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THREE ESSAYS ON CROSS-BORDER MERGERS AND ACQUISITIONS

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THREE ESSAYS ON CROSS-BORDER MERGERS AND ACQUISITIONS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
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By
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ABSTRACT OF DISSERTATION

THREE ESSAYS ON CROSS-BORDER MERGERS AND ACQUISITIONS

This dissertation consists of three essays on cross-border mergers and acquisitions (M&As). The first essay studies horizontal and vertical investments between Organization for Economic Cooperation and Development (OECD) countries, while the second essay examines how investment patterns vary by country development. The third essay estimates the effect of merger policy reform on cross-border M&A activity in Europe.

The first essay tests how well theories of horizontal and vertical foreign direct investment (FDI) explain observed patterns of cross-border M&As in OECD countries. Horizontal investment occurs when multinational firms produce in foreign countries to serve the foreign market, whereas vertical investment occurs when multinational firms source intermediate goods from foreign affiliates for final assembly and sales at home. The former is often used to displace exports when transport costs exceed local production costs, while the latter is often driven by cross-country factor price differentials. Little support is found for the traditional explanations of FDI as results indicate horizontal and vertical investments look much more similar than previously believed.

The second essay challenges long-standing beliefs that the majority of FDI within the developed world is horizontal, whereas investments into developing nations are predominantly vertical. Developed-developed FDI is largely cross-border M&As and FDI into developing nations typically consists of greenfield investments. However, cross-border M&As are becoming more popular in developing countries and, contrary to previous beliefs, the proportion of horizontal and vertical investment is independent of country development. Results suggest trade costs have a stronger effect on developing countries, while no clear support is found for the idea that factor endowment drives vertical investments in developing nations.

The third essay examines how reforms to European Commission Merger

Regulation (ECMR) in 2004 affected cross-border M&A activity in Europe. The ECMR outlines competition rules and empowers the European Commission (EC) to block anti-competitive mergers adversely affecting the European market. Details of the reform suggest the law was expanded to cover more mergers, which is expected to have a non-positive effect on merger activity. Difference-in-differences results suggest the reform had no significant effect on cross-border merger activity in countries within the EC's jurisdiction.

KEYWORDS: Cross-border mergers and acquisitions, multinational firms, horizontal foreign direct investment, vertical foreign direct investment, antitrust

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THREE ESSAYS ON CROSS-BORDER MERGERS AND ACQUISITIONS

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1 Introduction

At just under $1.4 trillion in 2012, global foreign direct investment (FDI) flows constitute an important part of worldwide commerce (UNCTAD, 2013). FDI generally comes in the form of either cross-border mergers and acquisitions (M&As) or greenfield investments. The former occurs when a domestic firm buys a foreign firm, while the latter happens when foreign firms build new facilities abroad. A number of patterns have become known about global investment. First, most FDI concentrates in the developed world. However, developing country FDI is growing to the point where, in 2012, it actually surpassed activity in the developed world for the first time ever (UNCTAD, 2013). Second, cross-border M&As account for the majority of FDI flows. They are more common in the developed world, whereas greenfield investments are more commonly used to enter developing countries. However, firms in developing countries are becoming increasingly active in the M&A market. The three essays comprising the current dissertation study a number of characteristics regarding worldwide cross-border M&A trends.

The first essay tests how well theories of horizontal and vertical FDI explain observed patterns of cross-border M&As in Organization for Economic Cooperation and Development (OECD) countries. Horizontal investment occurs when multinational firms locate abroad to produce and sell in the local market, whereas vertical investment occurs when multinational firms vertically fragment production processes across national borders. The tariff-jumping explanation of FDI argues horizontal investment will displace exports when transport costs exceed local production costs. Moreover, the convergence hypothesis put forward by Markusen and Venables (1996) suggests horizontal FDI flows will be larger between countries more similar in terms of size, average income, and relative factor endowments. The comparative advantage theory of vertical FDI, in contrast, suggests firms look for cheaper factor prices abroad when vertically fragmenting production (Helpman, 1984).

Using a Poisson pseudo maximum likelihood (PPML) estimator and standard FDI determinants found in the literature, I provide one of the only studies empirically testing whether horizontal and vertical M&As are driven by high trade costs and comparative advantage, respectively. I identify horizontal and vertical M&As using common methods in the literature. Separate estimations using horizontal and vertical cross-border M&As as dependent variables show horizontal and vertical investments look much more similar than previously believed. Some evidence is found for the comparative advantage theory of vertical FDI, but evidence for horizontal M&As appears at odds with the tariff-jumping argument. In general, little support is found for the traditional explanations of FDI.

The second essay challenges long-standing beliefs that the majority of cross-border M&A activity within the developed world is horizontal, whereas M&As in developing nations are predominantly vertical. According to the convergence hypothesis, horizontal FDI should flow between developed countries. Basic comparative advantage theory, however, suggests vertical FDI should flow from developed to developing countries. Following the theories, trade costs and factor endowments should have a stronger effect on cross-border M&As in developing countries, stronger negative effect of trade costs and stronger positive effect of factor endowments. Researchers typically find cross-country FDI patterns fit with the theories reasonably well. However, few analyses explicitly test how well the theories explain current FDI patterns in both developed and developing countries.

The second essay helps fill the void by offering one of the only known studies examining how the effect of trade costs and factor endowments on FDI varies across countries of different development. Results based on the typical FDI determinants suggest trade costs have a stronger effect on developing countries, but no clear support is found for the idea that factor endowment drives vertical investments in developing nations. Although the evidence fails to provide unanimous support for any of the tariff-jumping argument, the convergence hypothesis, or comparative advantage theory, it appears consistent with the

finding that the proportion of horizontal and vertical investment is independent of country development. The results suggest vertical M&As are not driven by comparative advantage, but rather occur between firms in proximate stages of production.

The third essay examines how antitrust affects cross-border M&As in the European Union (EU). European Commission Merger Regulation (ECMR) outlines competition rules and empowers the European Commission (EC) to block anti-competitive mergers adversely affecting the European market. In 2004, ECMR was reformed to better meet challenges associated with competition policy and effectively changed to more closely resemble competition policy in the U.S. One of the most notable changes included in the reform was scrapping the old dominance test in favor of a new SIEC test. The former was essentially a two-part test first requiring a concentration (e.g. merger) created a dominant position before the EC would consider whether the concentration could impede competition. The new test instead put the focus on whether a concentration would "significantly impede effective competition." Switching from the dominance test to the SIEC test seems to have expanded the law to cover more mergers, which is expected to have a non-positive effect on merger activity. The goal of the third essay is to examine how ECMR reform affected cross-border M&As flowing into EU countries.

Results from difference-in-difference estimations provide little evidence suggesting cross-border merger activity increased in countries within the EC's jurisdiction. Although the results are robust to a number of different groups of acquiring countries, I am cautious to interpret the results as direct evidence that the reform had any significant effect on M&A activity in the EU because M&A activity was very similar outside of the EU. Furthermore, the difference-in-difference estimator is very simple and fails to account for a number of other possible events that could have affected M&A activity around the time of the reform.

Together, all three dissertation essays seek to better understand cross-border M&A patterns around the world. The first two essays seek to understand horizontal and vertical cross-border M&A location decisions in both developed and developing countries, while the third essay questions how antitrust policy affects the location of international merger activity. Cross-border M&As, and FDI more generally, are very important, and there appears to be no slow down in M&A activity in sight. Thus, the current dissertation contributes to a growing literature seeking to explain different features of the international market for corporate control.

2 The Determinants of Horizontal and Vertical Cross-border Mergers

2.1 Introduction

Cross-border M&As accounted for the majority of FDI flows over the 1999-2007 period and have remained an important part of global FDI since.[1] For example, with a 2012 value of 308 billion dollars, cross-border M&A flows were nearly the size of the world's 33rd largest economy, Denmark (UNCTAD, 2013).[2] The academic literature has taken notice, and a growing number of papers are studying cross-border M&As. The extant studies, however, examine aggregate cross-border M&A flows despite a well-recognized international trade literature that suggests the reasons for expanding production horizontally or vertically across national borders are not the same. That is, the determinants of horizontal investments differ from the determinants of vertical investments. In the current essay, I separate horizontal and vertical cross-border M&As and test whether the determinants to each type of investment are different as the theory suggests.

Multinational firms have two main reasons for producing abroad. They set up production facilities either for local sales of the same products being sold at home (i.e. horizontal investment) or for purposes of intermediate good production and subsequent shipments back to the home firm for final sales (i.e. vertical investment). Market access theories suggest horizontal FDI is used to avoid the trade costs associated with entering new markets and generally flows between rich countries with similar relative factor endowments (Markusen and Venables, 1996).[3] The comparative advantage theory of vertical FDI, in contrast, suggests firms look for cheaper factor prices abroad (Helpman,

[1] See the annual World Investment Reports produced by the United Nations Conference on Trade and Development (UNCTAD) (www.unctad.org).

[2] World ranking of GDP is based off of 2012 World Bank data (www.worldbank.org).

[3] The substitution of horizontal FDI for exports when trade barriers are large is often referred to as the tariff-jumping argument.

1984). Vertical investments typically flow between relatively skilled-labor abundant rich countries and relatively unskilled-labor abundant developing countries.[4] Because vertical investments are characterized by intra-firm imports of intermediate goods, higher trade costs are expected to discourage these investments. Thus, the traditional theories suggest cross-country endowment differences should discourage horizontal and promote vertical FDI, and trade costs should have a relatively stronger negative effect on vertical than horizontal FDI.

The empirical literature studying FDI is sizable, but it largely ignores the differences between horizontal and vertical FDI. The most related literature consists of a group of papers empirically estimating ideas stemming from the knowledge-capital model. Developed by Markusen et al. (1996) and Markusen (1997), the knowledge-capital model combined the horizontal FDI (e.g. Markusen (1984)) and vertical FDI (e.g. Helpman (1984)) models into a unified framework. Empirical research based on the knowledge-capital framework typically uses country-level foreign affiliate sales data, and evidence for either horizontal or vertical FDI is drawn from different signs and significance on regression coefficient estimates. For example, a positive and significant coefficient on a cross-country skill difference variable would be interpreted as evidence for vertical FDI. Carr et al. (2001) and Davies (2008) provide examples of studies estimating a knowledge capital framework.

Unfortunately, papers such as Carr et al. (2001) and Davies (2008) are ill-equipped to make direct comparisons between horizontal and vertical investments. The dependent variable pools horizontal and vertical FDI and the effect of the variables of interest are not allowed to vary across the different types of investment. Therefore, interpreting a positive coefficient on a skill difference variable as evidence for vertical FDI necessitates the

[4]The theory typically describes forward vertical investments, which occur when firms in rich countries seek lower unskilled-labor wages in developing countries when sourcing intermediate goods. Backward vertical investments are also possible, however, because firms in developing countries may seek the skilled-labor and knowledge capital in rich countries.

assumption that cross-country skill differences do not drive horizontal FDI. Although grounded in the theory, one cannot be confident in such a conclusion since no empirical papers have actually tested whether skill differences have a greater effect on vertical FDI.[5]

The current essay offers the only study aside from Hijzen et al. (2008) directly comparing the determinants of horizontal and vertical FDI.[6] As I will discuss later, Hijzen et al. restricted themselves to the differential role of only trade costs on horizontal and non-horizontal investments, whereas I examine the differential effect of many FDI determinants across horizontal and vertical investments. I use cross-border M&A data provided by Thomson Financial Securities (henceforth, Thomson), which improves upon previously used FDI statistics in both worldwide coverage and level of detail.[7] Horizontal deals are classified using firm-level details (e.g. industry codes identifying location of firm sales), and these details are matched with industry-level intermediate goods flow data to identify vertical deals. Classification of each type of investment allows me to create separate dependent variables for the number of horizontal or vertical M&As, respectively, between country-industry pairs. I then compare how the determinants differ across horizontal and vertical M&As by estimating separate models. The obvious variables thought to differ across deals are trade costs and cross-country factor endowment differences but, by estimating separate models, I relax the assumption that other variables have the same effect on horizontal and vertical deals. That is, I compare the effect of all variables in the model across horizontal and vertical M&As.

Results based on PPML estimation techniques show the determinants of horizontal and

[5]Another related issue with the literature is the FDI data statistics used. Alfaro and Charlton (2009) and Wynne and Kersting (2008) noted country-level FDI statistics often lack the level of detail necessary to find many vertical relationships between firms. Thus, it is not surprising that much of the empirical FDI literature has found better support for horizontal rather than vertical FDI theories.

[6]Coeurdacier et al. (2009) compared “within sector" M&As to “across sector" M&As, although the authors admitted both horizontal and vertical deals can occur within the same two-digit Standard International Trade Classification (SITC) sector.

[7]The literature described above generally uses bilateral U.S. data, whereas Thomson data cover bilateral investments between many different countries.

vertical M&As to look surprisingly similar. My results do not provide clear evidence that market access matters more for horizontal investments, that comparative advantage theories matter more for vertical investments, or that many other variables differently affect horizontal and vertical M&As. In fact, my results suggest distance, as a proxy for trade costs, deters horizontal M&As more strongly than vertical deals. A stronger effect on horizontal investments is puzzling for two reasons. First, theory suggests trade costs should have a stronger effect on vertical FDI. As transportation costs rise, intra-firm imports (i.e. vertical FDI) become more costly, but local production (i.e. horizontal FDI) should become more attractive relative to exports. Thus, trade costs should have a strictly negative effect on vertical investments but a smaller effect on horizontal investments.

Secondly, my results appear to be at odds with Hijzen et al. (2008), who found distance discourages horizontal M&As less than any other deals. The main difference between the current essay and their work is I compare the effect of distance across different types of M&As by constructing separate dependent variables and independently estimating two separate models. They, however, use an interaction term within a single model to identify the differential effect of distance on horizontal deals. Specifically, the authors interact the logarithm of bilateral distance between countries with σ, a variable measuring the percent of all cross-border M&As that are horizontal. σ, however, is positively correlated with the dependent variable, which is the total number of bilateral cross-border M&As between a country-industry pair. The authors estimated a negative effect of distance on total M&As and a positive coefficient on the interaction term. I show the latter effect, however, results from the strong positive correlation between σ and the dependent variable. When I control for the positive correlation, I find the results of Hijzen et al. agree with my results.

My results are robust to a variety of ways to define horizontal and vertical M&As, empirical specifications, and variables thought to differently affect horizontal and vertical FDI. For example, I replace distance with a measure of trade integration to provide another

proxy for trade costs. According to Bertrand et al. (2007), trade integration should have a positive effect on all non-horizontal FDI, but the effect on horizontal investments could be either positive or negative. Regardless, the effect on horizontal M&As is expected to be different than the effect on other M&As. Similarly, the potential for export-platform FDI, which consists of horizontal FDI and subsequent exports to proximate markets, is expected to drive horizontal but not other investments (Blonigen et al., 2007; Baltagi et al., 2007). Analyses using the measure of trade integration in Bertrand et al. (2007) and the surrounding market potential variable in Blonigen et al. (2007), however, provide no clear evidence that horizontal M&As are affected differently than vertical M&As.

Literature has also found contracting institutions to be important in the internalization and, therefore, vertical FDI decision. At a general level, better institutional environments are conducive to a variety of cross-border business interactions.[8] However, industrial organization (IO) literature states that a weaker ability to write and enforce contracts, among other things, makes internalization more attractive (e.g. Williamson (1981)). Combining the contracting and overall institutional ideas suggests that better contracting environments are conducive to M&As, but should have an attenuated effect on vertical deals. Using a number of measures of the contracting environment and overall institutional conditions, I find little evidence in favor of attenuation. Rather, contracting institution variables have a similar effect on horizontal M&As.

The recurring finding in the current study is horizontal and vertical M&As look much more similar than suggested by theory. The most likely explanation is, unlike the extant empirical literature, I separate horizontal from vertical FDI and individually estimate empirical models. Separate estimations provide a clear picture on the determinants of

[8]The positive effect of institutions on cross-border business activity has been shown in the law and finance literature (e.g. La Porta et al. (1998)), the international trade literature (e.g. Levchenko (2007)), and institutional characteristics have also been shown to be important determinants of capital flows (e.g. Alfaro et al. (2007)), FDI stocks (e.g. Daude and Stein (2007)) and cross-border M&A flows (e.g. Coeurdacier et al. (2009)).

horizontal and vertical M&As because they allow me to directly compare the effect of each variable across models. My results suggest future empirical work comparing horizontal and vertical FDI needs to use detailed data and empirical methodologies allowing for more appropriate comparisons between the different types of investment.

The essay proceeds by first discussing how M&As fit into the alternative options for expanding horizontally or vertically across national borders. The third section examines cross-border M&A patterns and describes the specific definitions of horizontal and vertical deals. Section 2.4 discusses the theoretical underpinnings and empirical specification of the estimated model. Furthermore, section 2.4 highlights the variables expected to have differential effects on horizontal and vertical deals. Section 2.5 presents the main results, and section 2.6 further examines how one of the key results fails to support theory. The following section addresses different market access motivations for horizontal FDI and how issues with contracting affect vertical integration decisions. The final section offers some concluding statements and suggests some areas for future research.

2.2 The Entry Mode Choice

A firm wishing to do business in a foreign market faces a menu of options. Market access can be achieved by exporting from a national firm, licensing proprietary assets to a foreign firm that will produce and sell locally, or using direct investment in the local economy. Exporting, licensing, and direct investment often involve the sale of goods identical or similar to those being sold in the home market. In contrast, firms may wish to fragment production vertically to take advantage of cheap intermediate input production options abroad. A firm can either import inputs via arm's length transactions with an upstream supplier or it can engage in intra-firm trade with a foreign affiliate. The latter will generally be chosen for complex production relationships that are longer term and involve relationship-specific assets. Whether expanding horizontally or vertically, the optimal

arrangement will ultimately depend on the relative advantages and disadvantages each option offers, which are discussed below.

The decision to enter new markets with horizontal production strategies has been studied by a number of authors.[9] The general idea is firms can license a foreign entity to produce on their behalf, export from a current production facility, or invest directly in the local economy via a joint venture, greenfield investment, or M&A. Licensing allows a firm to access foreign markets with minimal resource commitment, thereby mitigating many of the risks and costs of doing business abroad (e.g. developing local distribution networks, learning local laws). By licensing a proprietary asset, however, the parent firm exposes itself to opportunistic behavior on the part of the licensee. For instance, the licensee may decide to terminate the production relationship and use the proprietary knowledge to set up a competing firm. The logic broadly follows for joint ventures as well, thereby limiting the attractiveness of licensing and joint ventures.

Exporting, greenfield investments, and M&As are the other leading horizontal production options as they offer a greater degree of control over the production process. Exports and horizontal FDI are typically thought to be competing methods to serve a foreign market.[10] The general argument is exporting requires the physical shipment of goods, where the size of trade costs are increasing in the volume of goods shipped. Higher trade costs increase prices paid by final consumers and, as a result, discourage exports. In contrast, FDI requires the fixed costs of either buying or building a production facility. Fixed costs are avoided with exporting, but FDI avoids the variable tariff and transportation costs associated with exporting. The logic comprises the tariff-jumping argument, which suggests higher trade costs may encourage horizontal FDI. I test the tariff-jumping argument by comparing the effect of trade costs on horizontal and vertical investments.

[9] See Horstmann and Markusen (1987), Eicher and Kang (2005), and Görg (2000), for example.

[10] Use of the term FDI henceforth will refer to greenfield investments and cross-border M&As, which I do for brevity while acknowledging these are not the only direct investment strategies.

The latter involves intra-firm trade and, therefore, is expected to be discouraged by trade costs. Section 2.5 proxies trade costs with bilateral distance between countries, and section 2.7 uses a measure of trade integration. Furthermore, section 2.7 explores the idea that larger markets surrounding the foreign sales base may create opportunities for export-platform FDI. More specifically, surrounding market potential should attract horizontal rather than vertical investments.

Other factors also affect the export-FDI decision for horizontal sales, however. M&As entail immediate access to things such as local market knowledge, distribution networks, brand names, reputation, market shares, local resources, and proprietary technologies. The benefits are typically exclusive to M&As, but some may actually burden the acquiring firm. For instance, M&As could entail inheriting poor reputations or inferior brand names from less productive firms, especially when acquisitions serve as an alternative to firm exit (Bertrand and Zitouna, 2006; Breinlich, 2008). Greenfield investment and exporting, in contrast, are characterized by their own brand names and reputation. Both forms of entry, however, are disadvantaged since they have less market knowledge than local firms and lack distribution networks and market share. Therefore, firms looking to acquire complementary assets abroad are likely to choose acquisition over exporting or greenfield investments (Nocke and Yeaple, 2007, 2008).

If choosing horizontal FDI over exports, firms must decide between building a new production facility or acquiring an existing one. Both require the fixed costs of obtaining a functioning production facility, but greenfield investments require the resources spent understanding and adapting to local cultures, languages, standards, and laws. M&As, on the other hand, require the time and resources used to find a suitable acquisition target and then integrate corporate cultures or restructure the newly acquired firm. Furthermore, acquired firms need to be monitored to ensure operations fit within the standards of the headquarters. Head and Ries (2008) proxied monitoring costs with bilateral distance

between countries, language barriers, and colonial relationships, all of which are examined in section 2.4.

In contrast to horizontal production, firms may vertically fragment production to capitalize on cheaper factor prices abroad. Cross-country factor endowment differences have the effect of creating differences in factor prices, thereby leading firms to locate the production of unskilled labor-intensive processes in countries relatively well-endowed with unskilled labor. Vertical production fragmentation will be attractive if the factor price differentials are sufficient to offset the added costs of transporting intermediate inputs and, more generally, doing business abroad. In contrast, firms expanding horizontally will seek skills similar to those at home since horizontal FDI involves the replication of production processes abroad. Thus, horizontal investments are likely to flow between countries with similar factor endowments and factor prices. I test the expected differential effects of cross-country endowment differences in section 2.4 using skill and education data as proxies for a country's skilled-labor abundance.

Firms can procure intermediate inputs by either purchasing in the market or producing internally within the firm. That is, import intermediate goods from suppliers in arm's length transactions or obtain them via intra-firm trade with a foreign affiliate. Both require costs of physically shipping goods, but using the market also requires the cost of negotiating things such as product quality and price or delivery details. Specifying quality, price, or delivery details in a contract can be difficult due to either the complexity of the production relationship or bounded rationality on the part of the contracting agents (Williamson, 1981). Thus, internalization is more likely when writing and enforcing contracts is difficult. I examine the effect on contracting institutions in section 2.7 with data measuring the contracting environment in a country. Ideas generated by Coase (1937) also suggest internalization is more likely for repeated, long-term production relationships whereas infrequent interactions may be well suited for the marketplace. Furthermore, the

work of Williamson (1981) suggests the attractiveness of internalization is increasing in the presence of relationship-specific assets due to the potential for hold up. The tradeoff with internalization, however, is the added costs of buying or building a foreign affiliate. Thus, a firm seeking to exploit comparative advantages in the form of relative factor endowments will choose the lower cost option between transacting in the market and vertical FDI.

In reality, the above-described production arrangements are not perfectly interchangeable. Firms may use M&As to acquire complementary assets abroad (Nocke and Yeaple, 2007, 2008), while firms looking to expand into some markets via FDI may face objection from the local government.[11] Under the circumstances, exporting may provide the only suitable way to penetrate a market. However, I proceed with cross-border M&As because they have been one of the fastest growing forms of international production relationships and because they are provided within a detailed data set, as I describe next.

2.3 Merger & Acquisition Patterns

Data on cross-border M&As come from the Global Mergers and Acquisitions database compiled by Thomson, which began in 1985 for international transactions involving at least a five percent ownership change in a firm. Thomson's sources include over 200 English and foreign language news sources, SEC filings and their international counterparts, trade publications, wires, and proprietary surveys of investment banks, law firms, and other advisors. Thomson data have the advantage of the most expansive coverage of any other FDI source (Blonigen and Piger, 2012). In line with much of the literature, I define a merger as a transaction where an acquiring firm obtains a majority equity position in the target firm via acquiring at least 50 percent ownership or, if already owning 50 percent or more, acquiring all remaining equity to obtain 100 percent interest

[11] Japan provides a good example, although the government has lately taken measures to increase inward FDI (Head and Ries, 2005).

in the target firm. Distinguishing cross-border from domestic deals is left to Thomson, and I focus on announced rather than completed dates, although this distinction is not likely to be important since nearly 100 percent of cross-border M&As announced between 1990-2008 are consummated within the period. Moreover, over 90 percent of all consummated deals are completed in the same year of announcement.

Figure 2.1 shows the trend in the number of cross-border M&As both worldwide and for those between countries with OECD membership over the 1990-2008 period. The data follow patterns consistent with what have been documented by other authors (e.g. di Giovanni (2005)) as well as the annual World Investment Reports produced by UNCTAD. Cross-border M&A activity boomed in the late 1990s and then again after the global economic downturn in the early 2000s. More recent evidence provided by UNCTAD (2012) has shown, in terms of deal value, cross-border M&A activity has yet to reach pre-crisis levels despite its upward trend since 2009. In general, the figure illustrates M&A flows are strongly procyclical and are driven primarily by OECD countries.

In Figure 2.2, I provide the geographic dispersion of acquiring and target firms worldwide. The data are arranged according to Thomson's regional classification system: Africa/Middle East/Central Asia (AF), Americas (AM), Asia-Pacific (excluding Central Asia) (AP), Europe (EU), Japan (JP), Supranational[12] (SN). To no surprise, the majority of deals involve European or American (especially U.S.) firms. The figure also suggests M&As concentrate among developed countries, which supports the composition illustrated in Figure 2.1.

In addition to being geographically concentrated, Figure 2.3 shows cross-border M&As also cluster by industry. I use standard industrial classification (SIC) codes to define sector groupings in the following manner, with SIC codes in parentheses: Agriculture (1-17),

[12]Supranational M&As involve firms without a unique nationality.

Manufacturing (20-39), Transport (40-49), Trade (50-59), Finance (60-67), Services (70-89).[13] The figure shows the manufacturing sector experiences the most M&A activity, which is appealing for the purposes of the current essay for two reasons.[14] First and foremost, manufacturing firms are at the heart of the horizontal and vertical multinational enterprise (MNE) models. The early work of Markusen (1984) and Helpman (1984) modeled the practice of multinational firms moving horizontal and vertical, respectively, stages of manufacturing across national borders. Second, manufacturing output tends to be tradable, which enables one to compare the role of trade costs between horizontal and vertical M&As. Both reasons, along with the fact that most M&As involve OECD countries, provide credence to focus the remainder of the analysis on manufacturing M&As between countries with OECD membership.

Figure 2.4 shows M&As agglomerate at yet a more disaggregated level. Specifically, the figure illustrates a large proportion of M&As involve manufacturing firms in the same two-digit SIC sector, which suggests M&As are common between firms in closely related industries. Deals within two-digit SIC industries could represent horizontal relationships whereby firms acquire one of their competitors, or they could entail vertical relationships through which upstream firms produce highly specialized inputs for downstream producers. Another possibility, of course, is neither relationship exists and deals serve merely as a diversifying acquisitions.

In order to empirically compare the determinants of horizontal and vertical investments, I need to differentiate between horizontal and vertical M&As. In other words, I need to distinguish between marriages of competing firms and combinations of firms in buyer-supplier relationships. The literature commonly defines horizontal M&As as deals between firms in the same industry, while vertical M&As are generally identified by flows

[13] "Agriculture" includes mining and construction while "Trade" aggregates both wholesale and retail trade. Public administration is excluded due to the lack of deals in this sector.

[14] OECD STAN industry GDP data suggests manufacturing M&A activity is quite large for the size of the industry.

of intermediate inputs between industries. Gugler et al. (2003) and Hijzen et al. (2008) defined horizontal mergers as those where the merging parties were located in the same primary four-digit SIC sector.[15] Doing so is both sensible and straightforward, but the use of only primary SIC sectors treats all firms as single-product firms. In reality, many of the firms engaging in international M&As are large, multiproduct firms. Identifying multiproduct firms by the presence of secondary SIC codes in the Thomson data set reveals 70 percent of all acquirers and 50 percent of all targets do business in multiple sectors. Hence, treating all firms as single-product may miss many competitive and buyer-supplier relationships between firms. For example, Procter and Gamble's 2003 acquisition of Wella, one of the world's largest cosmetics suppliers based in Germany, likely eliminated some competitive pressures on its Pantene, Head and Shoulders, and Herbal Essences hair care brands. Similarly, Procter and Gamble's acquisition of Long Chen Paper Co. in 1999 secured a paper mill in Taiwan. Both mergers would be classified as conglomerate if only using primary SIC sectors, but these acquisitions undoubtedly have horizontal and vertical repercussions, respectively.

Alfaro and Charlton (2009) accounted for the multiproduct nature of many firms engaging in FDI by utilizing both primary and secondary SIC codes. Their data set provided up to six SIC codes (one primary, up to five secondary) for each firm. FDI was labeled horizontal if parent and subsidiary firms shared any four-digit SIC code. Similarly, vertical FDI was identified when any sector between parent and subsidiary were deemed buyer and supplier. Investments having both horizontal and vertical dimensions were identified as "complex," and were therefore isolated from horizontal and vertical investments.

I follow the method of Alfaro and Charlton (2009) by using primary and secondary industry codes to identify horizontal and vertical investments. However, omitting "complex" M&As throws out many deals between large, multiproduct corporations

[15] That is, firms in the same "primary industry."

involving interactions along both horizontal and vertical dimensions. For example, the acquisition of Long Chen Paper Co. by Procter and Gamble eliminated competition in the tissue and paper towel market in addition to securing a paper mill. Thus, I use the two methods for identifying horizontal and vertical FDI found in the literature, and I also add a definition to account for M&As involving both horizontal and vertical interactions. The three methods used for identifying horizontal and vertical M&As are as follows:

1. primary SIC
2. primary and secondary SIC (without overlap)
3. primary and secondary SIC (with overlap)

M&As are defined as horizontal when four-digit SIC codes between the target and acquiring firms match. Vertical deals are identified when the target and acquiring firms reside in different four-digit SIC industries which are marked with sufficient intermediate goods flow.[16] The input-output (I-O) tables provided by the U.S. Bureau of Economic Analysis (BEA) are commonly used to measure intermediate goods flow between industries (e.g. Gugler et al. (2003), Alfaro and Charlton (2009)), and are employed in the current study as well. The BEA 1992 Benchmark I-O Tables provide the value of goods flow between industries, and thus the strength of the vertical relationship between sectors. Specifically, for industries i and j, the Make Table provides $i's$ value of production of goods in j. In contrast, the Use Table gives the dollar value of inputs from i required to produce $j's$ total output. Using the Make Table, one can calculate the percent of each dollar of $i's$ output going to j, a_{ij}, by dividing production for j by total production of i. Analogously for the Use Table, dividing the dollar value of $i's$ inputs required to produce $j's$ total output gives the percent of each dollar of $j's$ output coming from i, b_{ij}. Together, a_{ij} and b_{ij} measure the link between upstream and downstream industries. I use

[16] Of course, intra-firm trade data would be a better way to identify vertical investments, but this data is not provided by Thomson.

$v_{ij} = max\{a_{ij}, b_{ij}\}$ as the final value to classify a merger as vertical. The BEA's six-digit industry codes are matched to four-digit SIC codes using BEA concordances. Common approaches are to define vertical investments where v_{ij} is greater or equal to five percent (e.g. Alfaro and Charlton (2009)) or ten percent (e.g. Gugler et al. (2003)), with larger values of v_{ij} corresponding to more strict definitions of vertical relationships. For illustration purposes, I present summary statistics using the one, five, and ten percent thresholds.

Table 2.1 shows the percentages of manufacturing M&As that are horizontal and vertical over the 1990-2008 period. With the exception of 2008, horizontal and vertical percentages are given in two-year averages and M&A totals sum over both years. I include summary statistics using all three definitions. Horizontal deals comprise 38 percent of all M&As if using only primary sectors to define deals (Panel A). Panel B, however, illustrates many primary SIC horizontal deals have vertical connections in secondary industries ($24.3 < 38.3$). If horizontal and vertical are allowed to overlap (Panel C), then 63.9 percent of M&As are horizontal. Thus, there exists large variation depending on how one defines horizontal deals. Comparing Panel A to Panels B and C shows how treating all firms as single-product limits our understanding of the true relationships existing between merging parties.

There also exists large differences across definitions for vertical M&As, particularly for definition 3. Just under ten percent of all deals are vertical (10 percent threshold) using definitions 1 and 2, but over one third are vertical when allowing horizontal and vertical deals to overlap (Panel C). Similar patterns follow when using one and five percent thresholds, which are consistent with the findings of others. Using only primary SIC sectors, Hijzen et al. (2008) found 32 percent of deals to be horizontal over the 1990-2001 period while Gugler et al. (2003) found four percent of deals to be vertical over the 1990-1998 period. I find 38.3 and 9.8 percent, respectively. Furthermore, Alfaro and

Charlton also found similar patterns between horizontal and vertical investments using definitions 1 and 2.

2.4 Econometric Methodology and Data

The econometric specification used in the current essay is motivated by the theoretical framework of Head and Ries (2008). The general idea is bilateral M&As occur as a result of an endogenous bidding process whereby firms across the globe compete for control rights on a foreign subsidiary. The probability that a particular firm submits the winning bid is given by the probability it anticipates a higher target value than do competing bidders. The authors derive the probability to be an exponential function of the number and ability of firms at home, the number and ability of competing bidders in other countries, and physical and cultural distance between home and target countries. In the end, the expected number of bilateral M&As between a country pair is shown to be a nonlinear function of both home and foreign market sizes, home firm abilities, bid competition from third countries, and physical and cultural distance measures.

The model developed by Head and Ries reduced to an estimable equation similar to the gravity equation, which has become a workhorse in the international trade and FDI literature. The standard method for estimating gravity equations is by ordinary least squares (OLS) after log-linearization. Santos Silva and Tenreyro (2006) pointed out two problems with log-linearization. The first is the existence of zeros in the dependent variable, which is not uncommon in bilateral trade and FDI data. Thus, taking logarithms would significantly reduce the sample size by eliminating all zero observations and therefore any information contained in such data points. The second problem is a logarithmic transformation of the error will in most cases be a function of the regressors, leading to heteroscedasticity. Under the circumstances, OLS will fail to be a consistent estimator. Santos Silva and Tenreyro recommend the PPML estimator as an attractive

alternative.

In order to successfully employ the PPML estimator for the purposes of the current essay, however, the modeling framework needs to incorporate the theoretical underpinnings of horizontal and vertical production relationships. In other words, the model needs to include both transportation costs and cross-country factor price differentials to test for differences between horizontal and vertical investments. Furthermore, the econometric specification should incorporate features of past research that has increased our understanding of foreign investments. There are two issues with the outstanding empirical FDI research. The first is, whether studying cross-border M&As or FDI more generally, the empirical literature is large and typically uses aggregated FDI data.[17] The use of aggregate data, however, makes comparison between horizontal and vertical investments difficult because horizontal and vertical M&As can only be identified with more detailed data. The other issue is the number of FDI determinants studied in the extant research is enormous.[18] For example, Blonigen and Piger (2012) pointed out that, among only three of the more well-regarded empirical FDI studies, there exists 22 different covariates with very little overlap between studies.

My goal is to examine differences between horizontal and vertical M&As using the commonly included variables in the empirical FDI literature, which will provide me the best opportunity to compare my (disaggregated) results to the existing (aggregate) results. Fortunately, Blonigen and Piger identified the standard variables consistently receiving strong support to be included in FDI studies. More specifically, they used Bayesian Model Averaging techniques on the exhaustive set of FDI covariates found in the literature to pinpoint the variables most likely to explain FDI, which I use as the basis for my empirical specification. In particular, I use the variables that illustrated inclusion

[17] Bertrand et al. (2007), Blonigen et al. (2012), and di Giovanni (2005) provide examples of cross-border M&A studies that used country-level, and therefore aggregate, investment flow data.

[18] Both Eicher et al. (2012) and Blonigen and Piger (2012) noted there exists a surprising lack of consensus on the appropriate FDI determinants.

probabilities greater than 50 percent for M&As between OECD countries. With the theoretical framework of Head and Ries in mind, I incorporate the robust determinants of M&As into a nonlinear empirical model estimated by PPML as recommended by Santos Silva and Tenreyro. Denoting the acquiring (target) industry and country as i (j) and k (l), respectively, the econometric specification is given by:[19]

$$\begin{aligned} E[m_{ijklt,d}|covariates] = exp(&\beta_0 + \beta_1 lnY_{ikt} + \beta_2 lnY_{jlt} + \beta_3 lnDistance_{kl} \\ &+ \beta_4 lnRemote_{kt} + \beta_5 lnRemote_{lt} + \beta_6 lnUrban_{kt} + \beta_7 lnUrban_{lt} \\ &+ \beta_8 lnSkill_{kt} + \beta_9 lnSkill_{lt} + \beta_{10} lnD.Skill^2_{klt} + \beta_{11} lnD.Education^2_{klt} \\ &+ \beta_{12} CommonLanguage_{kl} + \beta_{13} Colony_{kl} + \beta_{14} RTA_{klt} + \gamma_t + \alpha_i + \alpha_j) \quad (1) \end{aligned}$$

which will produce consistent estimates of the parameters of interest so long as the conditional expectation of $m_{ijklt,d}$, the number of type d cross-border M&As between industry i in country k and industry j in country l in time t, is correctly specified (Santos Silva and Tenreyro, 2006). The type of deal, d, is broken into four categories and, therefore, four different dependent variables. The first is the total number of deals, which I denote as “all." “All" M&As aggregates the number of horizontal, vertical, and conglomerate deals into a single dependent variable. The most important dependent variables for the purposes of the current study are for horizontal and vertical deals. One variable includes only the number of horizontal M&As, and another includes only the number of vertical M&As. Separately estimating equation 1 with the horizontal and vertical dependent variables allows me to compare regression coefficient estimates across models. I also create a fourth dependent variable comprised of non-horizontal deals to provide another comparison piece for horizontal deals.

The variables in equation 1 are defined in the following ways, with ln denoting the data

[19]The inclusion probability of urban concentration of country l was less than 50 percent, but is included here because, as will be discussed below, agglomeration in host countries has been shown to attract inward investment.

are in natural logarithms. Y_{ik} and Y_{jl} are production for industries i and j in countries k and l, respectively, and $Distance_{kl}$ is the bilateral distance between countries k and l.[20] $Remote$ represents the remoteness of a country, while $Urban$ measures the urban concentration of a country. $Skill$ is the skill level of a country, and $D.Skill^2$ and $D.Education^2$ measure the squared differences in skill levels and average education levels between countries, respectively. $CommonLanguage$ is a dummy variable denoting when countries share a common official language, and $Colony$ similarly denotes when countries share a common colonizer. Having regional trade agreements in place is represented by RTA. γ_t are time fixed effects and α_i, α_j are two-digit SIC sector fixed effects for industries i and j, respectively, which are included to control for unobserved variations across time and industries.

I separately estimate equation 1 using different dependent variables to test whether the determinants to horizontal and vertical M&As are different. The main differences expected between horizontal and vertical M&As are for distance and the endowment difference variables. Distance should deter all deals, but the tariff-jumping explanation argues its effect on horizontal investments should be attenuated or potentially even positive. In contrast, trade costs should have a purely negative effect on intra-firm trade and therefore vertical investments. In terms of relative endowment differences, comparative advantage theories (e.g. Helpman (1984)) claim larger differences are conducive to vertical investments while the convergence hypothesis suggests more similar country characteristics lead to larger flows of horizontal investment (Markusen and Venables, 1996). Thus, the endowment difference variables should have a positive effect on vertical M&As and a negative effect on horizontal M&As. The effect on “all" M&As will ultimately depend on the share of deals that are horizontal and vertical.

[20] Blonigen and Piger (2012) found strong support for real GDP and real per capita GDP at the country level. Since the current study analyzes M&As at the industry level, I use real value added by two-digit SIC manufacturing sectors.

I also allow the effects of the remaining variables to differ across horizontal and vertical investments. Although the coefficient signs are expected to be the same across models, the current study offers one of the first papers showing the magnitudes can differ. Higher income at the country level has consistently been shown to generate more inward and outward investment, and Hijzen et al. (2008) showed this to be true for larger industries as well. Hence, bigger industries are expected to promote all types of M&As. The effect of remoteness on cross-border M&As is not entirely clear. Both the trade and cross-border M&A literatures offer mixed evidence for remoteness, which can (at least partially) be attributed to the disparate ways of measuring third-country effects. Researchers generally agree that remote countries should experience less international activity, however.

Urban concentration and skill levels should positively affect M&A flows. The former has not been analyzed in previous cross-border M&A studies, but was examined by Blonigen and Piger (2012) to measure possible agglomeration effects. Agglomeration effects are tied to theories of economic geography, which posit positive externalities (i.e. agglomeration effects) induce firms in the same industry to locate proximate to each other (Head et al., 1995). If agglomeration indeed drives the location of M&A activity, one should expect urbanization to promote deals. The skill variables, measured as the skill level of the workforce within a country, should also promote all deals. Tekin-Koru (2012) found target-country skilled labor to promote FDI, while the MNE literature has shown parent-country skilled labor promotes FDI (e.g. Markusen (2002)).

Previous research has also found sharing a common official language, sharing a common colonizer, and having regional trade agreements in place can facilitate cross-border M&As. Many authors have shown deals to be more common between countries speaking the same language (e.g. di Giovanni (2005), Berger et al. (2004), Head and Ries (2008)), while Head and Ries (2008) found colonial variables to be important in promoting cross-border M&A flows. Similarly, Hijzen et al. (2008), di Giovanni (2005), and

Coeurdacier et al. (2009) all have shown trade agreements help encourage cross-border deals. Accordingly, I expect common language, common colonizer, and regional trade agreement variables to encourage M&A flows. Table 2.2 summarizes the expected effects of all variables, while Table A1.2 provides data definitions and sources.

Using equation 1 above, the empirical strategy focuses on 19 manufacturing sectors for all countries with OECD membership.[21] I focus on the most recent 10 years of data to obtain a manageable number of observations. Doing so results in 19 acquiring sectors, 19 target sectors, 10 years, and 29 acquiring and target countries. The final data set is further reduced to less than two million observations due to missing data in the regressors.

2.5 Results

I now turn to the estimation results, which are given in Table 2.3. As specified in equation 1, all estimations include both year and acquirer and target industry fixed effects. Robust standard errors allow for clustering at the country-pair level. I present results using definition 2 for horizontal and vertical M&As and v_{ij} = five percent for vertical M&As, but it turns out the use of other definitions or vertical thresholds does not meaningfully change the results.[22] For aggregate ("All") M&As, good support is found for the covariate set as most coefficients are statistically significant with the expected sign. Hence, the results are consistent with the standard findings in the literature.

Results central to the essay are given in the second and third columns of output, which provide estimations for horizontal and vertical M&As. I use Wald tests to examine whether coefficients are equal across models; any statistically different (five percent significance level) coefficients are denoted by boldface font in the vertical column.

[21] Table A1.1 provides a list of all two-digit SIC manufacturing sectors. The "furniture and fixtures" (SIC 25) sector is excluded from the analysis due to the lack of production data in the OECD STAN database. Table A1.3 lists all countries included in the analysis, while Table A1.4 and Table A1.5 provide summary statistics and the correlation matrix, respectively.

[22] Results using definitions 1 and 3 are given in Appendix B.

Overall, the signs, magnitudes, and statistical significance of estimated coefficients suggest the determinants of horizontal and vertical M&As are very similar. For example, both horizontal and vertical deals are encouraged by larger industries, higher skill levels, speaking the same language, and sharing colonial ties. Although some coefficient estimates across horizontal and vertical deals are different statistically, the differences seem quite small economically (e.g. $\hat{\beta}_1$ = 0.66 and 0.76 for horizontal and vertical M&As, respectively).

The coefficient estimates on the distance and endowment difference variables between horizontal and vertical M&As are of particular interest. Distance is found to discourage both horizontal and vertical deals, but it has a stronger effect on *horizontal* deals, which was not expected. Trade costs should have a strictly negative effect on vertical investments, but the tariff-jumping argument suggests trade costs could have a positive effect on horizontal investments. At a minimum, trade costs should have a weaker effect on horizontal than vertical deals. Furthermore, my result runs counter to the main results of Hijzen et al. (2008), who similarly tested the tariff-jumping argument using cross-border M&A data. The contradictory findings present a puzzle, which is more formally addressed in Section 2.6 below. The differential effect of distance on horizontal and vertical deals, however, is not statistically different. Moreover, coefficient estimates of 0.32 and 0.25 for horizontal and vertical deals, respectively, suggest distance also has an economically similar effect across deals.

Theory also suggests endowment differences should have different effects on horizontal and vertical investments. The comparative advantage theory suggests a positive effect on vertical FDI, while the convergence hypothesis suggests a negative effect on horizontal FDI. However, I find cross-country skill and education differences promote both vertical and horizontal deals. The coefficient estimates are very small, but they are statistically larger for vertical deals. Thus, comparative advantage seems to explain vertical M&As,

but support for the convergence hypothesis is not evident. The small coefficient estimates are somewhat surprising given the variation in skill and education levels across countries. For example, 48 percent of the workforce in the Netherlands is employed in skilled labor positions whereas only 16 percent are in Mexico. Similarly, the average years of education attained in Portugal is only seven while the average person receives 13 years of education in the U.S. One may expect more vertical M&As between U.S. and Portugese firms, but the results suggest horizontal M&As also flow between these countries.

In general, horizontal and vertical M&As look similar. I use multiple methods to check for robustness. The first is to compare horizontal to non-horizontal M&As, which is particularly meant to check whether market access is more important for horizontal M&As. Non-horizontal M&As are defined as deals where the merging parties do have sales in the same four-digit SIC industries. The results, given in the last column of Table 2.3, show non-horizontal deals also look similar to horizontal deals. Moreover, the similarities between deals are robust to alternative definitions of horizontal and vertical deals. Tables A1.6 and A1.7 present results when using definitions 1 and 3, respectively, to define deals as described in section 2.3 above. That is, allowing M&As to be simultaneously defined as horizontal and vertical does not meaningfully change the results, nor does using only primary SIC codes to define M&As. The results are also robust to a variety of empirical specifications. For example, using the absolute value of skill and education differences or including the logarithm of education does not impact the results. Moreover, in unreported results I show my results are robust to negative binomial regressions.

The current study provides one of the first papers to separately estimate models in order to explicitly compare horizontal and vertical investments. My evidence suggests the determinants of horizontal and vertical investments look much more similar than previously believed. I do not find clear evidence that tariff-jumping motivations explain

horizontal M&As, and factor endowment differences have a small but positive effect both horizontal and vertical M&As. The former result is not consistent with the conclusion of Hijzen et al. (2008), which is explicated next.

2.6 Distance Puzzle

Hijzen et al. (2008) provide the only other study empirically examining the role of trade costs on different types of FDI. With interest in testing the tariff-jumping explanation of horizontal FDI and not on testing the comparative advantage theory of vertical investments, the authors compared horizontal M&As to all other (non-horizontal) deals. They found distance to have a less negative effect on horizontal deals, or evidence in favor of the tariff-jumping argument. In contrast, my results suggest the opposite: distance deters horizontal investments more strongly than any other. Both papers use Thomson cross-border M&A data for OECD countries, and horizontal M&As are defined by primary four-digit SIC codes.[23] The goal of the current section is to explain why our results are not consistent.

The main difference between papers is I separate horizontal and vertical M&As into two separate dependent variables and estimate two regressions while Hijzen et al. used total M&As as the dependent variable (d = all) and allowed the effect of trade costs to differ for horizontal deals with an interaction term.[24] In other words, they use a single regression where a trade cost variable is interacted with σ_{ij}, which is defined as:

$$\sigma_{ij} = \frac{\text{horizontal M\&As}_{ij}}{\text{total M\&As}_{ij}} \tag{2}$$

which is the percent of all deals between industries i and j that are horizontal over the sample period. Since horizontal M&As are defined at the four-digit SIC level and the

[23] My results using primary SIC codes to define horizontal and vertical deals are given in Table A1.6.

[24] They use data over the 1990-2001 period, while I focus on the 1999-2008 time frame. They also used two-year averages while I focus on annual data.

empirical analysis focuses on the two-digit SIC level, σ_{ij} ranges from zero to one for observations within the same two-digit sector and equals zero for observations crossing two-digit sectors. In reference to Figure 2.4, $\sigma_{ij} \in [0, 1]$ on the diagonal but will always equal zero off the diagonal. The authors allowed the effect of distance to vary across horizontal and non-horizontal deals through the use of:

$$\alpha_1 lnDistance_{kl} + \alpha_2 \sigma_{ij} lnDistance_{kl} \tag{3}$$

in their empirical specification, where the dependent variable is the total number of cross-border M&As between a country-industry pair.[25] According to the tariff-jumping argument, $\hat{\alpha}_1 < 0$ and $\hat{\alpha}_2 > 0$ should be the case, which is exactly what the authors found. Moreover, equation 3 shows one can calculate the value of σ_{ij} necessary to induce a positive effect of distance.[26] Depending on the specification, the authors showed the threshold can be as small as 63.7 percent. Therefore, distance deters M&As when horizontal deals make up a sufficiently small share of total deals ($<$ 63.7 percent) but has a positive effect if horizontal M&As comprise a larger share of all deals ($>$ 63.7 percent). However, by using only horizontal M&As as the dependent variable, my results in section 2.5 show the effect of distance is negative even if 100 percent of M&As are horizontal.

I begin by incorporating (3) into equation 1 in an attempt to replicate the main result of

[25]The total number of deals is comprised of horizontal, vertical, and conglomerate deals.
[26]$\hat{\alpha}_1 + \hat{\alpha}_2 \sigma_{ij} > 0$ or $\sigma_{ij} > -\hat{\alpha}_1 / \hat{\alpha}_2$.

Hijzen et al.. The resulting specification is given by:

$$
\begin{aligned}
E[m_{ijklt,all}|covariates] = exp(&\beta_0 + \beta_1 lnY_{ikt} + \beta_2 lnY_{jlt} + \beta_3 lnDistance_{kl} \\
&+ \beta_4 \sigma_{ij} lnDistance_{kl} + \beta_5 lnRemote_{kt} + \beta_6 lnRemote_{lt} + \beta_7 lnUrban_{kt} \\
&+ \beta_8 lnUrban_{lt} + \beta_9 lnSkill_{kt} + \beta_{10} lnSkill_{lt} + \beta_{11} lnD.Skill^2_{klt} \\
&+ \beta_{12} lnD.Education^2_{klt} + \beta_{13} CommonLanguage_{kl} + \beta_{14} Colony_{kl} \\
&+ \beta_{15} RTA_{klt} + \gamma_t + \alpha_i + \alpha_j) \qquad (4)
\end{aligned}
$$

where the dependent variable in equation 4 corresponds to d = "all" in equation 1.[27] Table 2.4 provides the estimation results.[28] Column 1 is labeled "Hijzen et al. (2008)" as it mirrors the authors' use of the interaction term. Results corroborate those of Hijzen et al.: although distance discourages M&As in aggregate, its effect weakens the higher the share of horizontal M&As. In fact, if the share of horizontal M&As exceeds 68 percent ($\sigma_{ij} > 0.496/0.730$), then distance actually *encourages* deals. Notice also the original signs and significance on all other variables are unaffected by the inclusion of the interaction term.

Figure 2.4 illustrates a large proportion of M&As occur within the same two-digit SIC industries which, by definition, is also where all of the horizontal deals happen. Moreover, $\sigma_{ij} = 0$ anywhere off the diagonal by definition. Hence, σ_{ij} is positively correlated with the dependent variable, which is confirmed in the data.[29] Thus, it is an open question whether the estimate for β_4 reflects the differential effect of distance on horizontal M&As or if it is instead picking up the vast M&A activity within two-digit SIC sectors. I include σ_{ij} as a separate regressor to test, and column 2 confirms. The estimate for β_4 falls to zero,

[27] Since I am using primary SIC industries to define horizontal M&As here to match the methods of Hijzen et al., the results obtained using equation 4 will be comparable to the left-most column of output in Table A1.6.

[28] I present results using PPML estimations to be consistent with section 2.5. Hijzen et al. used negative binomial regressions, but my results are robust to this estimation procedure as well.

[29] The correlation coefficient = 0.1045.

and the large coefficient on σ_{ij} reflects the sizable M&A activity along the diagonal of Figure 2.4.

Columns 3 and 4 serve as robustness checks. In column 3, I repeat the Hijzen et al. (2008) specification after replacing σ_{ij} with D_{ij}, a dummy variable taking a value of one when $i = j$ and zero otherwise. The results are similar to those when using σ_{ij}, but the coefficient on the interaction term between σ_{ij} and the logarithm of distance is negative and significant when using D_{ij}. That is, the effect of distance on horizontal deals is also negative, and it becomes more negative the larger is the share of horizontal deals. Thus, the results using D_{ij} suggest σ_{ij} acts as a dummy variable denoting when M&As take place in the same two-digit industry. Another way to show σ_{ij} acts like a dummy variable is by including industry-pair fixed effects, which will control for M&As in the same two-digit sectors. As shown in column 4, the results are similar to those in column 2. Distance has a negative effect on all deals, but the estimate for β_4 is statistically zero.

In general, the results in Table 2.4 cast doubt on the finding that distance encourages horizontal cross-border M&As. Rather, the positive coefficient estimated on $\sigma_{ij} lnDistance_{kl}$ is due to strong positive correlation between σ_{ij} and the dependent variable. Once one controls for the positive correlation (i.e. the fact that most M&As occur within two-digit SIC sectors), distance no longer has a positive effect on horizontal investments. In other words, results presented in columns 2-4 of Table 2.4 agree with those presented in Table 2.3: the effect of distance is not weaker for horizontal investments. Hence, properly controlling for the large intra-industry M&A activity shows the results of Hijzen et al. (2008) agree with my results. Distance has a strictly negative effect on all types of deals, and there exists evidence it may be stronger for horizontal cross-border M&As.

2.7 Extension: Market Access and Contracting Institutions

The tariff-jumping and comparative advantage theories are two well-recognized explanations of cross-border investment. Yet they are not the only theories describing international production patterns. As discussed in section 2.2, the FDI literature has shown horizontal investments are driven by another form of market access: export-platform FDI. Export-platform investment occurs when horizontal investments are used to serve not only the local market, but nearby countries through exports as well. In contrast, theories of the firm in the IO literature have shown the firm's choice between outsourcing and internalizing the production of intermediate inputs depends critically on the ability to write and enforce contracts. Market transactions are attractive when details of a contract are easily specified and enforced, but vertical FDI is more attractive when the contracting environment is poor. The current section tests whether export-platform opportunities drive horizontal M&As and contracting environments affect the location of vertical M&As. I also follow the literature and test whether trade integration explains horizontal deals.

2.7.1 Market Access

Market access is a term often used to describe reasons for expanding production horizontally across national borders. Whether it comes in the form of entering new markets or simply maintaining sales in an existing market by replacing exports with local production, horizontal FDI involves the sale of products similar to those being sold at home. The tariff-jumping idea suggests trade costs encourage horizontal FDI to distant countries, whereas exports can be optimal between more proximate countries. In section 2.5, I surprisingly found distance had the largest effect on horizontal M&As. I revisit the puzzling result using a measure of trade integration, which more explicitly controls for the amount of bilateral trade flowing between countries.

Following Bertrand et al. (2007), market access can be approximated by a measure of trade integration given by:

$$\phi_{kl} = \sqrt{\frac{\psi_{kl}\psi_{lk}}{\psi_{kk}\psi_{ll}}}$$

where ψ_{kl} represents the value of country $k's$ imports from country l and ψ_{kk} is local sales of country k.[30] Data were obtained from the OECD STAN database (ISIC Rev. 3) and subsequently converted to U.S. dollars using the International Monetary Fund's (IMF) International Financial Statistics (IFS) exchange rate data (period average). ϕ_{kl} lies between zero and one, with values closer to one indicating more integrated markets. When considering horizontal M&As, ϕ_{kl} has two opposing effects. The tariff-jumping argument suggests better market integration (larger ϕ_{kl}) reduces the incentives to merge because trade costs are not large enough to make horizontal FDI more attractive than exporting. In contrast, more integrated markets could mean more competition, which could spur M&As in order for firms to capture some price-setting power. Hence, the overall effect on horizontal investments will be determined by which individual effect dominates. According to Bertrand et al., ϕ_{kl} should have a strictly positive effect on all non-horizontal deals.

Export-platform FDI, which consists of horizontal FDI and subsequent exports to proximate markets, should also have a different effect on the location of horizontal investments.[31] Specifically, locations well-suited for export-platform FDI should attract horizontal FDI and not vertical investments. Following Blonigen et al. (2007), I measure surrounding market potential by the sizes of markets near a potential target firm. Market potential is represented by the sum of inverse-distance weighted GDPs of all $k \neq l$

[30] Local sales are calculated by netting exports out of total production.
[31] See Blonigen et al. (2007) and Baltagi et al. (2007) for recent articles on export-platform FDI.

countries in the world, and is formally given by:

$$Potential_l = \sum_{k \neq l} \frac{Y_k}{Distance_{kl}}$$

Real GDP data (Y_k) are taken from Penn World Tables while, as before, the distance data are obtained from CEPII.[32] Theory maintains $Potential_l$ should encourage export-platform (i.e. horizontal) FDI while having no effect on other types of investments.

Table 2.5 provides the estimation results for both trade integration and surrounding market potential. The specification follows equation 1 but individually appends $ln\phi_{kl}$ and $lnPotential_l$. For brevity, I only report the results for the variables of interest. The effect of $ln\phi_{kl}$ and $lnPotential_l$ should be smaller and larger, respectively, for horizontal M&As compared with all other deals. However, I find the effects to be both statistically and economically similar between different types of deals. The positive effect of trade integration mirrors the result found by Bertrand et al., and the negative effect of market potential, although not expected, is consistent with the finding of Blonigen et al..[33] The former suggests trade and cross-border M&As are complementary, while the latter suggests the M&A market is competitive, with fewer firms being acquired when nearby substitutes are plentiful. The latter result follows the idea that higher bid competition can reduce M&A activity in a given country (Head and Ries, 2008).

2.7.2 Contracting Institutions

Just as market access motivations are thought to be important for horizontal investments, issues with writing and enforcing contracts are very important in the firm's internalization, and thus vertical FDI, decision. As discussed in section 2.2, firms have two general options when looking to source intermediate inputs. They can either acquire inputs

[32] GDP data are in trillions of 2005 international dollars.
[33] Blonigen et al. suggested border effects may be the cause of the negative coefficient.

through arm's length transactions in the market where the details of the relationship are outlined in a contract, or they can internalize input production within the boundaries of the firm. Higher transactions costs of market interactions, contract complexity, and bounded rationality all increase the attractiveness of internationalization over contracting. Thus, a firm comparing the two options between two different countries should prefer to internalize suppliers in the country with relatively worse contracting institutions while outsourcing input production in the country with better institutions.

More general institutional characteristics, however, will affect the decision to do business in foreign countries in the first place. For example, institutional environments have been shown to be important in the law and finance literature (e.g. La Porta et al. (1998)), the international trade literature (e.g. Levchenko (2007)), and they have also been shown to be important determinants of capital flows (e.g. Alfaro et al. (2007)), FDI stocks (e.g. Daude and Stein (2007)) and cross-border M&A flows (e.g. Coeurdacier et al. (2009)). Findings indicate better institutional characteristics promote cross-border transactions, whatever form they take. Combining the results for overall institutional characteristics with the IO theories suggests cross-border M&A activity should be higher in countries with stronger institutions, but their effect on vertical M&As should be attenuated because a better contracting environment reduces the relative attractiveness of vertical FDI over contracting.

I examine the idea that contracting institutions will affect vertical M&As differently than other M&As using multiple proxies for institutions, all attempting to measure a country's contracting environment. The first data set I utilize is the World Bank's Doing Business Report, which collects data for 185 countries on the capacity to resolve a commercial lawsuit. I take two variables from the report. The first is the number of days required to enforce a contract ($Days$), while the second is the cost (percent of claim) of enforcing a contract ($Cost$). Larger values of both variables translate into less efficient contracting

environments. Hence, contracting institutions variables are expected to have a negative effect on M&As, with an attenuated effect on vertical deals. Moreover, only the contracting institutions of the target country should matter because that is where the contract need be enforced.

I also use two legal environment variables to measure the strength of contract enforcement in a country. The first is a rule of law index taken from the World Governance Indicators. Denoted $Rule$, this variable takes on a value ranging from -0.25 to 0.25, with larger index values corresponding to better rule of law. In addition, an index of the strength of legal rights ($Legal$) is taken from World Bank's World Development Indicators. $Legal$ ranges from zero to 10, with higher scores indicating bankruptcy and collateral laws are better designed to facilitate the flow of credit in an economy. Both indexes of the legal environment are expected to promote M&As but, as noted above, the effects should be attenuated for vertical deals. Moreover, they should matter for both outward and inward investment because better institutions facilitate overall business activity. Table 2.6 formally provides the hypothesized effect of each variable.

Table 2.7 provides the estimation results using equation 1 appended individually by each measure of institutions. For presentation purposes, I report only the variables of interest. Real GDP per capita variables are included in each estimation to avoid the possibility that institutions proxy for average income.[34]

The signs and significance largely fit with expectations, but I once again find very little differences between horizontal and vertical investments. As expected, the variables measuring contract enforcement are more important in the target country, and $Days_l$ and $Cost_l$ show some evidence of attenuation for vertical deals. For the overall legal environment better institutions are found to promote deals, in particular for the strength of

[34]Real GDP per capita data are in 2005 international dollars and were taken from Penn World Tables.

legal rights. Both $Legal$ and $Rule$ provide evidence of attenuation, but only in the target country. In general, Table 2.7 shows some evidence of attenuation in the target country, but the degree of difference between horizontal vertical M&As is neither statistically nor economically large.

The results follow the general theme of the essay that the determinants of vertical and horizontal look similar. Market access affects vertical as well as horizontal investments, and contracting institutions drive the location of both types of deals. The results are robust to a number of proxies for market access and contracting institutions.

2.8 Conclusion

Theory suggests market access should drive horizontal FDI, while cross-country factor endowment differences should facilitate vertical FDI. The empirical FDI literature studying the different types of investment largely fails to appropriately distinguish between the determinants of horizontal FDI and the determinants of vertical FDI. The current essay provides one of the first studies explicitly comparing the determinants of FDI across horizontal and vertical investments.

I use a detailed database on cross-border M&As to compare the determinants of horizontal and vertical investments in OECD countries over the 1999-2008 period. Importantly, the database improves upon FDI data used in prior empirical studies by offering firm-level details, information that allows me to identify horizontal and vertical M&As. I separate horizontal and vertical M&As into two separate dependent variables and estimate two regressions using the standard regressors found in the literature. I then compare the effect of each regressor across horizontal and vertical models.

I find the determinants of horizontal and vertical M&As to look very similar, both statistically and economically. That is, I do not find market access matters more for

horizontal than vertical investments. In fact, my results suggest distance deters horizontal M&As more strongly than vertical deals. Furthermore, I find only weak evidence that cross-country endowment differences matter more for vertical investments than horizontal investments. Thus, I show the determinants of horizontal and vertical M&As look more similar than the theory and past empirical research suggest. The results are robust to a variety of M&A definitions, empirical specifications, and additional variables thought to differently affect horizontal and vertical deals.

The evidence presented in the current study suggests the identification of horizontal and vertical FDI requires more detailed information than many country-level data sets offer. Future comparisons between the different types of investment need to use very detailed data to accurately discern between horizontal and vertical investments. Admittedly, the level of detail necessary to separately identify horizontal and vertical FDI is very demanding of any data set. Future research is needed to better understand why distance deters horizontal investments more strongly than vertical investments, and more generally why horizontal and vertical FDI look so similar.

2.9 Tables and Figures

Figure 2.1: Cross-border M&A activity

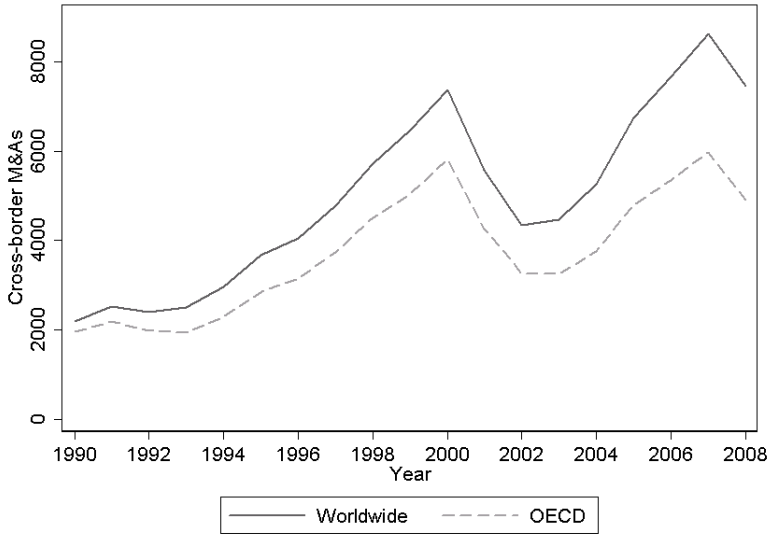


Figure 2.2: Cross-border M&A activity by region

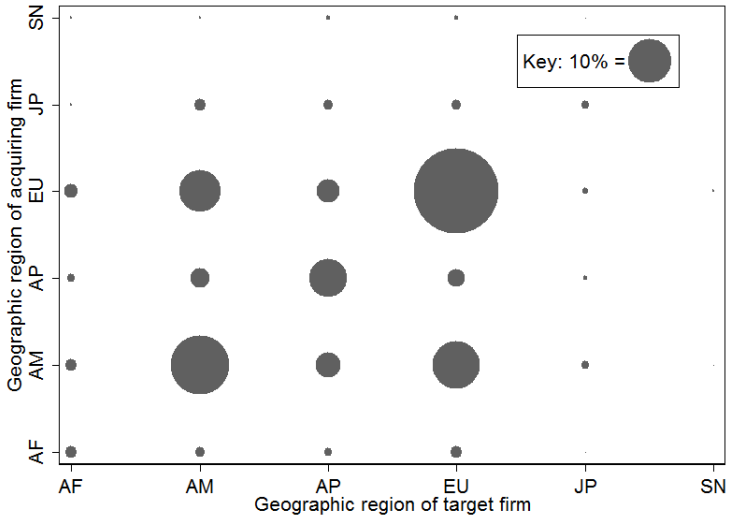


Figure 2.3: Cross-border M&A activity by sector

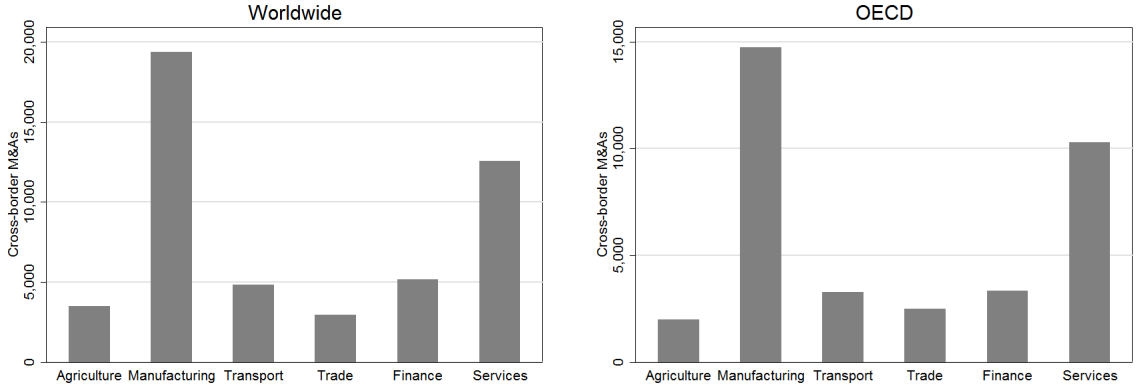


Figure 2.4: Cross-border M&A activity by manufacturing sector, OECD countries

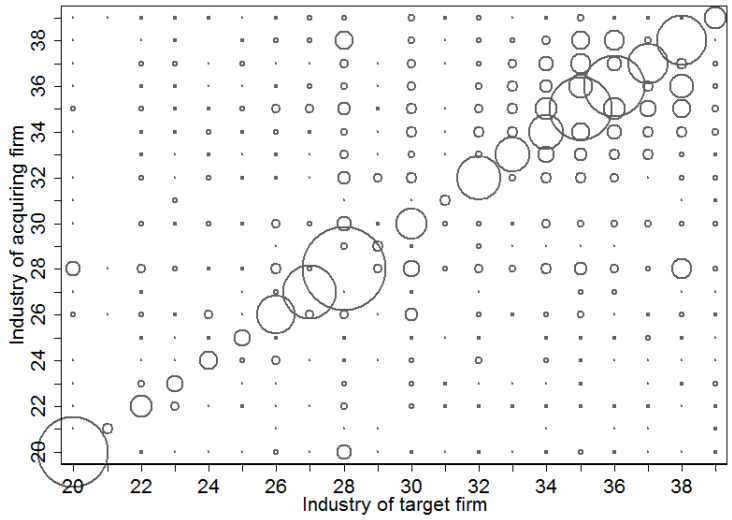


Table 2.1: Composition of horizontal and vertical M&As

	Horizontal	Vertical (1%)	Vertical (5%)	Vertical (10%)	Total
Panel A: Primary SIC					
1990-1991	35.2	28.9	14.8	11.5	1,860
1992-1993	37.8	28.1	14.9	10.5	1,599
1994-1995	33.3	28.6	14.4	10.2	1,948
1996-1997	37.3	26.8	13.3	9.9	2,416
1998-1999	35.6	29.1	15.2	10.7	3,037
2000-2001	36.5	28.6	14.2	9.2	2,742
2002-2003	39.9	26.7	11.8	8.9	1,861
2004-2005	41.8	25.5	13.4	10.7	2,110
2006-2007	43.0	24.5	11.6	8.1	2,629
2008	44.9	24.4	12.6	9.1	1,244
Total	38.3	27.2	13.7	9.8	21,446
Panel B: Primary and secondary SIC (without overlap)					
1990-1991	26.9	29.1	19.6	9.9	1,860
1992-1993	29.1	28.8	18.3	9.3	1,599
1994-1995	23.8	30.8	19.4	10.0	1,948
1996-1997	26.5	28.4	18.2	9.2	2,416
1998-1999	25.2	28.0	17.8	9.4	3,037
2000-2001	25.8	26.9	17.6	9.3	2,742
2002-2003	24.6	25.6	16.8	8.6	1,861
2004-2005	21.0	24.8	16.9	8.5	2,110
2006-2007	19.8	24.5	17.1	7.8	2,629
2008	20.2	21.9	16.7	7.6	1,244
Total	24.3	27.0	17.8	9.0	21,446
Panel C: Primary and secondary SIC (with overlap)					
1990-1991	60.0	73.1	52.7	32.5	1,860
1992-1993	59.5	68.8	48.7	29.3	1,599
1994-1995	55.9	72.0	51.5	30.5	1,948
1996-1997	59.6	71.7	51.3	30.1	2,416
1998-1999	61.5	73.5	54.1	31.6	3,037
2000-2001	64.1	76.6	55.9	33.0	2,742
2002-2003	66.5	78.8	58.8	35.5	1,861
2004-2005	69.2	84.1	65.1	42.1	2,110
2006-2007	70.8	85.8	68.1	41.2	2,629
2008	73.4	85.8	69.9	43.0	1,244
Total	63.9	76.9	57.4	34.6	21,446

Horizontal and vertical M&As do not sum to one due to the presence of conglomerate deals.

Table 2.2: Expected effects of variables

	All M&As	Horizontal M&As	Vertical M&As
Y_{ik}	+	+	+
Y_{jl}	+	+	+
$Distance_{kl}$	**–**	**+/–**	**–**
$Remote_k$	–	–	–
$Remote_l$	–	–	–
$Urban_k$	+	+	+
$Urban_l$	+	+	+
$Skill_k$	+	+	+
$Skill_l$	+	+	+
$D.Skill^2_{kl}$	**+/–**	**–**	**+**
$D.Education^2_{kl}$	**+/–**	**–**	**+**
$CommonLanguage_{kl}$	+	+	+
$Colony_{kl}$	+	+	+
RTA_{kl}	+	+	+

Table 2.3: PPML estimation results *(primary and secondary SIC – without overlap)*

	All M&As	Horizontal	Vertical	Non-horizontal
lnY_{ik}	0.719***	0.662***	**0.763*** **	**0.737*** **
	(0.034)	(0.042)	(0.043)	(0.034)
lnY_{jl}	0.686***	0.582***	**0.720*** **	**0.717*** **
	(0.035)	(0.044)	(0.047)	(0.035)
$lnDistance_{kl}$	-0.255***	-0.316***	-0.249***	-0.236***
	(0.073)	(0.098)	(0.094)	(0.074)
$lnRemote_{k}$	1.926***	1.411*	2.302***	2.079***
	(0.552)	(0.734)	(0.686)	(0.533)
$lnRemote_{l}$	1.074	0.554	**2.086*** **	1.223*
	(0.704)	(0.989)	(0.747)	(0.662)
$lnUrban_{k}$	0.481	-0.152	0.490	**0.673**
	(0.404)	(0.513)	(0.587)	(0.414)
$lnUrban_{l}$	0.998**	0.850	0.636	1.053**
	(0.432)	(0.538)	(0.547)	(0.440)
$lnSkill_{k}$	2.751***	2.373***	3.050***	2.871***
	(0.340)	(0.364)	(0.413)	(0.367)
$lnSkill_{l}$	1.874***	1.146**	**2.766*** **	**2.081*** **
	(0.325)	(0.473)	(0.376)	(0.309)
$lnD.Skill^{2}_{kl}$	0.055***	0.006	**0.082*** **	**0.068*** **
	(0.021)	(0.029)	(0.027)	(0.020)
$lnD.Education^{2}_{kl}$	0.066***	0.060**	**0.143*** **	0.068***
	(0.020)	(0.026)	(0.035)	(0.021)
$CommonLanguage_{kl}$	0.561***	0.701***	**0.516*** **	**0.520*** **
	(0.121)	(0.143)	(0.140)	(0.120)
$Colony_{kl}$	0.520***	0.516***	0.513***	0.515***
	(0.166)	(0.197)	(0.180)	(0.168)
RTA_{kl}	0.225	-0.204	0.091	0.241
	(0.151)	(0.200)	(0.204)	(0.157)
$Constant$	-58.737***	-48.250***	-72.435***	-62.590***
	(8.136)	(11.345)	(9.070)	(7.684)
Log-pseudolikelihood	-26,533.6	-7,318.1	-6,087.0	-21,599.0
Observations	1,336,240	1,336,240	1,336,240	1,336,240

Estimations include both acquirer and target industry fixed effects (two-digit SIC level) as well as time effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively. Bold coefficients in the vertical and non-horizontal columns denote the coefficients are statistically different (five percent significance level) from the corresponding coefficients in the horizontal column.

Table 2.4: PPML estimation results *(primary SIC)*

	(1) Hijzen et al. (2008)	(2) All M&As	(3) All M&As	(4) All M&As
lnY_{ik}	0.727***	0.724***	0.724***	0.727***
	(0.034)	(0.035)	(0.035)	(0.024)
lnY_{jl}	0.693***	0.691***	0.692***	0.694***
	(0.035)	(0.036)	(0.036)	(0.025)
$lnDistance_{kl}$	-0.496***	-0.235***	-0.184***	-0.223***
	(0.082)	(0.078)	(0.076)	(0.053)
$\sigma_{ij} lnDistance^{\dagger}_{kl}$	*0.730***	*-0.050*	*-0.177***	*-0.075*
	(0.025)	(0.050)	(0.046)	(0.112)
σ_{ij}		5.950***		
		(0.374)		
D_{ij}			4.009***	
			(0.206)	
$lnRemote_k$	1.985***	1.907***	1.901***	1.932***
	(0.566)	(0.553)	(0.557)	(0.623)
$lnRemote_l$	1.118	1.070	1.070	1.099*
	(0.723)	(0.701)	(0.702)	(0.580)
$lnUrban_k$	0.436	0.466	0.466	0.468
	(0.411)	(0.408)	(0.409)	(0.320)
$lnUrban_l$	0.951**	0.984**	0.984**	0.983***
	(0.434)	(0.431)	(0.433)	(0.270)
$lnSkill_k$	2.828***	2.766***	2.766***	2.782***
	(0.341)	(0.341)	(0.341)	(0.316)
ln $Skill_l$	1.952***	1.896***	1.899***	1.915***
	(0.334)	(0.326)	(0.327)	(0.318)
$lnD.Skill^2_{kl}$	0.053**	0.055***	0.055***	0.056***
	(0.021)	(0.021)	(0.021)	(0.016)
$lnD.Education^2_{kl}$	0.066***	0.067***	0.067***	0.068***
	(0.021)	(0.021)	(0.021)	(0.012)
$CommonLanguage_{kl}$	0.553***	0.549***	0.549***	0.547***
	(0.121)	(0.119)	(0.119)	(0.061)
$Colony_{kl}$	0.544***	0.543***	0.548***	0.550***
	(0.167)	(0.169)	(0.170)	(0.101)
RTA_{kl}	0.286*	0.207	0.212	0.217***
	(0.154)	(0.152)	(0.152)	(0.082)
$Constant$	-58.454***	-59.407***	-58.601***	
	(8.547)	(8.220)	(8.277)	
Acquirer industry effects	Yes	Yes	Yes	No
Target industry effects	Yes	Yes	Yes	No
Industry-pair effects	No	No	No	Yes
Log-pseudolikelihood	-20,895.9	-20,673.6	-20,477.9	-19,000.1
Observations	1,336,240	1,336,240	1,336,240	823,874

All estimations include time effects. Robust standard errors clustered by country pairs are in parentheses for columns 1-3, while the standard errors are clustered by industry pairs for column 4. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.
† In column 3, the result is robust to the use of $D_{ij} lnDistance_{kl}$ in place of $\sigma_{ij} lnDistance_{kl}$.

Table 2.5: PPML estimation results: market access *(primary and secondary SIC – without overlap)*

	All M&As	Horizontal	Vertical	Non-horizontal
Panel A:				
$ln\phi_{kl}$	0.522***	0.545***	0.643***	0.512***
	(0.060)	(0.077)	(0.088)	(0.062)
Log-pseudolikelihood	-24,722.0	-6,860.6	-5,589.9	-20,104.6
Observations	1,283,248	1,283,248	1,283,248	1,283,248
Panel B:				
$lnPotential_l$	-0.513***	-0.442***	-0.571***	-0.527***
	(0.125)	(0.149)	(0.156)	(0.128)
Log-pseudolikelihood	-26,453.6	-7,304.6	-6,075.7	-21,535.2
Observations	1,336,240	1,336,240	1,336,240	1,336,240

Estimations include both acquirer and target industry fixed effects (two-digit SIC level) as well as time effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively. Bold coefficients in the vertical and non-horizontal columns denote the coefficients are statistically different (five percent significance level) from the corresponding coefficients in the horizontal column. Panel A omits distance because of high correlation between distance and ϕ_{kl} (-0.6458), and target remoteness is removed in Panel B because it is highly correlated with surrounding market potential (-0.7836). The signs and significance of other variables follow the previous analysis with few exceptions.

Table 2.6: Expected effects of variables: contracting institutions

	All M&As	Horizontal M&As	Vertical M&As
$Days_k$	0	0	0
$Days_l$	–	–	+/–
$Cost_k$	0	0	0
$Cost_l$	–	–	+/–
$Rule_k$	+	+	+/–
$Rule_l$	+	+	+/–
$Legal_k$	+	+	+/–
$Legal_l$	+	+	+/–

Table 2.7: PPML estimation results: contracting institutions *(primary and secondary SIC – without overlap)*

	All M&As	Horizontal	Vertical	Non-horizontal
Panel A:				
$lnDays_k$	-0.125	0.058	**-0.544*** **	-0.162
	(0.119)	(0.212)	(0.170)	(0.117)
$lnDays_l$	-0.329***	-0.380**	-0.189	-0.315***
	(0.117)	(0.150)	(0.167)	(0.120)
Log-pseudolikelihood	-17,482.1	-4,479.5	-3,918.1	-14,502.8
Observations	867,256	867,256	867,256	867,256
Panel B:				
$lnCost_k$	0.048	-0.061	-0.121	0.079
	(0.141)	(0.210)	(0.196)	(0.145)
$lnCost_l$	-0.295**	-0.276*	-0.225	-0.298**
	(0.119)	(0.161)	(0.187)	(0.123)
Log-pseudolikelihood	-17,486.6	-4,481.8	-3,923.1	-14,505.6
Observations	867,256	867,256	867,256	867,256
Panel C:				
$Legal_k$	0.060**	0.041	0.113***	0.065***
	(0.024)	(0.042)	(0.034)	(0.023)
$Legal_l$	0.081***	0.116***	0.050	0.073***
	(0.024)	(0.032)	(0.041)	(0.025)
Log-pseudolikelihood	-15,022.5	-3,723.2	-3,409.7	-12,560.8
Observations	728,820	728,820	728,820	728,820
Panel D:				
$Rule_k$	0.297**	0.029	**0.627*** **	0.369**
	(0.146)	(0.219)	(0.191)	(0.145)
$Rule_l$	0.023	0.247	-0.076	**-0.029**
	(0.131)	(0.157)	(0.199)	(0.136)
Log-pseudolikelihood	-21,942.3	-5,809.7	-5,012.9	-18,063.1
Observations	1,119,248	1,119,248	1,119,248	1,119,248

Estimations include both acquirer and target industry fixed effects (two-digit SIC level) as well as time effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively. Bold coefficients in the vertical and non-horizontal columns denote the coefficients are statistically different (five percent significance level) from the corresponding coefficients in the horizontal column. All estimations include per capita GDP of the acquiring and target countries to avoid the possibility that institutions could proxy for wealth. The signs and significance of other variables follow the previous analysis with few exceptions.

3 The Determinants of Cross-border Mergers by Country Development

3.1 Introduction

At just under $1.4 trillion in 2012, global FDI flows remain an important piece of worldwide market activity (UNCTAD, 2013). Most FDI concentrates in the developed world and, from the late 1990s up until the recent global financial crisis, the majority takes the form of cross-border M&As (UNCTAD, 2012). Although cross-border M&As are prevalent in developed countries, FDI flows in developing nations are more commonly greenfield investments. Two recent trends in FDI flows, however, are of particular interest. First, the proportion of FDI flowing in developing countries has risen over time. For the first time ever, developing country FDI surpassed activity in the developed world in 2012 (UNCTAD, 2013). Second, cross-border M&A activity in developing countries has also risen over time. The current essay provides one of the only known analyses studying such trends and examining differences between M&As in developed and developing countries.

Widely held beliefs are that most FDI within the developed world is horizontal, whereas investments from developed countries into developing nations are largely vertical. The former occurs when firms produce and sell the same products in overseas markets as at home. The convergence hypothesis put forward by Markusen and Venables (1996) suggests horizontal FDI flows will be larger between countries more similar in terms of size, average income, and relative factor endowments. Furthermore, the tariff-jumping explanation of horizontal FDI suggests higher trade costs may have a positive effect on investment since horizontal investment and exports can be substituted for each other. Thus, horizontal FDI flows are expected to be largest between very similar countries separated by relatively large trade costs.

A firm's decision to fragment production vertically across national borders, however, is

quite different. One of the main reasons for moving intermediate good production abroad is to take advantage of cheaper production processes, usually with unskilled-labor-intensive stages of production. The latter occurs because developing nations tend to have less-skilled workforces, which results in lower unskilled-labor wages. Hence, following basic comparative advantage theory, production processes requiring skilled labor will tend to be located at home, whereas unskilled-labor-intensive processes will tend to be located in developing countries. In addition, the costs associated with intra-firm trade make proximity another important decision variable when considering vertical FDI. Thus, vertical FDI flows should be largest between country pairs characterized by relatively small trade costs and large differences in factor endowments.

The current essay tests how well the above-described ideas explain cross-border M&A patterns across developed and developing countries. More specifically, it examines whether factor endowments and trade costs have a larger impact on developing countries, as suggested by theory. Using the standard FDI determinants, I compare bilateral cross-border M&A flows by location of target firms. Results suggest trade costs have a larger impact when targets are located in developing countries. For example, bilateral distance has a negative effect on M&A activity, but its effect is much stronger for targets located in developing countries. Moreover, the effect of distance is strongest for horizontal deals which, although consistent with the findings of Chapter 2, was not expected. A number of other trade cost variables have a differential effect by country development. The effect of speaking the same language is largest for developing targets, and results also suggest the positive effect of sharing a geographic border and signing bilateral tax treaties or trade agreements is constrained to M&As of developing targets. Thus, trade costs appear to play a larger role in M&A decisions when acquisition targets are located outside of the developed world.

Contrary to commonly held beliefs, however, factor endowments do not seem to attract

investment into developing countries. Education levels, which proxy for skilled-labor endowments, have no effect on M&A activity. Moreover, evidence suggests lower wages drive investment into developed rather than developing countries. A potential explanation is factor endowments drive only vertical M&As, but results change very little when isolating the analysis to vertical M&As. I also compare how endowments of communications and financial infrastructure impact deals in developed and developing countries. Surprisingly, both promote M&As only of developed targets.

In general, I fail to find strong evidence that FDI between developed country pairs is horizontal whereas developed-developing country investment flows are predominantly vertical. Rather, it seems the proportion of M&As that are horizontal or vertical is largely independent of country development. Some evidence even suggests the proportion of M&As that are vertical is higher in more developed countries. I find trade costs to be more important for developing countries, but the evidence provides no clear support for the comparative advantage theory of vertical FDI. The empirical results are roughly consistent with the main conclusions of Alfaro and Charlton (2009), who found vertical FDI is not driven by factor endowments since much of it occurs within the developed world. It appears vertical investments take place between more proximate stages of production than has been the case in the past.

The essay proceeds by first discussing cross-border M&A activity worldwide and the relative patterns across developed and developing countries. The third section presents the empirical model and discusses the expected findings. The results are presented in the fourth section, and the final section offers some concluding comments.

3.2 M&A Patterns

Data on cross-border M&As come from the Global Mergers and Acquisitions database compiled by Thomson, which began in 1985 for international transactions involving at

least a five percent ownership change in a firm. Thomson's sources include over 200 English and foreign language news sources, SEC filings and their international counterparts, trade publications, wires, and proprietary surveys of investment banks, law firms, and other advisors. Thomson data have the advantage of the most expansive coverage of any other FDI source (Blonigen and Piger, 2012). In line with much of the literature, I define a merger as a transaction where an acquiring firm obtains a majority equity position in the target firm via acquiring at least 50 percent ownership or, if already owning 50 percent or more, acquiring all remaining equity to obtain 100 percent interest in the target firm. Distinguishing cross-border from domestic deals is left to Thomson, and I focus on announced rather than completed dates, although this distinction is not likely to be important since nearly 100 percent of cross-border M&As announced between 1990-2008 are consummated within the period. Moreover, over 90 percent of all consummated deals are completed in the same year of announcement.

Figure 3.1 shows the trends in cross-border M&As over the 1990-2008 period. Using 2012 classifications of UNCTAD, I distinguish between developed and developing countries and show the relative cross-border M&A activity in each.[35] Specifically, "Developed" denotes cross-border M&As involving two developed countries while "Developing" M&As involve at least one developing country.[36] The left figure illustrates cross-border M&As follow the business cycle, with M&A activity rising during economic expansions and falling during recessions. Most deals take place between developed countries, but it is clear from the figure on the right that developing countries are becoming more active in the M&A market. For example, Developing M&As comprised just under 10 percent of global activity in 1990, but by 2008 they made up one third.[37]

[35] Transition economies are lumped in with developing countries. Table A2.4 provides the full list of countries by development status.

[36] "Worldwide" is the sum of Developed and Developing.

[37] Of the Developing deals, approximately half flow from developed to developing countries while 20 percent flow in the opposite direction. The remaining 30 percent of M&As flow between developing countries.

The geographic dispersion of acquiring and target firms is given in Figure 3.2, with the left side showing Developed M&As and the right side showing Developing M&As. Cross-border M&A activity is arranged according to Thomson's regional classification system: Africa/Middle East/Central Asia (AF), Americas (AM), Asia-Pacific (excluding Central Asia) (AP), Europe (EU), Japan (JP), Supranational[38] (SN). To no surprise, the majority of Developed deals involve either European or American (especially U.S.) firms. M&As between the U.S. and Canada alone make up nearly 17 percent of all Developed deals, and a massive 47 percent of Developed deals involve two European firms.[39] An example of the latter is the acquisition of the German Mannesmann AG by the British Vodafone Airtouch PLC in 1999 for a hefty $202.8 billion, which remains one of the largest deals in the world to date.

In contrast to Developed M&As, which concentrate in Western Europe, Canada, and the U.S., the majority of Developing M&A activity concentrates in the Americas and the Asia-Pacific region. M&As in the latter comprise 21 percent of all Developing M&A activity, and these deals typically involve the developing nations of China, Hong Kong, India, Malaysia, or Singapore. For example, in 2008 China Merchants Bank Co. Ltd. purchased 53 percent equity in the Hong Kong based Wing Lung Bank Ltd. for just under $2.5 billion. M&As within the Americas, in contrast, comprise 19 percent of all Developing deals and typically involve a developed country's firm acquiring a developing country's firm. Specifically, two-thirds originate in the U.S. or Canada, of which over half target firms in Argentina, Brazil, or Mexico. For example, in 2004 Wal-Mart Stores Inc. purchased the Brazilian supermarket chain Bompreco SA Supermercados do Nordeste for $300 million. Thus, M&As in the Asia-Pacific typically flow between developing nations whereas M&As in the Americas typically flow from developed to developing nations.

Figure 3.3 shows cross-border M&A activity by industry of acquiring and target firms. I

[38]Supranational M&As involve firms without a unique nationality.
[39]The top European economies, in order of M&A activity, are the U.K., Germany, and France.

use SIC codes to define sector groupings in the following manner, with SIC codes in parentheses: Agriculture (Ag.) (1-17), Manufacturing (Manu.) (20-39), Transport (40-49), Trade (50-59), Finance (60-67), Services (70-89).[40] For Developed M&As, 30 percent of deals take place between manufacturing firms. The next largest sector by M&A activity is the service industry, which comprises approximately 17 percent of all Developed M&As. An example is when the U.S.-based eBay Inc. paid $4.3 billion for the Luxembourg-based Skype Technologies SA in 2005.

The right side of Figure 3.3 provides Developing M&A activity by sector. As with Developed M&As, the manufacturing sector experiences the most Developing M&A activity. Over one fourth of all deals involve two manufacturing firms. The second most active Developing sector, however, is different than that for Developed M&As. Whereas the service sector experienced the second most Developed M&A activity, the financial sector experienced the second most Developing M&A activity over the 1990-2008 period. Over one fourth of all acquirers and 16 percent of all targets were financial firms, and 13 percent of all Developing deals were marriages between financial firms. A recent example of the latter is when the British financial services giant, Barclays PLC, purchased the South African bank, Absa Group Ltd., in 2005 for just under $5 billion in order to expand its operations in markets outside of the U.K.

In general, Figure 3.3 shows most cross-border M&A activity is intra-industry[41], and further that most occurs in the manufacturing sector. A very active M&A market in the manufacturing sector is appealing for the purposes of this essay for two reasons. First and foremost, manufacturing firms are at the heart of the horizontal and vertical MNE models.[42] Second, manufacturing output tends to be tradable, which enables one to

[40]"Agriculture" includes mining and construction while "Trade" aggregates both wholesale and retail trade. Public administration is excluded due to the lack of deals in this sector.

[41]Over two thirds of worldwide cross-border M&A activity is intra-industry based on sector grouping in Figure 3.3.

[42]See Markusen (1984) and Helpman (1984) for early work on horizontal and vertical FDI, respectively.

compare the effect of trade costs on M&As into developed or developing economies. Recall, trade costs are expected to discourage vertical and possibly promote horizontal FDI, where vertical tends to flow into developing countries and horizontal is thought to flow between developed nations. Hence, the remainder of the analysis will focus on cross-border M&As in the manufacturing sector.

The horizontal and vertical MNE theories suggest horizontal FDI should flow between developed country pairs whereas vertical FDI should flow from developed to developing countries. The former stems from the convergence hypothesis put forward by Markusen and Venables (1996), which posits horizontal investment will flow between more similar countries. The latter, however, is suggested by comparative advantage ideas which claim larger cross-country endowment differences will create larger relative wage gaps, thereby increasing the attractiveness of fragmenting production vertically. In order to test such theories, I identify horizontal and vertical cross-border M&As using methods found in the literature. Horizontal M&As represent marriages of competing firms, which researchers commonly identify by mergers between firms in the same industry. Adopting this definition, I define a deal as horizontal if the merging firms are located in the same four-digit SIC industry.[43] Vertical M&As, in contrast, are combinations of firms in buyer-supplier relationships. To be labeled vertical, a M&A must take place between firms in different four-digit SIC industries provided the industries are linked with sufficiently large intermediate input flows, which I measure using the BEA's I-O tables. Furthermore, I follow the literature and use a threshold of five percent input flow between industries.[44]

As discussed in Chapter 2, there exists some variation in the literature on how deals are defined when firms do business in multiple sectors. The Thomson data set assigns both primary and secondary SIC codes to firms; primary being the industry in which the firm

[43]The definition of a horizontal M&A of course disregards the geographical dimension to the relevant market. See Chapter 2 for more discussion on this topic.

[44]Chapter 2 provides a more detailed discussion of the BEA's I-O tables, using different intermediate input flow thresholds, and why I do not use intra-firm trade to identify vertical M&As.

does most business, and secondary being other industries in which it does business.[45] Many of the firms active in the M&A market are large, multiproduct firms who do business in multiple industries. Thus, the number of horizontal and vertical M&As identified will depend on whether one uses only primary SIC sectors or both primary and secondary SIC sectors. Finding more or less with the addition of secondary SIC sectors will depend on whether or not M&As are simultaneously considered horizontal and vertical. Chapter 2 describes the issue in greater detail and also defines three different ways to define horizontal and vertical M&As, which I use here.

Table 3.1 provides the percentages of manufacturing M&As that are horizontal and vertical over the 1990-2008 period for all countries in the Thomson data set. With the exception of 2008, horizontal and vertical percentages are given in two-year averages and M&A totals sum over both years.[46] I include summary statistics using all three definitions and, following the previous figures, I separate Developed and Developing M&As. Across the three different ways to define horizontal and vertical deals, a few patterns stand out. Notably, the number of deals identified as horizontal or vertical is highly dependent on the definition used. Fewer horizontal M&As are found when using definition 2 rather than definition 1, which occurs because some horizontal deals in primary industries have vertically related industries in secondary sectors, thereby being conglomerate using definition 2. In contrast, definition 3 finds more horizontal deals than does definition 1, which happens because some deals are horizontal in secondary industries but not in primary industries. Each pattern emerges because most firms active in the M&A market are large, multiproduct firms who do business in multiple sectors. Similar patterns follow for the percentage of vertical M&As identified using the three different definitions.

Comparisons between Developed and Developing M&As show some similarities, but also

[45] Firms are assigned as many secondary SIC codes as industries in which they do business.

[46] Note that summing the percent horizontal with the percent vertical is not meant to sum to one due to the presence of conglomerate M&As, which comprise all deals not identified as horizontal or vertical.

two noticeable differences. Both find approximately one fourth and two thirds of deals to be horizontal using definitions 2 and 3, respectively. Similarly, both find roughly 15 percent of M&As to be vertical using definitions 1 and 2. Definition 1, however, shows more horizontal for Developing than Developed M&As. The common belief is the majority of FDI flows between developed countries is horizontal, but Table 3.1 shows horizontal activity is no less prevalent in developing countries. Definition 3 also finds more vertical for Developing than Developed M&As. Thus, M&As between multisector firms tend to have more vertically-related industries when at least one of the merging parties is located in a developing country. In general, however, Table 3.1 does not show strong support for the idea that horizontal FDI is mostly developed-developed or most developed-developing activity is vertical.[47] Rather, it appears patterns of horizontal and vertical M&As are similar regardless of country development.

I provide a simple empirical exercise to more rigorously examine how the composition of M&As depends on country development. In particular, I regress the vertical percentage of M&As, denoted $PVERT$, on country development and gravity variables. The empirical specification is given by:

$$E[PVERT_{klt}|Y_k, Y_l, Distance_{kl}, y_k, y_l] = exp(\beta_0 + \beta_1 lnY_{kt} + \beta_2 lnY_{lt} + \beta_3 lnDistance_{kl} + \beta_4 lny_{kt} + \beta_5 lny_{lt}) \quad (1)$$

where the dependent variable represents the percent of bilateral cross-border M&As that are vertical between countries k and l in time t over the 1990-2008 period. The gravity variables are denoted by Y and $Distance$, which are real GDP and bilateral distance between countries k and l, respectively. Country development is measured with real GDP per capita (y). Following both Chapter 2 and the main empirical model in section 3.3,

[47] Developing statistics presented in Table 3.1 remain unchanged when isolating M&As from developed to developing countries.

equation 1 represents a nonlinear empirical model to be estimated by PPML as recommended by Santos Silva and Tenreyro (2006).[48]

The results are given in Table 3.2. Following Table 3.1, I present results using all three definitions of vertical M&As. P corresponds to vertical M&A percentage using definition 1, while PS-N and PS-O correspond to definitions 2 and 3, respectively, as represented in Table 3.1. I estimate equation 1 using both bilateral M&A flows and M&A inflows. The left-most column of output in Table 3.2 suggests the percent of primary SIC vertical deals is independent of target country development (y_l), but it is higher for less developed acquirers (y_k). Results using the most strict definition of M&As are given in the second column of output, which shows positive correlation between both target and acquirer development and the vertical proportion of M&As. The positive correlation goes away, however, if one uses definition 3 of vertical deals. Thus, similar to Table 3.1, Table 3.2 provides no clear support for the idea that less developed countries host higher proportions of vertical investments.

I replicate the analysis for M&As inflows as a robustness check.[49] The results are given in the last three columns of Table 3.2. Once again, I find positive correlation between target country development and vertical M&A percentage. The results, however, do not hold across all three definitions of vertical deals. Overall, the results of Table 3.2 fail to show vertical FDI dominates in less developed countries. In contrast, some evidence suggests the proportion of vertical FDI is higher in more developed countries. In the next section I develop an empirical model that examines whether cross-border M&A determinants have different effects depending on both country development and the type of merger.

[48]The results remain statistically unchanged when estimating the following linear model via OLS: $PVERT_{klt} = \beta_0 + \beta_1 lnY_{kt} + \beta_2 lnY_{lt} + \beta_3 lnDistance_{kl} + \beta_4 lny_{kt} + \beta_5 lny_{lt} + \epsilon$.

[49]I replace bilateral distance with a measure of target country remoteness to control for trade costs. See Section 3.3 and Table A2.2 for a more detailed description of ρ_l.

3.3 Econometric Model

The econometric specification used in the current essay is motivated by the theoretical framework of Head and Ries (2008). The general idea is bilateral M&As occur as a result of an endogenous bidding process whereby firms across the globe compete for control rights on a foreign subsidiary. The probability that a particular firm submits the winning bid is given by the probability it anticipates a higher target value than do competing bidders. Head and Ries derived the probability to be an exponential function of the number and ability of firms at home, the number and ability of competing bidders in other countries, and physical and cultural distance between home and target countries. In the end, the expected number of bilateral M&As between a country pair was shown to be a nonlinear function of both home and foreign market sizes, home firm abilities, bid competition from third countries, and physical and cultural distance measures.

Building off of the ideas of Head and Ries, I construct an empirical model which incorporates the standard FDI determinants. Importantly, the model includes measures of both trade costs and factor endowments in order to test for differences between mergers flowing into developed and developing countries, and therefore horizontal and vertical investments. As discussed above, both trade costs and factor endowments should have a stronger effect on deals involving target firms in developing countries. By way of intra-firm trade, trade costs should deter vertical investments. The ability to substitute horizontal investments for exports, however, suggests trade costs have a smaller impact on horizontal investments. Likewise, factor endowment is expected to be important in the location of vertical investments, but it should have less influence on the location of horizontal investments. Thus, both trade costs and factor endowments should have a relatively stronger effect on developing countries, stronger negative effect of trade costs and stronger positive effect of factor endowment.

A number of other country characteristics have been shown to affect cross-border investments. Real GDP and physical distance are frequently included in empirical trade and FDI studies to account for gravity between countries. Real GDP per capita is also often included to account for average incomes which, along with real GDP, is expected to promote cross-border investments. Remoteness, on the other hand, is often used to control for the idea that remote countries tend to engage less in international commerce due to their disadvantageous physical location. The idea is most often applied to international trade, but Hijzen et al. (2008) and Head and Ries (2008) have used analogous variables to measure multilateral trade costs and bid competition, respectively. Profitability is another factor influencing a firm's decision to enter a foreign market, where higher expected corporate profits are likely to induce more M&As. Similarly, both communications and financial infrastructure are likely to affect foreign investment. Portes et al. (2001) and Portes and Rey (2005) have shown better communications infrastructure can facilitate cross-border investment flows due the presence of information costs when crossing national boundaries, and di Giovanni (2005) similarly showed financial depth to be important for cross-border M&A activity. A number of authors have also shown firms tend to "cherry-pick" the most productive foreign firms when looking to enter distant markets.[50] Finally, cultural, political, and institutional differences between countries are likely to limit the flow of cross-border investments.

Building an empirical model around the above-described, standard determinants of FDI, I compare cross-border M&A flows along two dimensions: country development and type of M&A, horizontal or vertical. With the theoretical framework of Head and Ries in mind, I incorporate such determinants of M&As into a nonlinear empirical model to be estimated by PPML as recommended by Santos Silva and Tenreyro (2006). Denoting the acquiring and target countries as k and l, respectively, the baseline econometric

[50]See Blonigen et al. (2012), among others, for a recent study on cherry-picking.

specification is given by:

$$
\begin{aligned}
E[m_{klt,d}|covariates] = exp(&\beta_0 + \beta_1 lnY_{kt} + \beta_2 lnY_{lt} + \beta_3 lny_{kt} + \beta_4 lny_{lt} \\
&+ \beta_5 lnDistance_{kl} + \beta_6 ln\rho_{lt} + \beta_7 lnTaxRate_{kt} + \beta_8 lnTaxRate_{lt} \\
&+ \beta_9 lnPhoneLines_{kt} + \beta_{10} lnPhoneLines_{lt} + \beta_{11} lnStockMkt_{kt} \\
&+ \beta_{12} lnStockMkt_{lt} + \beta_{13} lnEducation_{kt} + \beta_{14} lnEducation_{lt} \\
&+ \beta_{15} CommonLanguage_{kl} + \beta_{16} Colony_{kl} + \beta_{17} Contiguous_{kl} \\
&+ \beta_{18} BTT_{klt} + \beta_{19} RTA_{klt}) \qquad (2)
\end{aligned}
$$

which will produce consistent estimates of the parameters of interest so long as the conditional expectation of m_{klt}, the number of cross-border M&As between country k and country l in time t, is correctly specified (Santos Silva and Tenreyro, 2006).[51] All variables are in natural logarithms (denoted with "ln") with the exception of dummy variables. Y and y are real GDP and real GDP per capita, respectively. $Distance_{kl}$ is the bilateral distance between countries k and l, while ρ_l is a multilateral index of trade costs for the target country.[52] The latter has been used as a measure of remoteness by both Hijzen et al. (2008) and Head and Ries (2008). $TaxRate$ is the highest marginal corporate tax rate in a country, which proxies for corporate profitability. $PhoneLines$ and $StockMkt$ proxy for communications and financial infrastructure, respectively. The former represents the number of telephone lines per 100 people, while the latter is the stock market-to-GDP ratio in each country. I proxy skilled-labor endowment with $Education$, which is the average number of years of total education in each country. $CommonLanguage$, $Colony$, and $Contiguous$ are dummy variables denoting when countries share a common official language, a common colonizer, and a geographic border, respectively. The former two variables measure cultural distance between

[51] Note the direction of acquisition matters (i.e. $m_{kl} \neq m_{lk}$).

[52] $\rho_l = \sum_{k \neq l} \frac{Distance_{kl}}{Y_k}$

countries and the latter is another measure of physical distance. Having signed bilateral tax treaties or regional trade agreements is captured by the dummy variables BTT and RTA, respectively. The latter two variables also measure bilateral trade costs.

Table 3.3 provides the expected effects of each variable, which are broken down by type of investment. $Distance$, ρ_l, $Contiguous$, $CommonLanguage$, $Colony$, BTT, and RTA all measure trade costs. As discussed above, distance should have an attenuated or positive effect on horizontal investments while strictly discouraging all other types of investment. The effect of ρ_l may also vary across different types of investment. In empirical international trade studies, remoteness dampens trade flows, suggesting ρ_l may have a negative effect on cross-border M&As as well. However, ρ_l is constructed following Hijzen et al. (2008), who use it as an index of multilateral trade costs. It is expected to promote cross-border M&As because larger values imply less bid competition for a given country k from bidders in competing countries. However, more remote countries are likely to experience fewer horizontal M&As due to pre-emptive buyouts from competing firms (Hijzen et al., 2008).

Previous research has also found sharing a common official language, sharing a common colonizer, and having regional trade agreements in place can facilitate cross-border M&As. Many authors have shown deals are more common between countries that speak the same language (e.g. di Giovanni (2005), Berger et al. (2004), Head and Ries (2008)), while Head and Ries (2008) have found colonization variables to be important in promoting cross-border M&A flows. Similarly, Hijzen et al. (2008), di Giovanni (2005), and Coeurdacier et al. (2009) all have shown trade agreements encourage cross-border deals. Accordingly, I expect each variable to encourage M&A flows. Similarly, sharing a contiguous border and ratifying BTTs are expected to facilitate cross-border M&A flows between countries. Physical adjacency implies both relatively low trade costs and cultural proximity, both of which are likely to encourage cross-border deals. BTTs are expected to

reduce the costs, and therefore raise profits, of doing business internationally. As a result, tax treaties should positively correlate with M&A activity.

The main factor endowment variables are real GDP per capita and education. The cherry-picking story of cross-border M&As suggests countries with more skilled workforces will tend to produce productive firms which are highly attractive acquisition targets. Thus, more educated, high-wage countries are expected to experience more M&A activity. The effect of skilled-labor endowment on vertical M&As, however, should be very different. Countries with more skilled workforces will be attractive for FDI, but acquiring firms will tend to seek out relatively lower wages for vertical investments. In other words, higher wages are expected to correlate positively with outward vertical investment but negatively with inward vertical investment. Since developing countries are most likely to host vertical investments, the negative effect of wages should be strongest for developing targets.

The remaining variables include country size, tax rates, and capital endowments. The number of firms is expected to be larger in larger countries, so higher GDP should have a positive effect on cross-border M&As. By affecting corporate profits, higher tax rates at home are expected to encourage international M&As, while lower tax rates abroad will tend to produce more attractive targets. Better communications and financial infrastructure provide rough proxies of capital endowment. Both Portes et al. (2001) and Portes and Rey (2005) have shown better communications infrastructure promotes cross-border asset trade, and di Giovanni (2005) similarly showed positive correlation between stock market and cross-border M&A activity. Therefore, both $PhoneLines$ and $StockMkt$ are expected to encourage M&As.

Equation 2 above provides the baseline empirical model, which I estimate via PPML with 1990-2008 data. I compare results by country development and then by horizontal and

vertical deals for robustness. Table A2.2 provides data definitions and sources, and Table A2.1 provides summary statistics.

3.4 Results

I first examine the effect of various measures of trade costs on cross-border M&As, and then analyze how measures of factor endowment are likely to have heterogeneous effects on deals involving developing countries. Most FDI flows between developed country pairs, but Figure 3.1 shows developing countries have become more active in the M&A market over time. The common belief is horizontal FDI concentrates between developed country pairs, whereas FDI flowing from developed to developing countries is typically vertical. If true, then one should find trade costs and factor endowments to have a stronger effect for developing countries. Section 3.4.1 examines the heterogeneous effect of trade costs, while the effect of factor endowment is explored in Section 3.4.2.

3.4.1 Trade Costs

The results obtained from estimating equation 2 are provided in Table 3.4. To direct attention to trade costs, I place the coefficient estimates of all such variables at the top of the table. The first column of output provides the baseline results. In general, I get the standard results. Some surprising results are sharing a national border, signing bilateral tax treaties, and more highly educated populaces have no effect on cross-border M&As. Likewise, higher corporate tax rates and better communications infrastructure ($lnPhoneLines$) at home do not promote outward investment as expected.

Turning attention to the second column of output, I allow the effect of a number of trade cost measures to vary by the development status of the target country. Trade costs are likely to have a much stronger effect on cross-border M&As when targets are located in developing countries, especially if the deals are vertical. To capture any potential

differential effect, I interact trade cost variables with δ, a dummy variable taking the value of one when the target is a developing country and zero otherwise.[53] Physical distance ($lnDistance$) has a negative effect on cross-border investment but, as shown by the negative and significant coefficient on $\delta \cdot lnDistance$, its effect is much stronger when the target resides in a developing country. Remoteness has a positive effect on cross-border M&As, but inclusion of the interaction term suggests the positive effect is constrained to developing countries. Similarly, sharing a national border only promotes cross-border M&As flowing into developing targets.

The same pattern follows for the remaining trade cost variables. Cultural distance, as measured by $CommonLanguage$ and $Colony$, has different effects on developing countries. Sharing an official language promotes M&As in all countries, but its effect is stronger for developing countries. In contrast, colonial ties promote M&As into developed countries while discouraging M&As into developing nations. The coefficients on BTT and RTA also suggest political and institutional similarities are important for developing targets, but not for developed targets. Notably, the signs and significance on the remaining variables follow the previous discussion.

The right-most two columns of output provide robustness checks to the above-described results. The common belief is horizontal investment flows between developed, and thus more similar, countries whereas most vertical FDI flows from developed to developing countries. The dependent variable in the third column of output is the number of horizontal M&As, while that for the right-most column of output is the number of vertical M&As. Although the tariff-jumping argument posits trade costs should have a relatively larger effect on vertical investment as compared with horizontal, I find multiple measures of trade costs to have a similar effect.[54] Thus, the type of M&A has no significant impact

[53] Developing countries include both transition and developing countries as given in Table A2.4.

[54] Notably, the effect of distance is larger for horizontal than vertical deals. Although surprising, the result supports one of the key findings in Chapter 2.

on the effect of trade costs. Although the results seem to challenge long-held beliefs about patterns of horizontal and vertical FDI, they support the patterns shown in Table 3.1. Horizontal and vertical investments are found in roughly equal proportions in both developed and developing countries. The type of M&A does not matter, but country development does, as trade costs have a stronger effect on developing country FDI.[55]

3.4.2 Factor Endowments

The idea of factor endowment driving cross-border M&As is based on comparative advantage theory which, simply put, suggests cross-country wage differences will entice a multinational firm to vertically fragment production processes across national borders. Thus, according to the theory, one should expect more vertical M&As to flow between countries with larger disparities in wages. Since developed countries tend to pay the highest wages and developing countries the lowest, vertical investments should flow from developed to developing nations. I examine such ideas by interacting endowment variables with δ, as above. The interaction terms capture any differential effect between developed and developing target countries.

Table 3.5 provides the results, once again positioning variables of interest at the top of the table to direct attention. The first column of output replicates that in Table 3.4 with the exception that I replace real GDP per capita variables with wage variables, which provide more direct measures of average hourly earnings.[56] The results follow from Table 3.4 with the exception being wages in target countries have no effect on cross-border M&As.

When allowing the effect of endowment variables to vary by target development, however, some interesting results emerge. Most importantly, lower wages in developing countries

[55] Table A2.5 provides results when controlling for the development of both the acquiring and target countries. Table A2.6 and Table A2.7 provide robustness checks for horizontal and vertical M&As, respectively.

[56] See Table A2.2 for a description of the wage data. Note: $corr(y, wage) = 0.81$. Furthermore, Table A2.8 provides results when using real GDP per capita instead of wage data.

do not attract M&As. A potential explanation for the result is wages drive only vertical M&As. The right-most column of output provides no support for the explanation, while the third column of output suggests lower wages attract horizontal deals into developed countries. The results, therefore, provide evidence that seems to contradict theory: lower wages drive horizontal rather than vertical investments. However, vertical M&As do flow into less educated developing countries, a result consistent with the idea that firms move unskilled-labor-intensive production processes to countries with relatively more unskilled workers. Because the effect of wage and education levels fail to agree, however, it is difficult to ascertain firms exploit developing nations for their comparative advantage in low-skilled manufacturing processes.

Results from the remaining interaction effects suggest communication and financial infrastructure are less important for developing countries. More phone lines are correlated with more M&As, but the effect is attenuated for developing target countries (0.947 - 0.563 = 0.384). Similarly, a booming stock market has almost no effect in attracting M&As when the country is developing (0.143 - 0.151 = -0.008).[57] The latter result is robust to horizontal and vertical M&As, as are many of the remaining results. Thus, there is little evidence suggesting endowment is more important for developing country FDI.

3.5 Conclusion

The current essay offers one of the few empirical analyses studying cross-border M&As into both developed and developing countries. Recent FDI patterns indicate most activity in the developed world takes the form of horizontal cross-border M&As, whereas investment into developing nations is largely vertical greenfield FDI. The current essay improves our understanding of global cross-border M&A trends in two ways. First,

[57] Table A2.3 provides Wald tests for the hypotheses that linear combinations of the coefficients sum to zero. Results indicate phone lines have a positive effect for developing target countries while education has a negative effect.

cross-border M&As are becoming more prevalent in developing countries as improvements in economic conditions facilitate deals from both the buy and sell side. Second, the proportion of horizontal and vertical cross-border M&As is independent of country development. In other words, it is not the case that most developed-developed deals are horizontal or most developed-developing M&As are vertical.

Using a PPML estimator and standard FDI determinants found in the literature, I test whether the effect of many different variables depends on country development. Results suggest trade costs have a larger effect on M&As involving targets in developing countries, whereas no clear support is found for the idea that factor endowments pull vertical investment into developing nations. Findings are based on multiple measures of trade costs as well as wage and education data, respectively. Overall, both the summary statistics and empirical results are consistent with a small but growing literature finding evidence that vertical FDI is not only more common between developed countries than previously believed, it is also not driven by traditional comparative advantage.

Future research is needed to better understand the evolution of international investment over time. Different patterns of cross-country horizontal and vertical investment were expected to drive differences between developed and developing countries, but the current essay finds the type of investment has little bearing on how country characteristics influence investment. Future study should examine greenfield FDI to see if such results are exclusive to M&As, and it would also be helpful to explain what drives vertical investment between developed nations. A better understanding of cross-country investment patterns would benefit firms who are choosing how to penetrate new foreign markets, and it would also educate policy to help countries attract or discourage certain types of investment.

3.6 Tables and Figures

Figure 3.1: Cross-border M&A activity by country development

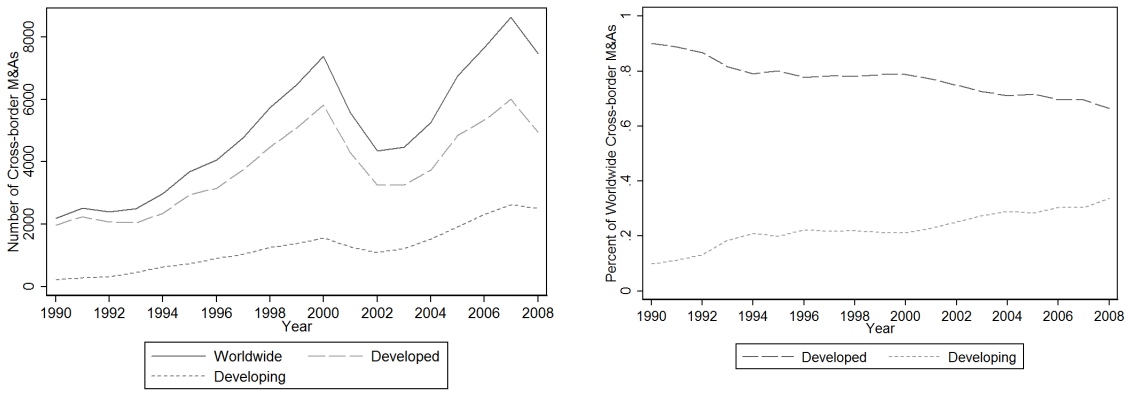


Figure 3.2: Cross-border M&A activity by region (1990-2008)

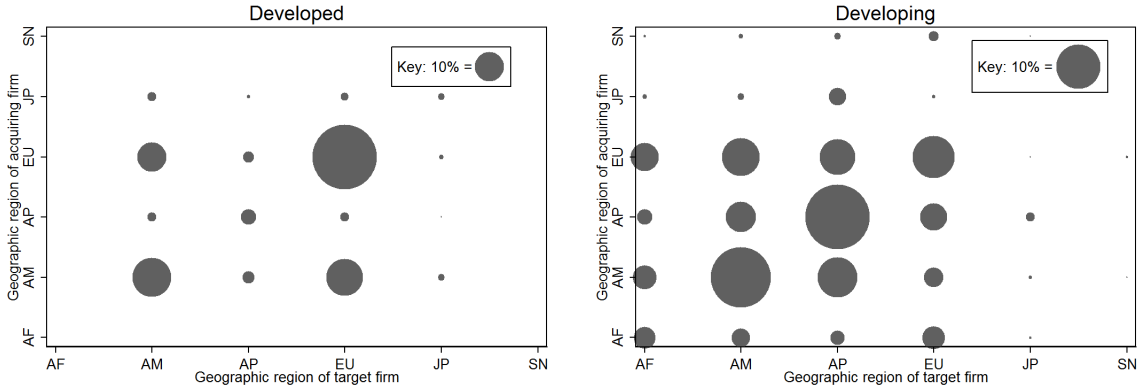


Table 3.1: Percentage of horizontal and vertical M&As by country development

Year	Developed			Developing		
	Horizontal	Vertical	Total M&As	Horizontal	Vertical	Total M&As
1. Primary SIC (P)						
1990-1991	35.5	14.8	1,895	43.5	12.9	147
1992-1993	37.9	14.6	1,709	41.7	11.1	216
1994-1995	34.0	14.0	2,021	42.9	11.7	427
1996-1997	37.1	13.1	2,415	47.7	12.8	619
1998-1999	35.8	15.0	3,013	39.6	16.3	755
2000-2001	36.3	14.1	2,717	42.5	13.9	746
2002-2003	40.1	11.6	1,833	48.5	13.9	633
2004-2005	42.3	13.1	2,073	44.2	13.7	844
2006-2007	43.2	11.4	2,590	47.9	15.9	1,096
2008	44.7	12.5	1,223	50.9	8.5	568
1990-2008	38.4	13.5	21,489	45.3	13.6	6,051
2. Primary and secondary SIC (no overlap) (PS-N)						
1990-1991	26.9	19.5	1,895	28.6	14.3	147
1992-1993	29.4	18.1	1,709	31.0	14.4	216
1994-1995	24.3	19.4	2,021	22.0	16.2	427
1996-1997	26.7	18.4	2,415	28.1	14.9	619
1998-1999	25.5	17.9	3,013	24.9	19.5	755
2000-2001	26.1	17.7	2,717	20.8	17.4	746
2002-2003	25.2	16.8	1,833	26.1	18.0	633
2004-2005	21.2	16.7	2,073	24.3	16.7	844
2006-2007	19.7	16.9	2,590	17.7	15.2	1,096
2008	20.7	16.5	1,223	16.7	14.6	568
1990-2008	24.6	17.8	21,489	22.8	16.4	6,051
3. Primary and secondary SIC (overlap) (PS-O)						
1990-1991	60.4	53.0	1,895	69.4	55.1	147
1992-1993	60.1	48.9	1,709	69.0	52.3	216
1994-1995	56.3	51.3	2,021	64.2	58.3	427
1996-1997	59.8	51.4	2,415	67.0	53.8	619
1998-1999	61.3	53.7	3,013	64.4	58.9	755
2000-2001	64.0	55.6	2,717	69.2	65.8	746
2002-2003	66.7	58.3	1,833	71.7	63.7	633
2004-2005	69.5	65.1	2,073	72.4	64.8	844
2006-2007	71.0	68.2	2,590	76.6	74.2	1,096
2008	73.1	68.9	1,223	77.1	75.0	568
1990-2008	63.9	57.1	21,489	70.8	64.5	6,051

Since every M&A involves one acquiring firm and one target firm, percentages can be interpreted from either the buy or the sell side of deals.

Definition 1 uses only primary SIC codes to identify horizontal and vertical M&As, while definitions 2 and 3 use both primary and secondary SIC codes. Definition 3 allows M&As to be simultaneously labeled horizontal and vertical, while definition 2 defines a deal as horizontal, for example, if the merging firms are horizontally related in at least one industry and operate in no industries sharing a vertical connection. The same logic applies to definition 2 for vertical M&As, and it follows definition 2 is more strict than definition 3.

Figure 3.3: Cross-border M&A activity by sector (1990-2008)

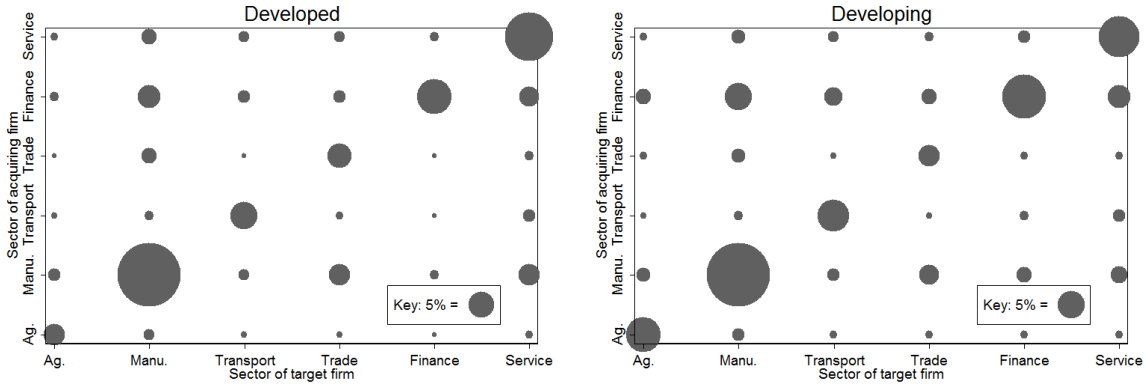


Table 3.2: PPML estimation results: percent of deals that are vertical

	Bilateral			Inflows		
	P	PS-N	PS-O	P	PS-N	PS-O
lnY_k	0.003	-0.032*	0.004			
	(0.018)	(0.017)	(0.006)			
lnY_l	-0.002	0.028*	-0.002	-0.056	0.034	0.005
	(0.021)	(0.017)	(0.006)	(0.041)	(0.038)	(0.010)
$lnDistance_{kl}$	0.007	0.066***	0.035***			
	(0.025)	(0.021)	(0.008)			
$ln\rho_l$				0.149	0.111*	0.098***
				(0.096)	(0.062)	(0.034)
lny_k	-0.155**	0.157**	0.001			
	(0.067)	(0.062)	(0.020)			
lny_l	0.060	0.124***	0.023	0.144**	0.145**	0.016
	(0.047)	(0.044)	(0.015)	(0.073)	(0.057)	(0.022)
$Constant$	-1.398	-5.183***	-0.871***	-4.422***	-3.632***	-0.870***
	(0.876)	(0.818)	(0.257)	(0.940)	(0.710)	(0.272)
Log-pseudolikelihood	-2,822.0	-3,282.7	-6,406.5	-475.8	-506.5	-1,065.4
Observations	7,322	7,322	7,322	1,265	1,265	1,265

The dependent variable is the percent of all deals that are vertical. P corresponds to vertical M&A percentage using definition 1, while PS-N and PS-O correspond to definitions 2 and 3, respectively as represented in Table 3.1. Estimations include time and developing country fixed effects. Robust standard errors clustered by country pairs (Bilateral) or target country (Inflows) are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table 3.3: Expected effects of variables

	All M&As	Horizontal M&As	Vertical M&As
Y_k	+	+	+
Y_l	+	+	+
y_k	+	+	+
y_l	+	+	−
$Distance_{kl}$	−	+/−	−
ρ_l	+	−	+
$Contiguous_{kl}$	+	+	+
$CommonLanguage_{kl}$	+	+	+
$Colony_{kl}$	+	+	+
BTT_{kl}	+	+	+
RTA_{kl}	+	+	+
$Education_k$	+	+	+
$Education_l$	+	+	+
$TaxRate_k$	+	+	+
$TaxRate_l$	−	−	−
$PhoneLines_k$	+	+	+
$PhoneLines_l$	+	+	+
$StockMkt_k$	+	+	+
$StockMkt_l$	+	+	+

Table 3.4: PPML estimation results: trade costs

	All M&As	All M&As	Horizontal M&As	Vertical M&As
$lnDistance_{kl}$	-0.444***	-0.462***	-0.520***	-0.430***
	(0.052)	(0.055)	(0.070)	(0.074)
$\delta \cdot lnDistance_{kl}$		-0.330***	-0.302**	-0.346**
		(0.112)	(0.124)	(0.158)
$ln\rho_l$	0.231**	0.060	0.008	0.040
	(0.112)	(0.105)	(0.110)	(0.127)
$\delta \cdot ln\rho_l$		1.717***	1.308***	2.295***
		(0.198)	(0.240)	(0.302)
$Contiguous_{kl}$	0.099	0.005	0.142	-0.095
	(0.118)	(0.127)	(0.141)	(0.164)
$\delta \cdot Contiguous_{kl}$		0.475**	0.496*	0.449
		(0.234)	(0.266)	(0.329)
$CommonLanguage_{kl}$	0.824***	0.824***	0.714***	0.868***
	(0.105)	(0.114)	(0.131)	(0.120)
$\delta \cdot CommonLanguage_{kl}$		0.340*	0.359*	0.275
		(0.180)	(0.208)	(0.226)
$Colony_{kl}$	0.425***	0.390***	0.552***	0.347**
	(0.137)	(0.150)	(0.158)	(0.164)
$\delta \cdot Colony_{kl}$		-0.648***	-0.823***	-0.713**
		(0.225)	(0.291)	(0.326)
BTT_{kl}	0.082	-0.011	-0.044	0.008
	(0.081)	(0.092)	(0.108)	(0.113)
$\delta \cdot BTT_{kl}$		0.297**	0.385**	0.401*
		(0.150)	(0.186)	(0.222)
RTA_{kl}	0.287***	0.074	-0.007	0.017
	(0.098)	(0.141)	(0.173)	(0.188)
$\delta \cdot RTA_{kl}$		0.458**	0.538**	0.479*
		(0.185)	(0.231)	(0.262)
lnY_k	0.653***	0.628***	0.638***	0.680***
	(0.041)	(0.039)	(0.044)	(0.055)
lnY_l	0.724***	0.724***	0.722***	0.773***
	(0.039)	(0.038)	(0.042)	(0.052)
lny_k	0.675***	0.578***	0.656***	0.662***
	(0.107)	(0.097)	(0.123)	(0.142)
lny_l	-0.260**	-0.319***	-0.455***	-0.183
	(0.106)	(0.102)	(0.123)	(0.143)
$lnEducation_k$	0.197	0.109	-0.530*	0.173
	(0.295)	(0.276)	(0.319)	(0.357)
$lnEducation_l$	0.051	0.372*	0.278	0.292
	(0.253)	(0.226)	(0.299)	(0.310)
$lnTaxRate_k$	-0.235	-0.118	-0.051	-0.319
	(0.165)	(0.144)	(0.175)	(0.237)
$lnTaxRate_l$	-0.423***	-0.454***	-0.671***	-0.422**
	(0.147)	(0.134)	(0.163)	(0.173)
$lnPhoneLines_k$	-0.056	0.024	0.338*	0.054
	(0.140)	(0.138)	(0.179)	(0.175)
$lnPhoneLines_l$	0.565***	0.717***	0.734***	0.876***
	(0.115)	(0.120)	(0.129)	(0.179)
$lnStockMkt_k$	0.314***	0.313***	0.202***	0.356***
	(0.042)	(0.041)	(0.049)	(0.061)
$lnStockMkt_l$	0.096***	0.116***	0.074**	0.121***
	(0.029)	(0.027)	(0.036)	(0.043)
$Constant$	-5.106***	-9.797***	-7.067***	-16.776***
	(1.302)	(1.385)	(1.729)	(2.190)
Log-pseudolikelihood				
Observations	63,682	63,682	63,682	63,682

Estimations include time and developed country fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table 3.5: PPML estimation results: factor endowments

	All M&As	All M&As	Horizontal M&As	Vertical M&As
$lnWage_k$	0.751***	0.750***	0.806***	0.764***
	(0.103)	(0.103)	(0.125)	(0.137)
$lnWage_l$	0.006	-0.186*	-0.364***	-0.027
	(0.096)	(0.112)	(0.130)	(0.162)
$\delta \cdot lnWage_l$		0.272	0.371	0.046
		(0.207)	(0.244)	(0.268)
$lnEducation_k$	0.450	0.453	-0.271	0.739**
	(0.299)	(0.299)	(0.337)	(0.368)
$lnEducation_l$	-0.166	0.199	-0.154	0.350
	(0.274)	(0.386)	(0.444)	(0.452)
$\delta \cdot lnEducation_l$		-0.729	-0.065	-1.443**
		(0.483)	(0.597)	(0.670)
$lnTaxRate_k$	-0.126	-0.136	-0.082	-0.342
	(0.154)	(0.152)	(0.184)	(0.233)
$lnTaxRate_l$	-0.321**	-0.511***	-0.656***	-0.468**
	(0.145)	(0.178)	(0.209)	(0.219)
$\delta \cdot lnTaxRate_l$		0.459	0.544	0.647
		(0.301)	(0.395)	(0.403)
$lnPhoneLines_k$	-0.256*	-0.247*	0.097	-0.239
	(0.136)	(0.136)	(0.175)	(0.171)
$lnPhoneLines_l$	0.366***	0.947***	0.886**	1.130***
	(0.116)	(0.295)	(0.348)	(0.414)
$\delta \cdot lnPhoneLines_l$		-0.563*	-0.519	-0.483
		(0.326)	(0.393)	(0.454)
$lnStockMkt_k$	0.297***	0.301***	0.180***	0.386***
	(0.049)	(0.048)	(0.057)	(0.067)
$lnStockMkt_l$	0.092***	0.143***	0.124**	0.153**
	(0.035)	(0.050)	(0.061)	(0.073)
$\delta \cdot lnStockMkt_l$		-0.151***	-0.156**	-0.154**
		(0.058)	(0.069)	(0.078)
lnY_k	0.606***	0.603***	0.638***	0.621***
	(0.039)	(0.039)	(0.043)	(0.051)
lnY_l	0.714***	0.697***	0.721***	0.708***
	(0.044)	(0.046)	(0.053)	(0.058)
$lnDistance_{kl}$	-0.448***	-0.452***	-0.503***	-0.372***
	(0.056)	(0.053)	(0.063)	(0.069)
$ln\rho_l$	0.243**	0.217**	0.133	0.218
	(0.114)	(0.109)	(0.117)	(0.133)
$Contiguous_{kl}$	0.127	0.115	0.248*	0.058
	(0.120)	(0.120)	(0.134)	(0.163)
$CommonLanguage_{kl}$	0.818***	0.785***	0.733***	0.806***
	(0.104)	(0.110)	(0.130)	(0.112)
$Colony_{kl}$	0.400***	0.389***	0.515***	0.384***
	(0.139)	(0.132)	(0.152)	(0.136)
BTT_{kl}	-0.021	-0.017	-0.071	0.023
	(0.083)	(0.082)	(0.097)	(0.108)
RTA_{kl}	0.229**	0.204**	0.138	0.243*
	(0.096)	(0.093)	(0.122)	(0.124)
$Constant$	-1.478	-1.224	-1.520	-4.689**
	(1.222)	(1.492)	(1.834)	(2.027)
Log-pseudolikelihood				
Observations	23,046	23,046	23,046	23,046

Estimations include time and developed country fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

4 Response of Merger Activity to European Commission Policy

4.1 Introduction

The past two decades have been characterized by decreasing trade barriers and fewer restrictions on FDI flows. In addition, the corporate takeover market has become increasingly active. Cross-border M&As flows have surged since the early 1990s, and merger regulation across the world has increased as a result. Interestingly, the growing cross-border M&A literature has largely neglected the effect of antitrust on cross-border M&As. Many legal and corporate finance analyses have been conducted, but relatively few economic analyses on the effects of competition authorities on cross-border M&As exist (Evenett, 2004). In the present analysis, I help fill the void by examining the effect of EU merger policy reform on M&As flowing into EU member countries.

The reform of the ECMR in 2004 provides an opportunity to quantify the effect of antitrust policy. With the help of competition authorities in EU member states, the EC enforces EU competition rules as outlined in ECMR. The first merger regulation in the EU was signed on December 21, 1989 and became effective in September of 1990. The EC's jurisdiction covers all concentrations (e.g. mergers) with turnovers exceeding minimum thresholds within the EU. The nationality of the involved parties is trivial; any activity resulting in anti-competitive effects within the EU is subject to EC scrutiny. Although the EC has intervened in mergers when the merging parties are not located in EU member states (e.g. General Electric/Honeywell case in 2001), the majority of EC actions involve firms based in EU countries.

Growing concern over challenges posed by cross-border mergers and the EU led the EC to consider a revision of the ECMR in the early 2000s. Published on December 11, 2001, *Green Paper on the review of the Council Regulation No. 4064/89* was one of the first

documents proposing revisions to the ECMR in order to meet the new challenges facing the Commission. The EC subsequently approved a comprehensive merger control reform package on December 11, 2002. Formal adoption of the amendments took place on January 20, 2003, which were agreed upon by the EU Council of Ministers on November 28, 2003. Taking effect May 1, 2004, the ECMR reform represented the desire for merger regulation in the EC to move towards a more effects-based approach rather than the market dominance approach.[58] The new legislation was likely catalyzed by three instances in 2002 where the Court of First Instance overruled decisions of the EC to prohibit firms from merging business activities, which highlighted weakness in the economic analyses conducted by the EC. To achieve a more economic approach to merger regulation, the new legislation scrapped the dominance test and instead focused on whether a concentration would "significantly impede effective competition." The SIEC test, as it became known, marked a convergence towards U.S. merger policy and represented arguably the most important change in the reform. Other notable changes resulting from the reform include the creation of an economic committee headed by a Chief Economist, more flexible time limits for the EC, and the creation of horizontal merger guidelines. Any merger announcements or agreements after May 1 were subject to the new policies while the announcements or agreements prior to May 1 were subject to the old policies.

The reform was far from inconsequential, but the response of the corporate takeover market appears yet to be satisfactorily answered. Reframing the dominance test as the SIEC test represents more of a clarification of the law rather than a change in the law itself, but the new test seems to have expanded the law to cover more mergers because dominance is no longer required for a merger to be prohibited. That is, EC scrutiny has been extended to more M&As which, all else equal, is expected to have a deterrence effect

[58] Prior to ECMR reform in 2004, any merger that "creates or strengthens a dominant position as a result of which effective competition would be significantly impeded" would be declared incompatible with the common market. The "dominance test" is essentially a two-part test that first requires the concentration creates a dominant position before the EC will consider whether the concentration will lead to any significant impediments to competition.

on cross-border M&As. Other policy changes, however, may stimulate M&A activity. Concurrent work by Duso et al. (2012) finds the policy reform resulted in an improved ability to predict decisions of the EC. The evidence contradicts the belief by some critics that a more flexible EC would result in less predictability in merger decisions.

The current analysis seeks to quantify the effects of the 2004 ECMR reform on cross-border M&A flows into EU countries. The reform appears to be well-received and marks a movement in the positive direction for merger regulation in the EU. Measuring the sentiment, however, requires a look into the data. Thus, the goal of the empirical section is to identify how ECMR reforms effected cross-border M&As of EU firms. I use cross-border M&A data from Thomson and a difference-in-difference framework to do so. Results provide some evidence suggesting the reform triggered an increase in M&A activity in EU countries, but the response is visible only with a specific set of acquiring countries. Overall, the reform had no significant effect on M&A activity in the EU.

The essay proceeds by first discussing both the theoretical and empirical research studying M&A activity and antitrust policy. The third section describes the difference-in-difference estimator, identifies the countries used in the analysis, and shows cross-border M&A patterns around the time of the reform. Section 4.3 also presents and discusses the difference-in-difference estimation results, and the final section offers some concluding remarks.

4.2 Literature Review

Both theoretical and empirical research have studied the relationship between international mergers and merger regulation. The body of theoretical work is quite small, and seems to focus on Cournot models. Studies by Head and Ries (1997) and Barros and Cabral (1994) examined situations when competition authorities should either block or allow international mergers. Since national antitrust authorities are generally concerned

with domestic welfare, they may allow mergers that could be detrimental to world welfare. Interestingly, Barros and Cabral stressed merger policy should reflect national regulators' concern about domestic welfare even if mergers generate externalities on other countries. Such situations pose the potential need for an international antitrust authority to pursue world welfare maximization even if it means overturning decisions of national competition authorities. Head and Ries derived cases where national and international merger regulators would disagree. Given a merger would reduce world welfare, the authors found national competition agencies should block the merger if it fails to generate cost savings, but the same does not necessarily hold for a merger which reduces costs. Acknowledging the increasingly globalized world, potentially large gains may be had by creating an international antitrust authority that will, unlike national competition authorities, pay attention to the negative externalities on third-party countries which may result from international mergers.

Other theoretical work on competition authorities has focused on the relationship between trade costs and merger regulation. Using a sequential merger formation model, Fumagalli and Vasconcelos (2009) found trade costs and antitrust authorities to affect whether mergers are domestic or cross-border. In other words, antitrust policies can be used to discriminate against foreign investors. Horn and Levinsohn (2001) found trade liberalization can lead to more strict domestic competition policies, but the study focused on domestic rather than cross-border M&As. Moreover, the authors found no evidence suggesting merger policies should be regulated at the international level despite the strong relationship between trade policy and merger policy. The latter finding is at odds with the general movement towards international competition policy.

The empirical literature studying cross-border M&As is growing, but the literature analyzing merger laws is relatively small. Studies range from how merger laws impact firm value to deterrence and relationships between political institutions and merger laws.

Both Bris and Cabolis (2008) and Bris et al. (2007) found positive correlation between merger laws and corporate value. Focusing on EU merger policies, Brady and Feinberg (2000) also found enforcement of merger regulation to have significant effects on firm value. Thus, the empirical evidence suggests antitrust policy, and more generally corporate governance, is able to impact market values of firms. Moreover, Bris et al. (2008) found merger laws can also affect market values of entire industries.

Researchers have also questioned the effect of political institutions on cross-border M&As. Conybeare and Kim (2010) found countries with democratic political systems were more likely to have merger laws, and Kim (2010) found merger laws to be more strict in countries with majoritarian electoral systems. Both studies improved our understanding of the political environment conducive to merger laws, but how does this link translate into the number of cross-border M&As flowing into such countries? The evidence of Conybeare and Kim suggests more stringent merger laws discriminate more heavily against cross-border deals than domestic deals. Evenett (2002) similarly found merger laws reduce the flow of cross-border M&As into a country. In particular, the author found mandatory pre-merger notification regimes provide the strongest deterring effect when compared against mandatory post notification regimes and voluntary notification regimes. Empirical estimates suggest mandatory pre-merger notification regimes cut the inflow of cross-border M&As by half. Taken together, the evidence presented by Conybeare and Kim and Evenett shows merger laws reduce cross-border M&As, and Evenett showed the reduction to be substantial. Bris et al. (2007), however, found merger laws can actually increase cross-border M&A activity. The authors argued merger laws reduce information asymmetries across countries, which provides an environment conducive to cross-border deals.

The above authors drew conclusions using data on both heterogeneous countries and antitrust authorities. Focusing on a single change in antitrust would enable one to more

clearly identify whether M&As increased or decreased as a result of the change. An ongoing study by Duso et al. (2012) assesses the effectiveness of the policy changes resulting from the EMCR reform of 2004 using multiple measures and a detailed data set.[59] Findings suggest merger policies have been effective in deterring anti-competitive mergers without deterring pro-competitive M&As. Evidence also reveals more anti-competitive M&As in the post reform period.[60] Duso et al. educate the literature on the effectiveness of ECMR reform policies, but the literature has yet to address the big picture: has the reform reduced or expanded the flow of cross-border M&As into the EU? The next section attempts to provide an answer.

4.3 Econometric Analysis

I now turn attention to the data and attempt to quantify the impact of the policy change on cross-border M&A flows into EU countries. To do so, I employ a simple difference-in-difference estimation procedure, which entails comparing M&A activity in countries affected by the reform to that in countries not affected by the reform. Since EC antitrust policy applies to any merger resulting in anti-competitive effects within the EU, the countries most likely to be affected are EU countries.[61] As shown it Table A3.1, however, the EU grew by 10 countries in 2004. That is, the ECMR reform was accompanied by an increase in the number of EU member states from 15 to 25. Furthermore, Bulgaria and Romania joined the EU in 2007, and Croatia followed suit in 2013. I sidestep potential self-selection issues in the group of EU countries by using only

[59] Other studies have more generally analyzed the policy actions of the EC. Empirical evidence casts doubt on whether policy actions by the EC are consistent with its claimed goals of protecting consumers and encouraging competition in markets. In particular, the results of Aktas et al. (2007) suggest the EC may actually be protecting privileged firms in the EU.

[60] In a similar study, Seldeslachts et al. (2009) estimated the impact of antitrust actions (blocked mergers, negotiated settlements, and monitorings) of 28 different antitrust jurisdictions on future merger frequencies and found blocking mergers deters future mergers, but negotiated settlements do not deter mergers. Thus, actions of antitrust authorities send strong signals to potential merging parties.

[61] As acknowledged above, countries outside the EU may also fall under EC jurisdiction if concentrations outside the EU inhibit competition within the EU. Given the low frequency of such occasions, however, it seems reasonable to assume EU countries are most affected by the reform.

the 15 countries that were member states prior to 2004 while excluding from the analysis completely the 12 countries newly minted in the EU in 2004 and 2007.[62]

In constructing a comparison group, I attempt to match a set of countries with very similar characteristics to the EU group. Since EU countries are developed[63], a simple way to construct a comparison group would be to choose all developed countries without EU membership. The latter essentially results in choosing all OECD countries without EU membership status. Most countries with OECD membership are developed, and many are located proximate to EU countries. Table 4.1 identifies the EU and comparison group countries. The EU group consists of all countries with EU membership prior to the year 2000, while the comparison group similarly consists of all non-EU countries with OECD membership prior to 2000. The year 2000 is chosen as a cutoff because I use the 2000-2003 period as the pre-reform period in the empirical estimations.

As noted in Table 4.1, the EU and comparison groups are used as target countries, so I must also identify a group of acquiring countries. Because M&As of firms located inside the EU are subject to ECMR provisions while M&As of firms located outside the EU typically are not, the EU and comparison groups are selected as target countries. I create a group of acquiring countries by holding constant the common countries active in acquiring firms in the EU and comparison countries both before and after the 2004 reform. That is, to be used as an acquiring country two conditions must be met: (1) the country must have acquired at least one firm in a minimum of a single country from both the EU and comparison groups, and (2) condition (1) must have been met in at least a single year of both the pre-reform (2000-2003) and the post-reform (2005-2008) periods. The list of acquiring countries is given in Table A3.2.

[62] Croatia is included since, as discussed below, the empirical analysis focuses on the 2000-2008 period. The 15 EU countries will henceforth be referred to as the EU group.
[63] See Table A2.4.

In order to use a difference-in-difference estimator to identify any effect of the ECMR reform, it is important to closely match pre-reform patterns of M&As into EU and comparison countries. The top panel in Table A3.2 shows all countries meeting the criteria to be an acquiring country. The list includes a mix of countries with or without OECD or EU membership. Since the EU and comparison groups are selected based on EU and OECD membership, I create subgroups of acquiring countries also based on OECD and EU membership. Specifically, I identify three additional groups of acquiring countries: one for non-OECD countries, one for non-EU countries, and another consisting of EU countries. All three groups are subsets of the full list, and they effectively capture developing countries, countries located outside the EU area, and the EU group, respectively.

Figures 4.1-4.4 present annual cross-border M&As flowing into the EU and comparison groups from all four groups of acquiring countries over the 1990-2008 period. I denote the ECMR reform (May 2004) with a vertical line, and numbers of cross-border M&As are given as an index relative to 2004.[64] Each group of acquiring countries is provided in a separate figure. Figure 4.1 shows the trends using the “All countries" group of acquirers. M&A activity in the EU and comparison groups match up well, both before and after the reform, providing no strong evidence of an ECMR reform effect. Figure 4.2 provides the same picture using non-OECD countries as the acquirers. M&A patterns between the EU and comparison groups match up reasonably well prior to 2004 with the exception of 1999 and 2000. However, M&A activity increased significantly in 2004 and 2005 for the EU and comparison groups, respectively. The cause of rapid increases in M&A activity are unknown, but the fact that activity in EU countries increased prior to activity in comparison countries is quite interesting. Figure 4.3 shows activity from non-EU countries. No clear effect of the ECMR reform emerges from the figure. When using EU countries as the acquirers, however, there exists a more rapid increase in M&A activity in

[64]Figures 4.5-4.8 replicate Figures 4.1-4.4 for the raw number of cross-border M&As.

2005 into EU countries as compared with the comparison countries, as illustrated in Figure 4.4. In sum, there appears to be little evidence of an ECMR reform effect. Figure 4.4 shows some evidence consistent with an ECMR reform effect in 2005, but Figure 4.2 shows the most stark increase in M&A activity around the time of the reform. Thus, I focus the main empirical analysis on M&As from non-OECD acquirers.

Proceeding to the estimation strategy, I now attempt to disentangle the economic effect of the reform (i.e. the ECMR reform effect). In its general form, the outcome of interest, Y, can be modeled with the following equation:

$$Y = \alpha + \beta d_{EU} + \gamma d_{post} + \delta(d_{EU} \cdot d_{post}) + \epsilon \tag{1}$$

where d_{EU} is a binary variable indicating EU countries (equals one if EU and zero otherwise) and d_{post} is a binary variable equaling zero in the pre-reform period and one in the post-reform period. Thus, β is the effect of being an EU country while γ is the effect of the time trend common to both the EU and comparison groups. The parameter of interest, δ, captures the "true" effect of the ECMR reform and is thus labeled the difference-in-difference estimator. It can be shown by taking the difference in the outcome variable for the EU group across time and comparing it to the difference in the comparison group across time. In other words,

$$\begin{aligned}
\delta &= \Big(E[\bar{Y}_1^{EU}] - E[\bar{Y}_0^{EU}]\Big) - \Big(E[\bar{Y}_1^{C}] - E[\bar{Y}_0^{C}]\Big) \\
&= \Big([\alpha + \beta + \gamma + \delta] - [\alpha + \beta]\Big) - \Big([\alpha + \gamma] - \alpha\Big) \\
&= \Big(\gamma + \delta\Big) - \Big(\gamma\Big) \\
&= \delta
\end{aligned}$$

where EU denotes the EU group and C denotes the comparison group. Similarly, 1 denotes the post-reform period and 0 indicates the period prior to the reform. The

estimator measures the effect of the ECMR reform on the EU group after controlling for a time trend and being exposed to the reform. In the current analysis, the outcome variable is the number of cross-border M&As flowing from the acquiring countries into the EU and comparison groups. I aggregate the number of deals over the 2000-2003 and 2005-2008 periods, which yields a panel of two periods for 15 EU and 11 comparison countries for a total of 52 observations. Because the outcome variable is a count I utilize the PPML estimator.[65] Rewriting equation 1 in its nonlinear form with the number of cross-border M&As flowing into country i in time t, m_{it}, as the outcome variable, I obtain,

$$E[m_{it}|d_{EU}, d_{post}] = exp(\alpha + \beta d_{EU} + \gamma d_{post} + \delta(d_{EU} \cdot d_{post})) \tag{2}$$

Table 4.2 presents the estimation results obtained using equation 2 for non-OECD acquirers, which are chosen because Figure 4.2 illustrated the most interesting M&A patterns post-reform.[66] The first column of output shows no evidence of an ECMR reform effect since the estimate of δ is not statistically significant. The effect of the reform, however, becomes significant when including country fixed effects in the estimation. According to column 2, the reform increased M&A activity in EU countries by 34.4%[67]. Note the significance of the result is driven by a smaller standard error rather than a larger coefficient estimate compared to the estimate in column 1. Regardless, evidence of an ECMR reform effect appears consistent with the patterns shown in Figure 4.2.

The results described above rely on aggregated M&As for the pre- and post-reform periods. Results based on aggregate data are unlikely to detect an ECMR refrom effect if it occurred in a smaller window of time than a few years.[68] I turn to annual data to more

[65] Breinlich (2008) similarly used Poisson estimation within a difference-in-difference framework to analyze the impact of the Canada-U.S. Free Trade Agreement on M&As.

[66] The Appendix provides estimation results for other groups of acquiring countries.

[67] $(e^{(0.296)} - 1) \cdot 100 = 34.4\%$.

[68] For example, empirical analysis using EU acquirers (Figure 4.4) is unlikely to find an ECMR reform effect. Table A3.4 confirms.

closely examine M&A patterns around the time of the reform. The third column presents the results for the annual data from 2000-2008 when including both time and country fixed effects. I replace $d_{EU} \cdot d_{post}$ in equation 2 with $\sum_{j=2005}^{2008} d_{EU} \cdot d_j$ to allow the effect of the reform to vary over time. Likewise, time fixed effects replace d_{post}. Not surprisingly, the results show the effect of the reform persists throughout the entire 2005-2008 period despite gradually diminishing from 2005-2007. As stated above, proposals for ECMR reform were published by December 2002 and the reform became certain in November 2003. Thus, the possibility of anticipatory effects prior to enforcement in May 2004 is real. I account for potential anticipatory effects by including EU-year interaction terms for both 2003 and 2004, and the results are given in column 4. Evidence suggests the EU group experienced more M&A activity than the comparison group in 2003, about the same amount in 2004, and more post-reform. One possible explanation is firms in non-OECD countries front-loaded acquisitions of EU firms to avoid the uncertainty associated with the new policies of the reform in 2004. Once uncertainty with the reform was eliminated, however, firms resumed acquisition of EU targets.

The analysis thus far has neglected country characteristics in equation 2. The growing cross-border M&A literature has shown various country-level variables are important determinants to the location of M&A flows. Following Seldeslachts et al. (2009), I augment equation 2 with economic and stock market variables. Specifically, I use real GDP and the stock market-to-GDP ratio for all 26 target countries. The data come from the Penn World Tables and the World Bank, respectively. The resulting empirical estimates are presented in the last column of Table 4.2. As you can see, the results in column 4 are robust to the inclusion of country characteristics.

The above results are based upon non-OECD acquirers which, as evidenced by Figures 4.1-4.4, are likely to provide the most evidence of an ECMR reform effect. There exists much less, if any, evidence of an ECMR reform effect using the other three groups of

acquirers. To avoid arbitrarily choosing the group of acquirers, I also estimate equation 2 for all acquiring countries, as listed in Table A3.2. The results are presented in Table 4.3.

Overall, the results suggest the reform essentially had no effect on M&A activity. Columns 1 and 2 show no evidence of a an ECMR reform effect using aggregate data over the pre-reform and post-reform periods. The use of annual data in columns 3-5, however, shows some evidence of an effect in 2005. Column 3 suggests the reform increased M&A activity in EU countries by 10.6% or, if including real GDP and stock market-to-GDP ratio variables, 14.9%. However, the trends illustrated in Figure 4.1 are not consistent with an economically significant effect of the ECMR reform.

Although the results in Tables 4.2 and 4.3 provide some evidence consistent with an ECMR reform effect for EU countries after the reform, little confidence is placed on such a conclusion. First, Figures 4.1-4.4 shows similar pre- and post-reform patterns for the EU and comparison groups across all groups of acquirers. The empirical results based on non-OECD acquirers show M&A activity most consistent with an ECMR reform effect. Thus, results from Table 4.2 likely provide an upper bound of any effect. However, estimates in Table 4.3 indicate no significant effect when using all acquiring countries. Second, the difference-in-difference estimator is very simple and fails to account for a myriad of other events taking place around the time of the reform. Interpreting changes in M&A activity as resulting directly from the ECMR reform, therefore, may be wrong.

4.4 Conclusion

Quantifying the effect of antitrust regulation on merger activity is theoretically straightforward but is practically very difficult. Therefore, it is no surprise that the number of studies attempting to quantify such effects is small. The current essay contributes to the small but growing line of research by examining the effects of one piece of antitrust regulation, the 2004 reforms to ECMR. The most notable change to ECMR was switching

from the old dominance test to the SIEC test, in effect moving EU merger policy to more closely resemble U.S. antitrust laws. Moreover, the new SIEC test appeared to have increased the probability of blocking more mergers.

Results from a difference-in-difference framework provide little evidence suggesting ECMR reforms of 2004 affected cross-border M&A activity in the EU. Rather, M&A activity remained similar across countries in both the EU and comparison groups around the time of the reform. The latter patterns hold for multiple groups of acquiring countries. Finding no clear evidence of an ECMR reform effect is not surprising since the reform was largely viewed as more of a clarification of the law rather than a change in the law itself.

The current essay adds to a small but growing literature studying the effects of merger policy around the world. One of the biggest challenges researchers in the area must face is how to identify the effect of antitrust policy on mergers when rising merger activity typically precedes reforms to antitrust policy or the establishment of new antitrust authorities altogether. In other words, merger activity often shapes antitrust policy, but people are also interested in how antitrust policy effects merger activity. More research is necessary to better understand how antitrust authorities control corporate marriages affecting the prices we face daily as consumers.

4.5 Tables and Figures

Table 4.1: Target countries

EU group (15)		Comparison group (11)	
Austria	Italy	Australia	Switzerland
Belgium	Luxembourg	Canada	Turkey
Denmark	Netherlands	Iceland	U.S.
Finland	Portugal	Japan	
France	Spain	Korea	
Germany	Sweden	Mexico	
Greece	U.K.	New Zealand	
Ireland		Norway	

All target countries are OECD members. The EU group includes EU member states in the 2000-2008 period, and the comparison group consists of non-EU members in the same period.

Figure 4.1: Cross-border M&A flows into EU and comparison countries, index (2004 = 100): all countries

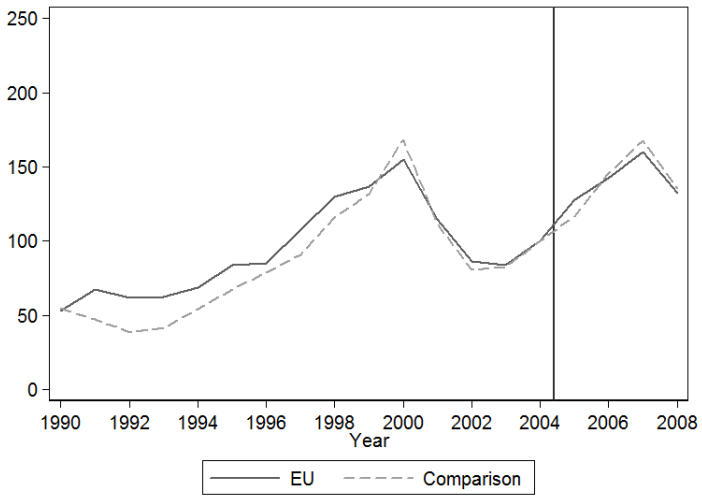


Figure 4.2: Cross-border M&A flows into EU and comparison countries, index (2004 = 100): non-OECD countries

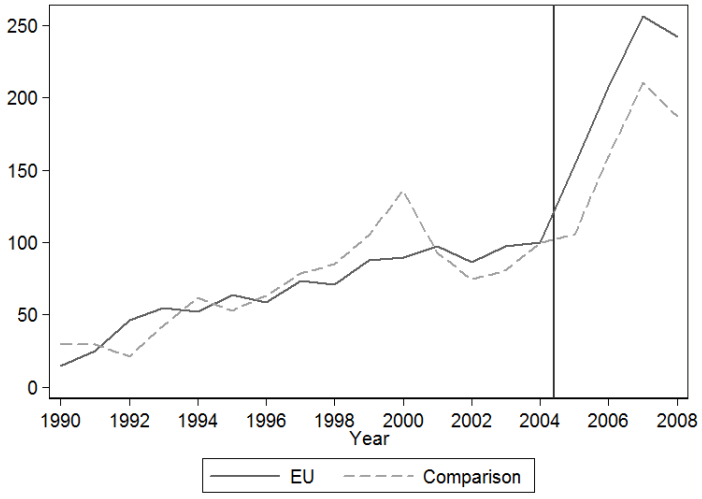


Figure 4.3: Cross-border M&A flows into EU and comparison countries, index (2004 = 100): non-EU countries

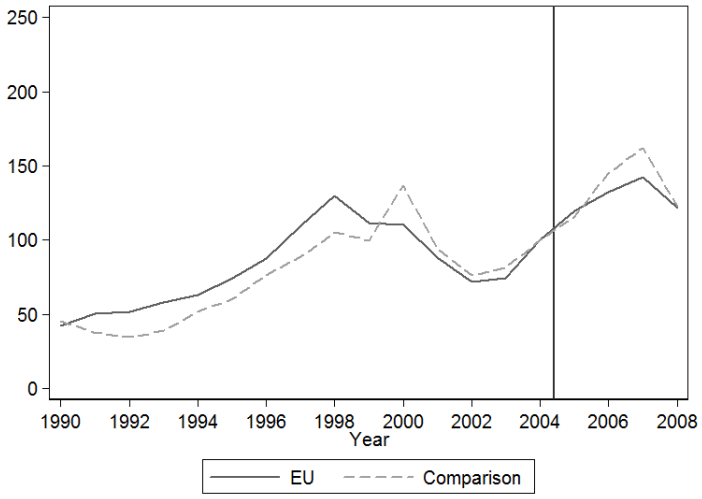


Figure 4.4: Cross-border M&A flows into EU and comparison countries, index (2004 = 100): EU countries

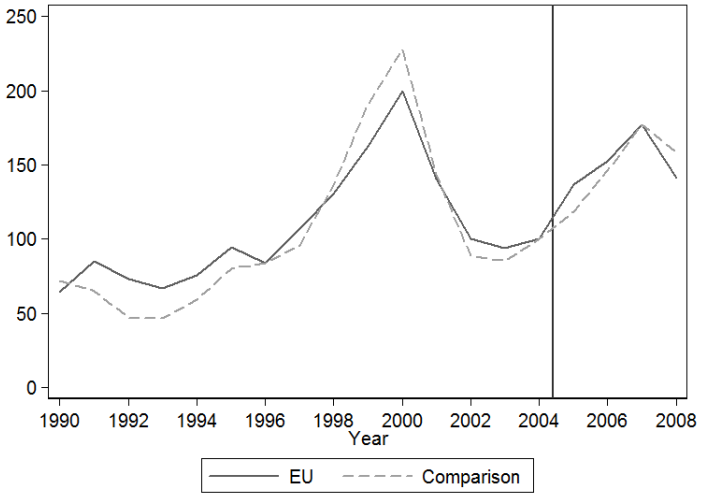


Figure 4.5: Cross-border M&A flows into EU and comparison countries, number: all countries

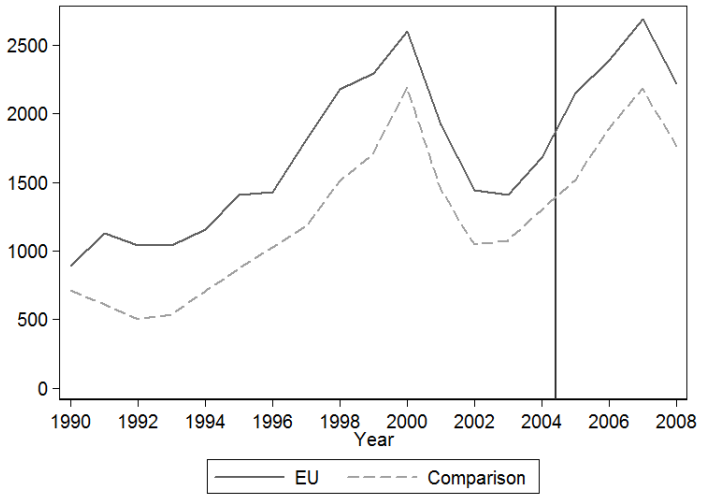


Figure 4.6: Cross-border M&A flows into EU and comparison countries, number: non-OECD countries

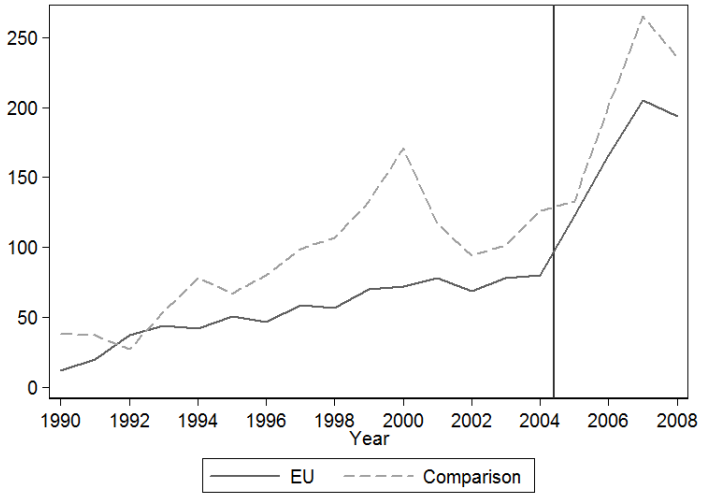


Figure 4.7: Cross-border M&A flows into EU and comparison countries, number: non-EU countries

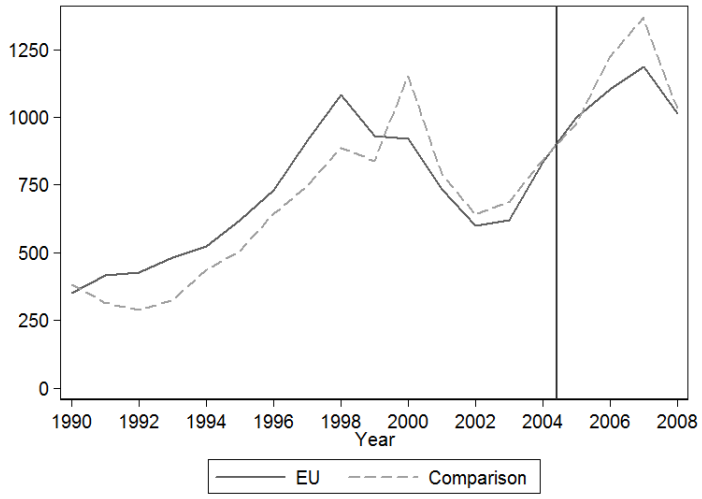


Table 4.2: PPML estimation results (acquirers = non-OECD countries)

Dependent variable: number of cross-border M&As					
Regressor	(1) Aggregate	(2) Aggregate	(3) Annual	(4) Annual	(5) Annual
d_{EU}	-0.894	1.525***	1.560***	1.502***	3.706***
	(0.685)	(0.226)	(0.148)	(0.161)	(0.846)
d_{post}	0.450	0.544***			
	(0.759)	(0.040)			
$d_{EU} \cdot d_{post}$	0.390	0.296***			
	(0.949)	(0.084)			
$d_{EU} \cdot d_{2003}$				0.221*	0.228*
				(0.130)	(0.126)
$d_{EU} \cdot d_{2004}$				0.082	0.073
				(0.136)	(0.144)
$d_{EU} \cdot d_{2005}$			0.359***	0.418***	0.358***
			(0.094)	(0.110)	(0.112)
$d_{EU} \cdot d_{2006}$			0.278***	0.337***	0.259**
			(0.085)	(0.103)	(0.105)
$d_{EU} \cdot d_{2007}$			0.195**	0.254**	0.211*
			(0.094)	(0.110)	(0.114)
$d_{EU} \cdot d_{2008}$			0.252**	0.311**	0.213*
			(0.123)	(0.136)	(0.130)
$Constant$	3.880***	2.464***	1.737***	1.737***	2.676***
	(0.540)	(0.193)	(0.126)	(0.125)	(0.556)
Country fixed effects	No	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes
Country characteristics	No	No	No	No	Yes
Observations	51	51	209	209	209
Log-pseudolikelihood	-2,019.2	-142.2	-456.7	-455.8	-451.3

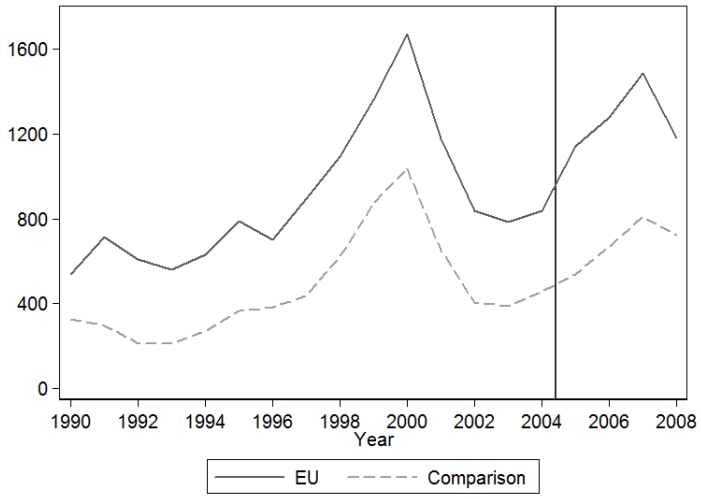
Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table 4.3: PPML estimation results (acquirers = all countries)

Dependent variable: number of cross-border M&As					
Regressor	(1) Aggregate	(2) Aggregate	(3) Annual	(4) Annual	(5) Annual
d_{EU}	-0.064	2.686***	2.661***	2.654***	2.298***
	(0.516)	(0.113)	(0.119)	(0.123)	(0.386)
d_{post}	0.245	0.245***			
	(0.631)	(0.019)			
$d_{EU} \cdot d_{post}$	0.003	0.003			
	(0.726)	(0.034)			
$d_{EU} \cdot d_{2003}$				0.027	0.042
				(0.052)	(0.052)
$d_{EU} \cdot d_{2004}$				0.014	0.034
				(0.050)	(0.051)
$d_{EU} \cdot d_{2005}$			0.101**	0.108**	0.139***
			(0.049)	(0.054)	(0.053)
$d_{EU} \cdot d_{2006}$			-0.015	-0.008	0.014
			(0.050)	(0.055)	(0.054)
$d_{EU} \cdot d_{2007}$			-0.040	-0.033	-0.001
			(0.037)	(0.043)	(0.042)
$d_{EU} \cdot d_{2008}$			-0.021	-0.014	-0.013
			(0.049)	(0.054)	(0.052)
$Constant$	6.261***	4.490***	3.343***	3.343***	3.629***
	(0.451)	(0.098)	(0.107)	(0.107)	(0.210)
Country fixed effects	No	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes
Country characteristics	No	No	No	No	Yes
Observations	52	52	231	231	231
Log-pseudolikelihood	-16,365.6	-253.0	-937.9	-937.7	-933.4

Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Figure 4.8: Cross-border M&A flows into EU and comparison countries, number: EU countries



5 Conclusion

The three essays comprising the current dissertation study a number of features of recent patterns in global cross-border M&As. The goal of the research was to better understand factors affecting the locational decisions of M&As across countries. The three essays improve our understanding of global FDI in a number of ways. First, the traditional theories of horizontal and vertical investment have a difficult time explaining global cross-border M&A patterns. Second, cross-border M&As in developing countries are growing both in number and in proportion of worldwide cross-border M&A flows. Third, contrary to previous beliefs, horizontal and vertical FDI is largely independent of country development. More generally, the evidence suggests the differences between horizontal and vertical investments are becoming more subtle as it appears vertical M&As take place between firms in proximate stages of production. Lastly, reforms to antitrust policy in the EU had no significant effect on cross-border M&As of firms in EU member states.

The first essay tests how well theories of horizontal and vertical FDI explain observed patterns of cross-border M&As in OECD countries. Quite simply, the theories suggest horizontal FDI should flow between similar countries separated by relatively large trade costs while vertical FDI should flow between countries separated by low trade costs and relatively large differences in factor endowments. I identify cross-border M&As as horizontal and vertical using common methods in the literature and separately estimate an empirical model based on standard FDI determinants. The results provide little support for the traditional explanations of FDI. In general, horizontal and vertical M&As look much more similar than expected.

The second essay challenges the common belief that the majority of FDI within the developed world is horizontal, whereas FDI in developing nations is predominantly vertical. In effect, the second essay questions whether the results from the first essay were

driven by the use of OECD, and thus mostly developed, countries in the empirical analysis. The horizontal and vertical FDI theories suggest trade costs and factor endowments should have a stronger effect on cross-border M&As in developing countries, stronger negative effect of trade costs and stronger positive effect of factor endowments. Results suggest trade costs have a stronger effect on developing countries, but no clear support is found for the idea that factor endowment drives vertical investments in developing nations. Although the latter result does not support theory, it is both consistent with the results of the first essay and it also appears consistent with the finding that the proportion of horizontal and vertical investment does not depend on country development. The results suggest vertical M&As are not driven by comparative advantage, but rather occur between firms in proximate stages of production.

The third essay examines how ECMR reforms in 2004 affected cross-border M&As of EU firms. One of the most notable changes associated with the reform included replacing the old dominance test in favor of a new SIEC test, which appeared to have increased the probability of blocking more mergers. Results from difference-in-difference estimations provide little evidence suggesting cross-border M&A activity was effected in countries within the EC's jurisdiction. Rather, M&A activity in the EU remained comparable to that outside the EU both before and after the reform.

Together, all three essays increased our understanding of cross-border M&As in a number of ways. The first two essays studied horizontal and vertical M&A location decisions in both developed and developing countries, while the third essay questioned how antitrust policy affects the location of international merger activity. Future research is needed to better understand why cross-country M&A patterns are not well-explained by the existing theories of horizontal and vertical investment. Any potential new theories of cross-border M&As should update and better-describe the locational decisions of different types of investment we have seen in the recent past. Furthermore, the third essay highlights the

difficulty with identifying the effects on antitrust on corporate merger activity. Given the level of M&A activity around the world, challenges associated with understanding how to influence global corporate takeovers on a large scale are mounting.

A Appendix

A.1 Chapter 2 Appendix

Table A1.1: Two-digit SIC manufacturing industries

20	Food and kindred products
21	Tobacco products
22	Textile mill products
23	Apparel and other finished products made from fabrics and similar materials
24	Lumber and wood products, except furniture
25	Furniture and fixtures
26	Paper and allied products
27	Printing, publishing, and allied industries
28	Chemicals and allied products
29	Petroleum refining and related industries
30	Rubber and miscellaneous plastics products
31	Leather and leather products
32	Stone, clay, glass, and concrete products
33	Primary metal industries
34	Fabricated metal products, except machinery and transportation equipment
35	Industrial and commercial machinery and computer equipment
36	Electronic and other electrical equipment and components, except computer equipment
37	Transportation equipment
38	Measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks
39	Miscellaneous manufacturing industries

Table A1.2: Variable Descriptions

Variable	Definition	Source
M&As	The number of mergers and acquisitions for each country-industry pair in a given year.	Thomson Financial Securities
Industry GDP	Manufacturing sector value added (volumes) of the acquiring (target) country. Data are converted to USD using IFS exchange rates (period average).	OECD STAN database (ISIC Rev. 3)
Distance	Distance (in kilometers) between the two most populous cities in the acquiring and target countries.	Center for Prospective Studies on International Information (CEPII)
Remoteness	Distance of acquiring (target) country from all other countries weighted by those other countries' share of world GDP ($= \sum_{k \neq l} \frac{Y_k}{Y_{World}} \cdot Distance_{kl}$).	CEPII; Penn World Tables
Urban concentration	Percent of the country's population that resides in urban areas.	World Bank's World Development Indicators
Skill level	Percent of employment holding skilled labor positions in the acquiring (target) country. Skilled labor is defined as categories 1,2, and 3 for ISCO-88 and 0/1 and 2 for ISCO-1968. ISCO-88 was used in cases where both ISCO-88 and ISCO-1968 numbers were reported.	International Labor Organization's Database of Labor Statistics (LABORSTA)
Squared skill difference	Squared difference in the percent of employment holding skilled labor positions between the acquiring and target countries.	LABORSTA
Squared education difference	Squared difference in the average years of total education for the population aged 15 and over between the acquiring and target countries.	Barro-Lee Educational Attainment Dataset
Common language	A dummy variable indicating the acquiring and target countries share a common official language.	CEPII
Colony	A dummy variable indicating the acquiring and target countries have had (or do have) a colonial link.	CEPII
Regional trade agreement	A dummy variable indicating the acquiring and target countries are in a regional trade agreement, custom union, or economic integration agreement.	World Trade Organization

Table A1.3: Country list

Country (year of OECD membership)		
Australia (1971)	Hungary (1996)	Norway (1961)
Austria (1961)	Iceland (1961)	Poland (1996)
Belgium (1961)	Ireland (1961)	Portugal (1961)
Canada (1961)	Italy (1962)	Spain (1961)
Czech Republic (1995)	Japan (1964)	Sweden (1961)
Denmark (1961)	Korea (1996)	Switzerland (1961)
Finland (1969)	Luxembourg (1961)	Turkey (1961)
France (1961)	Mexico (1994)	United Kingdom (1961)
Germany (1961)	Netherlands (1961)	United States (1961)
Greece (1961)	New Zealand (1973)	

Source: OECD (www.oecd.org). Slovak Republic (2000) is excluded since the empirical analysis begins in 1999.

Table A1.4: Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
$Y_{ik(jl)}$ (millions USD)	10,016.15	22,597.36	2.86	225,577.53
$Distance_{kl}$ (kilometers)	4,070.55	3,763.91	173.03	19,586.18
$Remote_{k(l)}$	5,570.87	1,009.58	4,932.75	13,144.03
$Urban_{k(l)}$	0.76	0.1	0.54	0.97
$Skill_{k(l)}$	0.36	0.08	0.16	0.48
$D.Skill^2_{kl}$	0.01	0.02	0	0.09
$D.Education^2_{kl}$	3.19	3.93	0	29.4
$CommonLanguage_{kl}$	0.08	0.27	0	1
$Colony_{kl}$	0.04	0.19	0	1
RTA_{kl}	0.69	0.46	0	1
N = 1,336,240				

Table A1.5: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	1.00													
(2)	-0.02	1.00												
(3)	0.15	0.15	1.00											
(4)	0.17	-0.01	0.61	1.00										
(5)	-0.01	0.17	0.61	-0.03	1.00									
(6)	0.01	0.00	-0.01	-0.03	-0.01	1.00								
(7)	0.00	0.01	-0.01	-0.01	-0.03	-0.03	1.00							
(8)	-0.14	0.02	-0.44	-0.69	0.02	0.34	0.01	1.00						
(9)	0.02	-0.14	-0.44	0.02	-0.69	0.01	0.34	0.00	1.00					
(10)	0.04	0.04	0.57	0.36	0.36	-0.03	-0.03	-0.37	-0.37	1.00				
(11)	0.12	0.12	0.18	0.16	0.16	-0.10	-0.10	-0.15	-0.15	0.06	1.00			
(12)	0.02	0.02	-0.11	-0.04	-0.04	0.09	0.09	0.13	0.13	-0.15	-0.05	1.00		
(13)	0.06	0.06	-0.00	0.04	0.04	0.04	0.04	-0.03	-0.03	-0.11	0.12	0.33	1.00	
(14)	-0.25	-0.25	-0.69	-0.35	-0.35	-0.02	-0.02	0.25	0.25	-0.29	-0.12	0.03	-0.09	1.00

Where 1-14 denote: Y_{ik} (1), Y_{jl} (2), $Distance_{kl}$ (3), $Remote_k$ (4), $Remote_l$ (5), $Urban_k$ (6), $Urban_l$ (7), $Skill_k$ (8), $Skill_l$ (9), $D.Skill^2_{kl}$ (10), $D.Education^2_{kl}$ (11), $CommonLanguage_{kl}$ (12), $Colony_{kl}$ (13), RTA_{kl} (14).

Table A1.6: PPML estimation results *(primary SIC)*

	All M&As	Horizontal	Vertical†	Non-horizontal
lnY_{ik}	0.719***	0.706***	0.781***	0.733***
	(0.034)	(0.039)	(0.043)	(0.035)
lnY_{jl}	0.686***	0.650***	0.743***	**0.716*** **
	(0.035)	(0.039)	(0.042)	(0.035)
$lnDistance_{kl}$	-0.255***	-0.300***	-0.280***	-0.226***
	(0.073)	(0.082)	(0.086)	(0.075)
$lnRemote_{k}$	1.926***	2.085***	1.757**	1.819***
	(0.552)	(0.598)	(0.728)	(0.565)
$lnRemote_{l}$	1.074	1.031	1.538***	1.122
	(0.704)	(0.727)	(0.566)	(0.720)
$lnUrban_{k}$	0.481	0.549	0.221	0.417
	(0.404)	(0.416)	(0.591)	(0.453)
$lnUrban_{l}$	0.998**	1.066**	1.057**	0.934**
	(0.432)	(0.464)	(0.521)	(0.447)
$lnSkill_{k}$	2.751***	2.748***	2.505***	2.773***
	(0.340)	(0.343)	(0.446)	(0.362)
$lnSkill_{l}$	1.874***	1.487***	1.870***	**2.170*** **
	(0.325)	(0.362)	(0.315)	(0.327)
$lnD.Skill^{2}_{kl}$	0.055***	0.052**	0.059**	0.057***
	(0.021)	(0.023)	(0.027)	(0.021)
$lnD.Education^{2}_{kl}$	0.066***	0.068***	0.051	0.066***
	(0.020)	(0.025)	(0.035)	(0.021)
$CommonLanguage_{kl}$	0.561***	0.569***	0.450***	0.542***
	(0.121)	(0.118)	(0.128)	(0.129)
$Colony_{kl}$	0.520***	0.559***	0.528***	0.527***
	(0.166)	(0.167)	(0.177)	(0.176)
RTA_{kl}	0.225	0.243	0.274	0.201
	(0.151)	(0.170)	(0.200)	(0.159)
$Constant$	-58.737***	-54.843***	-82.350***	-59.388***
	(8.136)	(8.888)	(8.255)	(8.281)
Log-pseudolikelihood	-26,533.6	-6,841.2	-4,913.7	-17,403.7
Observations	1,336,240	71,114	1,336,240	1,336,240

Estimations include both acquirer and target industry fixed effects (two-digit SIC level) as well as time effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively. Bold coefficients in the vertical and non-horizontal columns denote the coefficients are statistically different (five percent significance level) from the corresponding coefficients in the horizontal column.

† Data sparsity prevents statistical comparison between coefficients for vertical and horizontal M&As.

Table A1.7: PPML estimation results *(primary and secondary SIC – with overlap)*

	All	Horizontal	Vertical	Non-horizontal
lnY_{ik}	0.719***	0.715***	**0.749*** **	0.724***
	(0.034)	(0.035)	(0.035)	(0.034)
lnY_{jl}	0.686***	0.676***	**0.723*** **	**0.702*** **
	(0.035)	(0.034)	(0.035)	(0.034)
$lnDistance_{kl}$	-0.255***	-0.270***	-0.245***	-0.243***
	(0.073)	(0.075)	(0.076)	(0.073)
$lnRemote_{k}$	1.926***	1.867***	**2.123*** **	2.007***
	(0.552)	(0.567)	(0.531)	(0.544)
$lnRemote_{l}$	1.074	0.996	**1.423** **	1.100
	(0.704)	(0.714)	(0.646)	(0.712)
$lnUrban_{k}$	0.481	0.479	0.746*	0.445
	(0.404)	(0.391)	(0.412)	(0.410)
$lnUrban_{l}$	0.998**	1.103**	1.085**	1.012**
	(0.432)	(0.434)	(0.443)	(0.432)
$lnSkill_{k}$	2.751***	2.686***	**2.901*** **	**2.842*** **
	(0.340)	(0.339)	(0.372)	(0.344)
$lnSkill_{l}$	1.874***	1.624***	**2.097*** **	**1.994*** **
	(0.325)	(0.332)	(0.311)	(0.322)
$lnD.Skill^{2}_{kl}$	0.055***	0.054***	**0.078*** **	0.059***
	(0.021)	(0.020)	(0.020)	(0.020)
$lnD.Education^{2}_{kl}$	0.066***	0.049**	**0.069*** **	**0.065*** **
	(0.020)	(0.020)	(0.022)	(0.021)
$CommonLanguage_{kl}$	0.561***	0.531***	**0.466*** **	0.550***
	(0.121)	(0.124)	(0.123)	(0.119)
$Colony_{kl}$	0.520***	0.516***	0.508***	0.509***
	(0.166)	(0.166)	(0.165)	(0.164)
RTA_{kl}	0.225	0.252*	0.233	0.219
	(0.151)	(0.151)	(0.159)	(0.152)
$Constant$	-58.737***	-58.010***	-65.194***	-60.196***
	(8.136)	(8.418)	(7.557)	(8.199)
Log-pseudolikelihood	-26,533.6	-19,401.8	-18,213.8	-25,219.9
Observations	1,336,240	1,336,240	1,336,240	1,336,240

Estimations include both acquirer and target industry fixed effects (two-digit SIC level) as well as time effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively. Bold coefficients in the vertical and non-horizontal columns denote the coefficients are statistically different (five percent significance level) from the corresponding coefficients in the horizontal column.

A.2 Chapter 3 Appendix

Table A2.1: Summary statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	N
$Y_{k(l)}$ (billions of 2005 international dollars)	649.08	1,576.54	1.82	13,187.36	63,682
$y_{k(l)}$ (2005 international dollars)	18,478.28	16,654.76	158.72	149,950.17	63,682
$Distance_{kl}$ (kilometers)	7,813.32	4,715.64	59.62	19,772.34	63,682
ρ_l	95.72	51.97	20.79	275.42	63,682
$Contiguous_{kl}$	0.03	0.17	0	1	63,682
$CommonLanguage_{kl}$	0.12	0.33	0	1	63,682
$Colony_{kl}$	0.02	0.15	0	1	63,682
BTT_{kl}	0.35	0.48	0	1	63,682
RTA_{kl}	0.27	0.45	0	1	63,682
$Education_{k(l)}$	8.95	2.03	3.56	13.02	63,682
$TaxRate_{k(l)}$	29.82	7.74	10	55	63,682
$PhoneLines_{k(l)}$	29.75	19.98	0.33	74.76	63,682
$StockMkt_{k(l)}$	44.61	70.92	0.00	755.06	63,682
$Wage_{k(l)}$	9.50	7.11	0.70	30.83	23,046

Table A2.2: Variable descriptions

Variable	Definition	Source
Real GDP	GDP in trillions of 2005 international dollars.	Penn World Tables
Real GDP per capita	GDP per person in 2005 international dollars.	Penn World Tables
Distance	Distance (in kilometers) between the two most populous cities in the acquiring and target countries.	Center for Prospective Studies on International Information (CEPII) (Paris, France)
ρ_l	Multilateral index of trade costs ($= \sum_{k \neq l} \frac{Distance_{kl}}{Y_k}$).	Penn World Tables, CEPII
Tax rate	Highest marginal corporate income tax rate.	KPMG's Corporate and Indirect Tax Rate Survey 2009
Phone lines	Number of telephone lines per 100 people.	World Bank (World Development Indicators)
Stock market	Stock market-to-GDP ratio (total value of stocks traded-to-GDP ratio).	World Bank (World Development Indicators)
Education	Average years of total education for the population aged 15 and over, where total education includes primary, secondary, and tertiary education.	Barro-Lee Educational Attainment Dataset
Common language	A dummy variable indicating that the acquiring and target countries share a common official language.	CEPII
Colony	A dummy variable indicating that the acquiring and target countries have had (or do have) a colonial link.	CEPII
Contiguous	A dummy variable indicating that the acquiring and target countries share a geographical border.	CEPII
Bilateral tax treaty	A dummy variable indicating that the acquiring and target countries have signed a bilateral tax treaty.	UNCTAD
Regional trade agreement	A dummy variable indicating that the acquiring and target countries are in a regional trade agreement, custom union, or economic integration agreement.	World Trade Organization
Wage	Effective gross hourly wage (in USD) in 15 professions, taking into account working hours, paid vacation and legal holidays; weighting according to distribution of professions. Wage data are city-specific, but I use these for countries as a whole. Averages are taken when multiple cities are surveyed in the same country.	Union Bank of Switzerland (UBS)

Table A2.3: Coefficient sum tests

		All M&As	Horizontal M&As	Vertical M&As
$lnWage_l$		-0.186	-0.364	-0.027
$\delta \cdot lnWage_l$		0.272	0.371	0.046
	sum	0.086	0.007	0.019
$lnEducation_l$		0.199	-0.154	0.350
$\delta \cdot lnEducation_l$		-0.729	-0.065	-1.443
	sum	-0.530*	-0.219	-1.093**
$lnTaxRate_l$		-0.511	-0.656	-0.468
$\delta \cdot lnTaxRate_l$		0.459	0.544	0.647
	sum	-0.052	-0.112	0.179
$lnPhoneLines_l$		0.947	0.886	1.130
$\delta \cdot lnPhoneLines_l$		-0.563	-0.519	-0.483
	sum	0.384**	0.367**	0.647***
$lnStockMkt_l$		0.143	0.124	0.153
$\delta \cdot lnStockMkt_l$		-0.151	-0.156	-0.154
	sum	-0.008	-0.032	-0.001

Wald tests examine the null hypothesis that the coefficient estimates sum to zero. Coefficient sums significantly different from zero are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table A2.4: Country list

Developed (36):			
Australia	Estonia	Japan	Portugal
Austria	Finland	Latvia	Romania
Belgium	France	Lithuania	Slovak Republic
Bermuda	Germany	Luxembourg	Slovenia
Bulgaria	Greece	Malta	Spain
Canada	Hungary	Netherlands	Sweden
Cyprus	Iceland	New Zealand	Switzerland
Czech Republic	Ireland	Norway	U.K.
Denmark	Italy	Poland	U.S.
Transition (14):			
Albania	Croatia	Moldova	
Armenia	Georgia	Russian Federation	
Azerbaijan	Kazakhstan	Ukraine	
Belarus	Kyrgyzstan	Uzbekistan	
Bosnia and Herzegovina	Macedonia		
Developing (87):			
Algeria	Egypt	Malaysia	Saudi Arabia
Argentina	El Salvador	Mauritius	Senegal
Bahamas	Fiji	Mexico	Sierra Leone
Bahrain	Gabon	Mongolia	Singapore
Bangladesh	Ghana	Morocco	Solomon Islands
Barbados	Guatemala	Mozambique	South Africa
Belize	Guyana	Namibia	Sri Lanka
Bolivia	Honduras	Nepal	Swaziland
Botswana	Hong Kong	Nicaragua	Syrian Arab Republic
Brazil	India	Niger	Taiwan
Brunei Darussalam	Indonesia	Nigeria	Tanzania
Cambodia	Iran	Oman	Thailand
Cameroon	Israel	Pakistan	Togo
Cape Verde	Jamaica	Panama	Trinidad and Tobago
Chad	Jordan	Papua New Guinea	Tunisia
Chile	Kenya	Paraguay	Turkey
China	Kuwait	Peru	United Arab Emirates
Colombia	Laos	Philippines	Uruguay
Costa Rica	Lebanon	Puerto Rico	Venezuela
Cuba	Libya	Qatar	Viet Nam
Dominican Republic	Macau	Republic of Korea	Zambia
Ecuador	Madagascar	Rwanda	Zimbabwe

Source: United Nations (2012). Note that the use of “developing" countries throughout the paper includes both transition and developing countries. Countries denote those included in the empirical analyses.

Table A2.5: PPML estimation results: trade costs (all M&As)

	Pooled	D-D	D-d	d-D	d-d
$lnDistance_{kl}$	-0.444***	-0.447***	-0.606***	-0.473***	-0.994***
	(0.052)	(0.067)	(0.142)	(0.107)	(0.084)
$ln\rho_l$	0.231**	0.035	1.576***	-0.345**	2.316***
	(0.112)	(0.119)	(0.228)	(0.174)	(0.335)
$Contiguous_{kl}$	0.099	0.035	0.488	0.634**	0.068
	(0.118)	(0.143)	(0.307)	(0.315)	(0.260)
$CommonLanguage_{kl}$	0.824***	0.595***	0.833***	1.821***	1.280***
	(0.105)	(0.119)	(0.201)	(0.252)	(0.257)
$Colony_{kl}$	0.425***	0.529***	0.083	-0.050	0.756
	(0.118)	(0.143)	(0.307)	(0.315)	(0.260)
BTT_{kl}	0.082	-0.122	0.332**	0.187	0.417*
	(0.081)	(0.105)	(0.136)	(0.168)	(0.227)
RTA_{kl}	0.287***	0.098	0.434***	0.509**	0.395**
	(0.098)	(0.144)	(0.155)	(0.207)	(0.199)
lnY_k	0.653***	0.573***	0.684***	0.884***	0.574***
	(0.041)	(0.050)	(0.061)	(0.078)	(0.090)
lnY_l	0.724***	0.691***	0.759***	0.817***	0.559***
	(0.039)	(0.055)	(0.041)	(0.088)	(0.066)
lny_k	0.675***	1.222***	0.740***	0.662***	0.463***
	(0.107)	(0.203)	(0.280)	(0.129)	(0.147)
lny_l	-0.260**	-0.230	-0.181	-0.835*	-0.497***
	(0.106)	(0.194)	(0.114)	(0.470)	(0.140)
$lnEducation_k$	0.197	0.411	-0.345	-0.289	-0.043
	(0.295)	(0.433)	(0.457)	(0.394)	(0.583)
$lnEducation_l$	0.051	0.805**	-0.096	1.201	-0.045
	(0.253)	(0.345)	(0.286)	(0.927)	(0.423)
$lnTaxRate_k$	-0.235	-0.139	-0.164	-0.027	-1.055***
	(0.165)	(0.206)	(0.262)	(0.306)	(0.290)
$lnTaxRate_l$	-0.423***	-0.507***	-0.387*	-0.439	-0.591
	(0.147)	(0.196)	(0.228)	(0.315)	(0.404)
$lnPhoneLines_k$	-0.056	0.935***	1.081***	-0.191	-0.093
	(0.140)	(0.262)	(0.342)	(0.177)	(0.186)
$lnPhoneLines_l$	0.565***	0.713**	0.717***	0.845	0.821***
	(0.115)	(0.295)	(0.140)	(0.628)	(0.161)
$lnStockMkt_k$	0.314***	0.237***	0.213***	0.269***	0.292***
	(0.042)	(0.052)	(0.074)	(0.059)	(0.048)
$lnStockMkt_l$	0.096***	0.147***	0.098***	0.144	0.035
	(0.029)	(0.047)	(0.034)	(0.109)	(0.057)
$Constant$	-5.106***	-15.633***	-14.097***	0.460	-2.814
	(1.302)	(2.384)	(3.202)	(3.695)	(2.996)
$Developed_k$	0.494***				
	(0.130)				
$Developed_l$	0.476***				
	(0.108)				
Log-pseudolikelihood					
Observations	63,682	10,166	15,481	15,481	22,554

Estimations include time fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table A2.6: PPML estimation results: trade costs (horizontal M&As)

	Pooled	D-D	D-d	d-D	d-d
$lnDistance_{kl}$	-0.494***	-0.492***	-0.662***	-0.470***	-0.929***
	(0.059)	(0.088)	(0.154)	(0.175)	(0.099)
$ln\rho_l$	0.132	-0.003	1.212***	-0.498	1.900***
	(0.113)	(0.127)	(0.293)	(0.309)	(0.489)
$Contiguous_{kl}$	0.215	0.196	0.647**	-0.605	0.287
	(0.137)	(0.153)	(0.326)	(0.621)	(0.310)
$CommonLanguage_{kl}$	0.721***	0.567***	0.816***	1.354***	0.998***
	(0.123)	(0.143)	(0.252)	(0.332)	(0.297)
$Colony_{kl}$	0.554***	0.610***	-0.227	0.395	1.543***
	(0.148)	(0.163)	(0.274)	(0.402)	(0.558)
BTT_{kl}	0.067	-0.162	0.608***	0.267	0.257
	(0.092)	(0.120)	(0.210)	(0.233)	(0.228)
RTA_{kl}	0.230*	0.048	0.367**	0.328	0.385
	(0.125)	(0.208)	(0.183)	(0.263)	(0.263)
lnY_k	0.664***	0.623***	0.599***	0.865***	0.487***
	(0.045)	(0.057)	(0.092)	(0.120)	(0.172)
lnY_l	0.735***	0.724***	0.709***	0.784***	0.616***
	(0.045)	(0.060)	(0.069)	(0.158)	(0.100)
lny_k	0.755***	1.322***	1.042**	0.526**	0.456
	(0.126)	(0.254)	(0.473)	(0.208)	(0.291)
lny_l	-0.394***	-0.411	-0.254	-1.373*	-0.444**
	(0.131)	(0.254)	(0.159)	(0.798)	(0.213)
$lnEducation_k$	-0.432	-0.469	-1.454**	-0.661	-0.341
	(0.332)	(0.470)	(0.705)	(0.557)	(0.747)
$lnEducation_l$	0.059	0.419	0.026	1.442	-0.030
	(0.307)	(0.434)	(0.427)	(1.424)	(0.811)
$lnTaxRate_k$	-0.167	-0.118	0.267	0.131	-1.143**
	(0.194)	(0.235)	(0.485)	(0.393)	(0.492)
$lnTaxRate_l$	-0.678***	-0.788***	-0.332	-0.332	-1.191**
	(0.173)	(0.221)	(0.328)	(0.527)	(0.581)
$lnPhoneLines_k$	0.266	0.930***	0.596	0.097	0.254
	(0.181)	(0.343)	(0.525)	(0.259)	(0.285)
$lnPhoneLines_l$	0.602***	0.482	0.776***	0.872	0.564**
	(0.130)	(0.346)	(0.173)	(0.910)	(0.276)
$lnStockMkt_k$	0.202***	0.139**	0.224**	0.207**	0.221**
	(0.050)	(0.063)	(0.108)	(0.094)	(0.101)
$lnStockMkt_l$	0.060	0.125*	0.035	0.258	0.074
	(0.037)	(0.064)	(0.059)	(0.199)	(0.080)
$Constant$	-4.053***	-10.536***	-13.827***	4.357	-1.019
	(1.556)	(3.139)	(5.021)	(6.095)	(4.660)
$Developed_k$	0.413***				
	(0.152)				
$Developed_l$	0.596***				
	(0.138)				
Log-pseudolikelihood					
Observations	63,682	10,166	15,481	15,481	22,554

Estimations include time fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table A2.7: PPML estimation results: trade costs (vertical M&As)

	Pooled	D-D	D-d	d-D	d-d
$lnDistance_{kl}$	-0.405***	-0.457***	-0.581***	-0.318*	-1.022***
	(0.069)	(0.084)	(0.186)	(0.183)	(0.175)
$ln\rho_l$	0.249*	0.036	2.163***	-0.207	2.577***
	(0.138)	(0.139)	(0.325)	(0.295)	(0.399)
$Contiguous_{kl}$	0.014	-0.134	0.406	0.961**	-0.341
	(0.159)	(0.178)	(0.436)	(0.442)	(0.373)
$CommonLanguage_{kl}$	0.855***	0.669***	0.750**	1.586***	1.374***
	(0.115)	(0.122)	(0.293)	(0.330)	(0.315)
$Colony_{kl}$	0.397***	0.473***	0.154	0.321	-13.434***
	(0.150)	(0.165)	(0.345)	(0.388)	(0.541)
BTT_{kl}	0.117	-0.108	0.522**	0.634***	0.314
	(0.115)	(0.122)	(0.224)	(0.228)	(0.346)
RTA_{kl}	0.232*	-0.020	0.312	0.553*	0.853**
	(0.131)	(0.176)	(0.266)	(0.313)	(0.368)
lnY_k	0.706***	0.651***	0.678***	0.750***	0.436***
	(0.057)	(0.070)	(0.126)	(0.115)	(0.156)
lnY_l	0.772***	0.726***	0.878***	0.662***	0.638***
	(0.051)	(0.070)	(0.084)	(0.125)	(0.140)
lny_k	0.749***	1.051***	0.536	0.840***	0.307
	(0.148)	(0.273)	(0.603)	(0.245)	(0.217)
lny_l	-0.135	-0.030	0.152	-1.514*	-0.385
	(0.142)	(0.262)	(0.185)	(0.782)	(0.299)
$lnEducation_k$	0.267	0.620	-0.212	-0.612	-0.851
	(0.379)	(0.549)	(0.837)	(0.626)	(0.973)
$lnEducation_l$	-0.156	0.868**	-0.708	3.263**	0.085
	(0.338)	(0.414)	(0.525)	(1.500)	(0.995)
$lnTaxRate_k$	-0.425*	-0.467	0.034	-0.330	-1.103**
	(0.252)	(0.306)	(0.628)	(0.454)	(0.497)
$lnTaxRate_l$	-0.343*	-0.439*	-0.378	-0.286	-0.499
	(0.176)	(0.243)	(0.349)	(0.489)	(0.485)
$lnPhoneLines_k$	-0.018	0.907***	1.681***	-0.107	0.214
	(0.178)	(0.326)	(0.610)	(0.300)	(0.348)
$lnPhoneLines_l$	0.667***	1.022**	0.860***	1.266	0.794**
	(0.162)	(0.401)	(0.212)	(1.115)	(0.388)
$lnStockMkt_k$	0.354***	0.291***	0.341**	0.356***	0.284***
	(0.062)	(0.080)	(0.167)	(0.100)	(0.077)
$lnStockMkt_l$	0.090**	0.127*	0.141**	0.207	-0.019
	(0.045)	(0.071)	(0.066)	(0.174)	(0.091)
$Constant$	-9.272***	-18.629***	-23.243***	-4.612	-4.772
	(1.706)	(3.148)	(6.871)	(5.320)	(4.302)
$Developed_k$	0.474***				
	(0.168)				
$Developed_l$	0.388***				
	(0.138)				
Log-pseudolikelihood					
Observations	63,682	10,166	15,481	15,481	22,554

Estimations include time fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table A2.8: PPML estimation results: factor endowments

	All M&As	All M&As	Horizontal M&As	Vertical M&As
lny_k	0.675***	0.674***	0.755***	0.746***
	(0.107)	(0.107)	(0.125)	(0.148)
lny_l	-0.260**	-0.314	-0.539**	-0.121
	(0.106)	(0.197)	(0.252)	(0.270)
$\delta \cdot lny_l$		0.091	0.235	0.026
		(0.239)	(0.302)	(0.317)
$lnEducation_k$	0.197	0.206	-0.456	0.314
	(0.295)	(0.296)	(0.331)	(0.374)
$lnEducation_l$	0.051	0.244	0.059	0.289
	(0.253)	(0.376)	(0.439)	(0.435)
$\delta \cdot lnEducation_l$		-0.342	0.053	-0.906
		(0.460)	(0.570)	(0.627)
$lnTaxRate_k$	-0.235	-0.247	-0.180	-0.439*
	(0.165)	(0.165)	(0.193)	(0.250)
$lnTaxRate_l$	-0.423***	-0.587***	-0.778***	-0.612***
	(0.147)	(0.181)	(0.200)	(0.222)
$\delta \cdot lnTaxRate_l$		0.429*	0.506	0.662**
		(0.250)	(0.318)	(0.329)
$lnPhoneLines_k$	-0.056	-0.052	0.269	-0.012
	(0.140)	(0.139)	(0.179)	(0.177)
$lnPhoneLines_l$	0.565***	0.791***	0.569*	1.104***
	(0.115)	(0.298)	(0.336)	(0.412)
$\delta \cdot lnPhoneLines_l$		-0.225	0.016	-0.393
		(0.321)	(0.372)	(0.449)
$lnStockMkt_k$	0.314***	0.316***	0.204***	0.359***
	(0.042)	(0.042)	(0.050)	(0.061)
$lnStockMkt_l$	0.096***	0.121***	0.117**	0.094
	(0.029)	(0.043)	(0.058)	(0.066)
$\delta \cdot lnStockMkt_l$		-0.074	-0.102	-0.060
		(0.047)	(0.064)	(0.067)
lnY_k	0.653***	0.653***	0.666***	0.705***
	(0.041)	(0.040)	(0.045)	(0.056)
lnY_l	0.724***	0.724***	0.743***	0.768***
	(0.039)	(0.040)	(0.046)	(0.051)
$lnDistance_{kl}$	-0.444***	-0.439***	-0.493***	-0.394***
	(0.052)	(0.051)	(0.059)	(0.067)
$ln\rho_l$	0.231**	0.208*	0.108	0.211
	(0.112)	(0.108)	(0.113)	(0.131)
$Contiguous_{kl}$	0.099	0.100	0.227*	0.008
	(0.118)	(0.118)	(0.135)	(0.160)
$CommonLanguage_{kl}$	0.824***	0.799***	0.736***	0.798***
	(0.105)	(0.111)	(0.128)	(0.116)
$Colony_{kl}$	0.425***	0.417***	0.521***	0.410***
	(0.137)	(0.134)	(0.146)	(0.146)
BTT_{kl}	0.082	0.085	0.071	0.116
	(0.081)	(0.086)	(0.098)	(0.117)
RTA_{kl}	0.287***	0.291***	0.217*	0.258**
	(0.098)	(0.096)	(0.122)	(0.129)
$Constant$	-5.106***	-5.801***	-5.966***	-9.928***
	(1.302)	(1.424)	(1.824)	(1.842)
Log-pseudolikelihood				
Observations	63,682	63,682	63,682	63,682

Estimations include time and developed country fixed effects. Robust standard errors clustered by country pairs are in parentheses. Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

A.3 Chapter 4 Appendix

Table A3.1: OECD and EU country lists

OECD Countries (year of OECD membership)		
Australia (1971)	Hungary (1996)	Poland (1996)
Austria (1961)	Iceland (1961)	Portugal (1961)
Belgium (1961)	Ireland (1961)	Slovak Republic (2000)
Canada (1961)	Israel (2010)	Slovenia (2010)
Chile (2010)	Italy (1962)	Spain (1961)
Czech Republic (1995)	Japan (1964)	Sweden (1961)
Denmark (1961)	Korea (1996)	Switzerland (1961)
Estonia (2010)	Luxembourg (1961)	Turkey (1961)
Finland (1969)	Mexico (1994)	United Kingdom (1961)
France (1961)	Netherlands (1961)	United States (1961)
Germany (1961)	New Zealand (1973)	
Greece (1961)	Norway (1961)	
EU Countries (year of EU membership)		
Austria (1995)	Germany (1952)	Poland (2004)
Belgium (1952)	Greece (1981)	Portugal (1986)
Bulgaria (2007)	Hungary (2004)	Romania (2007)
Croatia (2013)	Ireland (1973)	Slovak Republic (2004)
Cyprus (2004)	Italy (1952)	Slovenia (2004)
Czech Republic (2004)	Latvia (2004)	Spain (1986)
Denmark (1973)	Lithuania (2004)	Sweden (1995)
Estonia (2004)	Luxembourg (1952)	United Kingdom (1973)
Finland (1995)	Malta (2004)	
France (1952)	Netherlands (1952)	

Source: OECD (www.oecd.org) and EU (www.europa.eu), respectively.

Table A3.2: Acquiring country list*

All countries (55)				
Argentina	China	Iceland	Luxembourg	Saudi Arabia
Australia	Croatia	India	Malaysia	Singapore
Austria	Cyprus	Ireland	Mexico	Slovenia
Bahamas	Denmark	Isle of Man	Netherlands	South Africa
Bahrain	Finland	Israel	Netherlands Antilles	Spain
Belgium	France	Italy	New Zealand	Sweden
Bermuda	Germany	Japan	Norway	Switzerland
Brazil	Greece	Jersey	Panama	Taiwan
British Virgin Islands	Guernsey	Korea	Poland	Turkey
Canada	Hong Kong	Kuwait	Portugal	U.K.
Cayman Islands	Hungary	Liechtenstein	Russia	U.S.
Non-OECD countries (27)				
Argentina	Cayman Islands	India	Malaysia	Slovenia†
Bahamas	China	Isle of Man	Netherlands Antilles	South Africa
Bahrain	Croatia	Israel†	Panama	Taiwan
Bermuda	Cyprus	Jersey	Russia	
Brazil	Guernsey	Kuwait	Saudi Arabia	
British Virgin Islands	Hong Kong	Liechtenstein	Singapore	
Non-EU countries (36)				
Argentina	Cayman Islands	Israel	Netherlands Antilles	Switzerland
Australia	China	Japan	New Zealand	Taiwan
Bahamas	Croatia‡	Jersey	Norway	Turkey
Bahrain	Guernsey	Korea	Panama	U.S.
Bermuda	Hong Kong	Kuwait	Russia	
Brazil	Iceland	Liechtenstein	Saudi Arabia	
British Virgin Islands	India	Malaysia	Singapore	
Canada	Isle of Man	Mexico	South Africa	
EU countries (15)				
Austria	Finland	Greece	Luxembourg	Spain
Belgium	France	Ireland	Netherlands	Sweden
Denmark	Germany	Italy	Portugal	U.K.

Source: OECD (www.oecd.org) and EU (www.europa.eu), respectively.

∗ Acquiring countries include those with M&A activity in at least one country of both the EU and comparison groups (see Table 1) in at least one year of both the pre-reform (2000-2003) and post-reform (2005-2008) periods.

† Israel and Slovenia are included because they became OECD members in 2010, which is after the time period studied in the empirical analysis (2000-2008).

‡ Croatia is included because it became an EU member in 2013, which is after the time period studied in the empirical analysis (2000-2008).

Table A3.3: PPML estimation results (acquirers = non-EU countries)

Dependent variable: number of cross-border M&As					
Regressor	(1) Aggregate	(2) Aggregate	(3) Annual	(4) Annual	(5) Annual
d_{EU}	-0.439	2.165***	2.160***	2.127***	1.926***
	(0.557)	(0.111)	(0.130)	(0.136)	(0.486)
d_{post}	0.341	0.341***			
	(0.602)	(0.018)			
$d_{EU} \cdot d_{post}$	0.061	0.061**			
	(0.791)	(0.028)			
$d_{EU} \cdot d_{2003}$				0.034	0.059
				(0.078)	(0.076)
$d_{EU} \cdot d_{2004}$				0.131**	0.163***
				(0.058)	(0.058)
$d_{EU} \cdot d_{2005}$			0.126*	0.159**	0.200***
			(0.070)	(0.076)	(0.069)
$d_{EU} \cdot d_{2006}$			-0.001	0.033	0.054
			(0.053)	(0.062)	(0.060)
$d_{EU} \cdot d_{2007}$			-0.040	-0.006	0.043
			(0.047)	(0.057)	(0.059)
$d_{EU} \cdot d_{2008}$			0.080	0.114*	0.105*
			(0.049)	(0.058)	(0.055)
$Constant$	5.695***	4.119***	3.006***	3.006***	3.632***
	(0.420)	(0.102)	(0.115)	(0.116)	(0.266)
Country fixed effects	No	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes
Country characteristics	No	No	No	No	Yes
Observations	52	52	229	229	229
Log-pseudolikelihood	-10,716.2	-197.8	-779.9	-777.3	-772.4

Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

Table A3.4: PPML estimation results (acquirers = EU countries)

Dependent variable: number of cross-border M&As					
Regressor	(1) Aggregate	(2) Aggregate	(3) Annual	(4) Annual	(5) Annual
d_{EU}	0.277	3.370***	3.361***	3.335***	3.164***
	(0.562)	(0.141)	(0.144)	(0.149)	(0.418)
d_{post}	0.096	0.096***			
	(0.722)	(0.034)			
$d_{EU} \cdot d_{post}$	0.033	0.033			
	(0.773)	(0.048)			
$d_{EU} \cdot d_{2003}$				0.137**	0.147***
				(0.057)	(0.057)
$d_{EU} \cdot d_{2004}$				0.042	0.054
				(0.068)	(0.069)
$d_{EU} \cdot d_{2005}$			0.161***	0.187***	0.206***
			(0.062)	(0.068)	(0.072)
$d_{EU} \cdot d_{2006}$			0.062	0.088	0.100
			(0.067)	(0.072)	(0.072)
$d_{EU} \cdot d_{2007}$			0.020	0.046	0.064
			(0.053)	(0.060)	(0.059)
$d_{EU} \cdot d_{2008}$			-0.098	-0.072	-0.078
			(0.074)	(0.080)	(0.081)
$Constant$	5.421***	3.265***	2.051***	2.051***	2.294***
	(0.527)	(0.126)	(0.138)	(0.139)	(0.272)
Country fixed effects	No	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes
Country characteristics	No	No	No	No	Yes
Observations	52	52	229	229	229
Log-pseudolikelihood	-7,298.7	-223.4	-795.9	-793.8	-792.5

Significant coefficients are denoted by ***, **, * at the one, five, and ten percent significant levels, respectively.

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  - Macroeconomics and Globalization (1 section)
- Instructor of Record, University of Kentucky, 2010-2011.
  - Principles of Macroeconomics (3 sections)
  - Business and Economic Statistics (1 section)
  - Intermediate Macroeconomics (1 section)
- Teaching Assistant, University of Kentucky, 2009-2011
  - Contemporary Economic Issues
  - Principles of Microeconomics
  - Intermediate Microeconomics
  - Health Economics
  - Environmental Economics
  - Neoclassical Microeconomic Theory
  - International Finance

Awards

- Outstanding Teacher Award for Teaching Assistants, Department of Economics, University of Kentucky, 2013
- Gatton Fellowship, University of Kentucky, 2012
- Max Steckler Fellowship, University of Kentucky, 2009
- Olga B. Satre Hart Memorial Scholarship, St. Cloud State University, 2009