed-Developed flows in Table 7. One might expect that investment costs (as measured by distance) matter more when the target country is developing. Indeed, comparing the two sub-samples, one sees that the distance coefficient is always larger (in absolute terms) for the developing sub-sample. Furthermore, the baseline estimation of -0.654 for the developed sub-sample is similar to de Ménil's estimates of the impact of distance on intra-OECD FDI flows. The coefficient signs for the telephone and trade variables in specifications (2)-(4) have the expected signs for both developing and developed target countries. The telephone variable is largest and wipes out the impact of distance only in the developed country sub-sample in specification (2). This is interesting given that information costs are most probably greatest when investing in developing countries. However, this finding may simply imply that telephone traffic is not an adequate information proxy for firms

[29]The coefficient for other trade agreements is not included given that its interpretation is not straightforward, and it drops out of the estimation for some of the sub-samples explored below.

investing in developing countries. Similarly, including trade flows has a larger impact on the distance coefficient for the Developed-Developed sub-sample.[30] It should also be noted that the coefficients on the trade agreements for the sub-samples are very similar to those in the the pooled regressions. It should also be noted that the coefficients on the trade agreements for the sub-samples are very similar to those in the the pooled regressions.

4.3 Other Results

Turning to the last two rows of the second group of variables in Table 4, one sees that a higher tax rate in the target country drives M&A flows away, but that a capital tax treaty provides an incentive for these flows. The result for the target tax rate should not be overemphasized given the measurement problems discussed in Section 2.3. The result for the capital tax treaty measure is quite surprising, however, as it contradicts what Blonigen and Davies (2001) find. Therefore, it would appear that tax treaties offer additional gains beyond lower tax rates, e.g., more transparency in doing business.

Moving to the final group of variables, the real exchange has a negative (though not always significant) effect, while the coefficient for exchange rate volatility is always positive. Furthermore, as expected, larger countries as measured by real GDP invest more in each other. All these result match those in the relevant literature discussed in Section 2. The coefficients for target and acquiring developed countries (not reported) were always positive and significant. It also appears that firms take advantage of wage differentials, though the measure used to proxy for wages is far from perfect.

[30]Future research will address whether the types of M&A flows really differ between Developed-Developed and Developed-Developing country pairs. For example, it may be possible to explore whether the composition of *horizonal* vs. *vertical* FDI differs across different country pairs.

This result is also far from robust when the sample is broken down according to the developed/developing criteria of Table 7. However, it is also interesting to note that the coefficient on the square of the wage measure is always negative, implying that the advantage of lower relative labour costs is diminishing.

5 Conclusion

This paper attempts to determine some of the factors underlying gross cross-border M&A flows for the period 1990-1999. A simple gravity model is estimated, controlling for possible bias caused by censored data. Empirical results highlighting the importance of financially deep markets appear to be encouraging. In particular, the baseline estimation implies that a one percent increase of the stock market to GDP ratio is associated with a 0.955 percent increase in across-border M&A activity. This number is both economically and statistically significant. The impact of the credit to GDP ratio is also positive though not significant in the baseline specification. However, it is shown that the importance of each type of financing depends on the type of financial structure (bank- vs market-based) that an economy has.

The importance of investment costs, as proxied by distance and more directly by bilateral telephone traffic, is also affirmed, and the estimated coefficients for these variables are similar to those found in the previous literature on FDI and asset trade de Ménil (1999); Portes and Rey (1999). Firms also tend to invest more in countries that they trade with more and with which they share a common language. Regional trade agreements are significant driving variables, though the type of trade agreement matters: custom unions and free trade agreements work against cross-border M&A activity, while service agreements have a positive effect. High taxes in the target country decrease acquisitions, while capital tax treaties increase M&A activity — a result that contradicts what Blonigen and Davies (2001) find and that deserves

further research. Finally, coefficients for the real exchange rate, nominal exchange rate volatility, economic size, and wage differential have the expected signs.

The data set used in this research offers the opportunity to address several other questions in greater detail in future work. For example, a deeper study of whether the acquisitions of developed countries' firms by developed countries differ from those in developing ones could be pursued. Are Developed-Developed M&As *vertical* FDI (where trade costs are not the driving force), while trade costs play a large role in Developed-Developed M&As, which are *horizontal* FDI? Furthermore, exploring why different types of trade agreement have different effects on cross-border M&As would be a fruitful avenue of research.

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Table 1

World gross M&A flows announced:
Value (1990 billion US$) and number of deals

Year	World	Developed w/ developed	Developing w/ developing	Developed w/ developing
1990	140.42	112.84	1.12	26.46
	(2445)	(2059)	(24)	(362)
1991	66.61	53.82	0.82	11.97
	(2851)	(2260)	(49)	(542)
1992	73.95	57.89	1.56	14.50
	(2566)	(1918)	(66)	(582)
1993	83.03	58.19	4.52	20.32
	(2768)	(1904)	(108)	(756)
1994	97.34	77.92	3.73	15.69
	(3431)	(2322)	(169)	(940)
1995	168.78	137.49	3.44	27.85
	(4204)	(2806)	(208)	(1190)
1996	174.43	133.41	7.56	33.47
	(4513)	(2956)	(222)	(1335)
1997	269.80	186.19	17.79	65.82
	(4995)	(3342)	(299)	(1354)
1998	465.95	385.12	12.77	68.06
	(5828)	(3932)	(300)	(1596)
1999	798.84	688.45	7.68	102.70
	(6731)	(4439)	(322)	(1970)

Number of deals in brackets. Source: Thomson Financial.

Table 2
World stock market capitalization
(1990 billion US$)

Year	World	Developed	Developing
1990	9399.70	8802.78	596.92
1991	10877.83	9969.24	908.59
1992	10173.17	9169.65	1003.52
1993	12671.45	10895.10	1776.35
1994	13321.25	11531.21	1790.04
1995	15244.65	13446.31	1798.34
1996	16851.00	14654.26	2196.74
1997	18866.44	16713.10	2153.33
1998	21619.56	19793.13	1826.42
1999	28422.90	25635.70	2787.20

Source: Standard and Poor's *Emerging Market Factbook*.

Table 3
Number of world bilateral tax treaties and
Regional trade agreements in effect

Year	Capital tax treaty	Income tax treaty	Customs union	Free trade agreement	Service agreement	Other trade agreement
1990	415	913	205	245	67	1265
1991	430	957	214	235	66	1267
1992	452	1001	215	272	66	1346
1993	507	1084	215	312	66	1347
1994	561	1182	215	427	170	1532
1995	599	1276	263	549	243	1549
1996	672	1397	278	570	243	1549
1997	722	1476	281	616	244	1549
1998	749	1525	281	645	244	1549
1999	772	1562	281	658	244	1549

Sources: Tax Analysts' *Worldwide Tax Treaty Index* or `http://treaties.tax.org/` and the WTO (`http://www.wto.org/english/trato_e/region_e/region_e.htm`).

Table 4
Baseline estimation

	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	0.955	0.798	0.801	0.685
	(0.084)	(0.120)	(0.090)	(0.111)
$(\text{Credit/Y})_{j,t-1}$	0.133	-0.042	0.022	-0.051
	(0.088)	(0.134)	(0.122)	(0.140)
Distance	-0.767	-0.477	-0.411	-0.240
	(0.081)	(0.099)	(0.079)	(0.091)
Telephone_{ij}		0.332		0.298
		(0.045)		(0.050)
Trade_{ij}			0.500	0.323
			(0.063)	(0.081)
Language	1.324	0.837	1.220	0.788
	(0.093)	(0.129)	(0.104)	(0.128)
Customs union	-0.082	-0.953	-0.471	-0.611
	(0.192)	(0.322)	(0.231)	(0.292)
Free Trade Agr.	0.132	-0.387	0.122	-0.191
	(0.135)	(0.218)	(0.170)	(0.227)
Service Agr.	0.751	1.235	0.806	0.957
	(0.164)	(0.271)	(0.199)	(0.256)
Tax_i	-0.891	-0.888	-0.737	-0.900
	(0.137)	(0.198)	(0.161)	(0.201)
Capital Tax Treaty	0.319	0.336	0.395	0.271
	(0.086)	(0.124)	(0.100)	(0.126)
RXR	-0.036	-0.015	-0.006	-0.005
	(0.012)	(0.016)	(0.013)	(0.016)
V(e)	0.086	0.127	0.178	0.218
	(0.046)	(0.062)	(0.057)	(0.067)
Y_i	0.868	0.608	0.499	0.369
	(0.053)	(0.063)	(0.050)	(0.060)
Y_j	0.714	0.471	0.380	0.244
	(0.047)	(0.060)	(0.051)	(0.060)
Wage	-0.040	-0.267	-0.235	-0.307
	(0.028)	(0.099)	(0.091)	(0.108)
Wage^2	-0.021	-0.221	-0.237	-0.225
	(0.006)	(0.043)	(0.035)	(0.043)
Observations	3774	1855	2641	1742
R^2	0.25	0.28	0.28	0.27
R^2-within	0.08	0.07	0.07	0.07
R^2-between	0.21	0.28	0.28	0.29

Regressions corrected for selection. All variables (except dummies) are in logarithms. Constant, annual dummies, developing/developed dummies, other trade agreement, and the inverse Mills' ratio not included in table. Robust corrected standard errors in parentheses.

Table 5
Financial structure interaction

	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	0.520	0.297	0.273	0.145
	(0.118)	(0.157)	(0.133)	(0.154)
$(\text{Credit/Y})_{j,t-1}$	0.061	0.012	0.033	0.049
	(0.128)	(0.153)	(0.154)	(0.155)
$(\text{StockMkt/Y})_{j,t-1} \times \text{MktBase}_j$	0.408	0.535	0.392	0.505
	(0.145)	(0.202)	(0.176)	(0.207)
$(\text{Credit/Y})_{j,t-1} \times \text{MktBase}_j$	0.190	0.109	0.314	0.074
	(0.155)	(0.201)	(0.187)	(0.207)
Market Based_j	0.695	0.708	0.860	0.784
	(0.140)	(0.208)	(0.177)	(0.210)
Observations	3663	1812	2610	1724
R^2	0.29	0.28	0.29	0.27
R^2-within	0.10	0.07	0.08	0.07
R^2-between	0.27	0.31	0.30	0.31

Regressions correspond to specifications in Table 4. Robust corrected standard errors in parentheses.

Table 6
Financial structure sub-sample

Bank-based				
	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	0.327	0.178	0.224	0.082
	(0.137)	(0.184)	(0.145)	(0.174)
$(\text{Credit/Y})_{j,t-1}$	0.174	-0.009	0.202	0.078
	(0.125)	(0.176)	(0.159)	(0.187)
Observations	1435	702	1012	670
R^2	0.27	0.33	0.29	0.34
R^2-within	0.11	0.15	0.13	0.17
R^2-between	0.03	0.36	0.34	0.38
Market-based				
	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	1.174	0.859	0.848	0.704
	(0.133)	(0.188)	(0.156)	(0.188)
$(\text{Credit/Y})_{j,t-1}$	0.022	0.127	0.020	0.001
	(0.139)	(0.208)	(0.179)	(0.214)
Observations	2228	1110	1598	1054
R^2	0.33	0.03	0.31	0.28
R^2-within	0.11	0.06	0.07	0.06
R^2-between	0.33	0.35	0.34	0.33

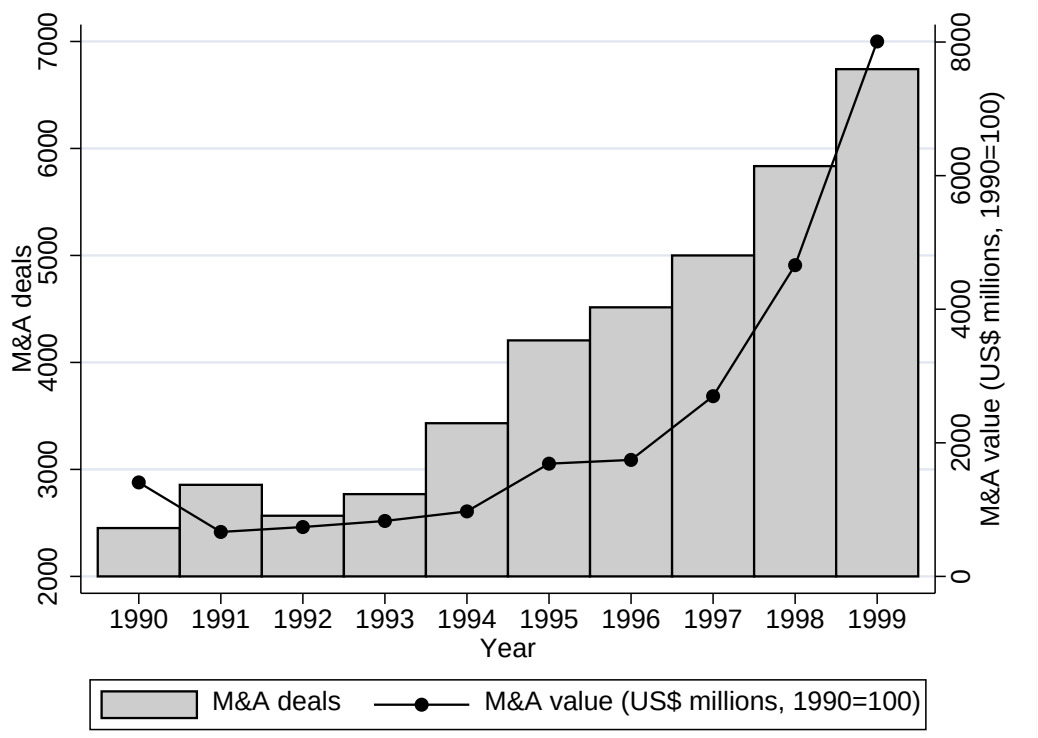
Regressions correspond to specifications in Tables 4. Robust corrected standard errors in parentheses.

Table 7
Developed acquiring country sub-sample

Target developing				
	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	0.790	0.730	0.489	0.451
	(0.185)	(0.293)	(0.207)	(0.280)
$(\text{Credit/Y})_{j,t-1}$	-0.027	-0.046	0.168	0.115
	(0.228)	(0.368)	(0.293)	(0.391)
Distance	-1.003	-0.902	-0.479	-0.446
	(0.201)	(0.263)	(0.205)	(0.257)
Telephone_{ij}		0.196		0.196
		(0.061)		(0.065)
Trade_{ij}			0.425	0.261
			(0.121)	(0.153)
Observations	1302	580	836	524
R^2	0.17	0.18	0.17	0.17
R^2-within	0.09	0.12	0.10	0.14
R^2-between	0.18	0.27	0.21	0.25
Target developed				
	(1)	(2)	(3)	(4)
$(\text{StockMkt/Y})_{j,t-1}$	1.039	0.641	0.617	0.422
	(0.130)	(0.165)	(0.119)	(0.142)
$(\text{Credit/Y})_{j,t-1}$	-0.013	0.126	0.016	0.023
	(0.172)	(0.242)	(0.195)	(0.230)
Distance	-0.654	-0.234	-0.155	-0.046
	(0.113)	(0.152)	(0.109)	(0.130)
Telephone_{ij}		0.521		0.352
		(0.092)		(0.095)
Trade_{ij}			0.747	0.450
			(0.102)	(0.131)
Observations	1685	892	1302	876
R^2	0.32	0.31	0.30	0.30
R^2-within	0.14	0.12	0.11	0.01
R^2-between	0.49	0.47	0.47	0.47

Regressions correspond to specifications in Table 4. Robust corrected standard errors in parentheses.

Figure 1
World Cross-Border M&A Activity



Source: Thomson Financial.

Appendix A Countries with M&A Data

Abu Dhabi	Cook Islands	India	Monaco	Spain
Albania	Costa Rica	Indonesia	Mongolia	Sri Lanka
Algeria	Croatia	Iran	Morocco	St Kitts&Nevis
Andorra	Cuba	Ireland	Mozambique	Sudan
Angola	Cyprus	Isle of Man	Myanmar(Burma)	Surinam
Antigua	Czech Republic	Israel	Namibia	Swaziland
Argentina	Czechoslovakia	Italy	Nepal	Sweden
Armenia	Denmark	Ivory Coast	Netherland Antilles	Switzerland
Aruba	Dominica	Jamaica	Netherlands	Syria
Australia	Dominican Rep	Japan	New Zealand	Taiwan
Austria	East Germany	Jersey	Nicaragua	Tajikistan
Azerbaijan	Ecuador	Jordan	Niger	Tanzania
Bahamas	Egypt	Kazakhstan	Nigeria	Thailand
Bahrain	El Salvador	Kenya	North Korea	Togo
Bangladesh	Equator Guinea	Kuwait	Norway	Tonga
Barbados	Eritrea	Kyrgyzstan	Oman	Trinidad&Tobago
Belarus	Estonia	Laos	Pakistan	Tunisia
Belgium	Ethiopia	Latvia	Panama	Turkey
Belize	Fiji	Lebanon	Papua New Guinea	Turkmenistan
Benin	Finland	Lesotho	Paraguay	Uganda
Bermuda	Fr Polynesia	Liberia	Peru	Ukraine
Bhutan	France	Libya	Philippines	United Kingdom
Bolivia	Gabon	Liechtenstein	Poland	United States
Bosnia	Georgia	Lithuania	Portugal	Upper Volta
Botswana	Germany	Luxembourg	Puerto Rico	Uruguay
Brazil	Ghana	Macau	Qatar	United Arab Emirates
Brunei	Gibraltar	Macedonia	Romania	Uzbekistan
Bulgaria	Greece	Madagascar	Russia	Vanuatu
C. African Rep.	Greenland	Malawi	Rwanda	Venezuela
Cambodia	Grenada	Malaysia	Saudi Arabia	Vietnam
Cameroon	Guatemala	Maldives	Senegal	Virgin Islands
Canada	Guernsey	Mali	Sierra Leone	Western Samoa
Cape Verde	Guinea	Malta	Singapore	Yemen
Cayman Islands	Guyana	Marshall Islands	Slovak Republic	Yugoslavia
Chad	Haiti	Martinque	Slovenia	Zaire
Chile	Honduras	Mauritania	Solomon Islands	Zambia
China	Hong Kong	Mauritius	South Africa	Zimbabwe
Colombia	Hungary	Mexico	South Korea	
Congo-Rep	Iceland	Moldova	Soviet Union	

Appendix B Electronic Data Sources

CIA Factbook: `http://www.cia.gov/cia/publications/factbook/`

Languages: `http://www.eiti.com/country_language_lookup.cfm`

Tax Treaties: `http://treaties.tax.org/` (30-day free trial offer)

Trade Agreements: `http://www.wto.org/english/tratop_e/region_e/region_e.htm`

Appendix C Standard Errors Correction

The corrected variance-covariance matrix for the selection problem is:

$$\boldsymbol{\Sigma} = \boldsymbol{\Sigma}_R + (\mathbf{X}'\mathbf{X})^{-1}(\mathbf{X}\tilde{\mathbf{Z}})\boldsymbol{\Sigma}_P(\mathbf{X}\tilde{\mathbf{Z}})'(\mathbf{X}'\mathbf{X})^{-1}, \tag{C.1}$$

where $\tilde{\mathbf{Z}}$ is the matrix of all exogenous variables in equation (1) in Section 3.2, appropriately weighted by the inverse Mills' ratio and its coefficient from the second-stage regression; $\mathbf{X}$ is the matrix of all exogenous variables and the inverse Mills' ratio; $\boldsymbol{\Sigma}_R$ is the variance-covariance matrix of the second-stage regression corrected for heteroscedasticity, and $\boldsymbol{\Sigma}_P$ is the variance-covariance matrix of the first-stage probit. See Newey and McFadden (1994) for details.