ABSTRACT

Title of dissertation: ESSAYS IN INTERNATIONAL FINANCE

TANAKORN MAKAEW, Doctor of Philosophy, 2010

Dissertation directed by: Professor VOJISLAV MAKSIMOVIC

Department of Finance

The dissertation consists of three essays on international capital flows.

In the first essay, titled "Do small firms benefit more from foreign portfolio investment? Evidence from a Natural Experiment," I test whether an increase in the supply of foreign portfolio capital benefits small firms by using the Thai government's unique restriction on capital inflows as a natural experiment. The Thai government imposed a very stringent capital control on December 19, 2006, and then quickly abandoned it one day later. Although many other studies have been plagued with the difficulty of separating the impact of foreign capital from the impact of other concurrent events, this experiment helps me solve the time-series identification problem. My results suggest that foreign portfolio investment helps large firms the most, contrary to existing evidence, which finds a benefit in foreign portfolio investment for small firms. I also investigate the importance of other firm characteristics correlated with size, which includes a firm's exchange rate exposure, foreign ownership, and political connection.

The next two essays are on the dynamic patterns of international mergers and acquisitions.

In the second essay, I uncover key facts about international M&As by estimating a variety of reduced form models. I find that: (1) Cross-border mergers come in waves that are highly correlated with business cycles. (2) Most mergers occur when both the acquirer and the target economies are booming. (3) Merger booms have both an industry-level component (productivity shocks) and a country-level component (financial shocks). (4) Across over one million observations, acquirers tend to be more productive and targets tend to be less productive, compared to their industry peers. These facts are consistent with the neoclassical theory of mergers in which productive firms expand overseas to seize new investment opportunities, but not with the widely held views that most cross-border mergers occur when the target economies are in a recession or face a financial crisis.

In the third essay, I construct a dynamic structural model of cross-border mergers and integrate the important facts above into the model. This dynamic structural approach allows me to quantify the effects of productivity and financial shocks on M&A decisions. In addition, this approach provides a proper analytical framework for conducting policy experiments. As an example of such analyses, I investigate the impact of President Obama's proposal on multinational corporation taxation. My simulation results suggest that the foreign operation tax has economically significant effects on productive firms and can be very distortionary for cross-border mergers.

ESSAYS IN INTERNATIONAL FINANCE

by

TANAKORN MAKAEW

Dissertation submitted to the Faculty of the Graduate School of the University of Maryland, College Park in partial fulfillment of the requirements for the degree of Doctor of Philosophy

2010

Advisory Committee:

Professor Vojislav Maksimovic, Chair

Professor Albert 'Pete' Kyle

Professor Gordon Phillips

Professor Lemma Senbet

Professor Peter Murrell

ACKNOWLEDGEMENTS

I owe the deepest gratitude to my advisor, Vojislav Maksimovic. This dissertation would not have been possible without him. I am also deeply indebted to my committee members, Albert "Pete' Kyle, Gordon Phillips, and Lemma Senbet, for their help and guidance throughout my doctoral studies.

I thank Jerry Hoberg and Mark Loewenstein for introducing me to the finance faculties. It was a pleasure working for Gurdip Bakshi, Steve Heston, Alex Triantis, and Haluk Unal. My thanks also go to my coauthors, Minwen Li and Juan Contreras.

I thank Peter Murrell for serving on my dissertation committee and Charle Lahaie for data supports. I appreciate valuable job market advices from Ethan Cohen-Cole, Shawn Cole, Michael Faulkender, Dalida Kadyrzhanova, Anna Obizhaeva, N.R. Prabhala, Georgios Skoulakis, and Russ Wermers. I thank Elinda Kiss for her teaching advices.

I thank Mara Faccio, Nandini Gupta, Anton Korinek, Andrew Karolyi, Carmen Reinhart, Antoinette Schoar, and Shangjin Wei, as well as seminar participants at FMA, EFA, and SWFA for comments and suggestions on Chapter 1.

I thank Rui Albuquerque, Sudipto Dasgupta, Antonio Felato, Amar Gande, Jarrad Harford, Pab Jotikastira, Sandy Klasa, Anton Korinek, Yrjo Koskinen, Michael Lemmon, Peter MacKay, Robert Marquez, Darius Miller, Kanda Naknoi, Mark Seascholes, Karin Thorburn, Missaka Warusawitharana, and Shangjin Wei, as well as seminar participants at Boston University, Federal Reserve Board of Governors, HKUST, Norwegian School of Economics, Southern Methodist University, University of Maryland, University of South Carolina, and University of Utah for many helpful suggestions on Chapters 2 and 3.

Contents

Chapter 1

Do small firms benefit more from foreign portfolio investment? Evidence from a Natural Experiment

1.1 Introduction

Small firms play an important role in emerging market economies since they are often associated with employment generation, economic diversity, balanced income distribution as well as being a source of entrepreneurship, innovation, and economic growth. While it is apparent that foreign portfolio investment has a significant impact on firms in emerging markets, it is less clear whether firms of different sizes are affected by foreign portfolio investment symmetrically. In this paper, I test whether an increase in the supply of foreign portfolio capital benefits small firms by using the Thai government's unique restriction on capital inflows as a natural experiment. I find that foreign portfolio investment helps large firms the most, contrary to existing evidence, which finds a benefit in foreign portfolio investment for small firms.

Existing papers tend to argue that small firms benefit from foreign portfolio investment more than large firms (for example, Gelos and Werner 1999, Knill 2005, and Patro and Wald 2005). A number of authors document a positive correlation between foreign portfolio investment and small firms' growth, both in terms of capital accumulation and the ability to access external capital markets. Others study the impacts of financial liberalization, the event that leads to a large increase in foreign portfolio investment. They find that, after financial liberalization, small firms have lower investment-cash flow sensitivities, face lower cost of capital, and invest more. Another important finding is that, during the time of liberalizations, small firms, on average, experience higher stock returns compared to large firms.

However, from the existing literature, it is ambiguous whether small firms benefit from foreign portfolio investment or from other factors correlated with the surge in foreign capital. Foreign portfolio investment is potentially correlated with a number of macroeconomic variables. Stock market and capital account liberalizations are usually concurrent with other major changes such as trade liberalizations, reforms in stock market regulations, and reforms in banking supervisions. I believe that this time-series identification problem is severe since it is virtually impossible to list all the events that affect firm value. Even if I can identify all the relevant factors, it is still hard to identify the exact time these changes took place (in order to control for them in a panel data study) or the exact time the market learned about them (in order to control for them in an event-study).

I analyze the stock market impacts of Thailand's unique restriction on portfolio capital inflow. The Thai government imposed a very stringent capital control on December 19, 2006 and then quickly abandoned it on December 20, 2006. The fact that the control only lasted for one day provides an excellent framework for a natural experiment study. It is difficult to come up with another factor that is unrelated to capital control, has as dominant of an effect on firms compared to capital control, and changes back and forth overnight like capital control. For example, one might argue the stock return on the capital control day may reflect both changes in foreign capital and changes in investor's perception about the Thai government's ability to run the economy effectively. However, it is not likely that this perception was largely reversed in a day at the same time that the government reversed its decision about the capital control.

Natural experiments have recently become popular in social sciences, especially in economics. A recent search using the term "natural experiment" on Google Scholar yields more than one million results. The 2002 Nobel Laureate in Economics, Vernon L. Smith, also stated in the Journal of Economic Perspective, "Natural experiments occur all the time and it would be desirable to develop a professional readiness to seize upon these occasions (p.155)." This paper joins a growing literature in finance that uses a natural experiment as a solution to the identification problems.

I show that large firms experienced more negative abnormal returns on the capital control day (December 19) and more positive abnormal returns on the liberalization day (December 20), suggesting that foreign portfolio investment by itself benefits large firms the most. Compared to small firms, large firms have higher fractions of foreign ownership and are more likely to have political and business connections. In order to examine how much of the size effects are due to the difference in other firm characteristics correlated with size, I control for (1) firm financial characteristics (profitability, investment opportunities, leverage, accounting liquidity, and industry dummy), (2) firm international involvements (exchange rate exposure, foreign ownership, and foreign control), and (3) firm connections (both political and business connections). I find that size still has a large and significant explanatory power after including these variables in our regressions. In the full specification, firms that are one standard deviation larger earn 83.35 basis points less on the capital control day and 84.78 basis points more on the liberalization day. I further show that size is correlated with visibility to foreign investors and past capital market activities - large firms tend to be included in key stock market indices, to be rated by rating agencies, and to have issued securities in international markets.

In addition to my findings about size, I find that firms with higher profitability, export-oriented firms, and firms with foreign directors are less affected by the capital control. Most interestingly, I find that the stock prices of firms connected to the former Prime Minister Thaksin Shinawatra, the major opponent of the incumbent coup government, reacted more strongly to the capital control and the subsequent liberalization. Consistent with Johnson and Mitton (2003) which views Malaysian capital control as a way to support firms connected to the incumbent government, here investors view Thai capital control as a way to punish firms connected to the opponent of the government in power.

One might be concerned about the findings that large firms are affected by the capital control more are due to the market microstructure effects, not changes in firms' fundamental value. In other words, since small firms are less liquid and small firms' stocks are more closely held, stock prices of large firms might be more sensitive to any negative news that has an impact on the macroeconomy. To address this concern, I use the day the market learned about the September 2006 coup as a placebo test. I regress abnormal returns on the coup date on firm size together with other firm characteristics and find that while the market return was negative on that day, small firm returns were significantly more negative, ruling out the claim that large firms are more sensitive to any bad news.

My results are robust to various econometric specifications and variable definitions. To correct the potential problems from the non-normality in error terms such as heteroscedasticity and cross-sectional correlations, I (1) use Huber/White/Sandwich standard errors, (2) cluster standard errors at firm-level, and (3) cluster standard errors at industry-level. I also (4) compute the empirical standard errors from bootstrapping and (5) compute the empirical standard errors from historical data. Finally, I use alternative definitions of size, industry classification, profitability, and liquidity and use raw returns instead of abnormal returns. All of the results I find are qualitatively the same.

The paper proceeds as follows. Section 2 summarizes related literature. Section 3 describes the natural experiment. Section 4 outlines the empirical strategy and provides the data sources. Section 5 estimates the effects that firm size and other control variables have on the benefits from foreign portfolio investment and analyzes the results. Section 6 performs robustness checks. Section 7 concludes.

1.2 Related Literature

Foreign portfolio investment has become an important part of international capital flow. According to Bosworth et al.(1999), the composition of capital flow has shifted away from foreign direct investment and bank loans to portfolio investment; the fraction of foreign portfolio investment in emerging markets has increased from 9% in 1978-1981 to 44% in the 1990's. Consequently, costs and benefits of foreign portfolio investment are usually at the heart of any fierce debates on financial globalization.

Benefits of Foreign Portfolio Investment

Foreign portfolio investment is believed by many to have large potential benefits. The inflow of foreign fund increases the supply of capital in a domestic economy. With more capital, firms can expand their existing capacities and undertake more projects. From the financial markets perspective, foreign portfolio investment increases market liquidity and hence improves asset-pricing efficiency (Levine and Zervos 1998). Li et al. (2006) provide evidence that capital account liberalization lowers the co-movement and raises idiosyncratic variation in stock prices, suggesting that stock prices contain more firm-specific information and the stock market becomes more efficient. Some policy experts (for example, Evan 2003) additionally argue that foreign portfolio investors have superior technologies to value firms compared to domestic investors. Therefore, they create informational externalities that help domestic investors identify the best place to invest.

The Importance of Small Firms

Small firms have long been a center of attention in academia and policy circles. In the Federal Reserve's Economic Quarterly, Weinberg (1994) stated, "It seems that a necessary part of the debate over any proposed public policy action, from healthcare to tax policy, is the question of how it will affect small firms (p.1)." Internationally, the World Bank has approved more than $10 billion support to the small and medium business enterprises during 1998-2002 (Beck et al. 2005). The attention that small firms received comes as no surprise since the growth of small firms and the growth of large firms are perceived to have very different impacts on an economy. Small firms are often associated with employment generation, economic diversity, balanced income distribution, and being a source of entrepreneurship, innovation, and economic growth. While small firms are looked fondly upon, large firms are often associated with entrenchment and economic inefficiencies. For example, Fogel, Morck, and Yeung (2005) find that in countries whose large firms are doing well, overall economic growth, productivity growth and capital accumulation is lower.

They interpret this evidence as a support of Schumpeter's theory of creative destruction, in which growth comes from small creative firms destroying large old firms.

Small firms in emerging markets are generally considered the ones that suffer more from informational problems (Kang and Stulz 1997; Dahlquist and Robertsson 2001; and others) since large firms tend to be better known, older and have a longer track record of past performance. Analysts and the media also tend to cover large firms more frequently, making it harder for executives of large firms to hide mistakes or overstate profits. Given that small firms suffer more from informational problems, I could easily deduce from the classical theories of corporate finance that small firms will be more financially constrained. For example, small firms will face more credit rationing according to Stiglitz and Weiss (1981) and will face a higher cost of equity according to Jensen (1976) and Jensen and Meckling (1986).

Small Firms and the Benefits from Foreign Portfolio Investment

While foreign portfolio investment mechanically increases the aggregate supply of capital and hence should benefit all firms in the domestic economy, it remains an empirical question whether or not small firms benefit more than large firms. Theoretically, if foreign portfolio investment does help alleviate asymmetric information and agency problems for all firms, then small firms should benefit more since they are the ones who suffer more from these problems and starve for capital in the first place (see Section 1 in Evan (2003) and Section 4 in Forbes (2005) for the detailed arguments how foreign capital might solve informational problems).

Even though it is well-documented empirically that foreign portfolio investors prefer to invest in larger firms (Kang and Stulz 1997; Dahlquist and Robertsson 2001; and others), many researchers in corporate finance note that small firms do not have to be the direct recipients of foreign portfolio investment in order to benefit more. In one example, Knill (2005) suggests the monetary transmission mechanism through bank loans (Bernanke and Blinder 1988; Kashyap and Stein 1995; Kashyap, Rajan and Stein 2002); small firms and large firms are competing for the same pool of bank loans. When additional supply of capital flows to large firms, small firms receive more bank loans since large firms have less demand for loans. In another example, Gallego and Hernandez (2003) suggest the trade credit channel; small firms and large firms are competing for the same pool of trade credits. When foreign portfolio investment flows to large firms, small firm receive more trade credit since large firms demand less trade credit. Gallego and Hernandez give the 1998 financial market turmoil in Chile as an anecdotal example: "When interest rates in Chile (and in other emerging market economies) reached extremely high levels. During this period a group of large firms arbitrarily extended the payment period to suppliers from 90 to 180 days, forcing smaller firms to assume the increase in the cost of funds (p.17)."

Existing empirical evidence strongly supports the hypothesis that small firms, not large firms, benefit more. These works come in a variety of forms, including panel data studies, event studies, single-country studies, and cross-country studies. Examples that represent each genre of work are summarized in the appendix.

The first example is a cross-country panel data study by Knill (2005). She studies a panel of firms from 53 countries during 1996 to 2005 and finds that foreign portfolio investment is associated with an increase in the ability to issue securities for small firms. Additionally, she finds that foreign portfolio investment increases the maturity of bank loans, leading her to conclude that small firms benefit more because they rely more on bank loans than large firms.

The next group of papers (Harris, Schiantarelli, and Siregar 1994; Jaramillo, Schiantarelli, and Weiss 1996; Gelos and Werner 2002; Laeven 2003; Koo and Shin 2004; Contreras and Makaew 2007) analyzes firm behaviors before and after financial liberalization, the event that leads to a large change in foreign investment. Most of these papers find that financial liberalization has different impacts on small and large firms: compared to large firms, it affects small firms by further relaxing financial constraints, lowering investment-cash flow sensitivity, increasing investment, and lowering purchasing price of capital.

The last example, which is closest to my work, is Patro and Wald (2005). They study the impacts of stock market liberalization on small and large firms by extending the event study framework of Henry (2000) to a cross-sectional event study. Using the stock market data from 18 developing countries, they find that small firms earn significantly higher abnormal returns when stock markets are liberalized.

Even though the amount of the existing evidence supporting the "small-firms-benefit-more" hypothesis is overwhelming, it is not clear whether small firms benefit from foreign portfolio investment or from other factors correlated with the surge in foreign capital. Stock market and capital account liberalizations are often concurrent with (1) banking deregulations (reduction in reserve requirements and credit controls; privatizations of state banks; allowing foreign bank entries), (2) reforms in stock market regulations and banking supervisions, and (3) trade liberalization. For instance, the Korean stock market liberalization was concurrent with interest rate deregulations and a strengthening of prudential regulations. The Colombian capital account liberalization was also concurrent with constitutional reforms and banking deregulations.

I believe that identification of the benefits from foreign portfolio investment is difficult, given that countries' economic prospects are changing rapidly along with their capital account policies. It is virtually impossible to list all the events that affect the value of small firms. Even if I could identify all the relevant factors, the liberalization process is still complicated and dynamic by nature. It is difficult to identify the exact date these changes took place (in order to control for them in a panel data study) or identify the exact time the market learned about them (in order to control for them in an event study).

In this paper, I propose a cross-sectional analysis of a unique event in Thailand. The Thai government imposed a draconian capital control on December 19, 2006 and then quickly abandoned it on December 20, 2006. This experiment-like event helps me separate the impact of foreign capital from the impact of other concurrent events.

1.3 Natural Experiment

In this section, I describe the capital control and liberalization which is the event of interest but I will first discuss the political and economic situations in Thailand that lead up to the event.

Thaksin Shinawatra and the September 2006 Coup

From January 2001 to September 2006, Thailand was under the administration of Prime

Minister Thaksin Shinawatra who was also a successful businessperson and one of the richest people in the country. He and his family were major shareholders of many listed firms in the Stock Exchange of Thailand including Advanced Info Service - the largest mobile phone operators in Thailand, Shin Satellite - the only operator of Thailand's commercial satellites, and ITV - a television station. Even though Prime Minister Thaksin swept the elections in 2001 and 2005, his popularity started to decline in late 2005 when he was accused of fraud, human rights offenses and lese-majeste. On September 19, 2006, the Thai Military staged a coup against Prime Minister Thaksin and overthrew his government while he was attending the United Nation Assembly in New York. The new Prime Minister, as well as the new cabinet, and the new governor of the Thai central bank were appointed in October 2006 and November 2006, respectively. Prime Minister Thaksin is currently in exile.

The One-Day Capital Control

On December 19, 2006, the Thai central bank had decided to implement a reserve requirement on short-term capital inflows. Under this new regime, foreigners bringing portfolio capital into Thailand had to deposit 30% of the funds into an account at the central bank which would earn no interest. This meant that only 70% of the funds would be available for investment in the Thai market. Moreover, if foreign investors wished to withdraw their money within one year, they would be fined 1/3 of the amount. The control was targeted straight at future portfolio capital inflows. The central bank stated clearly that foreign direct investment was not subjected to this reserve requirement.[1] Any foreign exchange transactions which had been traded before the announcement were also exempted. As anyone would expect, the Thai stock market reacted to this surprising news immediately; the Stock Exchange of Thailand (SET) Index dropped from 730.55 to 622.14 (i.e. 14.84% reduction in one day).

On December 20, 2006, the central bank announced that inflows for the investment in the Stock Exchange of Thailand, the Thai Market for Alternative Investment, the Thai Futures Exchange, and the Agricultural Futures Exchange of Thailand, which are basically most of

[1] Initially, foreign direct investment was also required to place 30% of the inflow as a reserve requirement, but after submitting the relevant documents to support the claim of legitimacy, the central bank would refund the reserve amount.

the portfolio flows into Thailand, were no longer subjected to the 30% reserve requirement. Again, this announcement took the market by surprise and the SET Index bounced back from 622.14 to 691.55 (or 11.16% increase in one day).

[INSERT FIGURE 1.1 HERE]

The fact that the capital control restriction only lasted for one day provides a proper framework for a natural experiment study. It is difficult to come up with another factor that is unrelated to capital control, has as dominant of an effect on firms compared to capital control, and changes back and forth overnight like capital control. For example, one might argue validly that the stock return on the capital control day may reflect both changes in foreign capital and changes in investor's perception about the Thai government's ability to run the economy effectively. However, it is not likely that this perception was largely reversed back to normal when the government reversed its decision about the capital control the next day.

1.4 Data and Methodology

In this section, I describe the sample firms, the variables used and how they are constructed. The dataset consists of all Thai firms listed in the Stock Exchange of Thailand. All of the trading data are from the Reuters Database. All of the financial statement data are from Reuters and the Stock Exchange of Thailand Market Analysis and Reporting Tool (SETSMART) Database. Daily stock prices are the last reported trade prices. Other firm characteristics are measured at the end of 2005 since most firms in Thailand report their financial status at the end of December and firm characteristics measured at the end of 2006 might be contaminated by the effects of the experiment already. The details how each firm characteristic is constructed are in the appendix. The summary statistics are provided in Table 1.1A.

I compute abnormal returns using the market model as the benchmark:

$\mathrm{R}_i = \alpha_i + \beta_i R_M + \epsilon$

where R_M is the percentage change in the MSCI Emerging Markets Asia Index. The market model is estimated by the daily returns from September 29, 2005 to August 31, 2006 (a 261-trading-day period). Abnormal returns, AR_i, are defined as:

$$\mathrm{AR}_i = R_i - (\hat{\alpha}_i + \hat{\beta}_i R_M)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are stock i's estimated market model coefficients. I also exclude all the firms that are not traded on the capital control day or the liberalization day.

My empirical strategy is to link the abnormal returns on the capital control day and on the liberalization day with firm sizes and other control variables. Firms that experienced larger reduction in value on the capital control day and firms that experienced larger gain on the liberalization day should be the ones that benefit more from foreign portfolio investment.

[INSERT TABLE 1.1 HERE]

1.5 Analysis

Table 1.1B presents a univariate comparison of the abnormal returns and firm characteristics across four size quartiles. On average, firms in the largest quartile earn 2.94% less on the capital control day and 3.27% more on the liberalization day, compared to firms in the smallest quartile. The differences are statistically significant at a 95% confidence level. This suggests that large firms are affected by foreign portfolio investment more than small firms.

Table 1.1B also suggests that there are systematic differences in the characteristics of small and large firms. Therefore, multiple regression analysis will be performed in the next section, but for now I use the propensity score method as a preliminary analysis to get a better feel of the data. The propensity score method matches treated firms with control firms that have the nearest propensity scores. I assign the largest size quartile as the treatment group and the smallest quartile as the control group. Propensity scores are computed from the probit model predicting the probability of being in the treatment group using four covariates: profitability, exchange rate exposure, foreign director, and Thaksin connection. (These four variables are chosen because in the next section, I find that they are indeed the most relevant variables.)

Table 1.1C compares the abnormal returns of firms in the largest quartile to the abnormal returns of propensity-score matched firms from the smallest quartile (average treatment effect on the treated). After matching, the differences in abnormal returns between small and large firms change slightly; the magnitude of the t-statistic drops from 2.78 to 2.18 on the capital control day and from 3.25 to 2.72 on the liberalization day.

The Effects of Firm Size and Other Financial Characteristics

In this section, I analyze the effects of firm size on the benefit from foreign portfolio investment by regressing the abnormal return on size and other firm characteristics. I use the least square method with robust standard errors.

Firm Size is measured by log of total asset. Besides firm size, other financial characteristics might also determine how firms will be affected when the supply of capital decreases so I have to add these variables to the regressions. The first set of control variables I include are the 9 *Industry Dummies* classified by the Stock Exchange of Thailand. These industry dummies capture any industry-level changes in goods and capital market conditions. They also filter out any effects of the cross-sectional co-movement in stock returns that are driven by industry-level factors. Next, I include accounting profitability, market-to-book ratio and cash flow growth to capture firm investment opportunities. *Profitability* is measured as pre-tax profit or loss scaled by lagged total asset. *Market-to-Book* is measured as market value of equity divided by book value of equity. *Cash Flow Growth* is measured as lagged annual growth in operating cash flow. Theoretically, firms with better investment opportunities should have higher demand for fund and hence should be affected by the capital control more. Unlike market-to-book that captures investment opportunities in the future, accounting profitability and cash flow growth measured in the previous year are also proxies for firm ability to generate internal fund in the short-run. Firms that can generate more internal fund, and hence rely on external financing less, should be affected by the capital control less. Finally, I include accounting liquidity and leverage. *Liquidity* is measured as net working capital (current asset minus current liability) scaled by lagged total asset. *Leverage* is measured as total debt scaled by lagged total asset. When the supply of capital decreases, firms that have less current asset compared to current debt are more likely to face a liquidity problem. At the same time, firms that have higher leverage might have trouble paying interests and are more likely to be bankrupt. Therefore, firms with lower liquidity and higher leverage should be affected by the capital control more.

[INSERT TABLE 1.2 HERE]

Results

Table 1.2A provides correlations between firm size and other characteristics. From the size column, I can see that size is not strongly correlated with any other variables. Large firms tend to be slightly less liquid and have higher leverage. No variables are strongly correlated with one another; the highest correlation of 24% is between liquidity and profitability. Therefore, multi-colinearity should not be a problem in my analysis.

The regression results are reported in Table 1.2B. In Panel A, the dependent variable is the abnormal return on the capital control day. In Panel B, the dependent variable is the abnormal return on the liberalization day. I find that the coefficients on size are statistically significant at a 95% or 99% confidence levels in all specifications. The coefficients on size are uniformly negative on the capital control day and uniformly positive on the liberalization day. This means that large firms lose more when a capital control is imposed and benefit more when a capital control is lifted. In other words, large firms benefit from foreign portfolio investment more. The estimated size coefficients indicate that the size effect is economically large. From the full specification (Model 7), one standard deviation increase in size leads to 0.97% reduction in firm value on the capital control day and 1.13% increase on the liberalization day.

Other results suggest that firms with higher profitability benefit less from foreign portfolio investment. This is consistent with the hypothesis that firm with higher profitability are less sensitive to changes in external capital markets. The economic significance of profitability is comparable to size's. From the full specification, one standard deviation increase in profitability leads to 1.27% increase in firm value on the capital control day and 1.05% decrease in firm value on the liberalization day. In panel A, market-to-book also has statistically negative coefficients, suggesting that firms that have better investment opportunities are affected more from the capital control. The coefficients on cash flow growth, liquidity and leverage are not statistically significant and these variables do not increase the statistical fit of my models.

Firm Size and International Involvement

In this section, I examine the effects of firm's international involvement. In particular, I analyze the relationship between firm size, exchange rate exposure, foreign ownership, and foreign control. I then include these variables in the regressions in order to examine how much of the size effects found in the previous section are due to the different degrees of international involvement between small and large firms.

A firm's *Exchange Rate Exposure* is proxied by exchange rate beta calculated from a factor model (see details in the appendix). Firms that have a positive exchange rate beta are likely to be firms that earn income in US dollars and have expenditure in the local currency (Thai Bahts) such as export-oriented firms and firms that own income-generating assets abroad. The high-beta firms should suffer less or even profit from the capital control. Since a control on capital inflow automatically reduces the demand for Thai Bahts relative to US dollars, these firms' cash flow in Thai Bahts will increase as a result of exchange rate depreciation. The next variable is *Foreign Ownership* which is measured as the fraction of firm's equity owned by non-Thai citizens. Firms with a higher foreign ownership fraction tend to rely on foreign capital more and hence should be affected by the capital control more. The last control variable is the *Foreign Director Dummy.* This dummy takes the value of one if a firm has at least one non-Thai citizen as a director and zero otherwise. I have to include *Foreign Director* dummy because foreign control and foreign ownership sometimes do not go hand in hand as foreign ownership might be diffused. Theoretically, firms that have a foreign director should be affected by the capital control less since (1) foreign directors might provide better corporate governance. Firms with better corporate governance are able to attract more external capital when needed and hence are affected by the capital control less. (2) The existence of a foreign director might reflect the fact that foreign investment in that firm is a non-diffused direct investment rather than portfolio investment and foreign direct investment is exempt from the December 19 capital control in the first place.

[INSERT TABLE 1.3 HERE]

Results

Table 1.3A reports correlations between firm size and international involvement variables. Size is strongly and positively correlated with foreign ownership with the correlation coefficient of 40.5%. This is consistent with the findings of Kang and Stulz (1997) as well as Dahlquist and Robertson (2001) that foreign institutional investors tend to invest in larger firms. Size is also negatively correlated with exchange rate exposure which is partially due to the industry effects; firms in export-oriented industries (such as textile and food processing) tend to be smaller than firms domestic-oriented industries (such as real estates and telecommunication). As expected, firms that have higher foreign ownership fractions are more likely to have foreign directors. Therefore, foreign director dummy is strongly correlated with foreign ownership (51.24%). However, the correlation between size and foreign director is much weaker, only 9.64%.

The regression results are reported in Table 3B. In Panel A, the dependent variable is the abnormal return on the capital control day. In Panel B, the dependent variable is the abnormal return on the liberalization day. I find that the coefficients on exchange rate exposure are significant at a 95% or 99% confidence level. As anticipated, these coefficients are positive on the capital control day and negative on the liberalization day. It is likely that this finding reflects the fact that firms with income in foreign currencies should be affected by the capital control less. The economic significance of exchange rate exposure is large; from Model 2, one standard deviation increase in exchange rate beta leads to 1.45% increase in firm value on the capital control day and 1.16% decline on the liberalization day.

From Model 3, I find that the coefficients on foreign ownership fraction are not statistically significant. One of the plausible explanations is that firm size is a better proxy for the benefit from future foreign investment, compared to foreign ownership fraction which reflects past investment. The insignificance of foreign ownership also rules out another alternative explanation for the size effect: one might claim that the size effect found the previous section is simply a result of foreign investors getting panic and liquidating their positions (which are mostly large firms) on the capital control day. If this explanation were valid, the foreign ownership variable would have driven out the significance of firm size.

From Model 4, I find that firms that have a foreign director are affected less by the capital control. On average, firms with foreign directors earn 1.16% more on the day of the capital control and 2.19% less on the liberalization day.

The effect of firm size is still large and significant even after controlling for a firm's international involvement. Comparing before and after including the control variables, on the capital control day, the magnitude of the size coefficients drops slightly from -0.74 in the baseline model (Model 1) to -0.60 in the full specification (Model 4) but remains statistically significant at a 95% level. Similarly, on the liberalization day, the magnitude drops from 0.70 to 0.55 but remains statistically significant at a 95% level.

The findings that size and foreign ownership is positively correlated and that size might be better as a proxy for the benefit from future foreign investment are interesting. Therefore, I further investigate the relationship between firm size and other capital market activities. Table 3C reports the firms' activities classified into four size quartiles. From the first three columns, I find that large firms are more visible to foreign investors in the sense that most firms that are constituents of key national indices and have credit ratings are from the largest quartile. I also find that large firms are more likely to engage in international capital market activities: In the secondary market, 9 out of 12 firms in the sample that are cross-listed or have over-the-counter ADRs are from the largest quartile. In the primary market, 75% of firms that have issued equities or debts in international capital market (from 1990 to 2006) are from the largest quartile. In short, I confirm that size is highly correlated with international capital market activities in general.

Firm Size and Political / Family Connections

In this section, I analyze the relationship between firm size and its political and family business group connections. A number of studies have documented that (1) large firms are more likely to have political connections (Faccio 2006), (2) drastic government policies tend to affect connected firms and unconnected firms differently (Johnson and Mitton

2003; Faccio, McConnell and Masulis 2006; and others), and (3) a firm's international capital market activities are influenced by its political connections (Leuz and Oberholzer-Gee 2006). The event of interest, the capital control, was imposed during the tenure of the coup government, shortly after throwing out Prime Minister Thaksin. Therefore, it is important that I include these political and family business group connections in the regressions in order to examine how much of the size effect is due to the different degrees of connectedness.

The first variable captures the direct political connection to the former Prime Minister Thaksin who is the rival of the coup government. *Thaksin Connection* is a dummy variable that takes the value of one if the firm's major shareholder is, or is blood-related to, a member of Thaksin's Cabinet and zero otherwise. Firms that are politically connected to Prime Minister Thaksin should suffer from the capital control more since these firms are more likely to have difficulties obtaining funds from domestic financial institutions when the coup government is in power. Next, I include the family business group variable. In Thailand, like in many other East Asian countries, business groups consist of firms whose major shareholders are relatives. *Family Business Group* dummy takes the value of one if the firm's major shareholder is from the 50 largest family business groups in Thailand and zero otherwise. Theoretically, firms in large business group can internalize many capital allocation functions and hence rely less on external capital markets. Therefore, firms that belong to a business group should suffer less from the capital control.

Finally, I also allow for a more general definition of political connections. Faccio (2006) defines politically connected firms broadly as firms that (1) have a major shareholder or a top executive who is a parliament member, minister or head of the state, or (2) have a major shareholder or a top executive who is related to a top politician or a political party. *Political Connection* is a dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006) and zero otherwise. I note that *Political Connection* captures political connections to anyone in Thai politics and *Thaksin Connection* should be a subset of *Political Connection*.

[INSERT TABLE 1.4 HERE]

Results

Table 1.4A reports correlations between firm size and the connection variables. I confirm that firms that are connected to Thaksin, firms that are connected to a top family business group and firms with any political connections tend to be larger. The correlation between firm size and the political connection dummy is 30.19% suggesting that large firms tend to have some sorts of connections, either with Thaksin or with other people in high offices. The correlation between Thaksin connection and family business group connection is very strong (42.31%) suggesting that many of the top family firms in Thailand have someone representing them in the Thaksin administration.

The regression results are reported in Table 4B. As usual, the dependent variable in Panel A is the abnormal return on the capital control day. The dependent variable in Panel B is the abnormal return on the liberalization day. From Panel B Model 1, I find that the coefficient on Thaksin Connection is significant while all other connection coefficients are not. (Since only 5% of firms in the sample are directly connected to Thaksin and the connected firms are concentrated in a few industries, it is natural that the level of significance is not high.)

This supports the belief that political connection does affect firm value. In fact, my finding here is closely related to the findings of Johnson and Mitton (2003). They view the 1998 capital control in Malaysia as a way to support firms connected to the incumbent government. Here the market views Thai capital control as a way to punish firms that are connected to the opponent of the people in power. After taking a closer look at the firms connected with Thaksin, I find that these firms are also the ones that heavily engage in international capital market activities. For example, 7 out of 12 firms in the sample that have ADRs are connected to Thaksin and approximately half of firms that are connected to Thaksin have issued equities in international capital markets.

I find that the effect of firm size is still large and significant after controlling for the connection effects. On the capital control day, the magnitude of the size coefficients drops from -0.74 in the baseline model to -0.53 in the model with Thaksin Connection dummy but remains statistically significant at a 95% level. Similarly, on the liberalization day, the coefficient drops from 0.70 to 0.54 but remains statistically significant at a 95% level.

1.6 Robustness Tests

Are large firms more susceptible to any bad news?

One might argue large firms are more susceptible to any negative national news compared to small firms, possibly because small firms are less liquid and small firms' stocks are more closely held. My first response to this argument is that I have excluded all the stocks that are not traded on the capital control day or the liberalization day. Conditioned on being traded, simple microstructure models predict that less-liquid firms should suffer more on a bad day since the prices of illiquid stocks have to decline more in order to induce trade.

My second response is to use the day the market learn about the September 2006 coup in Thailand as a placebo test. The coup is a good candidate for a placebo as it is a bad news that affects the entire economy within a short period of time before the capital control. If the hypothesis that large firms are more susceptible to any bad macro news is true, I should find that, after controlling for other factors, large firms were affected more.

[INSERT TABLE 1.5 HERE]

Results

Table 1.5 reports the placebo regression results. The dependent variable is the abnormal return on September 23, 2006 which is the first trading day that the market learned about the coup. In all specifications, I find that the coefficient on size is positive and significant at a 99% confidence level. In other words, large firms are affected by the coup less. This is consistent with the flight to quality hypothesis: when bad things happen, large firms become more attractive relative to small firms. More importantly, this finding rules out the alternative explanation that large firms are more sensitive to any bad news.

I also note that the coefficient of Thaksin Connection is negative and significant. From Model 6, firms that are connected to Thaksin earn 3.23% less than other firms when the Thaksin government lost power. I take this as a confirmation that my measure of connections with Prime Minister Thaksin is legitimate.

Econometric Issues

I use a number of techniques to address econometric concerns regarding the non-normality of the error terms. First, I note that in all of The previous regressions the t-statistics are computed from Huber/White/sandwich standard errors so they are already robust to the heteroscedasticity problem.

Second, a more serious problem here is the cross-sectional correlation problem because the event dates are the same across all firms in my analysis. My solution is to cluster standard errors both at the firm-level and the industry-level to eliminate the biases from stock return co-movements. I find that the significance of the size coefficient barely changes when clustered at firm-level and even improves when clustered at the industry-level.

Bootstrapping

Third, I address any non-normality problems in the error terms by using empirical standard errors. I use two methods to generate an empirical distribution. In the first one, I create 1,000 synthetic samples from the original dataset and estimate the full specification using these samples. I then compute the z-scores of the size coefficient using the empirical standard errors from these 1,000 synthetic betas. Once again, I obtain a similar result - the size coefficient is still statistically significant at a 95% confidence level.

In the second method, I use the historical data to generate the empirical distribution. I perform the cross-sectional regression everyday from January to September 2006. I then compute the z-score of the size coefficient using the standard errors computed from these daily beta estimates. This time, the empirical distribution computed from historical data yields a very high significance level because size is consistently a poor predictor of daily abnormal returns. The mean of the size coefficient on a regular day is -0.0005 (compared to -0.53 and 0.54 on the event days). The empirical standard deviation is 0.0227. Therefore, the z-value of the size coefficient becomes 23.28 which is statistically significant at a 99.99% confidence level.

Alternative Definitions

I confirm that my results are robust to alternative variable definitions. I use log of market capitalization and log of market capitalization adjusted for free-float as alternative proxies for size, GIC industry classification for industry dummies, sales for profitability, and cash holdings for liquidity. I also use raw returns instead of abnormal returns. All the results are qualitatively similar to what I found earlier.

1.7 Conclusion and Discussion

In this paper, I examine the effect foreign portfolio investment has on firms of different sizes using Thailand's unique restriction on short-term capital inflow as a natural experiment. The fact that this restriction was a surprise and only lasted one day makes it an appropriate set-up for an event-study. In contrast to the majority of existing literature, my evidence suggests that large firms benefit from foreign portfolio investment more; I find that large firms stock market valuations were hurt by the capital control and helped by the subsequent liberalization. Compared to small firms, large firms have a higher fraction of foreign ownership and are more likely to have political and business connections. After controlling for firm financial characteristics, international involvements and connections, size still has a large and significant explanatory power.

Other results suggest that firms with higher accounting profitability, export-oriented firms, and firms with foreign directors are less affected by the capital control while firms with higher market-to-book and firms connected to Prime Minister Thaksin, the major opponent of the incumbent coup government, were affected more. My results are robust to various econometric specifications and variable definitions.

This paper contributes to the international finance literature in several ways. First, I provide a clean framework to test the size effects and, from this, I find that the results from the existing literature are reversed. Second, by including a wide range of control variables, I identify that certain types of firms are affected more when the supply of foreign fund declines. Third, I confirm that, in emerging markets, political connection does affect firm value. Firms connected to Prime Minister Thaksin suffered more when the market learned about the coup and when the capital control was announced.

The main implication of my study is not that foreign portfolio investment does not benefit small firms. Rather what I find is that, after separating other events or factors that are typically correlated with foreign portfolio investment, foreign portfolio investment by itself does not favor small firms. Therefore, my results, taken together with the existing literature, imply that the "other factors" concurrent with stock market and capital account liberalizations are very important. Whatever governments were doing at the time of liberalizations - deregulating the banking systems, improving capital market supervisions, liberalizing international trade etc. - is probably good for small firms. In sum, my study calls for more research on how domestic reforms could channel funds to small firms who need it the most, and how domestic market conditions interact with foreign portfolio investment.

Table 1.1A: Summary Statistics

Variable	Mean	SD	Min	Quartile 0.25	Median	0.75	Max
Firm Size	22.2	1.57	19.46	21.1	21.88	22.97	27.97
Profitability	2.07	3.66	-15.45	0.42	1.85	3.43	17.01
Market-to-Book	2.59	21.89	-5.03	0.65	1.02	1.53	409.18
Cash Flow Growth	-58.03	576.8	-3567.23	-107.74	-21.77	41.98	5304.19
Liquidity	19.33	29.38	-51.15	1	14.97	36.51	161.81
Leverage	51.23	28.38	0	29.93	50.67	70.68	150.39
Exchange Rate Exposure	-0.63	0.66	-2.81	-1.07	-0.58	-0.13	0.75
Foreign Ownership	19.32	21.22	0	1.45	12.19	30.6	95.56
Foreign Director	0.34	0.47	0	0	0	1	1
Thaksin Connection	0.05	0.22	0	0	0	0	1
Family Business Group	0.10	0.29	0	0	0	0	1
Political Connection	0.08	0.26	0	0	0	0	1

Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Market-to-Book is measured as market value of equity divided by book value of equity; Cash Flow Growth is measured as lagged annual growth in operating cash flow; Liquidity is measured as net working capital (current asset - current liability) scaled by lagged total asset; Leverage is measured as total debt scaled by lagged total asset; Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign ownership is a fraction of the firm that is owned by non-Thai citizens; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise; Thaksin Connection is a dummy variable that takes the value of one if the firm's major shareholder is, or is related to (has the same last name as), a member of Thaksin's Cabinet and zero otherwise; Family Business Group is a dummy variable that takes the value of one if the firm's major shareholder is from the 50 largest family business groups in Thailand and zero otherwise; Political Connection is a dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006). The details how each variable is constructed are in the appendix.

Table 1.1B: Univariate Analysis

	Size Quartile			
	Smallest	Second	Third	Largest
Capital Control Day Abnormal Return	-10.38	-11.05	-11.16	-13.28
Liberalization Day Abnormal Return	7.29	8.15	8.25	10.67
Firm Size	20.56	21.43	22.38	24.34
Profitability	1.18	2.09	1.9	1.73
Market-to-Book	6.31	1.04	1.33	1.94
Cash Flow Growth	-65.62	35.05	-83.31	-117.68
Liquidity	19.09	22.87	17.15	12.13
Leverage	47.91	49.48	58.32	54.62
Exchange Rate Exposure	-0.43	-0.57	-0.63	-0.86
Foreign Ownership	7.61	13.32	22.96	33.37
Foreign Director	0.22	0.27	0.43	0.4
Thaksin Connection	0.02	0.02	0.05	0.12
Family Business Group	0.01	0.05	0.07	0.24
Political Connection	0	0.02	0.1	0.17

The table reports summary statistics of abnormal returns and firm characteristics classified into four size quartiles. The capital control day is December 19, 2006 and the liberalization day is December 20, 2006. Abnormal returns are from market model estimated by the daily returns from September 29, 2005 to August 31, 2006 (a 261-trading-day period). All firms that were not traded on the capital control day and the liberalization day are excluded. Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Market-to-Book is measured as market value of equity divided by book value of equity; Cash Flow Growth is measured as lagged annual growth in operating cash flow; Liquidity is measured as net working capital (current asset - current liability) scaled by lagged total asset; Leverage is measured as total debt scaled by lagged total asset; Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign ownership is a fraction of the firm that is owned by non-Thai citizens; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise; Thaksin Connection is a dummy variable that takes the value of one if the firm's major shareholder is, or is related to (has the same last name as), a member of Thaksin's Cabinet and zero otherwise; Family Business Group is a dummy variable that takes the value of one if the firm's major shareholder is from the 50 largest family business groups in Thailand and zero otherwise; Political Connection is a dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006).

Table 1.1C: Propensity Score Matching

	Treated (Largest)	Controls (Smallest)	Difference (Largest-Smallest)
Capital Control Day Abnormal Return			
Unmatched	-13.3067	-10.3577	-2.949
			[-2.78]
Average Treatment Effect on the Treated	-13.3067	-10.2044	-3.1023
			[-2.18]
Liberalization Day Abnormal Return			
Unmatched	10.6555	7.3836	3.2719
			[3.25]
Average Treatment Effect on the Treated	10.6555	7.115	3.5405
			[2.72]

The table compares the abnormal returns from the treatment group and the control group. The treatment group is the largest size quartile and the control group is the smallest quartile. The capital control day is December 19, 2006 and the liberalization day is December 20, 2006. Abnormal returns are from market model estimated by the daily returns from September 29, 2005 to August 31, 2006 (a 261-trading-day period). Both unmatched effects and propensity-score-matched effects (average treatment effects on the treated) are reported. Propensity scores are computed from the Probit model using four covariates: profitability, exchange rate exposure, foreign director dummy, and Thaksin connection. Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise; Thaksin Connection is a dummy variable that takes the value of one if the firm's major shareholder is, or is related to (has the same last name as), a member of Thaksin's Cabinet and zero otherwise. Numbers in the brackets are t-statistics.

Table 1.2A: Correlation Matrix: Size and Basic Firm Characteristics

	Firm Size	Profitability	Market-to-Book	Cash Flow Growth	Liquidity	Leverage
Firm Size	1					
Profitability	-0.0538	1				
Market-to-Book	-0.0911	-0.197	1			
Cash Flow Growth	-0.0015	-0.0107	0.0128	1		
Liquidity	-0.1926	0.2405	-0.0761	-0.0079	1	
Leverage	0.148	0.0536	0.0413	0.0427	-0.1998	1

Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Market-to-Book is measured as market value of equity divided by book value of equity; Cash Flow Growth is measured as lagged annual growth in operating cash flow; Liquidity is measured as net working capital (current asset - current liability) scaled by lagged total asset; Leverage is measured as total debt scaled by lagged total asset.

Table 1.2B: Basic Firm Characteristics and the Effects of Foreign Portfolio Investment

				Panel A			
Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Firm Size	-0.8392***	-0.7564***	-0.7457***	-0.742***	-0.7682***	-0.6195**	-0.6148**
	[-4.24]	[-3.3]	[-3.31]	[-3.08]	[-3.14]	[-2.09]	[-2.08]
Profitability			0.3619***	0.3042***	0.3038***	0.346***	0.3481***
			[3.65]	[3.01]	[3.1]	[3.18]	[3.18]
Market-to-Book				-0.0274***	-0.0282***	-0.0259***	-0.0257***
				[-5.28]	[-5.39]	[-4.93]	[-4.88]
Cash Flow Growth					-0.0009	-0.0009	-0.0008
					[-0.81]	[-0.65]	[-0.64]
Liquidity						-0.0026	-0.0032
						[-0.17]	[-0.21]
Leverage							-0.0024
							[-0.16]
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	No	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.0367	0.0927	0.1232	0.1326	0.1374	0.1479	0.148
Observations	312	309	306	294	293	265	265

Table 1.2B (Continued): Basic Firm Characteristics and the Effects of Foreign Portfolio Investment

				Panel B			
Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Firm Size	0.7397***	0.7267***	0.7092***	0.7385***	0.7804***	0.753***	0.7204**
	[3.92]	[3.37]	[3.27]	[3.18]	[3.38]	[2.63]	[2.49]
Profitability			-0.2642***	-0.2419**	-0.2398**	-0.2731**	-0.2878***
			[-2.64]	[-2.24]	[-2.32]	[-2.47]	[-2.61]
Market-to-Book				0.003	0.0042	0.0029	0.0015
				[0.6]	[0.92]	[0.6]	[0.31]
Cash Flow Growth					0.0014	0.0014	0.0013
					[1.42]	[1.1]	[1.05]
Liquidity						-0.0011	0.0031
						[-0.07]	[0.19]
Leverage							0.0164
							[1.12]
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	No	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.0324	0.0779	0.0969	0.1007	0.1151	0.127	0.1313
Observations	312	309	306	294	293	265	265

The table reports the coefficient estimates from regressions of abnormal returns on firm characteristics. The dependent variable in Panel A is the abnormal return on December 19, 2006 (the capital control day) and the dependent variable in Panel B is the abnormal return on December 20, (the liberalization day). Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Market-to-Book is measured as market value of equity divided by book value of equity; Cash Flow Growth is measured as lagged annual growth in operating cash flow; Liquidity is measured as net working capital (current asset - current liability) scaled by lagged total asset; Leverage is measured as total debt scaled by lagged total asset. All variables are from December 2004 and 2005 financial statements. Also estimated but not reported are a constant term and 9-industry dummy variables. Numbers in the brackets are heteroscedasticity-robust t-statistics. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively. R-squared and the number of observations are reported in the last two rows.

Table 1.3A: Correlation Matrix: Size and Firm's International Involvement

	Firm Size	Profitability	Exchange Rate Exposure	Foreign Ownership	Foreign Director
Firm Size	1				
Profitability	-0.0418	1			
Exchange Rate Exposure	-0.2724	0.1234	1		
Foreign Ownership	0.405	0.0495	-0.1343	1	
Foreign Director	0.0964	0.0207	-0.0726	0.5124	1

Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign ownership is a fraction of the firm that is owned by non-Thai citizens; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise.

Table 1.3B: Firms International Involvement and the Effects of Foreign Portfolio Investment

		Panel A				Panel B		
Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Firm Size	-0.7457***	-0.5426**	-0.6438***	-0.6026**	0.7092***	0.5469**	0.6273***	0.5494**
	[-3.31]	[-2.35]	[-2.62]	[-2.42]	[3.27]	[2.5]	[2.64]	[2.3]
Profitability	0.3619***	0.3266***	0.316***	0.3169***	-0.2642***	-0.236**	-0.2291**	-0.2308**
	[3.65]	[3.31]	[3.24]	[3.26]	[-2.64]	[-2.3]	[-2.27]	[-2.3]
Exchange Rate Exposure		2.1986***	2.2274***	2.2872***		-1.7571***	-1.7922***	-1.9052***
		[3.18]	[3.13]	[3.24]		[-2.69]	[-2.68]	[-2.88]
Foreign Ownership			0.0172	0.0025			-0.0129	0.0148
			[0.95]	[0.11]			[-0.6]	[0.54]
Foreign Director				1.1604				-2.1936**
				[1.18]				[-2.12]
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.1232	0.159	0.1598	0.1642	0.0969	0.1229	0.1216	0.1394
Observations	306	306	302	302	306	306	302	302

The table reports the coefficient estimates from regressions of abnormal returns on firm's international involvement. The dependent variable in Panel A is the abnormal return on December 19, 2006 (the capital control day) and the dependent variable in Panel B is the abnormal return on December 20, (the liberalization day). Firm size is measured as the log of total asset; Profitability is measured as pre-tax profit or loss scaled by lagged total asset; Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign ownership is a fraction of the firm that is owned by non-Thai citizens; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise. Also estimated but not reported are a constant term and 9-industry dummy variables. Numbers in the brackets are heteroscedasticity-robust t-statistics. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively. R-squared and the number of observations are reported in the last two rows.

Table 1.3C: Firm Size and Activities in International Capital Markets

	Number of Firms					
Size Quartile	Are SET 50 Index Constituent	Are SET 100 Index Constituent	Have TRIS Credit Ratings	Have ADR	Have Issued Equity Abroad	Have Issued Bond Abroad
Smallest	0	0	0	1	6	0
Second	0	1	3	2	4	0
Third	2	20	6	0	16	6
Largest	44	69	33	9	56	40
All	46	90	42	12	82	46

Stock Exchange of Thailand selects the constituents of SET 50 and SET 100 indices by choosing the top 50 and top 100 listed firms in terms of market capitalization, liquidity and compliance with requirements regarding the distribution of shares to minor shareholders. TRIS (Thailand Rating Information Services Co.) is Thailand's first and most prominent rating agency. The list of Thai firms with ADRs (American Depository Receipts) is from JP Morgan's and Bank of New York's Databases. Data on the issuances of equity and debt securities by Thai firms outside of Thailand (from 1990 to 2006) are from Thomson's SDC Platinum Database.

Table 1.4A: Correlation Matrix: Size and Firms Political/Family Connections

	Firm Size	Thaksin Connection	Family Business Group	Political Connection
Firm Size	1			
Thaksin Connection	0.1327	1		
Family Business Group	0.3290	0.4231	1	
Political Connection	0.3019	0.1248	0.1004	1

Thaksin Connection is a dummy variable that takes the value of one if the firm's major shareholder is, or is related to (has the same last name as), a member of Thaksin's Cabinet and zero otherwise. Family Business Group is a dummy variable that takes the value of one if the firm's major shareholder is from the 50 largest family business groups in Thailand and zero otherwise; Political Connection is a dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006): A firm is politically connected if (1) its major shareholder or top executive are parliament member, minister or head of the state or (2) its major shareholder or top executive are closely related to a top politician or a political party.

Table 1.4B: Political/Family Connections and the Effects of Foreign Portfolio Investment

		Panel A			Panel B	
Dependent Variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Firm Size	-0.5309**	-0.4991**	-0.6117**	0.54**	0.5289**	0.6941***
	[-2.26]	[-2.04]	[-2.41]	[2.41]	[2.23]	[2.95]
Profitability	0.3165***	0.3069***	0.3185***	-0.2213**	-0.2138**	-0.2167**
	[3.3]	[3.11]	[3.27]	[-2.23]	[-2.18]	[-2.17]
Exchange Rate Exposure	2.244***	2.2457***	2.287***	-1.8366***	-1.8530***	-1.9001***
	[3.22]	[3.24]	[3.34]	[-2.76]	[-2.85]	[-2.93]
Foreign Director	1.1498	1.1881	1.1939	-1.8121**	-1.8656**	-1.878**
	[1.49]	[1.54]	[1.55]	[-2.46]	[-2.53]	[-2.55]
Thaksin Connection	-2.2718			3.1052*		
	[-1.24]			[1.91]		
Family Business Group		-1.2385			1.2429	
		[-0.95]			[1.16]	
Political Connection			0.5489			-1.7614
			[0.31]			[-1.13]
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.1702	0.1677	0.1657	0.1511	0.1434	0.1448
Observations	306	306	306	306	306	306

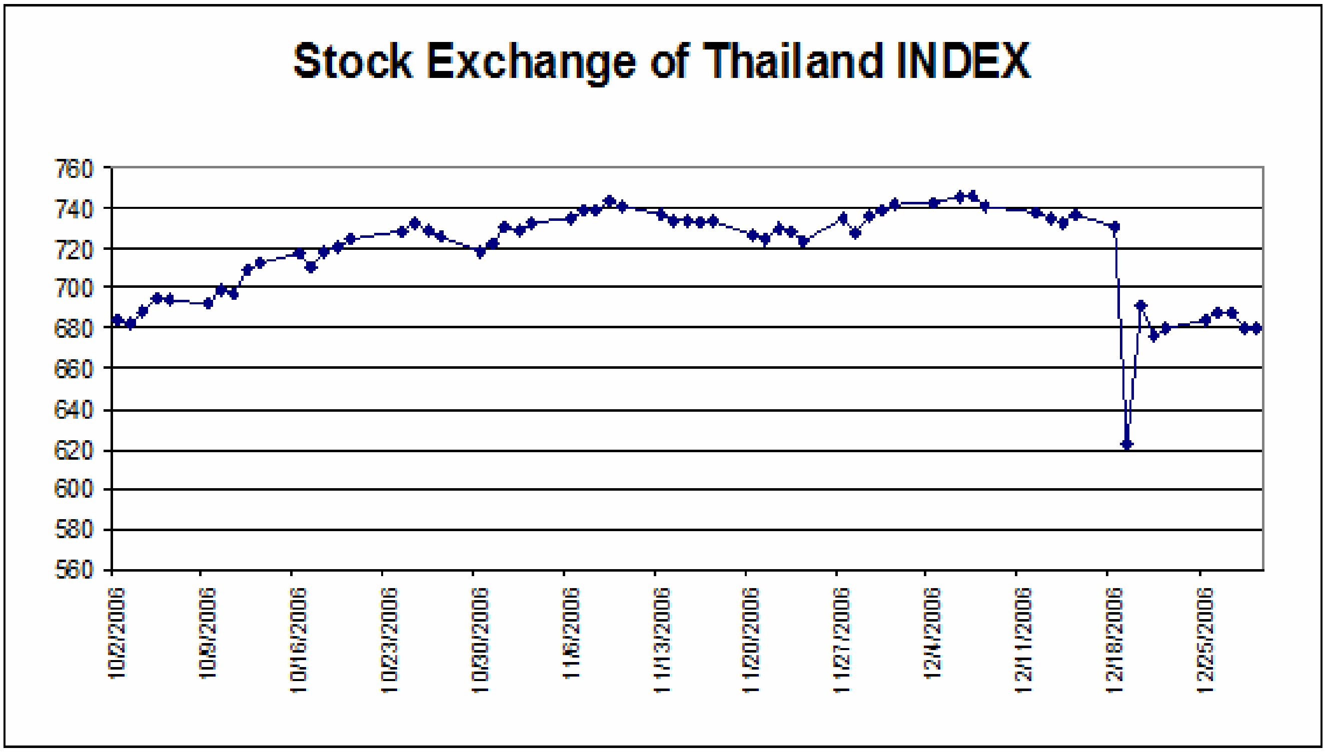
The table reports the coefficient estimates from regressions of abnormal returns on firms political/ family connections. The dependent variable in Panel A is the abnormal return on December 19, 2006 (the capital control day) and the dependent variable in Panel B is the abnormal return on December 20, (the liberalization day). Firm size is measured as the log of total asset; Profitability is measured as the pre-tax profit or loss scaled by lagged total asset; Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise; Thaksin Connection is a dummy variable that takes the value of one if the firms major shareholder is, or is related to (has the same last name as), a member of Thaksins Cabinet and zero otherwise. Family Business Group is a dummy variable that takes the value of one if the firms major shareholder is from the 50 largest family business groups in Thailand and zero otherwise; Political Connection is a dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006) and zero otherwise. Also estimated but not reported are a constant term and 9-industry dummy variables. Numbers in the brackets are heteroscedasticity-robust t-statistics. *,**, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively. R-squared and the number of observations are reported in the last two rows.

Table 1.5: Placebo Test: Are large firms more susceptible to bad news?

Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm Size	0.4772***	0.4438***	0.4481***	0.5496***	0.5311***	0.6125***
	[2.95]	[2.67]	[2.74]	[3.25]	[3.2]	[3.64]
Profitability			0.3057***	0.2881***	0.2864***	0.278***
			[4.14]	[4.19]	[4.22]	[4.12]
Exchange Rate Exposure				1.0988*	1.1337*	1.0762*
				[1.79]	[1.83]	[1.8]
Foreign Director					0.484	0.4255
					[1.14]	[1.01]
Thaksin Connection						-3.232*
						[-1.87]
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummy	No	Yes	Yes	Yes	Yes	Yes
R-squared	0.0257	0.0746	0.1231	0.1424	0.1447	0.1661
Observations	312	309	306	306	306	306

These placebo regressions examine the effects of firm size and other characteristics on abnormal returns when there is bad news. The dependent variable in is the abnormal return on September 22, 2006 (the first day the market learned about the coup). Firm size is measured as the log of total asset; Profitability is measured as the pre-tax profit or loss scaled by lagged total asset; Exchange Rate Exposure is measured as the exchange rate beta estimated from the multi-factor model; Foreign Director is a dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise; Thaksin Connection is a dummy variable that takes the value of one if the firms major shareholder is, or is related to, a member of Thaksins Cabinet and zero otherwise. Also estimated but not reported are a constant term and 9-industry dummy variables. Numbers in the brackets are heteroscedasticity-robust t-statistics. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively. R-squared and the number of observations are reported in the last two rows.

Figure 1.1: Stock Market Response to the Imposition and the Reversal of Capital Control



The Stock Exchange of Thailand (SET) Index is a composite calculated from the prices of all common stocks on the main board of the Stock Exchange of Thailand. The SET Index dropped from 730.55 to 622.14 on the capital control day (December 19, 2006) and bounced back from 622.14 to 691.55 on the liberalization day (December 20, 2006).

Appendix 1.1: Summary of Related Empirical Work

Paper	Country	Time Period	Methodology	Finding about Firm Size
Cross-Country Study				
Knill (2005)	53 countries	1996-2005	Panel Data Regression	Foreign portfolio investment is associated with an increase in the ability to issue securities for small firms; Foreign portfolio investment increases the maturity of bank loans.
Laeven (2003)	13 countries	1988-1998	Euler Equation Method	Financial liberalization relaxes financial constraints for small firms.
Single-Country Study				
Harris et al. (1994)	Indonesia	1981-1988	Euler Equation Method	The 1983 liberalization relaxed financial constraints for both small and large firms.
Jaramillo et al. (1996)	Ecuador	1983-1988	Euler Equation Method	The 1986 liberalization did not relax financial constraints, even for small firms.
Gelos and Werner (2002)	Mexico	1984-1994	Euler Equation Method	The 1989 liberalization relaxed financial constraints for small firms.
Koo and Shin (2004)	Korea	1980-2000	Tobin Q Mothod	The 1995 liberalization relaxed financial constraints for small firms; small firms get much wider access to outside credit after the liberalization.
Contreras and Makaew (2007)	Colombia	1989-1993	Structural Estimation	The 1991 liberalization increased investment rate and lowered buying price of capital for small firms.
Event Study				
Patro and Wald (2005)	18 countries	rolling window	Event Study	Small firms earn significantly higher abnormal returns when stock markets are liberalized.

Appendix 1.2: Definitions and Data Sources

Variable Name	Description and Source
Daily Stock Price	The last reported trade price each day, Source: Reuters
Daily Stock Return	Percentage changes in daily prices, Source: Authors Calculation
Total Assets	Everything that the company or group owns at the end of the financial year, expressed in local currency. Is equal to total current assets plus total fixed assets, Source: Reuters and SETSMART
Firm Size	Log of total assets, Source: Authors Calculation
Profit	Pre-tax profit or loss, expressed in local currency, Source: Reuters and SETSMART
Industry Dummy	Dummy variables representing 9 industries: Agro and Food, Consumer Products, Financials, Industrials, Property and Construction, Resources, Services, Technology, and Others, Source: SETSMART
Profitability	Profit scaled by lagged total assets, Source: Authors Calculation
Market Equity	Number of shares outstanding times market price, Source: Reuters
Book Equity	Number of shares outstanding times book value per share, Source: Reuters
Market to Book	Market equity scaled by book equity, Source: Authors Calculation
Operating Cash Flows	The net cash inflow from operating activity, expressed in local currency. Is equal to the sum of various operating activities., Source: Reuters and SETSMART
Cash Flow Growth	Lagged annual growth in operating cash flows, Source: Authors Calculation

Variable Name	Description and Source
Current Assets	The cash and other assets that the company or group expects to turn into cash. Is usually equal to cash and equivalents plus receivables plus inventories plus any of the following items: short term investments; marketable securities; prepayments, Source: Reuters and SETSMART
Current Liabilities	All of the liabilities that the company or group expects to have to meet within 12 months, Source: Reuters and SETSMART
Working Capital	Current asset minus Current liability, Source: Authors Calculation
Liquidity	Working capital scaled by lagged total assets, Source: Authors Calculation
Total Debts	Current Liabilities plus Long-term liabilities, Source: Reuters and SETSMART
Leverage	Total debts scaled by lagged total assets, Source: Authors Calculation
Exchange Rate	Local Currency (Thai Baht) / US Dollar Exchange Rate, Source: WRDS
Exchange Rate Exposure	The beta coefficient estimated from a multi-factor model regressing stock returns on percentage changes in the exchange rate. The factor model is estimated by the daily returns from September 29, 2005 to August 31, 2006 (a 261-trading-day period), Source: Authors Calculation
Foreign Ownership	A fraction of the firm that is owned by non-Thai citizens, Source: SETSMART
Foreign Director	A dummy variable that takes the value of one if the firm has at least one non-Thai citizen as a director and zero otherwise, Source: SETSMART
Thaksin Connection	A dummy variable that takes the value of one if the firms major shareholder is, or is related to, a member of Thaksins Cabinet and zero otherwise, Source:Ownership information is from SETSMART. The list of Thaksins Cabinet members is from the Thai government website: www.cabinet.thaigov.go.th/
Family Business Group	A dummy variable that takes the value of one if the firms major shareholder is from the 50 largest family business groups in Thailand and zero otherwise, Source: Ownership information is from SETSMART. The list of family business groups is from a Brooker Group Publication: Thai Business Group: A Unique Guide to Who Owns What

Variable Name	Description and Source
Political Connection	A dummy variable that takes the value of one if the firm is politically connected according to Faccio (2006) and zero otherwise. Faccio (2006) defines politically connected firms broadly as firms that (1) have a major shareholder or a top executive who is a parliament member, minister or head of the state or (2) have a major shareholder or a top executive who is related to a top politician or a political party, Source: Faccio (2006)'s dataset is available on American Economic Review website: www.aeaweb.org/
Market Capitalization	Number of shares outstanding times market price, Source: Reuters
Cash Holdings	The cash and cash equivalents value as shown in the company's balance sheet. Cash and equivalents can include cash at bank and in hand, short-term deposits or other liquid assets, Source: Reuters and SETSMART
Sales	The amount derived from the provision of goods and services falling within the company or group's ordinary activities, otherwise known as turnover. The data is entered as reported in the profit and loss account of the annual report, Source: Reuters and SETSMART
SET 50/SET 100 Index	Stock Exchange of Thailand selects the constituents of SET 50 and SET 100 indices by choosing the top 50 and top 100 listed firms in terms of market capitalization, liquidity and compliance with requirements regarding the distribution of shares to minor shareholders, Source: Stock Exchange of Thailand website: www.set.or.th/
TRIS Ratings	TRIS (Thailand Rating Information Services Co.), Thailands first and most prominent rating agency, provides credit ratings of Thai firms, Source: TRIS website: www.trisrating.com/
ADR	American Depository Receipts of Thai firms, Source: JP Morgan website: www.adr.com/ and the Bank of New York website: www.adrbny.com/
Equity Issuance Abroad	Issuances of equity securities by Thai firms outside of Thailand from 1990 to 2006, Source: SDC Platinum
Debt Issuance Abroad	Issuances of debt securities by Thai firms outside of Thailand from 1990 to 2006, Source: SDC Platinum

Chapter 2

Waves of International Mergers and Acquisitions

2.1 Introduction

In the past two decades, 26% of worldwide M&A activities involve acquirers and targets from different countries. The aggregate volume of cross-border mergers from 1989 to 2008 totals more than 8 trillion dollars. In spite of such a large volume, most of the M&A literature focuses on domestic mergers. Moreover, the amount of cross-border mergers varies greatly from year to year. For example, the volume of worldwide M&A deals dropped by 62% from 2000 to 2003 but bounced back by 158% in 2006.[1] Despite such a large year-to-year fluctuation, most papers on cross-border M&As study the effects of long-run determinants like corporate governance and capital market development. These gaps in the literature motivate the research questions that are at the core of this paper: what are the dynamic patterns of cross-border mergers, and what are the factors that drive them?

Using the data from 50 countries over the period of 1989-2008, I document the following facts about international M&As:

[1]See table 2.1 and figure 2.1 for details

(1) International mergers come in waves that are highly correlated with business cycles. Merger booms coincide with booms in the real sector and in the financial market. While the literature on merger waves shows that domestic mergers are pro-cyclical, I find that cross-border mergers are even more pro-cyclical than domestic mergers.

(2) Mergers are more likely to occur when both the acquirer and the target economies are booming. This is true even when I eliminate the effects of global booms. My finding refutes the widespread belief that most cross-border mergers occur when the target economies are in a recession or face a financial crisis, and that acquirers are vulture investors taking advantage of liquidity-constrained targets (Krugman, 1998; Aguiar and Gopinath, 2005; Desai, Foley, and Forbes, 2007; Acharya, Shin, and Yorulmazer, 2009). Although such "fire sale" mergers can happen under specific circumstances, most mergers do not follow this pattern.

(3) Merger booms have both an industry-level and a country-level component. Given that productivity shocks are better measured at the industry level and that financial shocks such as a change in monetary policy are more of a country-wide phenomenon, this finding is consistent with the notion that M&As are driven by productivity shocks and facilitated by macro liquidity shocks (Harford, 2005; Eisfeldt and Rampini, 2006).

(4) Across over one million firm-year observations, acquirers tend to be more productive than their industry peers and targets tend to be less productive than their industry peers. This finding supports the neoclassical theory of mergers in that high productivity firms acquire low productivity firms in order to redeploy their assets toward more profitable uses (Maksimovic and Phillips, 2001). This finding is at odds with the "like-buys-like" theory in which high productivity acquirers seek high productivity targets to realize gains from asset complementarity (Rhodes-Kropf and Robinson, 2008).

This paper makes contributions to several strands of merger literature. Most papers on cross-border M&As put their emphasis on long-run determinants of mergers. Starting in the 1980s, Errunza and Senbet (1984) develop a theory of why corporations diversify internationally based on capital and goods market imperfections. Rossi and Volpin (2004) find that acquirers are more likely to be from countries with stronger investor protection than targets. Bris and Cabolis (2008) find that the merger premium is higher when the acquirer country's investor protection is stronger than the target country's. Ferreira, Massa, and Matos (2009) find that cross-border mergers increase with foreign institutional ownership. Di Giovanni (2005) finds that mergers are more likely to originate from countries with developed financial markets.

Although corporate governance and capital market development are undeniably important for mergers, it is hard to imagine that the large year-to-year fluctuations (i.e., waves) in M&A activities are driven by these long-run determinants. Variables such as investor protections are extremely persistent and can be traced back to colonial origins. The central contribution of this paper is to incorporate the dynamic dimensions from business cycle theories and help explain the cyclical fluctuations of international mergers.

My paper is also related to the neoclassical theory of mergers. This literature typically argues that merger waves are driven by productivity shocks (Maksimovic and Phillips, 2001; Ditmar and Ditmar, 2008; Yang, 2008). Some authors further argue that, for waves to be formed, productivity shocks must be accompanied by liquidity shocks (Eisfeldt and Rampini, 2003; Harford, 2005; Maksimovic, Phillips, and Yang, 2009).

Although my international paper draws insights from relatively well-established domestic merger literature, I also address important issues unique to cross-border mergers, such as the role of exchange rates and government policies on multinational corporations. In relation to empirical work on domestic mergers, cross-border M&As are an excellent setting for out-of-sample tests and provide more comprehensive data. For instance, Dittmar and Dittmar (2008) suggest that U.S. domestic merger activities fluctuate in response to GDP shocks. However, it is difficult to identify the mechanisms by which GDP effects mergers using data from a single country. All acquirers, targets, and non-merging firms face the same macroeconomic shocks, and most macroeconomic shocks are highly correlated. In my international context, acquirers and targets are from different countries so I can better identify where the shocks originate. Moreover, using the data from 50 different countries, or 50x50 = 2,500 country pairs, will substantially increase the degrees of freedom of the analysis.

2.2 Empirical Framework

The goal of this paper is to document the important facts about cross-border mergers. More precisely, I ask the following four questions.

(1) How do cross-border mergers behave over a business cycle?

I first present exploratory evidence on the cyclicality of international mergers. Without making any structural assumptions, I compute the correlations between merger activities and a number of macroeconomic indicators measuring the real sector, the financial sector, and the external sector. The lead-lag correlations are computed within a seven-year window around mergers to offer a clear picture of what happens before, during, and after merger waves.

(2) Where do shocks that effect cross-border mergers come from?

The results from the correlation analysis can be driven by the co-movements of the acquirer economy and the target economy or by global economic booms. Following Harford (2005) and Dittmar and Dittmar (2008), I assume that lagged macroeconomic indicators are proxies for exogenous shocks and that M&As fluctuate in response to these shocks. Then, I regress mergers on acquirer country shocks and target country shocks, controlling for the year fixed-effects to eliminate the effects of global booms. This exercise will help me identify where the cyclical nature of cross-border mergers originates.

(3) What type of shocks (real or financial) effect cross-border mergers?

Mergers come in waves either because productivity shocks occur in waves or because financial shocks occur in waves. Using industry-level data, I form indices of industry-level productivity and valuation shocks. Then, I regress mergers on the industry indices, controlling for country-level shocks and year fixed-effects. Given that the macro financial shocks (such as changes in lending rates, monetary policy, and security issuance cost) are likely to be highly correlated across different industries within the same country, these regressions will allow me to distinguish the effects of productivity shocks from the effects of financial shocks.

(4) What types of firms engage in cross-border mergers?

To complete the analysis, I examine the characteristics of the merging firms. Using data from WorldScope, I compute a number of productivity and valuation measures. Then, I compare the characteristics of the merging firms with non-merging firms and compare the characteristics of acquirers with targets. Studying what types of firms engage in merger activities will shed some light on the motives behind M&A decisions.

2.3 Data

Mergers and Acquisitions Data

The source of M&A data is Thomson's Securities Data Corporation (SDC) database. My sample covers all deals announced and completed between 1988 and 2008. To ensure that my results represent a wide range of countries but are not driven by countries that rarely have mergers, I require that acquirers and targets must be from 25 developed countries with the most M&A deals and 25 developing countries with the most M&A deals. These 50 countries are listed in Table 2.2. There are 412,810 deals in my sample. The aggregate value of these deals is approximately 40 trillion dollars. Eight trillion dollars are from cross-border deals.

[INSERT TABLE 2.1 AND FIGURE 2.1 HERE]

Table 2.1 reports the aggregate volume and aggregate frequency of M&A activities. In Figure 2.1, aggregate volume exhibits both growing trends and large cyclical fluctuations. The volume of all M&A deals grows from around 500 million dollars in the early 1990s to more than 3 trillion in 2006-2007. The cyclical component is very large, especially in recent years. For example, the volume of all M&A deals dropped by 62% from 2000 to 2003 but bounced back by 158% three years later. Cross-border M&A deals are more volatile than domestic deals. The standard deviation scaled by mean is 70% for all deals but 84% for cross-border deals.

[INSERT TABLE 2.2 HERE]

Table 2.2 shows the breakdown by country. Most M&As are between high-income countries. The countries that have a large number of acquirers also have a large number of targets. The developed countries that have the highest number of acquirers and targets are the G-7 countries (except Italy): the U.S., UK, Germany, Canada, and Japan. The top developing countries are the BRIC countries (Brazil-Russia-India-China) plus Malaysia.

SDC provides detailed information on deal characteristics. Aside from basic information such as country, industry, and year, the SDC data include deal size, percent acquired, method of payment, and acquirer/target public status. The SDC collects data from a number of sources including the SEC and international stock exchange filings, news wires, trade publications, as well as surveys of banks and advisory firms.

It might be a concern that some deals do not have the size attached to them because firms are not required to report the transaction values to SDC. Di Giovanni (2005) finds no pattern in which industries, countries, or years have more missing values than others. As a precautionary measure, I also compare data from the SDC to the country-level FDI data from UNCTAD and the transaction-level data from Capital IQ. At the aggregate level, I observe similar cyclical patterns from these three sources.

Macroeconomic Data

Most of the macroeconomic data are from the World Bank's World Development Indicator (WDI) database. I use the variables that capture the states of an economy in terms of the real sector, the financial sector, and the external economy sector. For the real sector, I use the data on GDP, gross value added, gross capital formation, and total population. For the financial sector, I use the data on domestic credit and stock market capitalization. For the external sector, I use current account balance and nominal exchange rate. I augment the WDI data with the foreign portfolio investment data (net foreign portfolio investment) from the IMF's Coordinated Portfolio Investment Survey (CPIS) and stock price data (Average M/B and Average P/E ratios) from Kenneth French's Website. The average M/B and average P/E are equal-weighted. The data from WDI cover all 50 countries over the 20-year sample period, but the CPIS and French's data have less coverage. The CPIS data are available from 2001 and French's data cover the entire period but are only available for 21 countries. The country-pair variables, geographical distance, and common language dummy are from Di Giovanni (2005).

Micro Data

I use the WorldScope database, which covers over 95% of world market capitalization. It provides the financial statement information and market price of firms around the world. From the 50 countries in Table 2.2, WorldScope provides full coverage of the listed firms in 31 countries, 10 of which are developing countries. WorldScope also provides targeted coverage (all listed firms with a market capitalization higher than 100 million dollars) for 16 countries. The missing countries are Slovakia, Lithuania, and Ukraine. The list of these countries is available in the appendix. I construct a 1988-2008 annual data set of all the public firms available. There are 1,104,516 observations in this data set.[2]

[INSERT TABLE 2.3 HERE]

To ensure that my results are not specific to a particular variable definition, I compute six different measures of productivity: return on assets, profit margin, labor productivity, sales growth, employment growth, and payout ratio. Return on assets is profit (EBITDA) divided by total assets; profit margin is profit divided by sales; labor productivity is profit per worker; sales growth is the percentage change in annual sales; employment growth is the percentage change in number of workers; and payout ratio is dividends divided by total assets. I compute three valuation measures: M/B, past one-year return, and past three-year returns. The M/B is market capitalization divided by total assets less total debts; past return is the percentage change in market prices. I also collect four other variables that might effect M&As: size as measured by log of total assets (book value), age calculated from incorporation date, age calculated from listing date, and leverage. Leverage is total debts divided by total assets. To ensure that my results are not driven by outliers or any mistakes in the original data set, I winsorize the data at 0.025. I report the descriptive statistics of WorldScope variables in Table 2.3.

[2] I believe that WorldScope is an appropriate database for this research. Compared to practitioner-oriented products like Reuters, WorldScope retains inactive firms but Reuters does not. M&As can result in the de-listing of target firms; therefore, information for many targets are not available in Reuters. Compared to other popular research-oriented products, such as S&P's Research Insight or Compustat Global, which also cover inactive firms, WorldScope provides better coverage. For example, there are only 27,805 firms represented in Research Insight [but there are 52,596 firms represented in WorldScope]. Finally, many premium databases, such as Dun and Bradstreet's WorldBase or CapitalIQ, cover larger cross-sections of firms. They provide limited or no historical data, which I deem necessary for a time-series study.

Filtering Procedure

There are challenges associated with using raw data directly. First, most of the variables of interests such as merger activities, stock market capitalizations, and GDPs, are increasing over time. If I use the raw data to compute correlations or run regressions, then the results are likely to be spurious.

Second, the focus of this paper is the cyclical properties of M&As rather than their cross-country variations. If I run a panel-data regression using raw data as seen in Di Giovanni (2005), then the estimated coefficients will combine the time-series and cross-sectional effects together. For example, Di Giovanni (2005) finds that that larger stock market capitalization in year t-1 leads to more acquisitions in year t. This finding could be driven by cross-country differences. For example, countries like the U.S. have larger stock markets than Sub-Saharan African countries do; therefore, his results might reflect the fact that there are more American acquirers than Nigerian acquirers. My research question is different: I ask whether there are more U.S. acquirers and targets when there is an economic boom in the U.S.

Mendoza and Terrones (2008) develop an algorithm to identify and analyze credit booms. I use a minor variation of their algorithm to transform my data:

(1) I deflate all the nominal variables with GDP deflators and scale them by total population. Because I try to measure various shocks to the economy, scaling by total population is more appropriate for my application than scaling by GDP. GDP itself is also affected by the shocks; thus, scaling by GDP will confound the effect of the shocks in the original variables.

(2) I filter out trends in all variables by using the Hodrick-Prescott (HP) filter. Hodrick and Prescott (1997) propose a de-trending method, which is now commonly used in the business cycle literature. The HP filter decomposes the raw variable X_t into the trend component, $trend_t$, and the cyclical component, $shock_t$. Given the smoothing parameter ξ, the filter will choose the trend component that minimizes the objective function:

$$\sum_{t=1}^{T}(X_t - trend_t)^2 + \xi \sum_{t=2}^{T-1}((trend_{t+1} - trend_t) - (trend_t - trend_{t-1}))^2$$

The first term in the objective function penalizes the deviations from the trend, while the second term penalizes the fluctuation in the growth rate of the trend components, i.e., the non-smoothness of the trend. Following Mendoza and Terrones (2008), I apply the HP filter to the full sample period 1988-2008 and set the smoothing parameter equal to 100, which is commonly used with annual data.[3]

(3) I compute the standard deviations of shocks in each country and then scale the shocks with their standard deviations. Mendoza and Terrones (2008) define “boom” as a situation in which the deviation from trend is unusually large relative to the country’s typical cycle. Scaling by the country’s standard deviation is necessary because some economies are more volatile than others. Moreover, such scaling will eliminate the cross-country differences in size and allow me to run a panel data regression in which all countries are treated equally.

[INSERT FIGURE 2.2 HERE]

Figure 2.2 shows an example of the raw and the de-trended series of U.S. firm acquisitions of assets in other countries.

Consistent with Mendoza and Terrones (2008), I identify a “wave” as a situation in which the deviation from trend is unusually large. Instead of providing a specific cutoff and discretizing the wave variable, I use the HP-de-trended and standard deviation-normalized variables directly to preserve their information content. From the filtered variables, I observe many “merger waves” in the data. Out of 1,000 country-year observations, there are 165 observations in which total M&As activities exceed one standard deviation and 109 observations in which M&As exceed two standard deviations.

2.4 Merger Activities and Macroeconomic Conditions

Correlation Analysis

Business cycle theories predict that there are systematic relations among macroeconomic

[3] I examine the stationarity of the detrended data using the Levin-Lin-Chu test (a pooled Dickey-Fuller test). The test confirms that the panel is indeed stable.

variables. These variables might effect one another endogenously or be driven jointly by some unobservable factors. As a first step, I do not make any causality or structural assumptions. To see which variables coincide or have lead-lag relations with M&As activities, I compute sample correlations at different time periods in a seven-year window around mergers. This exercise offers a clearer picture of what happens before, during, and after merger waves.

To examine how M&As fluctuate over a business cycle, I compute the following correlations:

$$Correlation(Merger_{c,t}, X_{c,t+j}) \ j \in \{-3, -2, -1, 0, 1, 2, 3\},$$

where $Merger_c$ is the aggregate volume of mergers in country c. The X_cs are the macroeconomic indicators capturing: (1) the real sector of the economy (gross value added, GDP, and capital formation); (2) the financial sector of the economy (market capitalization, M/B, P/E, and domestic credit); as well as (3) the external sector of the economy (current account, exchange rate, and foreign portfolio investment). Both $Merger_c$ and X_c are de-trended using the Mendoza and Terrones' filtering procedure described earlier.

[INSERT TABLE 2.4 HERE]

The results are reported in Table 2.4. Because cross-border deals are associated with two countries, there are three sets of correlations: (1) between cross-border deals and the acquirer country's characteristics, reported in Table 2.4A; (2) between cross-border deals and the target country's characteristics, reported in Table 2.4B; and (3) between domestic deals and the corresponding country characteristics, reported in Table 2.4C.

It is apparent from these tables that M&As are pro-cyclical and that merger waves coincide with macroeconomic booms. The correlations between mergers and real/financial indicators show a similar pattern across the board. The correlations between mergers at time t and the indicators at time t-3 are negative; then these correlations increase, become positive at time t-2 or t-1, and peak at time t; they then remain positive for a period of time and then turn negative at t+3. According to this cyclical pattern, the lagged values of the indicators will be able to predict mergers.

The fluctuations of the real indicators should be highly correlated with aggregate productivity shocks facing an economy.[4] The contemporaneous correlations between M&As and gross value added are positive and statistically significant in all specifications. A one standard deviation shock in the acquirer's value added is associated with a 0.26 standard deviation change in cross-border mergers; a one standard deviation shock in target's value added is associated with a 0.18 standard deviation change in cross-border mergers; a one standard deviation shock in domestic value added is associated with a 0.07 standard deviation change in domestic mergers.

I find that the correlations between M&As and the financial indicators are higher than the correlations between M&As and the real indicators. For example, stock market capitalization in the acquirer country has a 42% correlation with cross border M&As. A one-year lagged stock market capitalization has a 31% correlation with cross-border M&As, but gross value added only has correlations of 26% and 14%, respectively. This is not surprising given that the financial indicators are forward-looking, but the real indicators are accounting numbers measuring past performance. As Harford (2005) points out, the fluctuations in valuation measures can come from any source, including productivity shocks, liquidity shocks, and misvaluations.

Comparing Tables 2.4A and 2.4B, real and financial conditions of the acquirer country have a higher impact on M&As than the conditions in the target country. This finding can be explained by a variety of reasons. One example could be that acquirers have to raise funds for the acquisitions, and that the cost of financing is lower when the acquirer country is booming. Another might be that the acquirers must take control of the targets, so it is more important that the acquirers receive high productivity shocks.

Comparing Tables 2.4A and 2.4B with Table 2.4C, I find that cross-border mergers are much more correlated with real and financial conditions than domestic mergers. Harford (2005), Eisfeldt and Rampini (2006), Dittmar and Dittmar (2008), and Yang (2008) document that domestic M&As are pro-cyclical. The comparison between Table 2.4A-2.4B and Table 2.4C shows that cross-border mergers are even more pro-cyclical than domestic mergers.

[4] Wurgler (2000) and Maksimovic and Phillips (2001) use value added as a proxy for productivity shocks.

Turning to the measures of the external sector, the dynamic pattern of correlations between cross-border mergers and the exchange rate is interesting. Merger waves do not occur when the domestic currency is strongest. The contemporaneous correlation between M&As and exchange rates is statistically zero. The domestic currencies are strong two to three years before the peak of the merger waves and become weak two to three years after the merger's peak. This finding suggests that M&As do not react directly to exchange rate appreciations. Instead, both mergers and exchange rate movements are more likely to be part of a larger business cycle model in which symptoms such as the appreciation of local currencies and the run-up in real estate prices are typical during economic expansions.

The correlations of other external indicators are less significant. Cross-border mergers do not have a significant relation with the acquirer's current account. There is weak evidence that target countries run current account deficits during the merger waves. This is expected because M&As are a part of the capital inflow that might worsen the current account balance (current account deficit = capital inflow + change in foreign reserve). I detect a small correlation between mergers and foreign portfolio investments. This is probably due to the fact that the foreign portfolio investment data from CPIS have much less coverage than the domestic variables, which come from WDI.

In sum, the correlation analysis reveals that M&As exhibit a strong cyclical pattern. Real and financial indicators coincide with and predict mergers.

Fact 1: Cross-border mergers are highly correlated with business cycles.

Regression Analysis

Because the correlation analysis is univariate in nature, it is possible that the results in Table 2.4 are driven by global economic booms or by the co-movements of the acquirer economy and the target economy. To answer this question, I move to a multivariate framework.

Following Harford (2005) and Dittmar and Dittmar (2008), I assume that lagged macroeconomic indicators are proxies for exogenous shocks and that M&As fluctuate in response to these shocks. Specifically, I regress mergers between country c_1 and c_2 on the lagged conditions of c_1 and the lagged conditions of c_2, controlling for the year fixed-effects. By putting the acquirer conditions and the target conditions side by side, I can identify how much of the M&As are driven by the acquirer conditions and how much are driven by target conditions. Additionally, by including the year fixed-effect, I can determine whether the variations beyond the global averages still have an effect on M&As. My specification is:

$$Merger_{c_1,c_2,t} = \beta_0 + \beta_1 Ex_{c_1,c_2,t-1} + \beta_2 X_{c_1,t-1} + \beta_3 X_{c_2,t-1} + \epsilon_{c_1,c_2,t}$$

where $Merger_{c_1,c_2}$ is the volume of deals with the acquirer in c_1 and the target in c_2. Ex_{c_1,c_2} is the exchange rate (acquirer currency per one unit of target currency). The X_cs are the real and financial indicators I used earlier. All the variables are again de-trended by the Mendoza and Terrones' filtering procedure.

Putting all seven real and financial indicators in a regression at the same time will result in a multi-collinearity problem. I solve this problem in two ways: (1) by picking a representative variable and (2) by using all the indicators to form economic shock indices. First, I pick the representative variable based on data availability. If data are equally available, then I try all of the indicators in a regression and select the horse-race winner. Second, I adopt Harford's (2005) approach by forming indices using the first principal component of all the indicators. (The real economy indicator is constructed from the gross value added, GDP, and capital formation; the financial market indicator is constructed from market capitalization, M/B, P/E, and domestic credit.)

[INSERT TABLE 2.5 HERE]

The results are reported in Table 2.5. In column 1, the coefficient of exchange rate is significant and negative, which suggests that the acquirer currency is strong relative to the target currency prior to merger booms. In column 2, I use gross value added as a real economy indicator. The coefficient of the acquirer country is estimated at 3%, and the coefficient of the target country is estimated at 2%. These numbers are positive and statistically significant even after controlling for the year fixed-effect. These estimates suggest that mergers react to shocks both from acquirer countries and from the target countries. Because the year fixed-effect has removed the global averages from all the variables year by year, my result does not depended upon the worldwide merger booms in a particular time period.

In column 3, I use market capitalization as a financial market indicator. The coefficient of the acquirer country is estimated at 6% and the coefficient of the target country is estimated at 4%. Again, both numbers are positive and statistically significant. Mergers are more likely to take place when stock markets in both the acquirer and the target country are booming. Consistent with the correlation analysis, financial indicators are a better predictor of mergers than the real indicators. In addition, the conditions of the acquirer country are more significant than the conditions of the target country.

The specifications in columns 4 and 5 are similar to those in columns 2 and 3, except that I use first principal component indicators. The results in columns 4 and 5 are similar to the ones in columns 2 and 3.

In sum, the regression analysis confirms that M&As react to shocks both in the acquirer country and in the target country. In other words, there are more M&As when both the acquirer and the target economies are booming. My results are also robust to the inclusion of the year fixed-effects.

Fact 2: There are more M&As when both the acquirer and the target economies are booming.

Mergers and Global Economic Conditions

From Table 2.5A, the year fixed effect explains approximately 2% of the variations in cross-border merger activities. This finding suggests that there must be global factors driving mergers across different countries. As an example of such factors, I replace the year dummies with three candidate measures of global economic conditions. Following Albuquerque, Loayza and Serven (2005), I use (1) World Equity Market, measured by the return on Morgan Stanley World Capital Index, (2) World Interest Rate, measured by the average of American, Japanese, and German three-month treasury rates, and (3) Credit Spread which is Moody's AAA bond rate minus Moody's BAA bond rate. I collect raw monthly data from Bloomberg, convert them into annual series, and detrend the series using the Mendoza and Terrones' procedure.

The results are reported in Table 2.5B. The sign and the magnitude of the country-level indicators are similar to the ones in Table 2.5A. Even though the coefficients of the acquirer and the target country indicators are still statistically significant after controlling for the worldwide economic conditions, the effects of the global variables are relatively large - in some cases, larger than the effects of the acquirer and the target countries. For instance, the coefficient of acquirer's market capitalization is 0.07 and the coefficient of target country is 0.03. The coefficient of World Equity Market is estimated at 0.07.

2.5 Firm Characteristics and Industry Merger Waves

In this section, I examine the characteristics of merging firms and show how these characteristics change along with the merger waves.

Characteristics of the Merging Firms

In the previous section, I examined merger waves at the country level. In this section, I look inside each country and identify which firms engage in M&As activities. Analyzing the characteristics of the merging firms will shed some light on the main motives behind M&As in my sample.

From the WorldScope data, I construct 13 measures of firm characteristics: 6 productivity measures, 3 valuation measures, and 4 other measures that might effect mergers. The productivity measures consist of return on assets (ROA), profit margin, labor productivity, sales growth, employment growth, and payout ratio.[5] Although these measures are positively correlated, each represents different concepts of productivity and has its own strength. For example, labor productivity captures technological shocks; profit margin captures demand conditions; the level measures, such as return on assets, capture productivity more directly; growth measures, such as sales growth, are less affected by firm-specific reporting practices or earning management. I examine all six to ensure that my results are not specific to a particular measure. For the valuation measures, I compute the market-to-book ratio, past one-year return, and past three-year returns, which

[5]The term "productivity" is used loosely here- some of these should be labeled "profitability" measures instead.

are similar to the measures used in Harford (2005). The other potential determinants of mergers are size, age based on incorporation date, age based on the listing date, and leverage.

Because my sample consists of firms from different countries, industries, and time periods, it is difficult to interpret any differences in the unadjusted firm characteristics. For example, it is unclear whether a 2% ROA of a food factory in Thailand means the same thing as a 2% ROA of a car company in the U.S. To address this issue, I normalize each characteristic, labeled i, by:

(1) Grouping all observations by country-industry-year and, for each group, computing the means and the standard deviations of i

I use Fama-French's 16 industries instead of the four-digit SIC code provided by World-Scope. The four-digit SIC industry is rather small, leaving some industries in small countries empty or sparsely populated. The definitions of Fama-French's 16 industries and the mapping from SIC code can be found on Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/

(2) Using the means and standard deviations to compute i's Z-score (Z-score = (i-mean)/ standard deviation) for each observation.

In other words, using the distribution of i in each country-industry-year, I convert the raw value of i into its position in the distribution. Mechanically, these Z-scores will have the mean of zero and the standard deviation of one. This adjustment will eliminate all cross-country and cross-industry differences.

To investigate which firms are more likely to engage in M&As, I first match the WorldScope data with the SDC data. For mergers that take place at time t, I compare the characteristic at time t-1 to avoid the reverse causality problem. Of all 173,357 deals that involve public acquirers, 122,118 deals can be matched with WorldScope firms. Of all 52,524 deals that involve public targets, 46,607 deals are matched. I then compare the Z-scores between the population of acquirers, targets, cross-border acquirers, cross-border targets, and other non-merging firms.

[INSERT TABLE 2.6 HERE]

The results are reported in Table 2.6. The first four columns compare acquirers with targets. Column 1 reports the difference between the average Z-scores of all acquirers and the average Z-score of all targets. Column 2 reports the difference between the cross-border acquirers and the cross-border targets. The numbers in the parenthesis are the t-statistics from the t-tests. Across all the productivity and valuation measures, I find that the acquirers' Z-scores are consistently higher than the targets'. The magnitudes of the difference are around 0.2-0.3 standard deviations. The economic significance of these numbers is large but varies from country to country and from industry to industry. For example, in 2008, one standard deviation of ROA of the food industry in Thailand is 13% and one standard deviation of ROA of the American auto industry is 35%.

The t-test only compares the averages of acquirers and targets. In columns 3 and 4, I compare the whole distributions using the Kolmogorov-Smirnov's D-statistics. Column 3 reports the distributional distances between all acquirers and all targets. Column 4 reports the distributional distances between the cross-border acquirers and the cross-border targets. I find that the differences are statistically significant. This significance confirms that not only do the acquirers and the targets have different means but they also come from different distributions.

In the last four columns, I compare the Z-score of the merging firms with the non-merging firms. Column 5 compares all of the acquirers with the non-acquirers, and column 6 compares cross-border acquirers with the non-acquirers. I find that acquirers are more productive and have higher valuations than their industry peers. Column 7 compares all of the targets with the non-targets, and column 8 compares cross-border targets with non-targets. I find that targets are less productive and have lower valuations than their industry peers. These results are virtually uniform across all measures. This is consistent with the neoclassical theory of mergers in which more productive firms purchase less productive firms to realize efficiency gain.

Turning to other characteristics, firms that participate in mergers are likely to be older and larger than non-merging firms. Among the merging firms, firms participating in cross-border mergers are older and larger than firms participating in domestic mergers. The acquirers are, generally, larger and older than the targets. For leverage, I find some evidence that the targets tend to have higher leverage than the acquirers.

Because acquirers are larger and are more likely to be public than targets, acquirers find more matches in WorldScope than targets. There is concern that the comparisons between acquirers and targets in columns 1-4 are potentially biased. However, Maksimovic, Phillips, and Yang (2009) report that non-listed firms are smaller and less productive than listed firms. This finding will bias my results toward zero. The fact that I still find significant differences between the acquirers and the targets implies that the unbiased differences must be very large and that my results in columns 1-4 can be thought of as a lower bound of the true differences.

Fact 3: Acquirers are more productive firms. Targets are less productive firms.

Comparisons between Acquirers and Targets

In Table 2.6A, for cross-border mergers, the difference between the acquirers' and the targets' Z-scores might not be aligned with the difference in the original variable, i. In other words, the acquirers and targets are benchmarked by their industry peers in their own countries. It is unclear if the cross-border acquirers are more or less productive than their targets since the Z-scores come from two different distributions. As a robustness check, I combine all countries together and assign a new Z-score based on industry-year grouping instead of country-industry-year grouping. The results are reported in Table 2.6B.

I find that, on average, the acquirers are still more productive and have higher valuation than the targets, but the significance is not as strong as those of the original grouping. This is consistent with the country-level cross-sectional results in Section 2.5 that acquirers seek less productive firms in high income/productive countries, and not the least productive firms anywhere in the world.

Characteristics of Merging Firms during Booms and Busts

Motives behind mergers during booms and busts can be different. Therefore, comparing the characteristics of the merging firms at different points along the business cycle might shed some light on the factors driving merger activities.

From the country- and the industry- level regressions, there are more mergers during booms. The standard neoclassical explanation is that productivity shocks are different during booms and busts. Alternatively, more mergers during booms can be a result of the increase in participation by less productive firms. Less productive firms might engage in

MAs during booms due to higher capital liquidity, more free cash flows, or more intense product market competitions.

In Table 2.6C, I compare the merging firms during booms and busts by computing another set of Z-scores based on country-industry grouping. I define two types of booms (busts): (1) real booms (busts) as the periods in which HP detrended Gross Value Added is above (below) one standard deviation (2) financial booms (busts) as the periods in which HP detrended Stock Market Capitalization is above (below) one standard deviation.

I find that more firms participate in MAs during booms and that the average acquirers during booms are smaller, younger, and have less leverage. However, I find no evidence that economic booms lower the productivity threshold for mergers. The acquirers during booms are more productive than the acquirers during busts and the targets during booms are more productive than the targets during busts.

Post-Merger Operating Performance To examine post-merger operating performance, I compute the percentage change in return on assets (Profit/Total Assets) over four windows: [t-1, t], [t-1, t+1], [t-1, t+2], and [t-1, t+3] where t denotes the year of the acquisition. The results are reported in Table 2.6D. Numbers in the table are the average performance of the treatment group (merging firms) minus the performance of the control group.

From the first four columns, without controlling for the selection issues, I find that the acquirers and the targets underperform after mergers. Performance of the acquirers is worse than performance of the targets. Performance of the firms involving cross-border deals is worse than performance of the firms involving domestic deals.

In Section 2.4, I find that merging firms and non-merging firms have different characteristics. Therefore, the unmatched results might reflect different initial characteristics rather than merger outcomes. To solve the problem, I use the propensity scores matching method. My probit selection model uses basic firm characteristics as covariates: lagged profitability, sales, total assets, and firm age. Columns 5-8 reports propensity-score-matched effects (average treatment effects on the treated).

I find that the most underperformance in the first four columns disappears after controlling for basic firm characteristics. A potential explanation is that firms receive large productivity shocks prior to engaging in MA and the shocks revert in subsequent years.

Industry Shocks

Next, I examine how the industry-level M&As are affected by the year-to-year fluctuations in productivity and valuation measures. From section 2.4, it is not obvious whether the country-level indicators represent productivity shocks or other macroeconomic shocks because these shocks are highly correlated at the country level. Performing industry-level regressions will help me identify what types of shocks are driving the results. Although productivity shocks are probably best described at the industry level, financial shocks (such as changes in lending rates, monetary policy, and security issuance cost) are more of an economy-wide phenomenon. If the industry-level regressors are significant after controlling for the country-level regressors, then the productivity shocks are likely to be the factor driving M&As. At the same time, if the country-level regressors are significant after controlling for the industry-level shocks, then the true shocks effecting M&As must have an economy-wide component.

Using the six productivity measures and three valuation measures from the previous section, I construct the industry shock indices. I average the firm characteristics for each country-industry-year and normalize each series using the Mendoza and Terrones' procedure. Similar to section 2.4, I either choose one variable (ROA) to represent productivity shocks and choose another variable (market-to-book) to represent the valuation shocks or I construct a productivity index from the first principal component of the six productivity measures and construct a valuation index from the three valuation measures.[6]

[6] It might be a concern that indices constructed from WorldScope variables might not be an accurate proxy of industry shock because private firms in SDC are not covered by WorldScope. To the extent that shocks to firms in the same industry in the same country are correlated, the fluctuations in the average productivity of the listed firms can be used as a proxy of the fluctuations in the average productivity of all firms. To further address this concern, I use the United Nations Industrial Development Organization (UNIDO) database, which is a census-type dataset, to construct an alternative measure for industry shocks - value added per worker and output per worker. Again, I find that the industry shocks have positive coefficients. However, the new coefficients are less significant than those of the WorldScope shocks. This result might be due to the fact that UNIDO uses ISIC industry classification, but WorldScope and SDC use SIC classification and that the mapping between ISIC and SIC introduces noise into the UNIDO measures. Yet another possibility is that the universe of WorldScope (large/listed firms) is more relevant to mergers compared to the small manufacturing firms in UNIDO.

I regress M&A volume of industry i in country c on the conditions of industry i in country c and the macroeconomic conditions of country c. I also control for the year fixed-effects.

$$Merger_{i,c,t} = \beta_0 + \beta_1 I_{i,c,t-1} + \beta_2 X_{c,t-1} + \epsilon_{i,c,t}$$

where $I_{i,c}$ is the condition of industry i in country c and X_c is the condition of country c.

[INSERT TABLE 2.7 HERE]

The results are reported in Table 2.7. In Table 2.7A, I regress cross-border mergers on acquirer country and industry indicators. In Table 2.7B, I regress cross-border mergers on target country and industry indicators. In Table 2.7C, I regress domestic mergers on the country and industry indicators. In columns 1-3 and columns 7-9, I use the representative measures as my regressors: industry ROA as the real industry indicator, gross value added as the real economy indicator, industry M/B as the industry valuation indicator, and stock market capitalization as the financial market indicator. In columns 4-6 and columns 10-12, I use the principal component indices as my regressors. The country-level principal component indicators are similar to the ones in section 2.4.

The coefficients of the industry-level real indicators are positive and statistically significant. In most specifications, the country-level real indicators are driven down to zero or less significant than the industry-level real indicators. From the third columns of Table 2.7A-2.7C (the specification in which I include the real indicators at the country level and control for the year fixed-effect), the industry real indicator's coefficients are estimated at 0.06 for an acquirer country, 0.03 for a target country, and 0.03 for domestic mergers. The coefficients of the country-level real indicators in the same regressions are 0.02, 0.03, and 0, respectively.

The coefficients of the industry-level valuation indicators and the country-level financial indicators are positive and statistically significant in all specifications. In most specifications, the country-level financial indicators outperform the industry-level valuation shocks. From the ninth column of Table 2.7A-2.7C (the specification in which I include the country-level financial indicators and control for the year fixed-effect), industry valuation's coefficients are estimated at 0.09 for an acquirer country, 0.02 for a target country, and 0.04 for domestic mergers. The coefficients of the country-level financial indicators in the same regressions are 0.12, 0.02, and 0.10, respectively.

The country-level patterns that I document in section 2.4 are still preserved at the industry level. All the coefficients in Table 2.7 are positive, indicating that there are more mergers during booms. The coefficients of the valuation/financial market indicators are higher than those of the real/ productivity indicators. The coefficients in Table 2.7A are larger than the coefficients in Tables 2.7B and 2.7C, suggesting that cross-border mergers are more pro-cyclical than domestic mergers and that the conditions of acquirer countries are more important than the conditions of target countries.

In sum, shocks that effect mergers have both significant industry components and significant country components. Productivity shocks are mostly significant at the industry level. On the other hand, the country-level financial indicators are still important after controlling for the industry-level valuation shocks. These findings support the literature on U.S. merger waves (e.g., Harford, 2005; Eisfeldt and Rampini, 2006; Maksimovic, Phillips, and Yang, 2009) in which mergers are affected by both productivity shocks and macro financial shocks.

Fact 4: Shocks that effect mergers have both significant industry and significant country components.

2.6 Additional Results

This section provides two sets of cross-sectional evidence to complement the time-series results. At the most aggregated level, I examine the long-run country effect on the 20-year aggregate of M&A activities. At the most disaggregated level, I examine the deal-level characteristics of domestics and cross-border M&As. The results in this section will give more information about the motives behind M&As and help to identify the issues that might be particularly pertinent to cross-border mergers.

Country-Level

I study the cross-country determinants of M&As by estimating the gravity model. The gravity model is one of the most popular empirical models used in international trade. Instead of using di Giovanni (2005)'s panel version of the gravity model, which combines the time-series and the cross-sectional effects together, I use a cross-sectional version.

$$Merger_{c_1,c_2} = \beta_0 + \beta_1 Distance_{c_1,c_2} + \beta_2 X_{c_1,t_0} + \beta_3 X_{c_2,t_0} + \epsilon_{c_1,c_2},$$

where the variable $Merger_{c_1,c_2}$ is the 20-year aggregate volume of M&A flow from country c_1 to country c_2. I deflate the annual mergers data with the GDP deflators and aggregate them from 1989 to 2008.[7] I use two variables to measure the distance between the acquirer and the target countries: the geographical distance and the common language dummy. The geographical distance captures various aspects of the affinity between the two countries. Examples include the volume of international trade, the presence of regional associations (such as EU and NAFTA), and the transportation costs. The common language dummy is a proxy for informational distance or the degree of information asymmetry between the two countries. The Xs are the likely determinants of mergers in the long run. I use total population to measure country size, GDP to measure the level of income, and stock market capitalization to measure the degree of financial development. The Xs are measured in the base year (t_0=1988, outside of the M&As 20-year sample) to avoid the endogeneity problem. The descriptive statistics of the Xs are reported in Table 2.9.

[INSERT TABLE 2.8 AND TABLE 2.9 HERE]

The results of the gravity model are reported in Table 2.8. From column 1 and column 2, the log of distance has negative and significant coefficients and the common language dummy has positive and significant coefficients. In other words, most mergers are between countries that are close together in terms of geographical and informational distance. If the distance of a country-pair is 1% smaller, then mergers will increase by 0.5-0.6%. If a country pair that does not share a common language adopts a common language, then mergers will increase by 1.8%.

From columns 3 and 4, all four coefficients of populations and GDPs are positive and statistically significant. This result means that most M&A activities are between large

[7] The deflator used is the average GDP deflator of the acquirer and the target countries.

and rich countries. A 1% increase in the 1988 population is associated with a 0.2% increase in M&As for the acquirer country and a 0.2% increase for the target countries. Keeping total population constant, a 1% increase in 1988 GDP is associated with a 1.1% increase in M&As for the acquirer country and a 0.5% increase for the target countries. The coefficients of the acquirer countries are higher than the coefficients of the target countries, implying that acquirer countries are on average larger and richer than the target countries. The results so far are consistent with the neoclassical theories and the standard results from international trade literature. That is, although firms tend to trade with partners in closer countries with larger markets, acquirers tend to seek targets in closer countries with a higher level of economic activities.

Interestingly, the log of stock market capitalization in 1988 is highly significant. From column 6, the coefficient of acquirer market capitalization is estimated at 0.65, driving out the significance of the GDP variable. The coefficients of the target market capitalization is also statistically significant but with a much smaller magnitude (0.15). This result suggests deep financial markets, especially in the acquirer countries, are very important for M&As.

Deal-level

Here, I examine the characteristics of deals in my sample and compare the characteristics of domestic deals to the characteristics of cross-border deals. The characteristics I study are deal size, payment method, and the acquirer's and target's listing status. I am also interested in whether these deals are in high-tech, tradable, or related industries.

"Deal Size" is the transaction value in millions of dollars. The "Cash-based Dummy" is a dummy variable taking the value of one if the percentage of cash is higher than the percentage of stock, and zero otherwise. The "Listed Acquirer" is a dummy taking the value of one if the acquirer is listed. The "Listed Target" is a dummy taking the value of one if the target is listed. The "Tradable" dummy is equal to one if the acquirer and the target are in tradable industries as defined by Aguiar and Gopinath (2005). The "High-tech" dummy is equal to one if the acquirer and the target are in the high-tech industry according to the American Electronic Association (http://www.aeanet.org/Publications/IDMK_definition.asp). "Relatedness" is the absolute value of the difference between an acquirer's four-digit SIC and target's four-digit SIC, as Alfaro and Charlton (2006) argue that related industries tend to have closer SIC codes.

The results are reported in Table 2.10. Columns 1, 2, and 3 show the average characteristics of all deals, the domestic deals, and the cross-border deals, respectively. In column 4, I report the t-statistics of the differences between the domestic deals and the cross-border deals. On average, the cross-border deals are larger than the domestic deals and more likely to involve listed acquirers. This is consistent with the finding in section 2.4 that, among the listed acquirers, the cross-border acquirers tend to be larger than the domestic acquirers. I also find that cross-border deals are more likely to be cash-based compared to the domestic deals. These comparisons suggest that financial constraints might be more relevant to cross-border deals than to domestic deals.

For the industry comparisons, cross-border deals are more likely to be in the tradable, high-tech, and related industries. This is circumstantial evidence that cross-border mergers are more likely to be driven by neoclassical motives than domestic mergers; mergers in tradable industry are likely to be driven by comparative advantage and trade costs; firms in the high-tech industry are more likely to have firm specific assets that can be redeployed in another country; and mergers in related industries are more likely to generate synergies.

A concern might be that the results in column 4 are driven by the differences in the compositions of the domestic deals and cross-border deals along country, industry, and year dimensions. For example, cross-border deals might cluster in certain countries or certain time periods compared to domestic deals. I address this problem by regressing deal characteristics on a cross-border dummy and controlling for country, industry, and year fixed-effects (only country and year fixed-effects for the industry comparisons). To ensure that the reported numbers are comparable to the t-statistics in column 4, I use a linear model instead of a logit or a probit. The coefficients of the cross-border dummy are reported in column 5. These numbers are roughly similar to the ones in column 4.

2.7 Conclusion and Discussion

In this section, I discuss the results from sections 2.4-2.6 in light of the popular theories on mergers and then conclude.

The Fire Sale Theory

Krugman (1998), Aguiar and Gopinath (2005), and Acharya, Shin, and Yorulmazer (2009) propose the fire sale theory of FDI in which foreign investors acquire firms in countries facing bad shocks such as financial crises in order to take advantage of the liquidity constrained targets. The fire sale theory has received broad empirical support. For example, Aguiar and Gopinath (2005) document an increase in foreign acquisitions during the East Asian financial crisis. Desai, Foley, and Forbes (2007) find that multinationals increase their investment in foreign affiliates when the host countries are facing currency crises.

Using the data from 50 countries over the last 20 years, my results suggest the opposite: there are more mergers when the target economy is booming. Even after controlling for the acquirer's boom and the global boom, there are still more foreign acquisitions when the target economy receives good shocks. In section 2.4, I find that the correlations between cross-border mergers and the target's macroeconomic conditions are approximately the same as the correlations between domestic mergers and domestic conditions. In other words, the capital inflow through acquisitions is as pro-cyclical as domestic mergers.

While M&As driven by the fire sale motive might be present in a specific country at a specific time, most mergers in my sample are more consistent with the theory that firms invest in other countries to gain access to new markets and new investment opportunities and that it is better to enter the target countries when the demand is strong, the productivity is high, and the business environment is good.

The Agency Theory

Jensen (1986) indicates that M&As can be driven by agency problems: that is, the acquirer's CEO might value mergers excessively. Although M&As might destroy firm value, corporate diversification tends to reduce the risk of managerial human capital and enhance the CEO's career prospects. The agency theory is strengthened by the fact that numerous authors find that conglomerates in the U.S. are traded at a discount, compared to single-segmented firms.

The agency theory of mergers focuses on the acquirer's problems and provides no specific predictions about the targets. However, in the international context, I find that the characteristics of the target firms and the target countries have significant effects on merger decisions. Moreover, Schenzler, Gande, and Senbet (2009) find that global diversifications enhance firm values as measured by Tobin's q. Their paper, combined with my findings in section 2.5, shows that the acquirers are the more productive firms and the targets are the less productive firms. This finding suggests that most cross-border M&As tend to be driven by the value-enhancing neoclassical motives, rather than by value-destroying agency motives.

The Misvaluation Theory

Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) propose a theory in which mergers are driven by stock market misvaluations. In their papers, targets accept the overpriced stock of the acquirers because they have a short time horizon or because they overestimate the synergies from the mergers. Rhodes-Kropf, Robinson, and Viswanathan (2005) find that merger waves in the U.S. coincide with high M/B ratios and argue in favor of the misvaluation theory: when the market valuation is high, there are more M&As because acquirers will try to sell their overpriced stocks to targets. In the international context, Baker, Foley, and Wurgler (2009) use the U.S. foreign direct investment data to show that FDI flow is large when the source country stock market valuation is high. The authors attribute this finding to the misvaluation theory.

In section 2.4, I study the behavior of ten macroeconomic indicators during the seven-year period around merger waves. I find that most indicators, including the ones that are typically associated with the misvaluation theory like M/B and exchange rate, are highly correlated with one another and exhibit strong cyclical patterns. This correlation implies that M&As might not react directly to these indicators. Instead, all variables might be a part of a larger business cycle model in which M&As, market capitalization, and exchange rates are driven by common factors like productivity shocks.

Moreover, my data do not reflect the many predictions of the misvaluation theory. One example is that misvaluation theory predicts that merger waves coincide with a strong acquirer currency. If the main motive of mergers is to take advantage of temporary exchange rate fluctuations, then most mergers should occur when the acquirer's currency is at its strongest relative to a target's currency. While a one-year lagged exchange rate can predict mergers, I find that M&As do not peak when the acquirer's currency is at its strongest. The peak appreciation is three years prior to merger waves. Another example is the prediction about the method of payment. In section 2.6, I find that the cross-border deals are less likely to be stock-based compared to domestic deals. The misvaluation theory predicts that domestic mergers are more pro-cyclical and more responsive to stock prices. However, my findings in sections 2.4 and 2.5 are the opposite: cross-border mergers are much more pro-cyclical than domestic mergers.[8]

In this paper, I present key facts about international mergers. Specifically, I answer these four main questions: (1) How do cross-border mergers behave over a business cycle? International mergers come in waves and are very pro-cyclical. (2) Where do shocks that effect cross-border mergers originate? Most mergers occur when both the acquirer and the target economies are booming. (3) What type of shocks (real or financial) effect cross-border mergers? Merger booms have industry-level (productivity shock) and country-level (financial shock) components. (4) What types of firms engage in cross-border mergers? Acquirers tend to be more productive than average firms and targets tend to be less productive than average firms.

In the next chapter, guided by the key facts above, I propose and estimate a dynamic structural model that is built on the neoclassical theory of mergers. [9]

[8]I do not mean to suggest that misvaluations do not occur. It is possible that stock market booms reflect bubbles or other irrationalities in the stock market. Because the merging firms are not paying for such irrationalities, as shown in Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004), it does not matter from my modeling standpoint whether the low cost of capital comes from rational sources or irrational sources like bubbles.

[9]Even though my findings suggest that neither the agency nor the misvaluation theories are the main motive for cross-border mergers, the distinctions between these two theories and the neoclassical theories are not crucial from my modeling standpoint. The dynamic structural model in Chapter 3 can be reinterpreted from the misvaluation or agency angles conveniently. For example, the liquidity shocks in my model can be interpreted as misvaluation shocks and the productivity shocks in my model can be interpreted as

Table 2.1 Merger Activities over Time

Year	All Mergers (Frequency)	Cross-border (Frequency)	All Mergers (Volume)	Cross-border (Volume)
1988	6,473	1,450	503	99
1989	8,918	2,177	545	122
1990	9,451	2,378	399	125
1991	12,964	2,706	329	66
1992	12,616	2,408	363	73
1993	13,214	2,654	463	85
1994	15,603	3,271	603	108
1995	18,945	3,950	934	186
1996	20,188	4,239	1,084	197
1997	22,233	4,836	1,571	289
1998	24,541	5,673	2,385	559
1999	26,689	6,504	3,110	971
2000	29,138	7,731	3,227	972
2001	22,049	5,358	1,529	431
2002	19,270	3,937	1,078	268
2003	20,393	3,960	1,223	232
2004	22,450	4,682	1,743	441
2005	25,163	5,547	2,401	608
2006	27,223	6,274	3,155	828
2007	28,766	7,033	3,422	1,068
2008	26,523	5,857	1,669	524
Total	412,810	92,625	31,736	8,252

The table reports the aggregate volume and the aggregate frequency of M&A activities from Thomson's Securities Data Corporation (SDC). The sample covers all deals whose acquirers and targets are from 25 developed countries and 25 developing countries with the most M&A's. Frequency is measured by the number of deals. Volume is the transaction value in billion of current dollars.

inflated productivity shocks contaminated by managers' private benefits of control.

Table 2.2 Merger Activities by Country

Country	Number of Acquirers	Number of Targets	Volume Acquired	Volume Sold
Argentina	1,001	2,023	78	136
Australia	15,715	16,950	794	800
Austria	2,408	2,152	68	80
Belgium	3,292	3,208	292	262
Brazil	2,543	3,918	234	338
Bulgaria	378	685	4	15
Canada	20,643	19,781	1,104	1,151
Chile	561	967	37	68
China	4,099	6,220	174	255
Colombia	213	458	18	45
Czech Republic	818	1,668	15	49
Denmark	3,546	3,360	136	136
Egypt	236	342	16	32
Finland	5,101	4,991	155	132
France	18,229	18,253	1,738	1,309
Germany	21,070	21,939	1,243	1,298
Greece	1,102	1,028	50	56
Hong Kong	5,630	5,248	332	270
Hungary	927	1,669	8	33
India	4,095	4,780	106	128
Indonesia	624	1,186	42	64
Ireland-Rep	2,287	1,899	100	82
Israel	1,126	1,191	67	59
Italy	7,771	8,811	1,024	1,025
Japan	18,595	16,716	1,211	1,107
Lithuania	184	372	1	5
Malaysia	7,424	7,151	174	150
Mexico	970	1,853	186	224
Netherlands	8,207	6,749	807	701
New Zealand	2,582	3,253	77	97
Norway	3,291	3,314	180	187
Peru	219	494	10	26
Philippines	786	1,120	35	53
Poland	1,277	2,378	20	58
Portugal	1,415	1,737	89	94

Table 2.2 (Continued) Merger Activities by Country

Country	Number of Acquirers	Number of Targets	Volume Acquired	Volume Sold
Romania	215	641	1	20
Russian Fed	3,342	3,922	283	302
Singapore	4,618	3,672	233	129
Slovak Rep	204	381	2	11
South Africa	2,841	3,090	143	150
South Korea	2,891	3,167	219	259
Spain	7,764	8,933	720	582
Sweden	7,400	6,687	358	417
Switzerland	5,162	4,274	623	432
Thailand	1,494	2,035	29	47
Turkey	518	859	27	73
Ukraine	271	521	2	17
United Kingdom	49,040	46,171	3,613	3,305
United States	158,492	150,225	14,800	15,400
Venezuela	193	368	14	22

The table reports the aggregate volume and the aggregate frequency of M&A activities from Thomson's Securities Data Corporation (SDC). The sample covers all deals announced and completed between 1988 and 2008. Frequency is measured by the number of deals. Volume is the transaction value in billion of current dollars.

Table 2.3 Descriptive Statistics of Firms in WorldScope

Variable	Mean	Standard Deviation	Minimum	Maximum
Productivity				
Return on Assets	2.22	29.26	-133.27	34.68
Profit Margin	-3.04	91.43	-476.68	88.09
Labor Productivity	0.04	0.15	-0.31	0.67
Sale Growth	11.43	35.72	-80.49	124.66
Employment Growth	4.85	25.06	-61.47	84.73
Dividend	1.1	1.86	0	8.32
Valuation				
Market-to-Book	1.41	1.77	0.03	8.91
Past Return-1 year	-11.48	67.14	-208.7	129.88
Past Return-3 year	-17.69	110.88	-339.56	206.23
Other				
Size	5.07	2.37	-0.5	10.13
Age1	3.25	1.05	0.69	4.9
Age2	2.45	1.09	0	4.41
Leverage	24.4	23.05	0	93.03

The table reports descriptive statistics of firms in the WorldScope database. Return on Assets is profit (EBITDA) divided by total assets; Profit Margin is profit divided by sales; Labor Productivity is profit per worker; Sales Growth is the percentage change in annual sales; Employment Growth is the percentage change in number of workers; Payout Ratio is dividends divided by total assets; M/B is market capitalization divided by (total assets less total debts); Past Return is the percentage change in market prices; Size is log of total assets (book value); Age1 is number of years since the incorporation date; Age2 is number of years since the listing date; and Leverage is total debts divided by total assets. All Percentage changes are calculated using the log formula.

Table 2.4A Correlations between Cross-Border Mergers and Acquirer's Macroeconomic Conditions

Cor(cross border mergers, acquirer's X_{t+j})	t-3	t-2	t-1	t	t+1	t+2	t+3
Real Economy							
Gross Value Added	-0.09**	0.02	0.14***	0.26***	0.23***	0.07**	-0.07*
Gross Domestic Product	-0.10**	-0.02	0.11***	0.25***	0.22***	0.07**	-0.06*
Capital Formation	-0.08**	0.05	0.15***	0.24***	0.19***	0.04	-0.11***
Financial Markets							
Stock Market Capitalization	-0.11***	0.12***	0.31***	0.42***	0.18***	-0.04	-0.13***
Average M/B Ratio	-0.17***	0.02	0.26***	0.50***	0.44***	0.10*	-0.27***
Average P/E Ratio	-0.12**	0	0.15***	0.31***	0.18***	0.01	-0.12**
Domestic Credit	-0.08*	0	0.06*	0.16***	0.11***	0	-0.10***
International Trade and Investment							
Current Account Balance	0.08**	0.01	0.04	-0.02	-0.04	0	0.10***
Exchange Rate	-0.11***	-0.15***	-0.11***	0	0.09***	0.16***	0.10***
Net Foreign Portfolio Investment	-0.16	-0.28**	-0.06	0.07	0.12*	0.11	-0.01

The table reports the correlations between the volume of cross-border mergers at time t and the acquirer country's conditions at time t+j, where j is from -3 to +3. Gross Value Added, Gross Domestic Product, Capital Formation, Stock Market Capitalization, Domestic Credit, Current Account Balance, and Exchange Rate (local currency unit /U.S. dollar) are from the World Development Indicator Database. Average M/B Ratio and Average P/E Ratio are equal-weighted averages from Kenneth French's website. Net Foreign Portfolio Investment (outflow - inflow) is from the Coordinated Portfolio Investment Survey Database. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.4B Correlations between Cross-Border Mergers and Target's Macroeconomic Conditions

Cor(cross border mergers, target's X_{t+j})	t-3	t-2	t-1	t	t+1	t+2	t+3
Real Economy							
Gross Value Added	-0.04	0.01	0.11***	0.18***	0.17***	0.06	-0.11***
Gross Domestic Product	-0.06	0.02	0.12***	0.18***	0.18***	0.04	-0.13***
Capital Formation	0.02	0.11***	0.17***	0.18***	0.13***	-0.01	-0.15***
Financial Markets							
Stock Market Capitalization	-0.04	0.09**	0.23***	0.26***	0.09***	-0.11***	-0.20***
Average M/B Ratio	-0.17***	0.03	0.24***	0.37***	0.38***	0.09*	-0.24***
Average P/E Ratio	-0.12**	0.03	0.18***	0.20***	0.25***	0.04	-0.13**
Domestic Credit	-0.06	-0.02	0.08**	0.10***	0.08**	0.01	-0.09***
International Trade and Investment							
Current Account Balance	0.02	-0.03	-0.07**	-0.07**	-0.13***	-0.07**	0.02
Exchange Rate	-0.12***	-0.10***	-0.02	0.09**	0.13***	0.17***	0.17***
Net Foreign Portfolio Investment	-0.03	-0.04	-0.26***	0.1	0.13*	0.20**	-0.13

The table reports the correlations between the volume of cross-border mergers at time t and the target country's conditions at time t+j, where j is from -3 to +3. Gross Value Added, Gross Domestic Product, Capital Formation, Stock Market Capitalization, Domestic Credit, Current Account Balance, and Exchange Rate (local currency unit /U.S. dollar) are from the World Development Indicator Database. Average M/B Ratio and Average P/E Ratio are equal-weighted averages from Kenneth French's website. Net Foreign Portfolio Investment (outflow - inflow) is from the Coordinated Portfolio Investment Survey Database. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.4C Correlations between Domestic Mergers and Macroeconomic Conditions

Cor(domestic mergers, X_{t+j})	t-3	t-2	t-1	t	t+1	t+2	t+3
Real Economy							
Gross Value Added	-0.11***	-0.08*	0.01	0.07**	0.13***	0.08**	-0.01
Gross Domestic Product	-0.15***	-0.09**	0.02	0.12***	0.17***	0.10***	-0.03
Capital Formation	-0.11***	-0.04	0.07**	0.13***	0.17***	0.08**	-0.01
Financial Markets							
Stock Market Capitalization	-0.09**	0.05	0.21***	0.27***	0.12***	0	-0.14***
Average M/B Ratio	-0.10*	-0.03	0.10**	0.32***	0.33***	0.10**	-0.08
Average P/E Ratio	0.01	-0.06	0.09*	0.20***	0.12**	0.03	0
Domestic Credit	-0.06	-0.08**	-0.03	0.04	0.08**	0.06*	-0.01
International Trade and Investment							
Current Account Balance	0.09**	0.06*	0.03	-0.09***	-0.13***	-0.04	0.01
Exchange Rate	-0.07*	-0.05	-0.04	0.02	0.08**	0.15***	0.18***
Net Foreign Portfolio Investment	0.21*	-0.15	-0.12	-0.05	0.24***	-0.09	0.1

The table reports the correlations between the volume of domestic mergers at time t and the macroeconomic conditions at time t+j where j is from -3 to +3. Gross Value Added, Gross Domestic Product, Capital Formation, Stock Market Capitalization, Domestic Credit, Current Account Balance, and Exchange Rate (local currency unit /U.S. dollar) are from the World Development Indicator Database. Average M/B Ratio and Average P/E Ratio are equal-weighted averages from Kenneth French's website. Net Foreign Portfolio Investment (outflow - inflow) is from the Coordinated Portfolio Investment Survey Database. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.5A Mergers and Country-Pair Conditions

Y= Volume of Merger$_t$	1	2	3	4	5
Exchange Rate$_{t-1}$	-0.02**	-0.01	-0.02	0	-0.02
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Real Economy Indicator$_{acquirer,t-1}$		0.03***		0.03***	
		[0.01]		[0.01]	
Real Economy Indicator$_{target,t-1}$		0.02**		0.02***	
		[0.01]		[0.01]	
Financial Market Indicator$_{acquirer,t-1}$			0.06***		0.05***
			[0.02]		[0.01]
Financial Market Indicator$_{target,t-1}$			0.04**		0.03***
			[0.02]		[0.01]
Year Fixed Effect	No	Yes	Yes	Yes	Yes
Observations	23450	16838	6905	14784	6457
R-squared	0	0.02	0.03	0.02	0.03

The table reports the coefficient estimates from the country-pair regressions. The dependent variable is M&A volume. The explanatory variables are lagged Exchange Rate, lagged conditions of the acquirer country, and lagged conditions of the target country. Exchange Rate is in acquirer currency unit / target currency unit. In column 2-3, Real Economy Indicator is Gross Value Added and Financial Market Indicator is Stock Market Capitalization. In column 4-5, Real Economy Indicator is the first principal component of {Gross Value Added, Gross Domestic Product, Capital Formation} and Financial Market Indicator is the first principal component of {Stock Market Capitalization, Average M/B Ratio, Average P/E Ratio, Domestic Credit}. Also estimated but not reported are a constant term and the year fixed-effects. Numbers in the brackets are the standard errors. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.5B Mergers and Global Economic Conditions

Y= Volume of Merger$_t$	1	2	3	4	5
Exchange Rate$_{t-1}$	-0.02**	-0.01	-0.01	-0.01	-0.02
	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]
Real Economy Indicator acquirer$_{t-1}$		0.04***		0.03***	
		[0.01]		[0.01]	
Real Economy Indicator target$_{t-1}$		0.03***		0.02***	
		[0.01]		[0.01]	
Financial Market Indicator acquirer$_{t-1}$			0.07***		0.05***
			[0.01]		[0.01]
Financial Market Indicator target$_{t-1}$			0.03***		0.05***
			[0.01]		[0.01]
World Equity Market$_{t-1}$		0.09***	0.07***	0.10***	0.16***
		[0.02]	[0.01]	[0.02]	[0.02]
World Interest Rate$_{t-1}$		0.05***	0.03**	0.05***	0.01
		[0.01]	[0.01]	[0.01]	[0.03]
Credit Spread$_{t-1}$		-0.05**	-0.04	-0.04	-0.04
		[0.03]	[0.02]	[0.03]	[0.04]
Observations	23450	13418	17474	12390	4946
R-squared	0	0.02	0.02	0.01	0.02

The table reports the coefficient estimates from regressions of the MA volume between country c1 and c2 on the lagged conditions of the acquirer, c1, the lagged conditions of the target, c2, and the lagged global economic conditions. Exchange Rate is in acquirer currency unit / target currency unit. In column 2-4, real sector indicator is gross-value added and financial sector indictor is market capitalization. In column 5-7, real sector indicator is the first principal component of Gross Value Added, Gross Domestic Product, Capital Formation and financial sector indictor is the first principal component of stock market capitalization, Average M/B Ratio, Average P/E Ratio, Domestic Credit. World Equity Market is measured as the return on Morgan Stanley World Capital Index. World Interest Rate is measured as the average of US, Japan, and Germany three month treasury-bill rates. Credit Spread is computed as Moody's AAA bond rate minus Moody's BAA bond rate. Numbers in the brackets are the t-statistics. All variables are standardized by the Mendoza and Terrones' procedure. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively.

Table 2.6A Characteristics of Acquirers and Targets Compared to Their Peers

Characteristics	Acquirer minus Target		Acquirer vs Target (Kolmogorov-Smirnov)		Acquirer minus Non-Acquirer		Target minus Non-Target	
	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border
	1	2	3	4	5	6	7	8
Productivity								
Return on Assets	0.37***	0.35***	0.2***	0.2***	0.2***	0.23***	-0.1***	-0.13***
	[58.174]	[35.25]			[65.26]	[51.838]	[-19.972]	[-12.059]
Profit Margin	0.3***	0.27***	0.2***	0.2***	0.17***	0.18***	-0.06***	-0.09***
	[46.983]	[27.296]			[56.433]	[41.868]	[-12.154]	[-8.255]
Labor Productivity	0.27***	0.24***	0.19***	0.21***	0.18***	0.18***	-0.03***	-0.04***
	[33.212]	[18.31]			[53.784]	[39.268]	[-4.921]	[-3.552]
Sale Growth	0.36***	0.18***	0.19***	0.14***	0.27***	0.16***	-0.05***	0.01
	[46.303]	[15.407]			[84.944]	[35.525]	[-8.569]	[0.602]
Employment Growth	0.48***	0.28***	0.22***	0.15***	0.39***	0.27***	-0.05***	0.02*
	[51.972]	[19.327]			[112.805]	[55.329]	[-8.376]	[1.466]
Dividend	-0.03***	0	0.06***	0.06***	0.09***	0.13***	-0.06***	-0.09***
	[-3.493]	[-0.222]			[27.822]	[29.15]	[-11.774]	[-8.638]
Valuation								
Market-to-Book	0.03***	-0.01	0.06***	0.08***	0.05***	0.07***	0.01***	0.07***
	[4.005]	[-0.824]			[16.145]	[14.857]	[2.788]	[6.017]
Past Return-1 year	0.22***	0.18***	0.12***	0.11***	0.12***	0.09***	0.09***	0.09***
	[28.991]	[14.402]			[37.103]	[20.79]	[17.639]	[8.921]
Past Return-3 year	0.19***	0.21***	0.17***	0.17***	0.24***	0.21***	0.03***	0.03***
	[26.887]	[18.356]			[67.907]	[42.01]	[4.944]	[2.922]

Table 2.6A (Continued) Characteristics of Acquirers and Targets Compared to Their Peers

Characteristics	Acquirer minus Target		Acquirer vs Target (Kolmogorov-Smirnov)		Acquirer minus Non-Acquirer		Target minus Non-Target	
	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border
	1	2	3	4	5	6	7	8
Other								
Size	0.64***	0.68***	0.28***	0.29***	0.76***	1.04***	0.22***	0.41***
	[89.504]	[57.784]			[252.874]	[242.22]	[42.124]	[37.821]
Age1	0.17***	0.26***	0.09***	0.13***	0.2***	0.37***	0.05***	0.11***
	[15.742]	[14.708]			[46.002]	[59.24]	[6.659]	[7.886]
Age2	0.16***	0.32***	0.09***	0.14***	0.21***	0.39***	0.09***	0.07***
	[13.8]	[15.931]			[43.355]	[56.154]	[11.078]	[4.313]
Leverage	-0.04***	-0.03***	0.06***	0.06***	0.08***	0.07***	0.1***	0.13***
	[-5.985]	[-2.531]			[12.437]	[16.947]	[19.823]	[12.437]

Observations are grouped by country-industry-year. Z-scores are computed from the mean and the standard deviation of each group. Column 1 reports the difference between the average Z-scores of all acquirers and the average Z-score of all targets. Column 2 reports the difference between the cross-border acquirers and the cross-border targets. The numbers in the parenthesis are the t-statistics from the t-tests. Column 3 reports the distributional distances (the Kolmogorov-Smirnov's D-statistics) between all acquirers and all targets. Column 4 reports the distributional distances between the cross-border acquirers and the cross-border targets. Column 5-6 compares the acquirers with the non-acquirers and column 7-8 compares the targets with the non-targets. The numbers in the parenthesis are the t-statistics from the t-tests. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively.

Table 2.6B Comparisons of Acquirers and Targets

Characteristics	Acquirer minus Target		Acquirer vs Target (Kolmogorov-Smirnov)		Acquirer minus Non-Acquirer		Target minus Non-Target	
	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border
	1	2	3	4	5	6	7	8
Productivity								
Return on Assets	0.28***	0.28***	0.17***	0.18***	0.21***	0.26***	-0.02***	-0.02**
	[46.262]	[32.445]			[67.963]	[59.93]	[-3.053]	[-2.114]
Profit Margin	0.2***	0.18***	0.1***	0.15***	0.14***	0.17***	-0.01	-0.01
	[32.282]	[21.076]			[45.881]	[38.101]	[-1.969]	[-0.961]
Labor Productivity	0.19***	0.18***	0.15***	0.2***	0.13***	0.16***	-0.01	0
	[23.513]	[14.271]			[39.805]	[34.316]	[-0.969]	[-0.381]
Sale Growth	0.37***	0.21***	0.16***	0.14***	0.29***	0.18***	-0.04***	0
	[47.329]	[17.591]			[90.633]	[40.218]	[-7.3]	[0.188]
Employment Growth	0.53***	0.35***	0.18***	0.2***	0.45***	0.32***	-0.04***	0.02
	[54.454]	[22.795]			[127.438]	[64.735]	[-5.673]	[1.229]
Dividend	0.16***	0.2***	0.24***	0.11***	0.08***	0.08***	-0.03***	-0.03***
	[22.034]	[16.303]			[26.586]	[18.828]	[-6.534]	[-2.675]
Valuation								
Market-to-Book	0.07***	0.11***	0.06***	0.08***	0.12***	0.09***	0.11***	0.11***
	[10.159]	[9.741]			[36.681]	[19.878]	[21.396]	[10.77]
Past Return-1 year	0.01*	-0.03***	0.11***	0.13***	0.28***	0.24***	0.08***	0.04***
	[1.566]	[-2.906]			[78.027]	[47.424]	[13.725]	[3.728]
Past Return-3 year	0.21***	0.2***	0.15***	0.19***	0.11***	0.19***	-0.04***	0
	[28.831]	[16.861]			[36.742]	[44.245]	[-7.248]	[-0.4]

Table 2.6B (Continued) Comparisons of Acquirers and Targets

Characteristics	Acquirer minus Target		Acquirer vs Target (Kolmogorov-Smirnov)		Acquirer minus Non-Acquirer		Target minus Non-Target	
	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border	All Mergers	Cross-Border
	1	2	3	4	5	6	7	8
Other								
Size	0.63***	0.75***	0.28***	0.32***	0.73***	1.05***	0.23***	0.36***
	[86.414]	[63.407]			[240.488]	[242.725]	[42.82]	[32.972]
Age1	0.14***	0.29***	0.09***	0.16***	0.2***	0.44***	0.08***	0.17***
	[12.889]	[16.128]			[44.363]	[69.099]	[11.507]	[12.079]
Age2	0.19***	0.36***	0.1***	0.17***	0.23***	0.44***	0.07***	0.09***
	[15.729]	[17.461]			[47.744]	[63.559]	[8.735]	[5.605]
Leverage	-0.04***	-0.04***	0.06***	0.06***	0.03***	0.01*	0.06***	0.07***
	[-6.255]	[-3.456]			[10.904]	[1.545]	[11.681]	[6.83]

Observations are grouped by country-year. Z-scores are computed from the mean and the standard deviation of each group. Column 1 reports the difference between the average Z-scores of all acquirers and the average Z-score of all targets. Column 2 reports the difference between the cross-border acquirers and the cross-border targets. The numbers in the parenthesis are the t-statistics from the t-tests. Column 3 reports the distributional distances (the Kolmogorov-Smirnov's D-statistics) between all acquirers and all targets. Column 4 reports the distributional distances between the cross-border acquirers and the cross-border targets. Column 5-6 compares the acquirers with the non-acquirers and column 7-8 compares the targets with the non-targets. The numbers in the parenthesis are the t-statistics from the t-tests. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively.

Table 2.6C Comparisons of Merging Firms during Booms and Busts

Characteristics	Real Booms minus Real Busts				Financial Booms minus Financial Busts			
	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets
	1	2	3	4	5	6	7	8
Productivity								
Return on Assets	0.04***	0.05***	0.2***	0.07*	0.05***	0.04***	0.04**	0.04
	[5.108]	[4.891]	[9.793]	[1.512]	[5.298]	[3.158]	[1.793]	[0.883]
Profit Margin	0.04***	0.04***	0.14***	-0.01	0.02**	0.02*	0.03	-0.06*
	[5.429]	[3.938]	[7.057]	[-0.145]	[2.106]	[1.57]	[1.159]	[-1.34]
Labor Productivity	0.13***	0.16***	0.18***	0.07*	0.12***	0.13***	0.1***	0.05
	[13.696]	[12.279]	[8.846]	[1.51]	[11.264]	[8.745]	[4.225]	[1.086]
Sale Growth	0.23***	0.23***	0.23***	0.24***	0.39***	0.34***	0.33***	0.23***
	[21.791]	[17.015]	[12.041]	[5.896]	[35.682]	[21.986]	[15.756]	[5.419]
Employment Growth	0.3***	0.31***	0.22***	0.31***	0.39***	0.42***	0.32***	0.38***
	[24.95]	[19.379]	[10.006]	[6.648]	[31.18]	[22.81]	[13.174]	[7.51]
Dividend	0.02*	-0.02*	0.16***	0.17***	0.08***	0.04***	0.14***	0.11***
	[1.569]	[-1.44]	[8.791]	[4.855]	[8.548]	[2.646]	[7.699]	[2.894]
Valuation								
Market-to-Book	0.03***	0	0.1***	0.22***	0.31***	0.38***	0.31***	0.45***
	[3.166]	[-0.029]	[5.543]	[5.509]	[29.014]	[21.306]	[15.207]	[9.65]
Past Return-1 year	-0.17***	-0.26***	-0.11***	-0.23***	-0.08***	-0.16***	-0.01	0.01
	[-17.634]	[-18.474]	[-6.113]	[-5.702]	[-7.499]	[-9.579]	[-0.669]	[0.118]
Past Return-3 year	0.06***	-0.08***	0.17***	0.07**	0.17***	0.13***	0.26***	0.26***
	[6.012]	[-5.934]	[8.398]	[1.73]	[16.7]	[8.524]	[11.948]	[5.912]

Table 2.6C (Continued) Comparisons of Merging Firms during Booms and Busts

Characteristics	Real Booms minus Real Busts				Financial Booms minus Financial Busts			
	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets
	1	2	3	4	5	6	7	8
Other								
Size	-0.11***	-0.12***	0.01	-0.07**	0	-0.01	0.02	0.02
	[-11.108]	[-8.604]	[0.644]	[-1.952]	[0.331]	[-0.397]	[1.222]	[0.553]
Age1	-0.02	0.07***	-0.02	-0.04	-0.13***	-0.14***	-0.07***	-0.12***
	[-1.211]	[3.091]	[-0.779]	[-0.831]	[-8.209]	[-5.758]	[-2.878]	[-2.371]
Age2	-0.06***	0.05**	-0.05*	-0.27***	-0.05***	-0.04*	-0.01	-0.08*
	[-3.62]	[2.059]	[-1.579]	[-4.355]	[-3.084]	[-1.644]	[-0.279]	[-1.291]
Leverage	-0.03***	-0.08***	-0.13***	-0.14***	0.02**	0	-0.09***	-0.09**
	[-3.145]	[-6.883]	[-7.583]	[-3.844]	[2.01]	[0.375]	[-4.857]	[-2.247]

Observations are grouped by country-industry. Z-scores are computed from the mean and the standard deviation of each group. Columns 1 and 5 report the difference between the average Z-scores of acquirers during booms and the average Z-score of acquirers during busts. Columns 2 and 6 report the difference between the cross-border acquirers during booms and the cross-border acquirers during busts. Columns 3 and 7 report the difference between the targets during booms and the targets during busts. Columns 4 and 8 report the difference between the cross-border targets during booms and the cross-border targets during busts. Booms (Busts) in Columns 1-4 are the periods in which HP detrended Gross Value Added is above (below) one (minus one) standard deviation. Booms (Busts) in Columns 5-8 are the periods in which HP detrended Stock Market Capitalization is above (below) one (minus one) standard deviation. The numbers in the parenthesis are the t-statistics from the t-tests. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively

Table 2.6D Post-Merger Operating Performance

Time Windows	Unmatched				Propensity Score Matched			
	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets	All Acq	Cross-Border Acq	All Targets	Cross-Border Targets
	1	2	3	4	5	6	7	8
t-1 to t	-3.17***	-3.5***	-1.13**	-2.14**	0.72	0.95	0.06	-0.7
	[-8.59]	[-7.36]	[-1.74]	[-1.67]	[1.01]	[1.01]	[0.05]	[-0.32]
t-1 to t+1	-4.78***	-7.13***	-0.51	-5.02***	1.09*	-0.16*	0.66	-6.92**
	[-10.81]	[-12.55]	[-0.64]	[-3.2]	[1.3]	[-0.14]	[0.44]	[-2.3]
t-1 to t+2	-6.07***	-9.86***	1.15*	2.39*	0.38	-2.84**	2.61*	0.75
	[-12.18]	[-15.4]	[1.25]	[1.34]	[0.39]	[-2.23]	[1.54]	[0.21]
t-1 to t+3	-6.05***	-10.95***	1.52*	2.83*	1.03	-6.26***	1.14	3.71
	[-10.94]	[-15.53]	[1.48]	[1.44]	[0.93]	[-4.51]	[0.58]	[0.99]

Profitability is measured as ROA. t denotes the year of acquisition. Column 1 reports the difference between the average profitability changes of all acquirers and the average changes of the non-acquirers. Column 2 reports the difference between the cross-border acquirers and the non-acquirers. Column 3 reports the difference between the targets and the non-targets. Column 4 reports the difference between the cross-border targets and the non-targets. Columns 5-8 reports propensity-score-matched effects (average treatment effects on the treated). Propensity scores are computed from the Probit model using the following covariates: lagged profitability, sales, total assets, and firm age. The numbers in the parenthesis are the t-statistics from the t-tests. *, **, and *** indicate statistical significant at 10, 5, and 1 percent levels, respectively.

Table 2.7A Cross-Border Mergers and Industry Shocks in Acquirer Countries

Y=Cross-border Mergers	1	2	3	4	5	6	7	8	9	10	11	12
Real Industry Indicator$_{i,c,t-1}$	0.08***	0.09***	0.06***	0.07***	0.06***	0.04***						
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]						
Real Economy Indicator$_{c,t-1}$		0.04***	0.02		0.03***	0.01						
		[0.01]	[0.01]		[0.01]	[0.01]						
Industry Valuation Indicator$_{i,c,t-1}$							0.15***	0.10***	0.09***	0.09***	0.08***	0.08***
							[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Financial Market Indicator$_{c,t-1}$								0.15***	0.12***		0.08***	0.05***
								[0.01]	[0.01]		[0.01]	[0.02]
Year Fixed Effects			Yes			Yes			Yes			Yes
Observations	10537	8519	8519	9029	7198	7198	10261	10198	10198	8515	4739	4739
R-squared	0.01	0.01	0.04	0.01	0.01	0.04	0.02	0.04	0.05	0.01	0.02	0.05

The table reports the coefficient estimates from regressions of the cross-border M&A volume on the lagged conditions of the acquirer industry and country. In column 1-3 and column 7-9, the industry productivity shock is average ROA, the real sector indicator is gross value added, the industry valuation shock is average M/B, and the financial market indicator is stock market capitalization. In column 4-6 and column 10-12, the industry productivity shock is the first principal component of 6 productivities measures in Table 2.6, the real sector indicator is the first principal component measure from section 2.4, the industry valuation shock is the first principal component of 3 valuation measures in Table 6, and the financial market indicator is the first principal component measure from section 2.4. Also estimated but not reported are a constant term and the year fixed-effects. Numbers in the brackets are the standard errors. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.7B Cross-Border Mergers and Industry Shocks in Target Countries

Y=Cross-border Mergers	1	2	3	4	5	6	7	8	9	10	11	12
Real Industry Indicator$_{i,c,t-1}$	0.05***	0.05***	0.03***	0.03***	0.02**	0.01						
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]						
Real Economy Indicator$_{c,t-1}$		0.05***	0.03**		0.03***	0.02**						
		[0.01]	[0.01]		[0.01]	[0.01]						
Industry Valuation Indicator$_{i,c,t-1}$							0.06***	0.03**	0.02	0.02***	0.06***	0.06***
							[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]
Financial Market Indicator$_{c,t-1}$								0.09***	0.02**		0.07***	0.04**
								[0.01]	[0.01]		[0.01]	[0.02]
Year Fixed Effects			Yes			Yes			Yes			Yes
Observations	11557	9329	9329	9621	7597	7597	11180	11106	11106	9236	4770	4770
R-squared	0	0	0.03	0	0	0.03	0	0.01	0.03	0	0.02	0.04

The table reports the coefficient estimates from regressions of the cross-border M&A volume on the lagged conditions of the target industry and country. In column 1-3 and column 7-9, the industry productivity shock is average ROA, the real sector indicator is gross value added, the industry valuation shock is average M/B, and the financial market indicator is stock market capitalization. In column 4-6 and column 10-12, the industry productivity shock is the first principal component of 6 productivities measures in Table 6, the real sector indicator is the first principal component measure from section 2.4, the industry valuation shock is the first principal component of 3 valuation measures in Table 2.6, and the financial market indicator is the first principal component measure from section 2.4. Also estimated but not reported are a constant term and the year fixed-effects. Numbers in the brackets are the standard errors. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.7C Domestic Mergers and Industry Shocks

Y= Domestic Mergers	1	2	3	4	5	6	7	8	9	10	11	12
Industry Productivity$_{i,c,t-1}$	0.04***	0.04***	0.03**	0.04***	0.04***	0.03***						
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]						
Real Economy Indicator$_{c,t-1}$		0.01	0		0.01	0						
		[0.01]	[0.01]		[0.01]	[0.01]						
Industry Valuation$_{i,c,t-1}$							0.07***	0.04***	0.04***	0.05***	0.06***	0.08***
							[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
Financial Market Indicator$_{c,t-1}$								0.10***	0.10***		0.04***	0.02
								[0.01]	[0.01]		[0.01]	[0.02]
Year Fixed Effects			Yes			Yes			Yes			Yes
Observations	11403	9197	9197	9533	7528	7528	11054	10981	10981	9152	4749	4749
R-squared	0	0	0.01	0	0	0.02	0	0.01	0.02	0	0.01	0.03

The table reports the coefficient estimates from regressions of the domestic M&A volume on the lagged conditions of the domestic industry and country. In column 1-3 and column 7-9, the industry productivity shock is average ROA, the real sector indicator is gross value added, the industry valuation shock is average M/B, and the financial market indicator is stock market capitalization. In column 4-6 and column 10-12, the industry productivity shock is the first principal component of 6 productivities measures in Table 2.6, the real sector indicator is the first principal component measure from section 2.4, the industry valuation shock is the first principal component of 3 valuation measures in Table 6, and the financial market indicator is the first principal component measure from section 2.4. Also estimated but not reported are a constant term and the year fixed-effects. Numbers in the brackets are the standard errors. All variables are standardized by the Mendoza and Terrones' procedure. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.8 Cross-Sectional Gravity Model

Y= Log of Aggregate Volume of Merger (from 1989-2008)	1	2	3	4	5
Log of Distance	-0.58***	-0.53***	-0.62***	-0.61***	-0.84***
	[0.08]	[0.08]	[0.08]	[0.07]	[0.07]
Common Language Dummy		1.77***	1.64***	1.21***	1.23***
		[0.16]	[0.16]	[0.15]	[0.14]
Log of Population$_{acquirer,1988}$			0.19***	0.73***	0.69***
			[0.05]	[0.05]	[0.05]
Log of Population$_{target,1988}$			0.18***	0.45***	0.56***
			[0.06]	[0.06]	[0.06]
Log of Real GDP$_{acquirer,1988}$				1.11***	0.09
				[0.06]	[0.12]
Log of Real GDP$_{target,1988}$				0.53***	0.32***
				[0.06]	[0.12]
Log of Market Capitalization$_{acquirer,1988}$					0.65***
					[0.07]
Log of Market Capitalization$_{target,1988}$					0.15**
					[0.06]
Constant	Yes	Yes	Yes	Yes	Yes
Observations	1052	1052	1052	1015	875
R-squared	0.04	0.14	0.16	0.38	0.46

The table reports the coefficient estimates from regressions of the 1989-2008 aggregate volume of M&A flow from country c_1 to country c_2 on the conditions of the acquirer, c_1, and the conditions of the target, c_2, in 1988. Distance and Common Language dummy are from Di Giovanni (2005). Population, GDP, and Stock Market Capitalization are from the World Development indicator Database. Numbers in the brackets are the standard errors. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 2.9 1988 Country Characteristics

Variable	Mean	Standard Deviation	Minimum	Maximum
Distance	8.696378	0.911802	5.41272	9.895177
Common Language Dummy	0.207841	0.405871	0	1
Population	16.99215	1.383335	14.86143	20.82006
Real GDP	8.732422	1.245854	5.692476	10.35871
Stock Market Capitalization	7.200922	2.339167	0.419264	10.60626

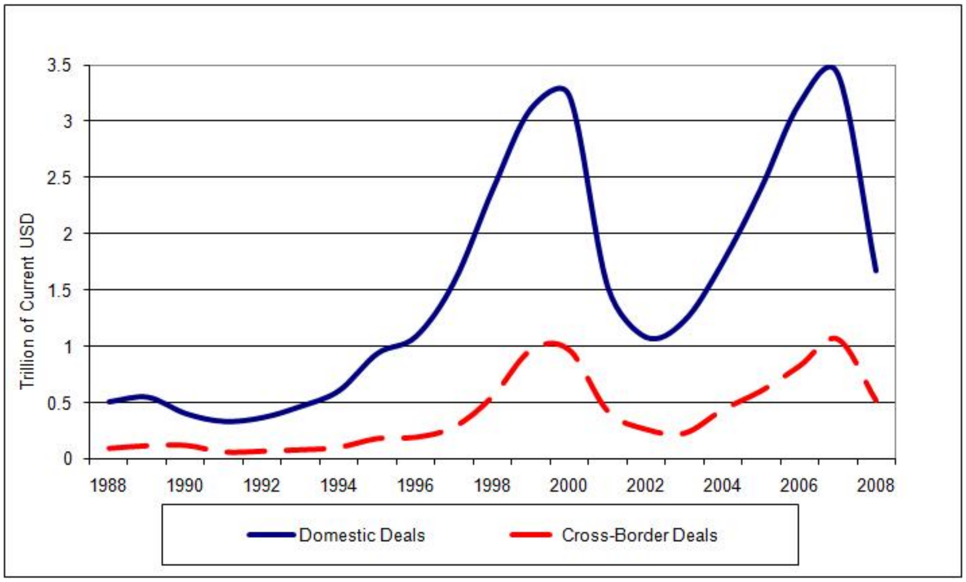
The table reports the summary statistics of country characteristics in 1988. Distance and Common Language dummy are from di Giovanni (2005). Population, GDP, and Stock Market Capitalization are from the World Development Indicator Database. All the variables except the common language dummy are in log form.

Table 2.10 Characteristics of Domestic versus Cross-Border Deals

Deal Characteristics	All Deal Average 1	Domestic Deal Average 2	Cross-Border Deal Average 3	Cross-Border - Domestic 4	Controlled for Fixed Effects 5
Deal Size	165.39	157.27	193.86	36.58***	40.11***
				[4.89]	[4.7]
Prob(Cash Deals)	0.51	0.49	0.55	0.06***	0.05***
				[4.39]	[3.18]
Prob(Listed Acquirer)	0.45	0.43	0.53	0.11***	0.11***
				[57.45]	[58.8]
Prob(Listed Target)	0.14	0.15	0.13	-0.02***	0
				[-18.81]	[1.27]
Prob(Tradable Industry)	0.2	0.17	0.29	0.13***	0.12***
				[85.32]	[76.29]
Prob(High-Tech Industry)	0.11	0.1	0.13	0.03***	0.05***
				[25.55]	[41.02]
Relatedness	1106.69	1122.11	1053.35	-68.75***	-94.89***
				[-11.46]	[-14.24]

Deal Size is the transaction value in million of current dollars. Cash Deals is a dummy variable taking the value of one if the percentage of cash is higher than the percentage of stock. Listed Acquirer is a dummy taking the value of one if the acquirer is listed. Listed Target is a dummy taking the value of one if the target is listed. Tradable is equal to one if the acquirer and the target are in the tradable industries as defined by Aguiar and Gopinath (2005). High-Tech is equal to one if the acquirer and the target are in the high-tech industry according to the American Electronic Association. Relatedness is the absolute value of the difference between the acquirer's 4-digit SIC and the target's 4-digit SIC. Columns 1, 2 and 3 shows the average characteristics of all deals, the domestic deals, and the cross-border deals. Column 4 shows the differences between the domestic deals and the cross-border deals. Column 5 shows coefficients of the cross-border dummy after controlling for the fixed-effects. Numbers in the brackets are *t*-statistics. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Figure 2.1 Volume of Aggregate Mergers



The figure shows the aggregate volume of M&A activities from the top 50 countries in trillion of current dollars.

Figure 2.2A US Acquisition of Foreign Firm

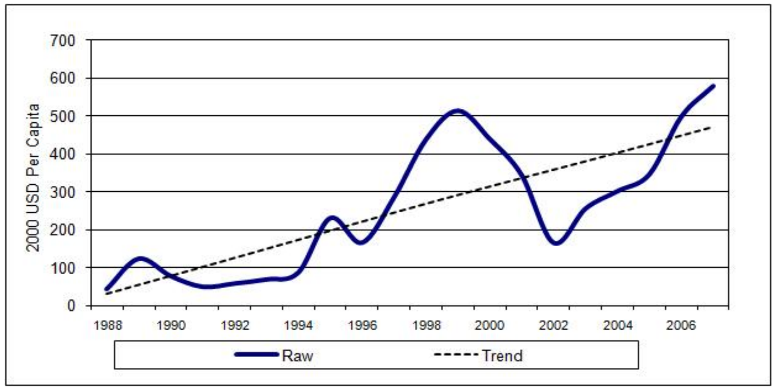
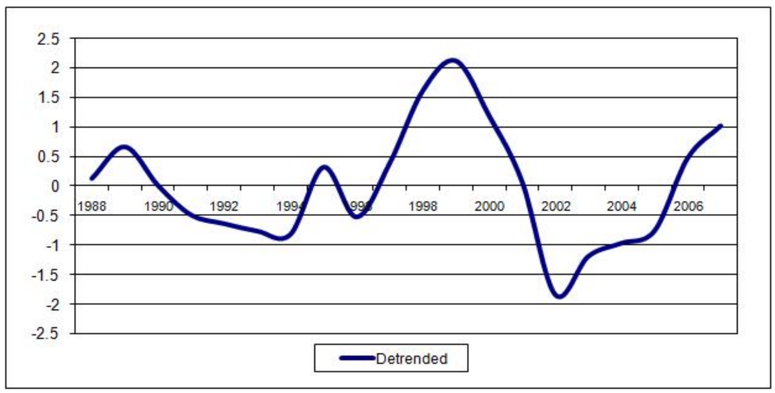


Figure 2.2B US Acquisition of Foreign Firm: Hodrick-Proscott Detrended



The figures show an example of the raw and the detrended series of US firm acquisitions of assets in other countries.

Appendix 2.1: The Country Coverage of WorldScope

Full-Coverage

Developed countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Emerging markets include Brazil, China, Indonesia, Korea, Malaysia, Mexico, Philippines, South Africa, and Thailand.

Targeted Coverage

Countries include Argentina, Chile, Colombia, Czech Republic, Egypt, Hungary, India, Israel, Jordan, New Zealand, Peru, Poland, Russia, Slovakia, Turkey, and Venezuela.

Chapter 3

A Dynamic Model of International Mergers and Acquisitions

3.1 Introduction

In the past two decades, 26% of worldwide M&A activities involve acquirers and targets from different countries. The aggregate volume of cross-border mergers from 1989 to 2008 adds up to above 8 trillion dollars. In spite of such a large volume, much of the M&A literature focuses on domestic mergers. Moreover, the amount of cross-border mergers varies greatly from year to year. For example, the volume of worldwide M&A deals dropped by 62% from 2000 to 2003 but bounced back by 158% in 2006. Despite such a large year-to-year fluctuation, most existing papers on cross-border M&As study the effects of long-run determinants like corporate governance and capital market development. These gaps in the literature motivate the research questions that are at the core of this paper: what are the dynamic patterns of cross-border mergers, and what are the factors that drive them?

In the previous chapter, I present key facts about international mergers. Specifically, I answer these four main questions: (1) How do cross-border mergers behave over a business cycle? International mergers come in waves and are very pro-cyclical. (2) Where do shocks that effect cross-border mergers originate? Most mergers occur when both the acquirer and the target economies are booming. (3) What type of shocks (real or financial) effect cross-border mergers? Merger booms have industry-level (productivity shock) and country-level (financial shock) components. (4) What types of firms engage in cross-border mergers? Acquirers tend to be more productive than average firms and targets tend to be less productive than average firms.

In this chapter, I use the four empirical facts mentioned earlier as a guideline and build a dynamic structural model of cross-border mergers. The dynamic structural approach offers two major advantages. First, by construction, it solves the identification problem inherent in reduced-form estimation. Using simulated data, I can quantify the effects of productivity and financial shocks on endogenous variables. Second, the dynamic structural model provides me with an analytical framework to investigate the impacts of various government policies. As an example of such policy analyses, I examine the impact of multinational corporation taxation which has long been the subject of heated policy debates.

My model is related to Gomes and Livdan (2004) and Yang (2008) in that firms make investment and merger decisions based on the productivity shocks they received. To investigate the effects of financial shocks, I incorporate external financing cost similar to the ones in Gomes (2001) and Whited (2006) and allow the cost to fluctuate along a business cycle. The distinguishing features of my model are that there are two countries and that a local firm has an option of engaging in cross-border mergers in order to become a multinational corporation. I also assume that the productivity shock has two components: firm-specific and location-specific. With this setup, productive firms will seek assets in booming locations.

Recently, President Obama proposed a 200 billion dollar tax increase on multinational corporations. As a consequence, the largest US corporations are concerned that the tax raise will put American firms at a disadvantage overseas and leave them vulnerable to foreign acquisitions.[1] Others are concerned that the tax will primarily impact the productive sectors, such as technology and pharmaceutical industries.[2] Clearly, there is an urgent need to understand the effects of multinational taxation. The simulation results from my tax

[1] BusinessWeek May 4, 2009

[2] The New York Times May 5, 2009

experiments confirm that foreign operation tax can be very distortionary for cross-border mergers and has larger effects on more productive firms. The model also provides a policy implication: when analyzing the effects of multinational corporation taxation, we should be careful not to focus only on multinational firms that already have overseas operations. Since cross-border mergers are sensitive to tax rate, we must also take into consideration its effects on productive local firms for whom the tax is a disincentive for future mergers.

This paper joins the growing literature on dynamic corporate finance (e.g., Whited, 2006; Gomes and Livdan, 2004; Yang, 2008). The dynamic structural approach is particularly appropriate for my context, since merger waves are, by nature, dynamic phenomena. The dynamic simulations in this paper are also related to the recent work on the impact of multinational corporation taxation. While the literature on taxation is voluminous, identifying the effect of taxes can pose a challenge since the tax policies are likely to be endogenous. Even if the tax policies are exogenous, their effects, as measured by the reduced-form coefficients, might still be endogenous according to the Lucas' critique. Dharmapala, Foley, and Forbes (2009) and Faulkender and Peterson (2009) use the Homeland Investment Act of 2004 as a natural experiment and analyze the effects of this one-time tax break on U.S. firms. In this paper, I offer structural estimation as an alternative approach to address the identification problem.

3.2 Conceptual Framework

The goal of chapter 3 is to integrate the findings from chapter 2 into a dynamic structural model and policy analysis. Because implications from a structural model are, to a great extent, driven by its structural assumptions, the strength of my analysis lies in the fact that my model is consistent with the key facts derived from a large amount of data.

Guided by the reduced-form evidence, I develop a dynamic structural model of cross-border mergers. I assume that firm decisions are driven by productivity shocks under the presence of financial frictions. Merger gain comes from access to the target country's markets and resources as well as the utilization of acquirer firm-specific assets. With these assumptions, productive firms will seek assets in booming locations. Then, I prove that a solution to the problem indeed exists and characterize the properties of the model. These properties can provide insights into firms' merger and investment decisions.

Next, I solve the model numerically using the value function iteration algorithm. Given the value functions and the policy functions, I construct a panel of firms, generate structural shocks, and observe how firms react to these shocks. These exercises allow me to quantify the effects of productivity and financial shocks on the endogenous variables.

In addition, I use the model to perform policy experiments on taxation. The issue of multinational corporation taxation frequently captures public attention. On May 4, 2009, President Obama proposed a 200 billion dollar tax increase on multinational corporations. As a consequence, the largest U.S. corporations have launched a vigorous lobbying effort against the plan. One of the arguments against the tax increase is that it will put American firms at a competitive disadvantage overseas and leave them vulnerable to foreign acquisitions. There is also some concern that the tax will primarily impact the productive sectors, such as the technology and pharmaceutical industries. Given my structural model, I can investigate how the tax on foreign operations might influence firm investment and merger decisions. I can also verify whether the concerns about the tax proposal above are valid.

3.3 The Model and its Basic Properties

I build a neoclassical model of cross-border investments. Firms make investment and production decisions in the presence of productivity shocks. The model is related to the domestic investment models in Gomes and Livdan (2004), Cooper and Haltiwanger (2006), as well as in Yang (2008). The distinguishing feature of this model is that I allow domestic firms to acquire establishments in another country and become multinationals.

Posit that there are two countries, A and B. In each country, there are a large number of firms so that each firm is a price-taker in the market for corporate assets. The model is in discrete time, and one period is defined as one year.

Technology

The profit function is described by $\Pi(\epsilon, K)$. In particular, the function is $\Pi(\epsilon, K) = e^{\epsilon} K^{\theta}$, where ϵ is the level of the productivity shock and θ is the curvature of the profit function. The θ is assumed to be less than one so that the production function exhibits the decreasing-return-to-scale property.[3] This property captures the concept that local resources and local markets are limited and that there is an incentive for local firms to expand to another country.

The productivity shock ($\epsilon = \epsilon_i + \epsilon_S$) has two components. The ϵ_i, which is firm-specific, captures the firm-level shocks that cannot easily be traded or transferred outside of the firm, such as patents, know-how, managerial skills, and reputation. The $\epsilon_S \in \{\epsilon_A, \epsilon_B\}$, which is specific to the location where firms operate, captures any country-specific factors that can effect firm profits, such as local input prices, proximity to customers, and other institutional environments.

Given the structure of the shocks, more productive firms (high ϵ_i) are more likely to acquire assets, and less productive firms (low ϵ_i) are more likely to sell their assets. Firms will also want to invest in a country where the country shock, ϵ_S, is high and expected to be so.

Firms are not certain about their future productivities.[4] For the calibration, I assume that each ϵ follows an AR(1) process:

$$\epsilon_{i,t} = \rho \epsilon_{i,t-1} + e_{i,t} \text{ and } e_{i,t} \sim N(0, \sigma_i);$$
$$\epsilon_{S,t} = \rho \epsilon_{S,t-1} + e_{S,t} \text{ and } e_{S,t} \sim N(0, \sigma_S).$$

Firm Organization

Firms are risk neutral and maximize the expected present value of dividend streams over an infinite time horizon. There are two types of firms: single-country firms and multinational firms. A single-country firm operates an establishment in one country, $S \in \{A, B\}$, but

[3]This profit function is a shorthand version of a large class of production processes. For example, Cooper and Haltiwanger (2006) show that it can be derived from the production processes that involve more than one type of inputs. It also allows imperfect competitions in the product markets.

[4]For the proof, I only assume that the transition matrix governing the dynamic of ϵ has the Feller property.

has the option of acquiring firms in another country and becoming a multinational. At the beginning of each period, single-country firms observe the productivity shocks and choose whether to stay local or not. Then, they decide how much capital they are going to buy or sell in that period.

A single-country firm i in country S that chooses to remain local has a value function defined as

$$V_{SS}(X, K_S) = \max_{\{K'_S\}} [d_{SS} + \beta E [V_S(X', K'_S)]], \text{ (eq1)}$$
$$\text{where } d_{SS} = \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S),$$
$$\text{i.e., dividend = operating profit - asset purchase - adjustment cost.}$$

In this equation, d stands for dividend. Subscript SS denotes a single-country firm in country S that decides to stay in country S. Firm i's establishment in country S has productivity $\epsilon_i + \epsilon_S$. The exogenous state variable is $X = \{\epsilon_i, \epsilon_A, \epsilon_B\}$. The value function has the productivity of the foreign country as an argument even though it does not have an establishment there. This is because the foreign country's productivity effects the option value of becoming a multinational. The prime variables represent the future values, while other variables represent current values. The $0 < \beta < 1$ is a discount factor. The capital stock depreciates at the exogenous rate $0 < \delta < 1$.

The cost of investment has two components: the direct cost of capital goods and the quadratic adjustment cost. The direct capital expenditure is given by $K' - (1-\delta)K$. The quadratic adjustment cost is $\Gamma(K', K) = \gamma/2(\frac{K'-(1-\delta)K}{K})^2 K$. The parameter γ reflects imperfections in the market for real assets, such as the transaction cost of purchasing and liquidating capital, as well as other real costs associated with change in the level of capital stocks, such as the disruption in the production processes.

A multinational has the value function:

$$V_M(X, K_A, K_B) = \max_{\{K'_A, K'_B\}} [d_M + [V_M(X', K'_A, K'_B)]], \text{ (eq2)}$$
$$\text{where } d_M = \textstyle\sum_{S=\{A,B\}} (\Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S)).$$

Subscript M denotes a multinational firm. A multinational firm has two establishments, one in country A and one in country B. At the beginning of each period, multinational firms observe the productivity shocks, X, and decide how much capital they are going to buy or sell in each country.

Merger Process

When single-country firms decide whether to remain local or to go abroad, they compare the expected net benefits of each alternative. Therefore, the value function of a single-country firm is:

$$V_S(X, K_S) = \max\left[V_{SS}(X, K_S), V_{SM}(X, K_S)\right]. \text{ (eq3)}$$

Subscript S denotes a single-country firm. Subscript SM denotes a single-country firm in country S that decides to become a multinational in the next period. The value function of the single-country firm that chooses to remain local, $V_{SS}(X, K_S)$, is defined by (eq1). The single-country firm that chooses to acquire production capacity in another country has the value function of:

$$\begin{gathered}
\text{If } S = A \text{, then } V_{AM}(X, K_A) = \max_{\{K'_A\}}\left[d_{AM} + \beta E\left[V_M(X', K'_A, f)\right]\right], \text{ (eq4A)} \\
d_{AM} = \Pi(\epsilon_i + \epsilon_A, K_A) - (K'_A - (1-\delta)K_A) - \Gamma(K'_A, K_A) - F, \text{ or} \\
\text{If } S = B \text{, then } V_{BM}(X, K_B) = \max_{\{K'_B\}}\left[d_{BM} + \beta E\left[V_M(X', f, K'_B)\right]\right], \text{ (eq4B)} \\
d_{BM} = \Pi(\epsilon_i + \epsilon_B, K_B) - (K'_B - (1-\delta)K_B) - \Gamma(K'_B, K_B) - F.
\end{gathered}$$

In order to become a multinational, a single-country firm has to pay a one-time fixed cost, F. After paying F at time t, the single-country firm will become a multinational at time t+1. The F captures the idea that investing in a foreign country is more difficult than investing domestically. The new multinational firm will start with toe-hold capital f, $0 < f < F$, in the foreign country. Therefore, F reflects the price of the toe-hold capital combined with other costs of international mergers such as costs of due diligence, costs of setting up new headquarters, and fees for foreign consultants. Under these assumptions, FDIs can be thought of as cross-border mergers. This is consistent with the existing evidence that most FDIs are in the form of cross-border M&As.[5]

[5] According to UNCTAD's FDI database, from 1988-2006, 62% of global FDIs are in the form of cross-border M&As.

[INSERT FIGURE 3.1 HERE]

The timeline of firm investment and merger decisions is given in Figure 3.1. Before analyzing and calibrating the model, I need to ensure that the dynamic programming problems (eq1) and (eq2) have a solution and that $V_M(X, K_A, K_B)$, $V_{SS}(X, K_S)$, and $V_{SM}(X, K_S)$ exist.

Let $C(X \times K)$ and $C(X \times K \times K)$ be the space of all bounded and continuous functions in $(X \times K)$ and $(X \times K \times K)$, respectively.

Existence

Proposition 1: There exists a unique continuous function $V_M(X, K_A, K_B)$ that solves the dynamic programming problem (eq2).
See the Appendix for the proof
The proof is a direct application of Blackwell's sufficient conditions for a contraction mapping. From theorem 9.7 and 9.11 in Stokey, Lucas, and Prescott (1989), $V_M(X, K_A, K_B)$ is also increasing in all its arguments. The solution $V_M(X, K_A, K_B)$ produces the policy function K'_A and K'_B, which determine a multinational's optimal level of investment in country A and country B.

Proposition 2: There exists a unique continuous function $V_S(X, K_S)$ that solves the dynamic programming problem (eq1), the maximization problems (eq3), and (eq4).
See the Appendix for the proof
The proof of Proposition 2 is more complicated than Proposition 1's because $V_S(X, K_S)$ can be mapped to either $V_{SS}(X, K_S)$ or $V_{SM}(X, K_S)$, depending upon the values of the state variables. The outline of the proof is as follows:
(1) From Proposition 1, there exists a unique function $V_M(X, K_A, K_B)$ in $C(X \times K \times K)$ that solves the multinational dynamic programming problem (eq2).
(2) Because the maximization problem of the single-country firm that chose to become multinational, (eq4) only involves the function $V_M(X, K_A, K_B)$, there exists a function $V_{SM}(X, K_S)$ in $C(X \times K)$ that solves (eq4).
(3) Next, I apply Blackwell's sufficient conditions for a contraction mapping for the dynamic programming problem of the single-country firm that chose to remain local (eq5).

Therefore, there exists a unique function $V_{SS}(X, K_S)$ in $C(X \times K)$ that solves (eq 5).
(4) Finally, $V_S(X, K_S) = \max[V_{SS}(X, K_S), V_{SM}(X, K_S)]$ exists and is in $C(X \times K)$, because both $V_{SS}(X, K_S)$ and $V_{SM}(X, K_S)$ are in $C(X \times K)$.
The solutions $V_{SS}(X, K_S)$ and $V_{SM}(X, K_S)$ also produce the policy function K'_S, which determines the domestic firm's optimal level of investment in country S.

Investment Euler's Equation

From (eq1) to (eq4), I can characterize the optimal level of investment by deriving the first order conditions and applying the envelope theorem.

Proposition 3: The optimal levels of investment in country S of multinationals and single-country firms are governed by the following Euler's equation:

$$1 + \partial_{K'_S}\Gamma(K'_S, K_S) = [\partial_{K'_S}\Pi(\epsilon'_i + \epsilon'_S, K'_S) + (1 - \delta) - \partial_{K'_S}\Gamma(K''_S, K'_S)].$$

See the Appendix for the proof
At the optimum, firms equate the marginal cost and marginal benefit of investment. Investing an additional unit of capital costs one plus the marginal adjustment costs. The gain from that additional unit of capital consists of the expected present value of the marginal product of capital, the value of capital left from depreciation, and the marginal effect that capital has on next period's adjustment cost. From Euler's equation, multinationals operate establishments in two locations as if they are two independent firms. Gains from entering another country will depend upon the acquirer's firm-specific productivity and the location-specific productivity of the target country. This proposition shows that the merger gains in this model come from the utilization of an acquirer's firm-specific assets and access to goods and factor markets in the target country.

Costly External Financing

External financing is more costly than internal financing. In particular, when firms raise external capital (dividend is less than zero), it has to pay the cost of external finance $\phi(d) = \phi_0 + \phi_1 d$, where d stands for dividend. This linear specification is frequently seen in the finance and macroeconomic literature. For example, Gomes (2001) assumes that $\phi(d)$ is $0.08 - 0.028d$ and Whited (2006) assumes that $\phi(d)$ is $0.04 - 0.0264d$. The function $\phi(d)$ can be thought of as the transaction costs of accessing external equity markets, such as the cost of an IPO, as well as the premium for agency problems or asymmetric information problems associated with external financing, such as the cost of monitoring the firms.[6]

With costly external financing, Proposition 3 does not hold: investment and mergers in one country might depend on productivity shocks of another country. To illustrate the importance of financial constraint, I consider the extreme case in which only internal financing is possible.

Proposition 4: If external financing is prohibitively costly (i.e., $\phi(d)$ approaches ∞), the optimal level of investment of a multinational satisfies the following conditions:

$$\frac{E[\partial_{K'_A}\Pi(\epsilon'_i+\epsilon'_A,K'_A)+(1-\delta)-\partial_{K'_A}\Gamma(K''_A,K'_A)]+cov(\partial_{K'_A}d,\tilde{\lambda}')}{1+\partial_{K'_A}\Gamma(K'_A,K_A)} =$$
$$\frac{E[\partial_{K'_B}\Pi(\epsilon'_i+\epsilon'_B,K'_B)+(1-\delta)-\partial_{K'_B}\Gamma(K''_B,K'_B)]+cov(\partial_{K'_B}d,\tilde{\lambda}')}{1+\partial_{K'_B}\Gamma(K'_B,K_B)},$$

where λ is the shadow value of relaxing the financial constraint: $d_M \geq 0$ and $\tilde{\lambda}'=\frac{1+\lambda'}{E[1+\lambda']}$.
See the Appendix for the proof
This condition implies that firms invest in such a way that, at the optimum, the cost/benefit ratios are equalized across the two countries. The denominator is the marginal cost of investing from the left hand side of Euler's equation in Proposition 3. The numerator is the marginal benefit from the right hand side of Euler's equation, plus the covariance term. The reasoning behind the covariance terms is that firms value an establishment that can generate internal cash flow when the financial constraint is binding (high λ) more than an establishment generating cash flow when financial constraint is less or not binding (low or zero λ).

[6] Gomes (2001) proves that the firm dynamic optimization with costly external financing $\phi(d)$ has a unique solution in the technical appendix.
With the cost of external financing, the firm's decision can be decomposed into two stages: (1) whether or not to incur the cost of external financing and (2) conditioned on decision in (1) how much to invest and whether or not to merge. For example, multinational's optimization problem becomes:

$$V_M(X,K_A,K_B) = \max[V_M^{InternalFinance}(.), V_M^{ExternalFinance}(.)],$$
$$\text{where } V_M^{InternalFinance}(.) = \max_{\{K'_A,K'_B\}\in\{d_M\geq 0\}} [d_M + \beta E\left[V_M(X',K'_A,K'_B)\right]] \text{ and}$$
$$V_M^{ExternalFinance}(.) = \max_{\{K'_A,K'_B\}\in\{d_M<0\}} [d_M - \phi(d_M) + \beta E\left[V_M(X',K'_A,K'_B)\right]].$$

From this condition, it is obvious that a location-specific shock in country A will effect investment in country B and vice versa. However, the direction of the effect is ambiguous. For example, on one hand, high ϵ_A will raise the marginal benefit of investing in country A and therefore take resources away from country B (the substitution effect). On the other hand, high ϵ_A will relax the financial constraints and then encourage investment in country B (the wealth effect).

3.4 Solution Method

I solve the dynamic programming problems numerically by using the value-function iteration algorithm. My computational strategy involves the following steps:

Parameterization
I specify standard structural parameters based on the existing literature and estimate the rest by matching simulated moments from the models with empirical moments from the data.

[INSERT TABLE 3.1 HERE]

Following Cooper and Haltiwanger (2006), I choose a discount rate β equal to 0.95, a curvature of the production function θ equal to 0.6, a depreciation rate δ equal to 0.1, and a quadratic adjustment cost parameter γ equal to 0.4. These numbers are in line with the ones in Gomes (2001), Whited (2006), Eisfeldt and Rampini (2006), and Yang (2008). Following Whited (2006), I set the fixed cost of external financing ϕ_0 to equal 0.08 and the variable cost of external financing ϕ_1 to equal -0.028.

For the productivity shocks, I first estimate the persistence and dispersion of total productivity shocks (ρ, σ_ϵ) by using the productivity data of U.S. firms from WorldScope.[7] The ρ and σ_ϵ are estimated at 0.87 and 0.45, respectively. Next, I decompose the total productivity shock into the firm-specific component ϵ_i and the location-specific component ϵ_S. The relative size of σ_i and σ_S is calibrated to match the relative effect of the acquirer

[7] From my production function specification, productivity is defined as $ln(profit) - \theta ln(totalassets)$.

country's productivity shocks and the target country's productivity shock on cross-border mergers.[8] The σ_i and σ_S are calibrated at 0.35 and 0.25, respectively. I calibrate the toehold capital in foreign country f and the fixed cost of cross-border mergers F to match the fraction of firms in WorldScope that have engaged in cross-border acquisitions within ten years after they were listed.[9] The f and F are calibrated at 10 and 175 units of capital, respectively.

Value Function Estimation

I use 25 x 25 evenly spaced grids for K_A and K_B. These grids are positioned around the deterministic steady state level of capital. I use 5 x 5 x 5 grids for the exogenous shocks. The shocks are discretized by the standard method in Tauchen (1986).

Parallel to the proofs of Propositions 1 and 2:

(1) I use the value function iteration algorithm to solve for the multinational value function $V_M(X, K_A, K_B)$.

(2) Given $V_M(X, K_A, K_B)$, I directly derive the value function of the single-country firms that have chosen to become multinational $V_{SM}(X, K_S)$.

(3) Given $V_{SM}(X, K_S)$, I use the value function iteration algorithm to solve for the value function of a single-country firm $V_S(X, K_S)$.

(4) I derive the policy functions from $V_M(X, K_A, K_B)$, $V_{SM}(X, K_S)$, and $V_{SS}(X, K_S)$ as well as the cross-border merger decisions from $V_{SM}(X, K_S) - V_{SS}(X, K_S)$.

3.5 Simulations and Policy Experiments

For the simulation, I construct two artificial panels of firms. Panel I starts with 1,000 multinationals at time t=0. Panel II starts with 1,000 single-country firms at time t=0.

[8] I choose to match this moment because ϵ_i reflects how much the acquirer's conditions effect cross-border mergers and ϵ_S reflects how much the target's conditions effect cross-border mergers. From the first row of Tables 2.4A and 2.4B as well as from column 2 of Table 2.5, the relative effect of acquirer productivity shocks and target productivity shocks is approximately 1.5.

[9] I choose F to match the incidence of mergers because the cost of mergers should directly effect the incidence of mergers. First, I set the toehold capital in foreign country f equal to $K_{min} = 10$. Fixing f, I then calibrate the fixed cost of cross-border mergers F.

The initial states (X, K) are drawn randomly from a uniform distribution. Then, I generate productivity shocks for 1,000 periods and observe how firms make their investment and cross-border merger decisions. Because country A and country B are symmetric, without loss of generality, I assume that country A is the acquirer (home) country and country B is the target (host) country.

Productivity and Liquidity Shocks

To illustrate how the endogenous variables respond to the structural shocks, I perform the regression analysis at the firm level. I regress investment rate I/K, output $F(X, K)$, and firm value $V(X, K)$ on the productivity shocks $(\epsilon_i, \epsilon_A, \epsilon_B)$. To be consistent with the reduced-form estimation in Chapter 2, I scale all of the variables by their standard deviations. The results are reported in Table 3.2. The numbers in the table are the mean of the coefficients from the 1,000 firm-level regressions. Their empirical standard errors are in the parentheses. Constants are included in all the regressions.

[INSERT TABLE 3.2 HERE]

As expected, most of the coefficients are positive indicating that investment, output, and stock prices are pro-cyclical. Cross-border investment responds directly to the acquirer's firm-specific productivity and the target's country-specific productivity: one standard deviation increase in the acquirer's firm-specific productivity leads to a 0.17 standard deviation increase in investment while one standard deviation increase in the target's country-specific productivity leads to a 0.12 standard deviation increase.

So far, the variation in the cost of capital is just a side effect of productivity shocks. When productivity is high, cash flow from operation is also high. The internal cash flow will effect the demand for external finance, which costs $\phi(d)$ extra. To model the financial shocks more explicitly, I adopt the idea of Eisfeldt and Rampini (2006) that liquidity is pro-cyclical. Specifically, I assume that the acquirer's cost of external finance varies with its country-specific shock, ϵ_A. With this assumption, the cost of external financing becomes:

$$\phi^{fluctuate}(d, \epsilon_A) = e^{-\mu . \epsilon_A} \phi(d),$$

where $\phi(d)$ is the cost of external financing defined earlier and μ is a liquidity multiplier that captures how much liquidity varies over the business cycle. If μ is equal to zero, then the cost of external financing is constant. If μ is positive (negative), then liquidity is pro-cyclical (counter-cyclical).

[INSERT TABLE 3.3 HERE]

Now, I perform the same regressions as the ones in Table 3.2 except that I use the cyclical cost of external financing, $\phi^{fluctuate}$. Table 3.3 reports the results when μ=5. Most of the coefficients in Table 3.3 are similar to those in Table 3.2. Compared to the case where cost of external financing is constant, the pro-cyclical liquidity raises the coefficients on ϵ_A slightly. For example, in the investment regression, the coefficient on ϵ_A is 0.116 when the cost of external financing is constant but becomes 0.121 when the cost of external finance depends on ϵ_A. This result indicates that regular (non-merger) investment is not greatly affected by fluctuations in liquidity.

[INSERT FIGURE 3.2 HERE]

The effect of liquidity is much larger for cross-border M&As. I measure the incentive for a single-country firm to engage in a cross-border merger by computing a hypothetical gain if a local firm decides to go abroad: $V_{SM}(X, K_S) - V_{SS}(X, K_S)$. I then regress these hypothetical gains on the productivity shocks $(\epsilon_i, \epsilon_A, \epsilon_B)$. The coefficients are plotted against the level of pro-cyclicality μ in Figure 3.2. The x-axis is μ and the y-axis is the estimated coefficients on the productivity shocks. From the graph, pro-cyclical liquidity raises the importance of local shocks ϵ_A substantially: the coefficient on ϵ_A goes up from 0.004 when $\mu = 0$ to 0.269 when $\mu = 5$. This is due to the fact that cross-border mergers involve a large fixed cost, so the acquirers are more likely to raise external capital, compared to firms making non-merger investments.

Taxation

The issue of multinational corporation taxation is frequently at the center of public attention. In this section, I examine how taxation on foreign operation might effect mergers, investment, and social welfare. I also analyze how different types of firms are affected by taxes differently.

Although my model abstracts from many important issues in international taxation, such as transfer pricing and strategic interactions among firms from different countries, my model can provide a neoclassical benchmark to quantify the effect of taxation. Assuming that I start from the first best-zero tax scenario, I can investigate what will happen to firms if the government raises the tax on income from foreign affiliates.

To evaluate the effect of a tax increase, I construct two artificial panels of firms. Panel I starts with 1,000 multinationals at time t=0. Panel II starts with 1,000 single-country firms at time t=0. (Firms in Panel II might engage in cross-border mergers and become a multinational in subsequent periods.) I run the simulation for 1,000 periods and observe firm output, tax payment, investment, and merger decisions. For each tax rate, I compute the present value of sales from each affiliate, the present value of tax paid, capital allocation decisions, and firm valuation at time 0. For comparison purposes, I also compute the valuations of firms that are restricted to investing in country A only. Table 3.4 reports the results.

[INSERT TABLE 3.4 HERE]

From Table 3.4, loss from taxation has two components: the tax proceeds and the deadweight loss. The present value of tax in the second and seventh rows is the direct transfer from firms to the government. The deadweight loss is the loss in social welfare due to the fact that the tax distorts firm incentive: when the tax rate increases, firms become smaller and misallocate the capital between the two countries. When the tax rate on foreign operation increases from 0% to 5%, the NPV of output decreases by 1.4% for multinational firms in Panel I and 6.8% for firms in Panel II. In addition, the fraction of foreign sales decreases from 50% to 49% for Panel I firms and to 44% for Panel II firms.

[INSERT TABLE 3.5 HERE]

The loss from taxation is not uniform across all types of firms. To examine the cross-sectional impacts of taxation, I sort each firm into five productivity quintiles based on their initial productivity, ϵ_i. Table 3.5 reports the results. Consistent with the public concerns, I find that the more productive firms are affected more by multinational taxation.

[INSERT FIGURE 3.3 HERE]

Interestingly, I observe that firms starting out as a single-country firm (Panel II) are more sensitive to multinational taxation, compared to multinational corporations who already have oversea affiliates (Panel I). For firms in Panel II, when the tax rate increases, the fraction of foreign sales and assets declines sharply. This is because the cross-border merger decision is relatively sensitive to the tax rate. To illustrate this point, I plot the aggregate number of firms engaging in cross-border mergers at different tax rates in Figure 3.3. As the tax increases, firms delay their decision to go abroad. For example, when the tax rate is 0%, 17% of the firms decide to go abroad within the first 20 years. When the tax rate is 5%, only 9% of the firms decide to go abroad within the first 20 years.

There is a policy implication from this experiment. When considering the welfare implications of multinational corporation taxation, we should be careful not to focus only on multinational firms like Microsoft or Pfizer that already have operations abroad. Because cross-border mergers are sensitive to the tax rate, we must also take into consideration the effects it has on productive local firms - promising firms that have a chance of becoming multinational in the future.

3.6 Conclusion and Discussion

Guided by the key facts from Chapter 2, I propose and estimate a dynamic structural model that is built on the neoclassical theory of mergers. The important feature of this model is the firms' option to acquire assets in another country. The structural approach allows me to separate and quantify the effects of each of the structural shocks, which are not observable in the data. Using the model, I perform policy experiments to analyze the impact of President Obama's multinational tax plan. The simulation results indicate that the loss from foreign operation taxation is economically significant, especially for productive firms, and that cross-border mergers are very responsive to this type of taxation.

Table 3.1: Parameter Values

Parameter	Description	Value	Source
β	discount rate	0.95	Cooper and Haltiwanger (2006)
θ	curvature of the production function	0.6	Cooper and Haltiwanger (2006)
δ	depreciation rate	0.1	Cooper and Haltiwanger (2006)
γ	convex adjustment cost	0.4	Cooper and Haltiwanger (2006)
ϕ_0	fixed external financing cost	0.08	Whited (2006)
ϕ_1	linear external financing cost	-0.028	Whited (2006)
ρ	persistence of productivity shocks	0.87	Estimated from WorldScope Data
F	fixed cost of international mergers	175	Calibrated
$\sigma_{\epsilon,i}$	S.D. of firm-specific shocks	0.35	Calibrated
$\sigma_{\epsilon,S}$	S.D. of country-specific shocks	0.25	Calibrated

The values, descriptions, and sources of parameters used in the simulation are given in the table.

Table 3.2 Effects of Productivity Shocks on Endogenous Variables

	Panel I: Firms Starting as a Multinational				Panel II: Firms Starting as a Single-Country Firm in A		
X=Productivity Shocks	Investment in A	Investment in B	Output	Firm Value	Investment in A	Output	Firm Value
Firm Specific	0.171***	0.173***	0.407***	0.351***	0.172***	0.401***	0.332***
	[0.02]	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]
Country A Specific	0.116***	-0.001	0.151***	0.129***	0.116***	0.153***	0.125***
	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]
Country B Specific	0	0.117***	0.15***	0.128***	0	0.144***	0.12***
	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]

The table reports the effects of structural shocks on endogenous variables. Starting with a panel of 1,000 multinationals and 1,000 single-country firms, the simulations are run for 1,000 periods. The reported coefficients are the average estimates from 1,000 firm-level regressions. The regressors are the firm-specific, country A specific, and country B specific shocks (ϵ_i, ϵ_A, ϵ_B) as well as a constant. Investment in country S is the investment rate, $(K'_S - (1-\delta)K_S)/K_S$, of country S. Output is $F(\epsilon_i + \epsilon_S, K_S)$ when a firm is local and is $F(\epsilon_i + \epsilon_A, K_A) + F(\epsilon_i + \epsilon_B, K_B)$ when a firm is multinational. Firm value is $V(X, K)$. All variables are standardized by their standard deviations. Numbers in the brackets are the empirical standard errors. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3.3 Effects of Productivity Shocks with Pro-cyclical Liquidity

	Panel I: Firms Starting as a Multinational				Panel II: Firms Starting as a Single-Country Firm in A		
X=Productivity Shocks	Investment in A	Investment in B	Output	Firm Value	Investment in A	Output	Firm Value
Firm Specific	0.165***	0.172***	0.405***	0.349***	0.165***	0.395***	0.322***
	[0.02]	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.03]
Country A Specific	0.121***	0.01	0.153***	0.132***	0.122***	0.156***	0.128***
	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]
Country B Specific	0	0.118***	0.149***	0.128***	0	0.14***	0.114***
	[0.02]	[0.02]	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]

The table reports the effects of structural shocks when liquidity is pro-cyclical. The level of liquidity pro-cyclicality, μ, is set to 5. (The cost of external financing is $e^{-\mu \cdot \epsilon_A}\phi(d)$.) Starting with a panel of 1,000 multinationals and 1,000 single-country firms, the simulations are run for 1,000 periods. The reported coefficients are the average estimates from 1,000 firm-level regressions. The regressors are the firm-specific, country A specific, and country B specific shocks (ϵ_i, ϵ_A, ϵ_B) as well as a constant. Investment in country S is the investment rate, $(K_S' - (1-\delta)K_S)/K_S$, of country S. Output is $F(\epsilon_i + \epsilon_S, K_S)$ when a firm is local and is $F(\epsilon_i + \epsilon_A, K_A) + F(\epsilon_i + \epsilon_B, K_B)$ when a firm is multinational. Firm value is $V(X, K)$. All variables are standardized by their standard deviations. Numbers in the brackets are the empirical standard errors. The *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

Table 3.4 Effects of Foreign Operation Taxation

Tax Rate on Foreign Operation	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Panel I: Starting as a Multinational Firm											
NPV(Sales)	661.86	660.28	658.35	656.82	654.49	653.03	650.97	648.71	646.59	644.61	642.35
NPV(Tax)	0	3.32	6.6	9.85	13.04	16.23	19.35	22.42	25.45	28.46	31.39
Fraction of Foreign Assets	0.5	0.5	0.49	0.49	0.49	0.48	0.48	0.47	0.47	0.47	0.46
Fraction of Foreign Sales	0.5	0.5	0.5	0.49	0.49	0.49	0.49	0.49	0.48	0.48	0.48
Firm Valuation at t=0	442.39	438.93	435.48	432.05	428.64	425.25	421.88	418.53	415.2	411.89	408.6
Panel II: Starting as a Single-Country Firm											
NPV(Sales)	432.35	431.94	431.34	430.9	430.3	392.64	329.52	329.52	329.52	329.52	329.52
NPV(Tax)	0	1.02	2.04	3.04	4.03	3.15	0	0	0	0	0
Fraction of Foreign Assets	0.47	0.47	0.46	0.46	0.46	0.43	0	0	0	0	0
Fraction of Foreign Sales	0.47	0.47	0.47	0.47	0.46	0.44	0	0	0	0	0
Firm Valuation at t=0	227.84	226.81	225.79	224.77	223.76	222.82	222.61	222.61	222.61	222.61	222.61
Benchmark Firm that is restricted to being local											
Firm Valuation at t=0	222.61	222.61	222.61	222.61	222.61	222.61	222.61	222.61	222.61	222.61	222.61

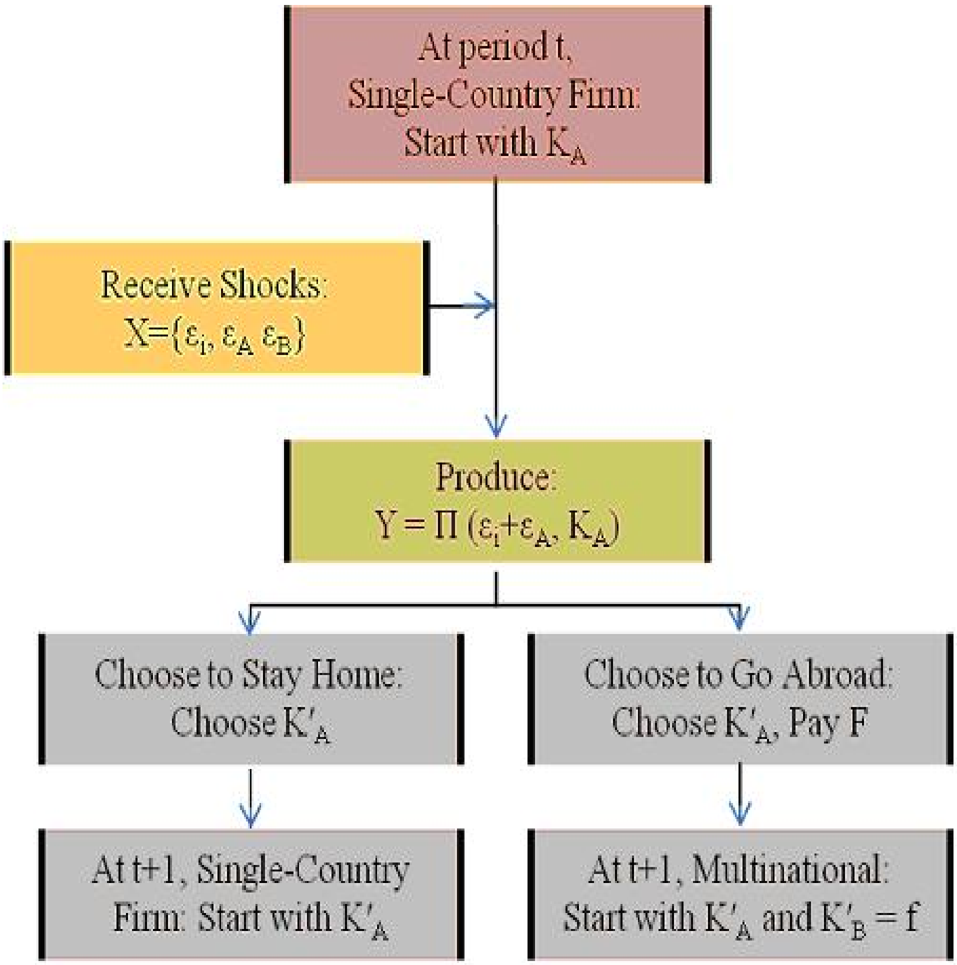
Table 14 reports the effects of a tax increase. Starting with a panel of 1,000 multinationals and 1,000 single-country firms, the simulations are run for 1,000 periods. NPV(Sales) is the sum of present value of output from the year 1 to year 1,000 averaged across all 1,000 firms. NPV(Tax) is the present value of tax from the year 1 to year 1,000 averaged across all 1,000 firms. Fraction of Foreign Assets is the capital in a foreign country divided by total capital average across 1,000 year and 1,000 firms. Fraction of Foreign Sales is the output from the foreign affiliate divided by total output. Firm Valuation at t=0 is the value functions, V_M and V_S, at time 0. For comparison purposes, the valuations of firms that are restricted to investing only in country A are reported in the last row.

Table 3.5 Effects of Foreign Operation Taxation on Firm Value Classified by Initial Productivity

Tax Rate on Foreign Operation	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Panel I: Starting as a Multinational Firm										
Least Productive 1	2.62	5.21	7.8	10.36	12.91	15.44	17.94	20.43	22.9	25.35
2	2.97	5.92	8.86	11.77	14.67	17.55	20.41	23.25	26.06	28.86
3	3.35	6.69	10	13.3	16.57	19.83	23.07	26.28	29.47	32.64
4	3.85	7.69	11.5	15.3	19.08	22.83	26.57	30.28	33.98	37.65
5= most productive	4.47	8.91	13.34	17.75	22.14	26.52	30.87	35.2	39.5	43.79
Panel II: Starting as a Single-Country Firm										
Least Productive 1	0.66	1.32	1.98	2.63	3.23	3.37	3.37	3.37	3.37	3.37
2	0.76	1.51	2.26	3	3.7	3.85	3.85	3.85	3.85	3.85
3	0.89	1.78	2.66	3.54	4.36	4.55	4.55	4.55	4.55	4.55
4	1.11	2.22	3.32	4.42	5.44	5.68	5.68	5.68	5.68	5.68
5= most productive	1.66	3.32	4.96	6.6	8.12	8.46	8.46	8.46	8.46	8.46

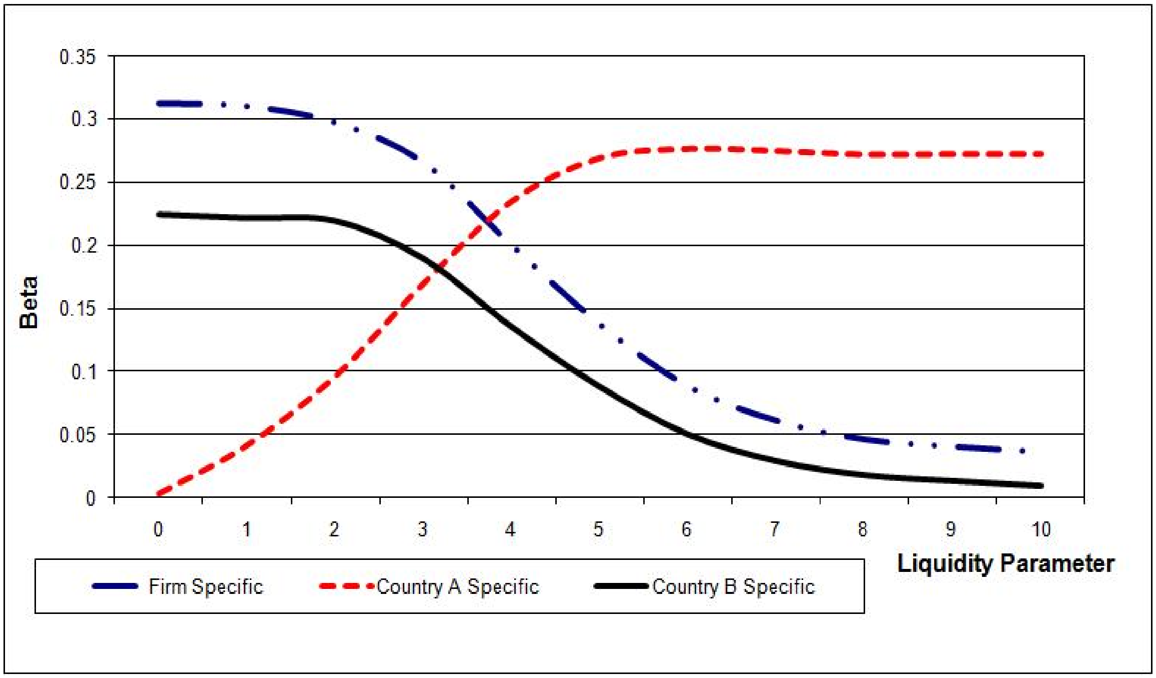
The table reports cross-sectional effects of taxation on foreign operations. Numbers in the table are the average loss from taxation (firm value without taxation minus firm value in the presence of taxation). Firms are sorted into 5 productivity quintiles based on their initial firm-specific productivity, ϵ_i, at time 0.

Figure 3.1 : Single-Country Firm's Decisions



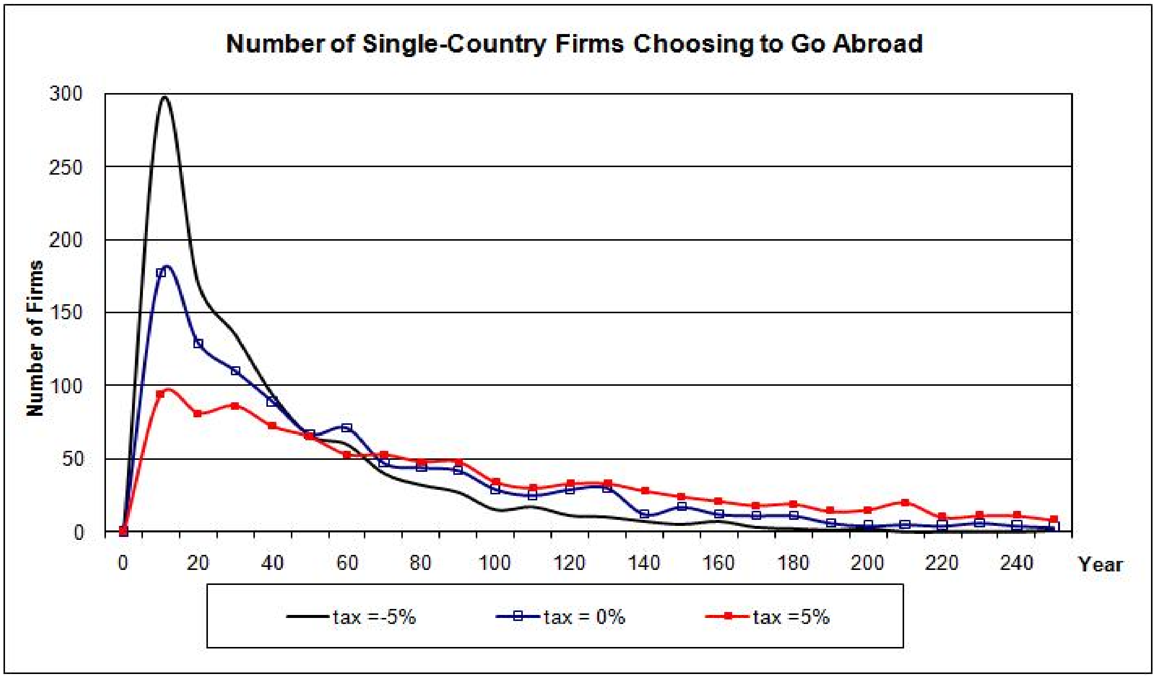
The figure shows the timeline of the events from the beginning of period t to the beginning of period t+1.

Figure 3.2 : The Effects of Pro-cyclical Liquidity on Merger Gains



The x-axis represents the level of liquidity pro-cyclicality μ. (The cost of external financing is $e^{-\mu.\epsilon_A}\phi(d)$.) For each level of μ, the coefficient estimates from the regressions of hypothetical gains from mergers $V_{SM}(X, K_S) - V_{SS}(X, K_S)$ on the firm-specific, country A specific, and country B specific shocks $(\epsilon_i, \epsilon_A, \epsilon_B)$ are plotted on the y-axis. Constants are included in all regressions.

Figure 3.3: The Effect of Foreign Operation Tax on Cross-border Mergers



The figure shows the results from tax experiments. Starting with 1,000 single-country firms at time 0, the aggregate number of firms engaging in cross-border mergers in each year is plotted. The three lines represent the tax rates of 5%, 0%, and -5%.

Appendix 3.1: The Proofs of the Propositions

Let $C(X \times K)$ and $C(X \times K \times K)$ be the space of all bounded and continuous functions in $(X \times K)$ and $(X \times K \times K)$, respectively.

Assumption 1: The productivity shocks, Xs, are governed by a process whose transitional probability satisfies the Feller properties.

Assumption 2: $0 \leq K_S \leq K_{\max}$, where $K_{\max} = \{K : \Pi(\max(X), K) - \delta K = 0\}$. Because $\Pi(X, K)$ is strictly concave in K, $K_{\max}$ exists.

Proposition 1: There exists a unique continuous function $V_M(X, K_A, K_B)$ that solves the dynamic programming problem:

$V_M(X, K_A, K_B) = \max_{\{K'_A, K'_B\}} [d_M + \beta E V_M(X', K'_A, K'_B)]$,

subject to $d_M = \sum_{S \in \{A,B\}} \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S)$.

Proof

Define the operator $\mathrm{T_M}$ as $(T_M V_M)(X, K_A, K_B) = \max_{\{K'_A, K'_B\}} [d_M + \beta E V_M(X', K'_A, K'_B)]$

Lemma 1.1: $\mathrm{T_M}$ maps $C(X \times K \times K) \rightarrow C(X \times K \times K)$

Proof:

Suppose that $V_M(X, K_A, K_B)$ is in $C(X \times K \times K)$, then

$E[V_M(X', K'_A, K'_B)]$ must also be in $C(X \times K \times K)$ due to the Feller property.

Because d_M is bounded and continuous, the result follows immediately.

Q.E.D.

Lemma 1.2: $\mathrm{T_M}$ is a contraction in $C(X \times K \times K)$.

Proof:

1.2.1 Monotonicity

Suppose $V_{M1}(X, K_A, K_B), V_{M2}(X, K_A, K_B) \in C(X \times K \times K)$ and $V_{M1}(X, K_A, K_B) \geq V_{M2}(X, K_A, K_B)$, therefore,

$E V_{M1}(X', K'_A, K'_B) \geq E V_{M2}(X', K'_A, K'_B)$ and

$(T_M V_{M1})(X, K_A, K_B) \geq (T_M V_{M2})(X, K_A, K_B)$.

1.2.2 Discounting

Suppose $a \in R^+$ and $V_M(X, K_A, K_B) \in C(X \times K \times K)$,

therefore,

$(T_M V_M + a)(X, K_A, K_B) = (T_M V_M)(X, K_A, K_B) + \beta a$ and

$(T_M V_M + a)(X, K_A, K_B) \leq (T_M V_M)(X, K_A, K_B) + a$.

From 1.1.1 and 1.1.2, $\mathrm{T_M}$ is a contraction in $C(X \times K \times K)$.

Q.E.D.

From Lemma 1.1 and 1.2, the contraction mapping theory guarantees that there is a unique fixed point in $C(X \times K \times K)$ that solves the dynamic programming problem.

Q.E.D.

Proposition 2: There exists a unique continuous function $V_S(X, K_S)$ that solves the dynamic programming problem:

$V_S(X, K_S) = \max[V_{SS}(X, K_S), V_{SM}(X, K_S)]$ and

$V_{SS}(X, K_S) = \max_{\{K'_S\}}[d_{SS} + \beta E V_S(X', K'_S)]$,

subject to $d_{SS} = \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S)$.

Proof:

Lemma 2.1: There exists a unique continuous function $V_{SM}(X, K_S)$ that solves the maximization problem:

$V_{AM}(X, K_A) = \max_{\{K'_A\}}[d_{AM} + \beta E V_M(X', K'_A, f)]$,

subject to $d_{AM} = \Pi(\epsilon_i + \epsilon_A, K_A) - (K'_A - (1-\delta)K_A) - \Gamma(K'_A, K_A) - F$, or

$V_{BM}(X, K_B) = \max_{\{K'_B\}}[d_{BM} + \beta E V_M(X', f, K'_B)]$,

subject to $d_{BM} = \Pi(\epsilon_i + \epsilon_B, K_B) - (K'_B - (1-\delta)K_B) - \Gamma(K'_B, K_B) - F$.

Proof:

From Proposition 1, $V_M(X, K_A, K_B) \in C(X \times K \times K)$.

Therefore, $V_M(X, K_A, f) \in C(X \times K)$ and $V_M(X, f, K_B) \in C(X \times K)$.

$EV_M(X', K'_A, f)$ and $EV_M(X', f, K'_B)$ must also be in $C(X \times K)$ due to the Feller property.

Because d_{SM} is bounded and continuous, the result follows immediately.

Q.E.D.

Define the operator $\mathrm{T_{SS}}$ as

$(T_{SS}V_{SS})(X, K_S) = \max_{\{K'_S\}}[d_{SS} + \beta E \max[V_{SS}(X', K'_S), V_{SM}(X', K'_S)]]$.

Lemma 2.2: $\mathrm{T_{SS}}$ maps $C(X \times K) \to C(X \times K)$.

Proof:

Suppose that $V_{SS}(X, K_S)$ is in $C(X \times K)$.

From Lemma 2.1, $V_{SM}(X, K_S)$ is in $C(X \times K)$.

$E \max[V_{SS}(X', K'_S), V_{SM}(X', K'_S)]$ must also be in $C(X \times K)$ due to the Feller property.

Because d_{SS} is bounded and continuous, the result follows immediately.

Q.E.D.

Lemma 2.3: $\mathrm{T_{SS}}$ is a contraction.

Proof:

2.3.1 Monotonicity

Suppose $V_{SS1}(X, K_S), V_{SS2}(X, K_S) \in C(X \times K)$ and $V_{SS1}(X, K_S) \geq V_{SS2}(X, K_S)$.

Therefore,

$\max[V_{SS1}(X', K'_S), V_{SM}(X', K'_S)] \geq \max[V_{SS2}(X', K'_S), V_{SM}(X', K'_S)]$

$E[\max[V_{SS1}(X', K'_S), V_{SM}(X', K'_S)]] \geq E[\max[V_{SS2}(X', K'_S), V_{SM}(X', K'_S)]]$

$(T_{SS}V_{SS1})(X, K_S) \geq (T_{SS}V_{SS2})(X, K_S)$.

2.3.2 Discounting

Suppose $a \in R^{+}$ and $V_{SS}(X, K_S) \in C(X \times K)$.

Therefore,

$(T_{SS}V_{SS} + a)(X, K_S) = \max_{\{K'_S\}} [d_{SS} + \beta E \max [V_{SS}(X', K'_S) + a, V_{SM}(X', K'_S)]]$

$(T_{SS}V_{SS} + a)(X, K_S) \leq \max_{\{K'_S\}} [d_{SS} + \beta E \max [V_{SS}(X', K'_S) + a, V_{SM}(X', K'_S) + a]]$

$(T_{SS}V_{SS} + a)(X, K_S) \leq \max_{\{K'_S\}} [d_{SS} + \beta E \max [V_{SS}(X', K'_S), V_{SM}(X', K'_S)]] + \beta a$

$(T_{SS}V_{SS} + a)(X, K_S) \leq (T_{SS}V_{SS})(X, K_S) + \beta a \leq (T_{SS}V_{SS})(X, K_S) + a.$

From 2.3.1 and 2.3.2, T_{SS} is a contraction in $C(X \times K)$.

Q.E.D.

From Lemma 2.2 and 2.3, the contraction mapping theory guarantees that there is a unique fixed point, $V_{SS}(X, K_S)$, in $C(X \times K)$ that solves the dynamic programming problem.

Because $V_{SS}(X, K_S)$and $V_{SM}(X, K_S)$ are in $C(X \times K)$, $V_S(X, K_S)$ must also be in $C(X \times K)$.

Q.E.D.

Proposition 3: The optimal levels of investment in country S of multinationals and single-country firms are governed by the following Euler's equation:

$1 + \partial_{K'_S}\Gamma(K'_S, K_S) = \beta E[\partial_{K'_S}\Pi(\epsilon'_i + \epsilon'_S, K'_S) + (1 - \delta) - \partial_{K'_S}\Gamma(K''_S, K'_S)].$

Proof:

Multinational Firms

The Bellman equation of a multinational is

$V_M(X, K_A, K_B) = \max_{\{K'_A, K'_B\}} [d_M + \beta E V_M(X', K'_A, K'_B)],$

subject to $d_M = \sum_{S \in \{A,B\}} \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1 - \delta)K_S) - \Gamma(K'_S, K_S).$

The first order condition is

$\partial_{K'_S} d_M + \beta E[\partial_{K'_S} V_M(X', K'_A, K'_B)] = 0.$

The envelope theorem implies that

$\partial_{K_S} V_M(X, K_A, K_B) = \partial_{K_S} d_M.$

Combine the two equations:

$-\partial_{K'_S} d_M = \beta E[\partial_{K'_S} d'_M].$

Substitute the expressions for $\partial_{K'_S} d'_M$ and $\partial_{K'_S} d_M$:

$1 + \partial_{K'_S}\Gamma(K'_S, K_S) = \beta E[\partial_{K'_S}\Pi(\epsilon'_i + \epsilon'_S, K'_S) + (1 - \delta) - \partial_{K'_S}\Gamma(K''_S, K'_S)].$

Single-Country Firms

The single-country firm in country S that chooses to become multinational has the value function:

$V_{AM}(X, K_A) = \max_{\{K'_A\}} [d_{AM} + \beta E V_M(X', K'_A, f)],$

subject to $d_{AM} = \Pi(\epsilon_i + \epsilon_A, K_A) - (K'_A - (1 - \delta)K_A) - \Gamma(K'_A, K_A) - F$, or

$V_{BM}(X, K_B) = \max_{\{K'_B\}} [d_{BM} + \beta E V_M(X', f, K'_B)],$

subject to $d_{BM} = \Pi(\epsilon_i + \epsilon_B, K_B) - (K'_B - (1 - \delta)K_B) - \Gamma(K'_B, K_B) - F.$

The first order condition is

$\partial_{K'_A} d_{AM} + \beta E[\partial_{K'_A} V_M(X', K'_A, f)] = 0$ or
$\partial_{K'_B} d_{BM} + \beta E[\partial_{K'_B} V_M(X', f, K'_B)] = 0.$
From the multinational problem, I have
$\partial_{K_S} V_M(X, K_A, K_B) = \partial_{K_S} d_M.$
Combine the equations:
$-\partial_{K'_A} d_{AM} = \beta E[\partial_{K'_A} d'_M]$ or
$-\partial_{K'_B} d_{BM} = \beta E[\partial_{K'_B} d'_M].$
Substitute the expression for $\partial_{K'_S} d'_M$ and $\partial_{K'_S} d_{SM}$:
$1 + \partial_{K'_S}\Gamma(K'_S, K_S) = \beta E[\partial_{K'_S}\Pi(\epsilon'_i + \epsilon'_S, K'_S) + (1-\delta) - \partial_{K'_S}\Gamma(K''_S, K'_S)].$
The Bellman equation of a single-country firm in country S that chooses to remain local is:
$V_{SS}(X, K_S) = \max_{\{K'_S\}} [d_{SS} + \beta E V_S(X', K'_S)],$
subject to $d_{SS} = \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S),$
and $V_S(X, K_S) = \max[V_{SS}(X, K_S), V_{SM}(X, K_S)].$
The first order condition is
$\partial_{K'_S} d_{SS} + \beta E[\partial_{K'_S} V_S(X', K'_S)] = 0.$
The envelope theorem implies that
$\partial_{K_S} V_{SS}(X, K_S) = \partial_{K_S} d_{SS}.$
From the problem of a single-country firm that chooses to become multinational, I have
$\partial_{K_S} V_{SM}(X, K_S) = \partial_{K_S} d_{SM}.$
From the functional form of d_{SS} and d_{SM}, I have
$\partial_{K_S} V_{SS}(X, K_S) = \partial_{K_S} V_{SM}(X, K_S) = \partial_{K_S}\Pi(\epsilon_i + \epsilon_S, K_S) + (1-\delta) - \partial_{K_S}\Gamma(K'_S, K_S).$
Therefore,
$-\partial_{K'_S} d_{SS} = \beta E[\partial_{K'_S} d'_{SM}] = \beta E[\partial_{K'_S} d'_{SS}].$
Substitute the expression for $\partial_{K'_S} d'_{SS}$, $\partial_{K'_S} d'_{SM}$ and $\partial_{K'_S} d_{SS}$:
$1 + \partial_{K'_S}\Gamma(K'_S, K_S) = \beta E[\partial_{K'_S}\Pi(\epsilon'_i + \epsilon'_S, K'_S) + (1-\delta) - \partial_{K'_S}\Gamma(K''_S, K'_S)].$
Q.E.D.

Proposition 4: If external financing is prohibitively costly (i.e., $\phi(d)$ approaches ∞), then the optimal level of investment of a multinational satisfies the following condition:

$$\frac{E[\partial_{K'_A}\Pi(\epsilon'_i+\epsilon'_A, K'_A)+(1-\delta)-\partial_{K'_A}\Gamma(K''_A, K'_A)]+cov(\tilde{\lambda}', \partial_{K'_A} d'_M)}{1+\partial_{K'_A}\Gamma(K'_A, K_A)} = \frac{E[\partial_{K'_B}\Pi(\epsilon'_i+\epsilon'_B, K'_B)+(1-\delta)-\partial_{K'_B}\Gamma(K''_B, K'_B)]+cov(\tilde{\lambda}', \partial_{K'_B} d'_M)}{1+\partial_{K'_B}\Gamma(K'_B, K_B)}.$$

Proof:
A multinational has the value function:
$V_M(X, K_A, K_B) = \max_{\{K'_A, K'_B\}} [d_M + \beta E V_M(X', K'_A, K'_B)],$
subject to $d_M = \sum_{S\in\{A,B\}} \Pi(\epsilon_i + \epsilon_S, K_S) - (K'_S - (1-\delta)K_S) - \Gamma(K'_S, K_S)$
and $d_M \geq 0.$
Let λ be the shadow value of relaxing the financial constraint: $d_M \geq 0$.
The first order condition is

$\partial_{K'_S} d_M(1+\lambda) + \beta E[\partial_{K'_S} V_M(X', K'_A, K'_B)] = 0.$

The envelope theorem implies that

$\partial_{K_S} V_M(X, K_A, K_B) = \partial_{K_S} d_M(1+\lambda).$

Combine the two equations:

$-\partial_{K'_S} d_M(1+\lambda) = \beta E[\partial_{K'_S} d'_M(1+\lambda')]$

$\frac{E[\partial_{K'_A} d'_M(1+\lambda')]}{\partial_{K'_A} d_M} = \frac{E[\partial_{K'_B} d'_M(1+\lambda')]}{\partial_{K'_B} d_M}.$

The covariance formula implies that

$\frac{E[\partial_{K'_A} d'_M]E[(1+\lambda')]+cov(\partial_{K'_A} d'_M, 1+\lambda')}{\partial_{K'_A} d_M} = \frac{E[\partial_{K'_B} d'_M]E[(1+\lambda')]+cov(\partial_{K'_B} d'_M, 1+\lambda')}{\partial_{K'_B} d_M}.$

Define $\tilde{\lambda}' = \frac{1+\lambda'}{E[(1+\lambda')]}$.

The benefit/cost ratios can be rewritten as

$\frac{E[\partial_{K'_A} d'_M]+cov(\partial_{K'_A} d'_M, \tilde{\lambda}')}{\partial_{K'_A} d_M} = \frac{E[\partial_{K'_B} d'_M]+cov(\partial_{K'_B} d'_M, \tilde{\lambda}')}{\partial_{K'_B} d_M}.$

Substitute the expression for $\partial_{K'_A} d'_M$, $\partial_{K'_A} d_M$, $\partial_{K'_B} d'_M$, and $\partial_{K'_B} d_M$:

$\frac{E[\partial_{K'_A}\Pi(\varepsilon'_i+\varepsilon'_A, K'_A)+(1-\delta)-\partial_{K'_A}\Gamma(K''_A, K'_A)]+cov(\tilde{\lambda}', \partial_{K'_A} d'_M)}{1+\partial_{K'_A}\Gamma(K'_A, K_A)} =$

$\frac{E[\partial_{K'_B}\Pi(\varepsilon'_i+\varepsilon'_B, K'_B)+(1-\delta)-\partial_{K'_B}\Gamma(K''_B, K'_B)]+cov(\tilde{\lambda}', \partial_{K'_B} d'_M)}{1+\partial_{K'_B}\Gamma(K'_B, K_B)}.$

Q.E.D.

Bibliography

[1] Acharya, V., H. Song and T. Yorulmazer, 2009, "Fire-Sale FDI," working paper, London Business School

[2] Aguiar, M. and G. Gopinath, 2005, "Fire-Sale FDI and Liquidity Crises," The Review of Economics and Statistics, 87(3), 439-542

[3] Alfaro, L. and A. Charlton, 2007, "Intra-Industry Foreign Direct Investment," working paper, Harvard Business School

[4] Baker, M., C. Foley, J. Wurgler, 2009, "Multinationals as Arbitrageurs: The Effect of Stock Market Valuations on Foreign Direct Investment," Review of Financial Studies 22, 337-69

[5] Beck, Thorsten, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2005, Financial and legal constraints to firm growth - Does size matter?, Journal of Finance, vol. 60(1), 137-177.

[6] Bernanke, Ben S., and Alan Blinder, 1988, Credit, Money, and Aggregate Demand, American Economic Review, vol. 78(2), 435-439.

[7] Bosworth, Barry P., Susan M. Collins, and Carmen M. Reinhart, 1999, Capital Flows to Developing Economies: Implications for Saving and Investment, Brookings Papers on Economic Activity, vol. 1999(1), 143-180.

[8] Bris, A. and C. Cabolis, 2008, "The Value of Investor Protection: Firm Evidence from Cross-Border Mergers," Review of Financial Studies 21, 605-48

[9] Contreras, Juan M., and Tanakorn Makaew, 2008, Financial Reforms and Corporate Investment: A Structural Estimation Approach (Congressional Budget Office-University of Maryland Working Paper).

[10] Cooper, R. and J. Haltiwanger, 2006, "On the Nature of Capital Adjustment Costs," Review of Economic Studies 73(3), 611-33

[11] Dahlquist, Magnus, and Gran Robertsson, 2001, Direct foreign ownership, institutional investors, and firm characteristics, Journal of Financial Economics, vol.46, 413-440.

[12] Desai, M., C. Foley, and K. Forbes, 2007, "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations," Review of Financial Studies 21(6), 2857-88

[13] Dharmapala, D., C. Foley, and K. Forbes, 2008, "The Unintended Consequences of the Homeland Investment Act: Implications for Financial Constraints, Governance and International Tax Policy," working paper, University of Connecticut, Harvard Business School, and MIT

[14] di Giovanni, J., 2005, "What drives capital flows? The Case of Cross-Border M&A Activity and Financial Deepening," Journal of International Economics 65(1), 127-149

[15] Dittmar, A. and R. Dittmar, 2008, "Timing of Financial Decisions: An Examination of the Correlation in Financing Waves," Journal of Financial Economics 90, 59-83

[16] Eisfeldt, A. and A. Rampini, 2006, "Capital Reallocation and Liquidity," Journal of Monetary Economics 53, 369 - 399

[17] Errunza V. and L. Senbet, 1984, "International Corporate Diversification, Market Valuation, and Size-Adjusted Evidence," Journal of Finance 39, 727-45

[18] Evans, Kimberly, 2003, Foreign Portfolio and Direct Investment: Complementarity, Differences, and Integration (Proceedings of the OECD Global Forum on International Investment: Attracting International Investment for Development, 2002 December 5-6, Shanghai).

[19] Faccio, Mara, 2006, Politically Connected Firms, American Economic Review, vol. 96(1), 369-386.

[20] Faccio, Mara, John J. McConnell, and Ronald W. Masulis, 2006, Political Connections and Corporate Bailouts, Journal of Finance, vol. 61(6), 2597-2635.

[21] Faulkender, M., and M. Petersen, 2009, "Investment and capital constraints: Repatriations under the American Jobs Creation Act," working paper, Northwestern University and University of Maryland

[22] Ferreira, M., M. Massa, and P. Matos, 2009, "Shareholders at the Gate? Institutional Investors and Cross-Border Mergers and Acquisitions," Review of Financial Studies, forthcoming

[23] Fogel, Kathy, Randall Morck, and Bernard Yeung, 2006, Corporate Stability and Economic Growth: Is What's Good for General Motors Good for America? (NBER Working Paper No. W12394).

[24] Forbes, Kristin J., 2005, The Microeconomic Evidence on Capital Controls: No Free Lunch (NBER Working Papers No. 11372).

[25] Gallego, Francisco A. and, Leonardo Hernandez, 2003, Microeconomic effects of capital controls: The chilean experience during the 1990s, International Journal of Finance and Economics, vol. 8(3), 225-253

[26] Gande, A., C. Schenzler, and L. Senbet, 2009 "Valuation Effects of Global Diversification," Journal of International Business Studies, forthcoming

[27] Gelos, Gaston R. and, Alejandro M. Werner, 2002, Financial liberalization, credit constraints, and collateral: investment in the Mexican manufacturing sector, Journal of Development Economics, vol. 67(1), 1-27.

[28] Gomes, J., 2001, "Financing investment," American Economic Review 91, 1263-1285

[29] Gomes, J. and D. Livdan, 2004, "Optimal Diversification: Reconciling Theory and Evidence," Journal of Finance 59, 507-535

[30] Harford, J., 2005, "What drives merger waves?," Journal of Financial Economics 77, 529-560

[31] Hodrick, R. and E. Prescott, 1997, "Postwar U.S. Business Cycles: An Empirical Investigation," Journal of Money, Credit, and Banking 29(1), 1-16

[32] Huizinga, H. and J. Voget, 2009, "International Taxation and the Direction and Volume of Cross-Border M&As," Journal of Finance, forthcoming

[33] Jensen, M., 1986, "Agency costs of free cash flow, corporate finance, and takeovers," American Economic Review 76, 323-329

[34] Jensen, Michael C., and William H. Meckling, 1976, Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, Journal of Financial Economics 3, 305-360.

[35] Johnson, Simon H. and Todd Mitton, 2003, Cronyism and Capital Controls: Evidence from Malaysia, Journal of Financial Economics, vol. 67(2), 351-382.

[36] Kang, J.-K., and Rene M. Stulz, 1997, Why is there a home bias? an analysis of foreign portfolio equity ownership in Japan, Journal of Financial Economics, vol. 46, 3-28.

[37] Kashyap, Anil K., and Jeremy C. Stein, 2000, What Do a Million Observations on Banks Say about the Transmission of Monetary Policy?, American Economic Review, vol. 90(3), 407-428

[38] Kashyap, Anil K., Raghuram Rajan, and Jeremy C. Stein, 2002, Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-Taking, Journal of Finance, vol. 57(1), 33-73.

[39] Knill, April M., 2005, Can Foreign Portfolio Investment Bridge the Small Firm Financing Gap Around the World? (World Bank Policy Research Working Paper No. 3796).

[40] Koo, Jaewoon, and Sunwoo Shin, 2004, Financial Liberalization and Corporate Investments: Evidence from Korean Firm Data , Asian Economic Journal, vol. 18(3), 277-292.

[41] Leuz, Christian, Felix Oberholzer-Gee, 2006, Political Relationships, Global Financing and Corporate Transparency: Evidence from Indonesia, Journal of Financial Economics, vol. 81(2), 411-439.

[42] Li, Kan, Randall Morck, Fan Yang, and Bernard Yeung, 2004, Firm-Specific Variation and Openness in Emerging Markets, Review of Economics and Statistics, vol. 86(3), 658-669.

[43] Laeven, Luc, 2003, Does Financial Liberalization Reduce Financing Constraints?, Financial Management, vol. 32(1), 5-34.

[44] Levine, Ross, and Sara Zervos, 1998, Stock Markets, Banks, and Economic Growth, American Economic Review, vol. 88(3), 537-558.

[45] Krugman, Paul, 1998, "Fire-sale FDI," available at http://web.mit.edu/krugman/www/FIRESALE.htm

[46] Mendoza, E. and M. Terrones, 2008, "An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data," working papers, International Monetary Fund

[47] Maksimovic, V. and G. Phillips, 2001, "The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and are there Efficiency Gains?," Journal of Finance 56, 2019-65

[48] Maksimovic, V., G. Phillips, and L. Yang, 2009, "Public and Private Merger Waves," working paper, University of Maryland and University of California Los Angeles

[49] Patro, Dilip K., and John Wald, 2005, Firm Characteristics and the Impact of Emerging Market Liberalizations, Journal of Banking and Finance, vol. 29 (7), 1671-1695.

[50] Rhodes-Kropf, M. and D. Robinson, 2008, "The Market for Mergers and the Boundaries of the Firms," Journal of Finance, forthcoming

[51] Rhodes-Kropf, M., D. Robinson, and S. Viswanathan, 2005, "Valuation Waves and Merger Activity: The Empirical Evidence," Journal of Financial Economics 77, 561-603

[52] Rhodes-Kropf, M. and S. Viswanathan, 2004, "Market Valuation and Merger Waves," Journal of Finance 59, 2685-2718

[53] Rossi, S. and P. Volpin, 2004, "Cross-Country Determinants of Mergers and Acquisitions," Journal of Financial Economics 74, 277-304

[54] Shleifer, A., and R. Vishny, 2003, "Stock Market Driven Acquisitions," Journal of Financial Economics 70, 295-311

[55] Stokey, N., R. Lucas, and E. Prescott, 1989, "Recursive Methods in Economic Dynamics," Cambridge, MA, Harvard University Press

[56] Tauchen, G., 1986, "Finite State Markov-Chain Approximations to Univariate and Vector Autoregressions," Economics Letter 20, 137-151

[57] Smith, Vernon L., 1989, Theory, experiment and economics, Journal of Economic Perspectives, vol. 3, 151-169.

[58] Stiglitz, Joseph E., and A. Weiss, 1981, Credit rationing in markets withimperfect information, part I, American Economic Review, vol. 71, 393-410.

[59] Weinberg, Jonathan A., 1994, Firm size, finance, and investment, Economic Quarterly, vol. 80, 19-40.

[60] Whited, T., 2006, "External Finance Constraints and the Intertemporal Pattern of Intermittent Investment," Journal of Financial Economics 81(3), 467-502

[61] Wurgler, J., 2000, "Financial markets and the allocation of capital," Journal of Financial Economics 58, 187-214

[62] Yang, L., 2008, "The real determinants of asset sales," Journal of Finance, 63, 2231-2262