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THE EFFECT OF MERGERS AND ACQUISITIONS ON THE WEALTH, RISK, AND EFFICIENCY OF LATIN AMERICAN BANKS

A DISSERTATION

By

FELICE POLICASTRO-CACCAVALE

Submitted to the Graduate School of the
University of Texas-Pan American
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THE EFFECT OF MERGERS AND ACQUISITIONS ON THE WEALTH, RISK, AND EFFICIENCY OF LATIN AMERICAN BANKS

A Dissertation

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ABSTRACT

Policastro-Caccavale, Felice. The Effect of Mergers and Acquisitions on the Wealth, Risk, and Efficiency of Latin American Banks. Dissertation, Doctor of Philosophy in Business Administration, April 2004, 101 pp., 15 tables, 6 illustrations, 136 references, 35 titles.

Over the last few years, mergers and acquisitions within Latin America's banking sector have significantly increased. From 1995 to 2003, Latin American countries experienced more than one thousand bank merger and acquisition deals. The majority of these mergers and acquisitions have occurred between domestic and foreign banks and, as a result, foreign banks now control more than fifty percent of the banking assets of Latin America's largest economies. In addition to the increased presence of foreign banks in Latin America, the process of mergers and acquisitions has reduced the number of banks in most Latin American countries and this has lead to increased competition.

In the literature, it is recognized that the bank merger and acquisition process that has evolved in Latin America is distinct from the process that occurred in developed countries. First, bank mergers and acquisitions in Latin America have occurred mostly amongst domestic (Latin American) and foreign (US and European) banks, while in developed countries they have occurred mainly amongst the country's domestic banks. Second, the Latin American bank merger and acquisition process was primarily motivated by the need to avoid further financial crisis, while in the developed countries it was motivated by the need to reduce excess capacity. Lastly, in Latin America, government authorities initiated the merger and acquisition process, while in developed countries the process was market driven.

However, not much else is known regarding the effect of bank mergers and acquisitions in Latin America. As such, overall the objective of this study is to examine whether Latin American bank mergers and acquisitions are beneficial or not to Latin America. Specifically, this study contributes to the literature in three important aspects. First, this study presents evidence on the effect of Latin American bank mergers and acquisitions on shareholders' wealth. Second, it provides evidence on the effect of bank mergers and acquisitions on the risk of Latin American banks. Lastly, it provides evidence on the effect of bank mergers and acquisitions on the efficiency of Latin America banks.

The empirical analyses generated important findings regarding the effect of mergers and acquisitions on the wealth, risk, and efficiency of Latin American banks. First, the findings suggest that bank mergers and acquisitions lead to increased shareholder wealth in Latin America. The findings also show that large bank mergers do not yield greater wealth than small bank mergers but that cross-border bank mergers do create greater wealth than domestic bank mergers. Second, Latin American banks did not experience significant changes in risk due to mergers and acquisitions. The findings also reveal that neither large or small bank mergers nor cross-border or domestic bank mergers affect the risks of Latin American banks. Third, the results indicate that bank mergers and acquisitions increase the efficiency of Latin American banks. The results also indicate that large bank mergers are more efficient than small bank mergers and that cross-border bank mergers are not more efficient than domestic bank mergers.

DEDICATION

I dedicate this dissertation to my loving wife, Miriam, who provided me love, encouragement, and perpetual support during this process and throughout our life together. I also dedicate this dissertation to my wonderful children (Pietro, Felice, and Antonietta) who were born during my graduate studies and are my sources of energy, inspiration, and happiness. They and Miriam provided me with strength, dreams, courage, and determination to move through the final stages of this process. This dissertation is the product of their encouragement and sacrifice.

I would not have pursued this education successfully if it were not for the two hardworking people that have inspired me, and have always unconditionally supported me with their love and trust, my mom Antonieta and my dad Pietro. My Mother, whose prayers and constant love have sustained me throughout my life. My father who kindly introduced me to the family business and finance during my early age. I also dedicate this work to my sisters Fortura (Flori) and Milena, my brothers-in-law Gaetano and Omar, and my nephew and nieces Michelle, Chiara, and Dalia.

This dissertation is also dedicated to the memory of my four guardian angels, my grandparents: Felice, Fortura, Vincenzo, and Filomena. I know that you will always be close to me. Special appreciation goes to my mother-in-law, Teresa, father-in-law, Jorge.

Above all else, thanks to Almighty God, who existed before me, who will exist after me, and who walks with me. I thank you God for making this entire process possible. Nunca dudaré de ti, ni en los peores momentos.

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Felice Policastro-Caccavale

2004

CHAPTER I

INTRODUCTION

Over the last decade, bank merger and acquisition deals have notably increased in Latin America. From 1995 to 2003, Latin America experienced more than one thousand merger and acquisition deals within their financial industry (see Table 1). For instance, Brazil, Mexico, and Chile experienced 294, 165, and 110 bank merger and acquisition deals, respectively (Table 1). Mergers and acquisitions in these three Latin American countries account for a little over half of the merger and acquisition deals and about 78 percent of the value of all merger and acquisition deals that occurred between 1995 and 2003 in Latin America. Brazil and Mexico are by far the countries with the most deals in terms of value, US$ 36.9 and US$ 31.4 billion, respectively (Table 1).

Moreover, the number of Latin American bank mergers and acquisitions between domestic and foreign banks have been substantial over the last decade (Crystal *et al.*, 2002;Levy & Micco, 2003). Between 1995 and 2000, the foreign share of Latin America's banking assets grew significantly. For example, in Latin America's largest economies (*i.e.*, Argentina, Chile, Mexico, and Venezuela) foreign banks control approximately 50 percent or more of the banking assets (Figure 1). As a result, Latin American banks are experiencing significant competitive pressure from foreign banks (Folkerts-Landau & Chadha, 1999). This intense competitive pressure is unprecedented and is changing the organizational structure and operating environment in which Latin American banks operate (Levy & Micco, 2003).

Table 1

Bank Mergers and Acquisitions in Latin American from 1995 to 2003

Target Country	Value Including Net Debt of Target [a]	Market Share (%)	Cumulative Market Share (%)	Number of Deals	Cumulative Number of Deal
Brazil	36,856	36	36	294	294
Mexico	31,457	31	67	165	459
Chile	11,492	11	78	110	569
Other Countries [b]	22,518	22	100	571	1140
Industry Total	102,323	100		1,140	

Note: [a] In million US$. [b] Other countries include: Argentina, Bolivia, Colombia, Costa Rica, El Salvador, Ecuador, Guatemala, Guyana, Honduras, Nicaragua, Panamá, Paraguay, Perú, Surinam, Uruguay, and Venezuela. Source: Thomson Financial SDC Platinum

In addition to the increased presence of foreign banks, the number of banks in most Latin American countries has fallen dramatically. For example, in Argentina and Brazil the number of banks dropped from 206 and 245 banks in 1994 to 113 and 193 banks in 2000 (Table 2). Amongst the bank deposit shares per country presented in Table 2, Mexico's 10 largest banks experienced the largest increase in market concentration going from 80.8% in total deposits in 1994 to 94.5% in 2000. This increase was primarily due to the sale of the two largest banks in Mexico to two large Spanish banks, which had already acquired other banks in Mexico (Gelos & Roldos, 2002). Note that by 2000, the 10 largest banks in each country (except for Venezuela) controlled over 80% of the deposits. Moreover, Mexico experienced the highest market concentration for the largest 3 banks, follow by Brazil, then Venezuela. For instance, Mexico's 3 largest banks experienced the largest increase (8%) in market concentration going from 48.3% in total deposits in 1994 to 56.3% in 2000. Similarly, Brazil's 3 largest banks controlled 55.2% of the total deposits in 2000 compared to 49.9% in 1994.

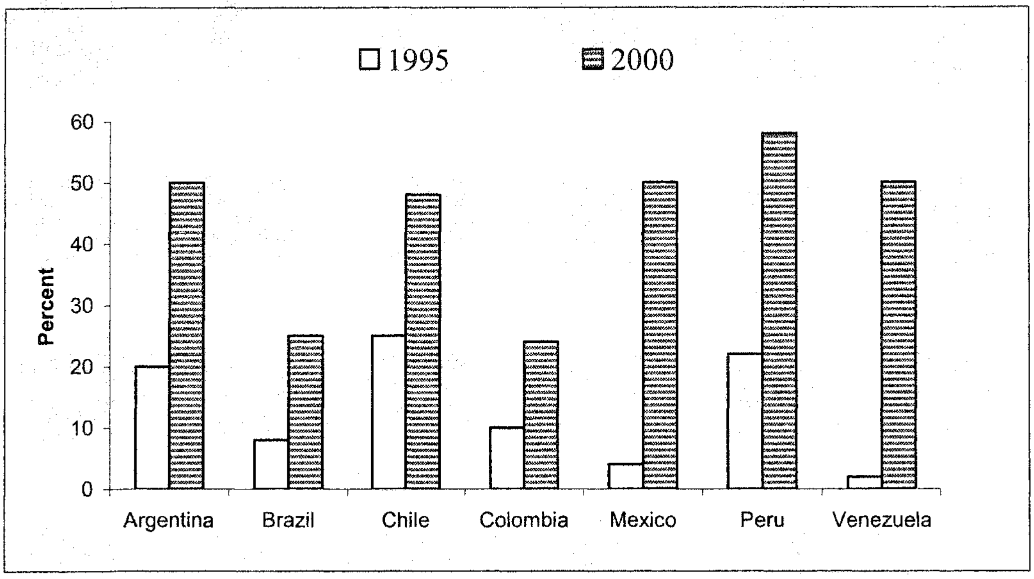

Figure 1

Foreign Share of Latin American Banking System Assets

Source: Crystal *et al.*, 2002. Reprinted with permission.

It should be noted, that the bank merger and acquisition process that has evolved in Latin America has several features that distinguish it from the merger and acquisition process of developed countries. First, bank mergers and acquisitions in Latin America have occurred mostly among domestic (Latin American) and foreign (US and European) banks, while in developed countries bank mergers and acquisitions have occurred mainly between the domestic banks operating within a developed country's borders (Gelos & Roldos, 2002). Second, the Latin American bank merger and acquisition process has been primarily motivated by the need to avoid further financial crises, while the bank merger and acquisition process in developed countries has been motivated by the need to reduce excess capacity (Crystal *et al.*, 2002; Gelos & Roldos, 2002). Lastly, in Latin America, government authorities initiated the merger and acquisition process, while in developed countries the process can be characterized as market driven (Mathieson *et al.*, 2000; Gelos & Roldos, 2002).

Table 2

Number of Banks and Total Deposit for 1994 and 2000 per Selected Latin American Country

		Percentage Total Deposit Share (1994)			Percentage Total Deposit Share (2000)	
Country	Number of Banks (1994)	3 Largest Banks	10Largest Banks	Number of Banks (2000)	3 Largest Banks	10 Largest Banks
Argentina	206	39.1	73.1	113	39.8	80.7
Brazil	245	49.9	78.8	193	55.2	85.6
Chile	37	39.5	79.1	29	39.5	82.0
Mexico	36	48.3	80.8	23	56.3	94.5
Venezuela	43	43.9	78.6	42	46.7	75.7

Source: The figures are based on data from Fitch IBCA's BankScope and official data obtained from the central banks of each country (Mathieson *et al.*, 2001; Gelos & Roldos, 2002). Reprinted with permission.

Additionally, several motives have been advanced in the literature regarding why Latin American governments liberalized the entry of foreign banks into their country (Levine, 1997; Dages *et al.*, 2000; Peek & Rosengren, 2000). First, it was believed that foreign banks would improve the scope and quality of financial services provided to local customers and that they would provide newer, more advance banking technologies and managerial skills (Vasconcelos & Fucidji, 2002). Second, it was reasoned that as Latin American banks merged with foreign banks, there would be greater access to international capital and this would improve the supply of domestic credit and make bank loans less vulnerable during periods of domestic credit austerity (Dages *et al.*, 2000). Third, the presence of foreign banks could provide a "safe haven" for local depositors who might, in periods of financial distress, withdraw their savings and deposit them internationally (Peek & Rosengren, 2000). Fourth, since foreign banks still have to meet the regulatory requirements of their country of origin, there would be regulatory spillover effects, which would probably lead to an improved domestic banking regulatory and supervisory process that is stronger, more transparent and efficient (Glaessner & Oks, 1994; Dages *et al.*, 2000; Peek & Rosengren, 2000). Fifth, it was believed that the presence of foreign banks would increase competition in the banking sector and this would lead to a reduction in interest spreads and other bank costs to borrowers and other clients (Evanoff & Örs, 2003). Sixth, the presence of foreign banks would increase the ability of domestic banks to assess and supervise risk more critically (Dages *et al.*, 2000). Lastly, it was expected that the presence of foreign banks would make Latin America's banking system more dynamic and efficient and this would lead to enhanced economic growth (Levine, 1997; Kono & Schuknecht, 1998; Claessens & Glaessner, 1998; Scholtens, 2000; Tamirisa *et al.*, 2000; Claessens *et al.*, 2001; Cetorelli, 2001).

Alternatively, cross-country bank mergers and acquisitions will not occur if foreign banks are not motivated to go abroad. There are several reasons why foreign banks could go abroad. First, international bank mergers and acquisitions are expected to improved operating efficiency and enhanced profits or shareholder wealth (Clarke *et al.*, 2001; Choi & Tsai, 2003; Berger & Mester, 2003; Gugler *et al.*, 2003). Second, international bank mergers and acquisitions might produce international diversification benefits in the form of lower risks and lower cost of capital (Dages *et al.*, 2000 and Choi

& Tsai, 2003). Third, international bank mergers and acquisitions in Latin America could provide a potential foothold in the ever increasing bank market that is evolving in Latin America due to an increasing population, raising standards of living, and a maturing banking market (Focaralli & Pozzolo, 2000; Sebastian & Hernansanz, 2000). Lastly, it is relatively more affordable to acquire banks in developing countries (such as in Latin America) than in developed countries (Sebastian & Hernansanz, 2000).

Given the potential benefits of bank mergers and acquisitions and the increasing numbers of bank mergers and acquisitions in Latin American countries, the objective of this dissertation is to determine whether bank mergers and acquisitions are beneficial to banks in Latin American, which in most cases are the target banks of most of the bank merger and acquisitions deals. Specifically, this dissertation contributes to the literature in three important aspects. First, this dissertation presents evidence on the effect of Latin American bank mergers and acquisitions on shareholder wealth. Second, it examines the effect of bank mergers and acquisitions on the risk of Latin American banks. Thirdly, the study provides empirical evidence on the effect of bank mergers and acquisitions on the efficiency of Latin America banks.

Problem Statement

The literature regarding bank mergers and acquisitions can be divided into three broad groups: (1) the effect of bank mergers and acquisitions on shareholder wealth, (2) the effects of bank mergers and acquisitions on risk, and (3) the effect of bank mergers and acquisitions on efficiency. Within the first group of studies, several hypotheses have been developed to describe the effect of mergers and acquisitions on shareholder wealth. Among the most important hypotheses are the synergy hypothesis, the information hypothesis, and the market-power hypothesis. The synergy hypothesis is based on the presumption that mergers and acquisitions will result in shareholder wealth gains due to potential economies of scale and scope (Seth *et al.*, 2000; Weber & Dholakia, 2000; Slusky & Caves, 1991; Swary, 1983). The information hypothesis suggests that mergers and acquisitions create value if capital markets are efficient in the semi-strong form (Hawawini & Swary, 1990). The market-power hypothesis maintains that mergers and acquisitions will increase industry concentration, which permits firms to increase prices and hence increase shareholder wealth (Hawawini & Swary, 1990). Alternatively, the manager-utility-maximization hypothesis and Roll's hubris hypothesis (Roll, 1986) state that mergers and acquisitions are a convenient way for management to enhance company growth at the expense of shareholder wealth.

A number of empirical studies have examined the effects of bank mergers and acquisitions on shareholder wealth. Evidence indicating that target banks experience wealth gains is abundant (Hudgins & Seifert, 1996;Zhang, 1995; Houston & Ryngaert, 1994; Cornett & De, 1991;Hawawini & Swary, 1990; Hannan & Wolken, 1989). However, empirical evidence concerning the effects of mergers and acquisitions on bidder banks is more limited and inconclusive. In this case, a group of studies document positive shareholder wealth effects (Chavaltanpipat *et al.*, 1999; Cornett & De, 1991; James & Weir, 1987; Desai & Stover, 1985) while other studies find negative shareholder wealth effects (Hudgins & Seifert, 1996; Madura & Wiant, 1994; Cornett & Tehranian, 1992; Wall & Gup, 1989; Neely, 1987). Another group of studies have found positive, combined (target plus bidder) wealth effects (Houston *et al.*, 2001; Becher, 2000; Kane, 2000; Houston & Ryngaert, 1994). Regarding cross-border bank mergers, Cybo-Ottone and Murgia (2000) finds that cross-border mergers create wealth gains for both bidding and target banks while the study of Kiymaz (in press) reports that only target banks experience wealth gains. Lastly, Waheed and Mathur (1995) document positive wealth gains for bidding banks who expand into developing countries but no gains when bidding banks expand into developed countries.

The second area of research is related to the effect of bank mergers and acquisitions on risk. In this area, two opposing views can be found in the mergers and acquisition literature. The first view is based on the notion that mergers and acquisitions are a venue for banks to diversify. Thus, it is assumed that mergers and acquisitions have the potential to reduce bank risk (Choi & Tsai, 2003; Amihud *et al.*, 2002; Dages *et al.*, 2000; Vander Vennet, 1996). Alternatively, the second view founded on a moral hazard dilemma created by the deposit insurance, which could encourage large merged banks to undertake risky projects because they believe they are "too-big-to-fail" (Levy & Micco, 2003; Hughes *et al.*, 2001; De Nicoló, 2000; Hughes *et al.*, 1999; Berger *et al.*, 1999; Amihud & Miller, 1998; Berger, 1998; Hughes *et al.*, 1996).

The number of empirical studies that have examined whether bank mergers and acquisitions increase or decrease risk is very limited (Amel *et al.*, in press). A survey by the Group of Ten (2001) documents that the empirical findings are mixed, with some studies finding that mergers and acquisitions lead to reductions in risk (Craig & Cabral Dos Santos, 1997; Hughes *et al.*, 1999) while other studies suggest that mergers and acquisitions increase risk (De Nicoló, 2000; Acharya *et al.*, 2002, Berger *et al.*, 1999; Berger, 2003).

Regarding the third area of research, theory suggests that mergers and acquisitions have the potential to increase efficiency (Berger & Humphrey, 1992b; Shaffer, 1993; Rhoades, 1998; Garden & Ralston, 1999). The theory presumes that bank mergers and acquisitions lead to increased efficiency. This theory suggests that increase efficiencies will be forthcoming from mergers and acquisitions because they will force banks to consider much needed operational improvements, substitute for inefficient management, and/or implements new, but unpleasant reorganizational processes (Berger, 2003). Alternatively, mergers and acquisitions can also decrease bank efficiency. This could occur because increased costs (e.g., consultant fees, severance pay, legal expenses, etc.) associated with the mergers and acquisitions, downsizing disruptions, the clashing of organizational cultures, and/or managerial turf battles exist (Berger, 2003).

The testing of these two efficiency propositions has received much attention in the banking literature. However, the results have been mixed and the studies have mainly focused on developed economies (Fried *et al.*, 1999). In the US, a group of studies found positive merger and acquisition effects on bank efficiency (Akhavein *et al.*, 1997; DeLong, 2003; Ely & Song, 2000) while another group of studies presented no efficiency gains (Peristiani, 1997; Berger, 1998; Rhoades, 1998). In Europe, the results are also mixed. Here too, some studies report that bank mergers and acquisitions improve efficiencies (Resti, 1998; Haynes & Thompson, 1999) while other studies provide evidence of no efficiency improvements (Vander Vennet, 1996; Altunbas *et al.*, 1997; Focarelli *et al.*, 2002). Lastly, for the case of developing countries, the results indicate that bank mergers and acquisitions increased the efficiency of banks (i.e. the study of Isik and Hassan (2003) in Turkey and Yu and Luu (2003) in Taiwan).

It is evident from the above-cited literature regarding the effect of bank mergers and acquisitions on the wealth, risk, and efficiency that three important and timely gaps in the literature are present. First, research regarding the shareholder wealth effect of bank mergers and acquisitions has overwhelmly being focused on US and Europe and missing from the literature are studies that examine this issue in Latin America. Second, similarly to the previous case no study has examined the effect of mergers and acquisitions on the risk of Latin American banks. Lastly, absent from the literature are studies that have examined the effect of mergers and acquisitions on the efficiency of Latin American banks.

Therefore, the purpose of this dissertation is to provide empirical evidence regarding the effect of mergers and acquisitions on the wealth, risk, and efficiency of Latin American banks. An examination of these issues for Latin American banks is timely and important, given the increasing number of mergers and acquisitions in this part of the world. For example, between 1995 and 2003 bank mergers and acquisitions (both cross-border and domestic) in Latin America amounted to US$ 102 billion (see Table 1). Additionally, the results obtained from studying these issues would be informative and useful to Latin American bank managers and shareholders as well as bank policy-makers and regulators.

CHAPTER II

THE EFFECT OF MERGERS AND ACQUISITIONS ON THE WEALTH OF LATIN AMERICAN BANKS

Introduction

Various hypotheses have been advanced to explain why mergers and acquisitions lead to increased shareholder wealth. Three of the most important hypotheses are the synergy hypothesis, the information hypothesis, and the market-power hypothesis. The synergy hypothesis states that mergers and acquisitions will create more value if the potential economies of scale and scope are large (Seth *et al.*, 2000; Slusky & Caves, 1991; Swary, 1983; Weber & Dholakia, 2000). The information hypothesis suggests that mergers and acquisitions create value if capital markets are efficient in the semi-strong form (Hawawini & Swary, 1990). The market-power hypothesis states that as mergers and acquisitions increase concentration in the industry, firms can increase their prices and as a result shareholders wealth increases (Hawawini & Swary, 1990). Alternatively, the manager-utility-maximization hypothesis and Roll's hubris hypothesis (Roll, 1986) suggests that because manager incentives are tied to firm growth, they will overpay for target firms and therefore decrease shareholder wealth.

A number of empirical studies have examined whether bank mergers and acquisitions have lead to an increase or decrease in shareholder wealth. For example, Hudgins and Seifert (1996), Houston and Ryngaert (1994), Cornett and De (1991), and Hawawini and Swary (1990) provide evidence indicating that target banks experience positive wealth effects. The evidence regarding bidder banks, however, is mixed. In this case, the studies of Cornett & De, 1991, Desai & Stover, 1985 and James & Weir, 1987 document positive shareholder wealth effects while the studies of Neely (1987), Madura and Wiant (1994), Wall and Gup (1989), Hudgins and Seifert (1996) and Cornett and Tehranian (1992) document negative shareholder wealth effects. However, the studies of Becher (2000), Kane (2000), Houston and Ryngaert (1994), Houston *et al.*, (2001) find positive overall effects (target plus bidder). Regarding cross-border bank mergers, the study of Cybo-Ottone and Murgia (2000) finds that they create wealth gains for both bidding and target banks while the study of Kiymaz (in press) finds that targets experience wealth gains but that bidders do not. Lastly, Waheed and Mathur (1995) find that cross-border bank mergers create significant wealth gains for bidding banks who expand into developing countries but none when they expand into developed countries.

To date, research regarding the shareholder wealth effect of bank mergers and acquisitions has being dominated by US studies and to a lesser extend European studies. Missing from the literature are studies that examine the effect of bank mergers and acquisitions on the shareholder wealth of Latin American banks. This issue is important and significant, given that between 1995 and 2003 bank mergers and acquisitions (both cross-border and domestic) in Latin America amounted to US$ 102 billion (Table 1 in Chapter I). This tremendous increase in Latin American bank mergers and acquisitions has raised a number of questions: Do bank mergers and acquisitions create shareholder wealth for banks in Latin America? Do large bank mergers lead to greater wealth effects than small bank mergers? Do cross-border bank mergers and acquisitions generate greater wealth than domestic bank mergers? Do large transaction merger deals lead to greater wealth than small transaction deals? Do majority owned merged banks generate more wealth than minority owned merged banks? The responses to these questions are insightful and informative to Latin American bank managers and shareholders who are concerned with increased profitability and market share.

Hence, the overall purpose of this chapter is to investigate the effect of Latin American bank mergers and acquisitions on the shareholder wealth of Latin American banks.[1] To my knowledge, this is the first study to provide a systematic understanding of this issue for Latin America. Overall, the findings of this chapter indicate that Latin American bank mergers and acquisitions created significant wealth effects for Latin American target banks. The findings also reveal that (a) large bank mergers do not lead to greater wealth effects than small bank mergers, (b) cross-border bank mergers have greater wealth effects than domestic bank mergers, (c) large transaction merger deals have greater wealth effects than small transaction deals, and (d) minority owned merged banks have greater wealth effects than majority owned merged banks.

The balance of this chapter is organized as follows. The following section presents the methods used in this chapter. The sample design and data summary are presented next. Section 4 discusses the empirical results while section 5 provides a summary, conclusions, and the implications gain in this study.

---

[1] This study focuses only on Latin American target banks since the number of publicly traded bidder banks is very small. In addition, only banks from Brazil, Chile, and Mexico are included because mergers and acquisitions in these three countries account for about 80 percent of the merger and acquisition deals in Latin America. These three countries also have the most up-to-date and complete data that is currently available in Latin America.

Methods

This section presents the methods used to examine the effect of bank mergers and acquisitions on the wealth of Latin American banks. In the first subsection, I explain how the abnormal returns of Latin American banks are calculated. In the second subsection, I describe the statistical tests, which allow me to determine if the abnormal returns are significant.

Calculating Abnormal Returns

To calculate the abnormal returns of Latin American banks due to mergers and acquisitions, I employ the commonly used standard event study approach (Brown & Warner, 1985; Waheed & Mathur, 1995; Fraser *et al.*, 1997; Becher, 2000; Bessler & Murtagh, 2002; Cybo-Ottone & Murgia, 2000; DeLong, 2001). The abnormal returns for bank *i* are calculated as the difference between the observed returns, $R_{i\tau}$, during the event window and the forecasted "normal" returns, $\hat{R}_{i\tau}$, in absence of the merger and acquisition event.

Following Cybo-Ottone and Murgia (2000) and Heinkel and Kraus (1988), I use a 280-day "estimation period" ($t = -300$ to $t = -21$ days before the announcement day $\tau = 0$) and a 41-day "event window" ($\tau = -20$ to $\tau = +20$ days before and after the announcement day $\tau = 0$).[2] Hence, the abnormal returns ($AR_{i\tau}$) for bank i at time τ is calculated as:

$$AR_{i\tau} = R_{i\tau} - \hat{R}_{i\tau}. \tag{1}$$

The forecasted returns, $\tilde{R}_{i\tau}$, are obtained using the following equation:

$$\hat{R}_{i\tau} = \hat{\alpha}_i + \hat{\beta}_i R_{m\tau} \tag{2}$$

where $R_{m\tau}$ represent the market index returns and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are parameters that are estimated using the following single factor market model:[3]

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \tag{3}$$

where ε_{it} is a disturbance term with mean zero and variance $\sigma^2_{\varepsilon i}$.

However, it should be noted that the stocks of Latin American banks are infrequently traded and therefore the estimation of equation (3) needs to be adjusted to account for this infrequency, otherwise the estimated parameters will be biased (Luoma *et al.*, 1996; Fowler & Rorke, 1983; Dimson, 1979). Dimson and Marsh (1983) and Maynes and Rumsey (1993) have shown that this biasness can be resolved by using the trade-to-trade returns approach and a regression that corrects for the heteroscedasticity that results because of the use of the trade-to-trade returns approach. Following this suggestion, I employ the trade-to-trade returns approach and specify the heteroscedasticity corrected regression equation as:

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[2] Note that the symbol τ indicates observations within the event window, while t indicates observations in the estimation interval.

[3] The mean-adjusted market model and the market-adjusted-return model have also been used to obtain forecasted returns. However, Hawawini and Swary (1990), Bessler and Nohel (2000), and Bessler and Murtagh (2002), argue that these models do not result in improved explanatory power when using daily data, and therefore the parsimonious single factor market model is preferred.

$$\frac{R_{it}}{\sqrt{d_t}} = \alpha_i \frac{1}{\sqrt{d_t}} + \beta_i \frac{R_{mt}}{\sqrt{d_t}} + v_{it} \tag{4}$$

where d_t is the length in days of the period between two observed trades for bank i and v_{it} is a disturbance term. Note that the returns as well as the constant term are divided by $\sqrt{d_t}$ to allow for different period lengths to ensure that the estimated parameters are efficient as well as unbiased (Dimson & Marsh, 1983). The estimated parameters ($\hat{\alpha}_i$ and $\hat{\beta}_i$) from equation (4) are then substituted into equation (2) to obtain the forecasted returns.

Testing the Significance of Abnormal Returns

The significance of the abnormal returns is tested using Maynes and Rumsey's 1993 modified, nonparametric rank test. This test has consistently shown to perform better than other parametric and nonparametric tests employed when dealing with thinly traded stocks (Corrado, 1989; Corrado & Zivney, 1992; Maynes and Rumsey, 1993; Campbell & Wasley, 1993; MacKinlay, 1997). In addition, Corrado (1989) and Corrado and Zivney (1992) argue that the normal distribution does not effectively describe the distribution of returns in the presence of thin trading, and thus rule out the use of parametric tests.

Maynes and Rumsey (1993) modified Corrado's (1989) nonparametric rank test accommodating it to account for missing returns and adjusting for heteroscedasticity due to missing trades. In this test the abnormal returns for each bank i at time t are first standardized (SAR_{it}) and then transformed into their respective ranks (K_{it}), in which the highest rank is assigned to the higher standardized abnormal return. Thus, following Maynes and Rumsey (1993) the ranks are obtain by:

$$K_{it} = rank(SAR_{it}), \quad t = \text{-}300, \ldots + 20 \tag{5}$$

where K_{it} denotes the rank of the standardized abnormal return SAR_{it} for bank *i* at time *t* for the 321-day time sample, $SAR_{it} \geq SAR_{ij}$ implying that $K_{it} \geq K_{ij}$ and $321 \geq K_{ij} \geq 1$.

The standardized abnormal return ranks for bank *i* at time *t* is given by:

$$K_{it} = rank\left(SAR_{it}\right) = rank\left(\frac{AR_{it}}{S(AR_i)}\right), \tag{6}$$

where $S(AR_i) = \left\{\frac{1}{T_i - 1}\sum_{t=1}^{T_i}\left(AR_{it}\right)^2\right\}^{1/2}$ and T_i is the number of observations in the estimation interval for bank *i*.

The average rank $\bar{K}_i$ is $\frac{1}{2}\left(M_i + 1\right)$, the standard deviation is $\sqrt{\left(M_i^2 - 1\right)/12}$ and M_i is the number of nonmissing returns for bank *i* during both the entire period.

Following Maynes and Rumsey (1993) the ranks for each bank *i* at time *t* are transformed as follows:

$$K'_{it} = \frac{K_{it} - \bar{K}_i}{\sqrt{\left(M_i^2 - 1\right)/12}}. \tag{7}$$

Given that $\bar{K}_i$ and $\sqrt{\left(M_i^2 - 1\right)/12}$ are not estimated, they are known, the distribution of the transformed ranks will be uniform (with mean zero and variance one) with an approximate standard normal distribution as N banks increases. Thus, the nonparametric rank test for the standardized abnormal returns is given by:

$$T^{AAR} = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} K_{it}^{'} . \tag{8}$$

The nonparametric rank test for the average cumulative standardized abnormal returns (CSAR) estimated across all N banks between event days E_1 and E_2 (for a total length of $L = E_2 - E_1 + 1$) is calculated as:

$$T_L^{CSAR} = \frac{1}{\sqrt{L}} \sum_{\tau=E_1}^{E_2} \frac{1}{\sqrt{N}} \sum_{i=1}^{N} K_{it}^{'} . \tag{9}$$

If results from equation (8) and (9) are significantly different from zero, one can conclude that Latin American bank mergers and acquisitions have a significant effect on shareholders wealth.

Lastly, significant differences between mergers categories such as: (1) large merged banks vs. small merged banks, (2) cross-border bank mergers vs. domestic bank mergers, (3) large transaction deal vs. small transaction deal, and (4) majority owned bank mergers vs. minority owned bank mergers is calculated as:

$$T_L^{\Delta CAR} = \frac{CAAR_1 - CAAR_2}{\sqrt{L} * \sqrt{\frac{\hat{S}_1^2}{N_1} + \frac{\hat{S}_2^2}{N_2}}} \tag{10}$$

where $CAAR_1$ and $CAAR_2$ are the cumulative average abnormal returns for group 1 and 2, respectively, N_1 and N_2 are the number of banks in group 1 and 2, N is the total number of banks in the entire sample ($N = N_1 + N_2$), L is the window length, and the variance for each group is given by:

$$\hat{S}_{Group}^2 = \left\{ \frac{1}{T_i - 1} \sum_{t=1}^{T_i} \left(AR_{it} \right)^2 \right\} \tag{11}$$

Sample Design and Data Summary

The sample of banks used in this study was selected based on an analysis of the Latin American bank merger and acquisition data contained in the SDC-Platinum database. I only selected mergers in which the date of announcement was available, the deal was closed, and the target was a Latin American bank listed in its respective stock market. Initially, both bidder (cross-border and domestic) and Latin American target banks were selected but the bidder banks were eventually dropped since the number of bidder bank that were publicly traded were few. Thus, the final sample consisted of 30 Latin American target banks of which 15 are from Brazil, 7 from Chile, and 8 from Mexico.[4] The market indices for Brazil, Chile, and Mexico were obtained from DataStream and stock prices and financial information from Economatica.

The summary statistics of the bank mergers and acquisitions in the sample are presented in Table 3. Panel A shows the number and value of deals, total assets, and type of deals (majority owned mergers vs. minority owned mergers and cross-border bank mergers vs. domestic bank mergers) by year. Note that the largest number of deals (7) occurred in the year 2000 and these totaled US$ 2,403 million. In 2002, the five deals that were completed totaled US$ 3,706 million. The total deal value in the sample is US$ 10,530 million with a mean value of US$ 421 million. Similarly, the banks' total asset value and mean for the banks in the sample are US$ 389,618 million and US$ 12,987 million, respectively. Out of the 30 deals, 19 are among domestic banks and 11 are among cross-border banks. Moreover, in 13 out of the 30 deals less than 50% of the Latin American target bank was acquired, while in 17 out 30 deals, more than 50% of the Latin American target bank was acquired.

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[4] It should be noted that these three countries account for about 80% of the Latin American bank merger and acquisition value for the period 1995-2003 (see Table 1, Chapter I). These countries also account for about 50 percent of the Latin American merger and acquisition deals for this same period. Lastly, these countries have the best and most complete bank data that is currently available.

Panel B presents a partition of the merger and acquisition deals by country of origin and year. Out of the three target countries, Mexico is the one with the highest number of cross-border deals (7 out of 8 deals). In Brazil, 11 deals are among domestic banks and 3 are cross-border deals. Lastly, Spain is the foreign country with the highest cross-border merger deals (5 out of 11 deals).

The sample of banks used in this study is comparable to the sample of banks used in other European and US studies (see Table 4). The most significant difference between the sample used in this study and those of other studies is the size of the target banks. In this study, the average bank size is about US$ 13 million compared to the US$ 24 million of the Cybo-Ottone and Murgia (2000) study and the US$ 19 million of the Siems (1996) study. The average deal value is much higher in the European studies. For example, Goergen and Renneboog (2004) and Cybo-Ottone and Murgia (2000) report that the average value of the merger and acquisition deals are US$ 5,469 million and US$1,612 million, respectively, while the US study of Siems (1996) reports the highest average value of the deals of US$ 2,774 million. The reasons why the European mergers and acquisition deals are larger compared to those of the US and Latin American studies is because the sample used in the European studies only selected large merger deals (larger than US$ 100 million). Another reason why European banks are larger than US Banks is that on average the 10 largest European banks are 1.5 times larger than the 10 largest US banks (Cybo-Ottone & Murgia, 2000).

Table 3

Summary Statistics of Mergers and Acquisitions of the Latin American bank Sample

Panel A. Number of deals, value of deal, total assets and type of deal

	Transaction Deals and Value [a]			Total Assets [a]		Type of Deal			
Year	# of Deals	Total Deal Value	Mean Deal Value	Total Value	Mean Value	Own < than 50% after Merger	Own > than 50% after Merger	Cross-border	Domestic
1995	1	335	335	3,464	3,464		1		1
1996	1	435	435	29,219	29,219	1		1	
1997	1	-	-	13,157	13,157		1		1
1998	3	694	231	8,073	2,691		3	2	1
1999	5	921	230	46,267	9,253	3	2		5
2000	7	2,403	481	70,701	10,100	2	5	3	4
2001	5	1,243	311	112,491	22,498	5		2	3
2002	5	3,706	741	79,291	15,858	1	4	2	3
2003	2	792	396	26,954	13,477	1	1	1	1
Total	30	10,530	421	389,618	12,987	13	17	11	19

Table 3 (*continued*)

Summary Statistics of Mergers and Acquisitions of the Latin American Bank Sample

Panel B. Partition of deals by country and year

		Year									
Target Country	Bidder Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Brazil	Brazil	1		1	1	2	3	2	1	1	12
	Netherlands				1						1
	Portugal						1				1
	United States							1			1
	Total	1		1	2	2	4	3	1	1	15
Chile	Chile					3		1	2		6
	Spain				1						1
	Total				1	3		1	2		7
Mexico	Canada		1								1
	Mexico						1				1
	Spain						2	1	1		4
	United Kingdom								1		1
	United States									1	1
	Total		1				3	1	2	1	8
Grand Total		1	1	1	3	5	7	5	5	2	30

Note: [a] Values are in Million US$.

Table 4

Comparison of Some Statistics of Latin American Bank Mergers and Acquisitions in Sample with Selected European and US Studies (in millions of US$)

Statistics	Latin America	European [a]		US Bank Mergers Studies [a]				
	This Study	GR (2004)	CM (2000)	CT (1992)	HR (1994)	Z (1995)	P (1996)	S (1996)
Target Bank mergers in Sample	30	56	54	30	153	107	48	19
Deal Value	421	5,469	1,612	348	na	na	na	2,774
Size of Targets (Total Assets)	13	na	24	6	na	2	4	19

Note: [a] Legend: GR: Goergen and Renneboog (2004); CM: Cybo-Ottone and Murgia (2000); CT: Cornett and Tehranian (1992); HR: Houston and Ryngaert (1994); Z: Zhang (1995); P: Pilloff (1996); S: Siems (1996). Source: Modified from Cybo-Ottone and Murgia (2000).

Table 5 presents the frequency of the stock price data used to estimate the abnormal returns for each country. It includes both the estimation period (280 days) and the event window interval (41). Note that for the entire sample 24 percent of prices were missing. Additionally, the maximum consecutive days that a bank reports missing prices is 18-days, which is the case of one Brazilian bank. The highest number of infrequent prices (520) is the case of single-day with missing prices. When observing each country individually, the case of Brazil shows the highest thinly trading data with 30 percent of the prices missing. Chile, however, is the country with the lowest level of missing prices (16%). Lastly, only 22 percent of the prices are missing for Mexican banks.

Table 5

Infrequent Stock Trading by Country

		Brazil		Chile		Mexico		Total	
	days	# of Cases	Subtotal	# of Cases	Subtotal	# of Cases	Subtotal	Cases	Total
Consecutive Trading Days with Missing Prices	1	345	345	96	96	79	79	520	520
	2	125	250	20	40	28	56	173	346
	3	64	192	11	33	12	36	87	261
	4	35	140	4	16	9	36	48	192
	5	20	100	6	30	6	30	32	160
	6	10	60	1	6	6	36	17	102
	7	13	91	1	7	5	35	19	133
	8	6	48	4	32	4	32	14	112
	9	5	45	1	9	3	27	9	81
	10	1	10	1	10	1	10	3	30
	11	3	33	0	0	2	22	5	55
	12	1	12	1	12	0	0	2	24
	13	2	26	2	26	1	13	5	65
	14	1	14	0	0	2	28	3	42
	15	3	45	0	0	1	15	4	60
	16	0	0	0	0	1	16	1	16
	18	1	18	0	0	0	0	1	18
Total Missing			1,429		363		554		2,346
# of Trading Days[a]			4,815		2,247		2,568		9,630
% Missing			30		16		22		24

Note: [a] The number of trading days the stock markets were open was 321 days after adjusting for official holidays for each country.

Empirical Results

In this dissertation, the abnormal returns of Latin American banks were calculated to examine whether bank mergers and acquisitions increase or decrease Latin American shareholder wealth. The abnormal returns and cumulative abnormal returns were statistically tested to determine if the mergers and acquisitions generate significant changes in Latin American shareholder wealth. The results are presented next.

Figure 2 illustrates the CAARs and the AARs during the window analysis. It can be observed that before the announcement period both the CAARs and AARs are slightly positive (days -20 to -15) and drop to the lowest level at day -10. After day -8 the CAARs and AARs experience a rapid increase peaking on the day of the announcement and after this day they slowly decrease. These positive CAARs indicate that mergers and acquisitions are anticipated around 8 days before the announcement. Alternatively, the CAARs show a downward market adjustment movement right after the day of the announcement. These trends suggest the existence of some information leakages in the market prior to the announcement and a bearing market adjustment trend after the merger and acquisition announcement.

Table 6 reports the CAARs for several combined windows. It is worth noting that only for the -3 to +3 days window and for the announcement day did the Latin American shareholders experience positive and significant wealth gains (1.14% and 3.88%). These positive and significant abnormal returns are consistent with previous studies suggesting that the shareholders of target banks experience wealth gains due to mergers and acquisitions. The results also indicate positive wealth effects after announcement for windows (-4 to +4), (-5 to +5), and (-10 to +10); however, these results are not statistically significant. Lastly, for the windows (-15 to +15) and (-20 to +20) CAARs are negative but insignificant.

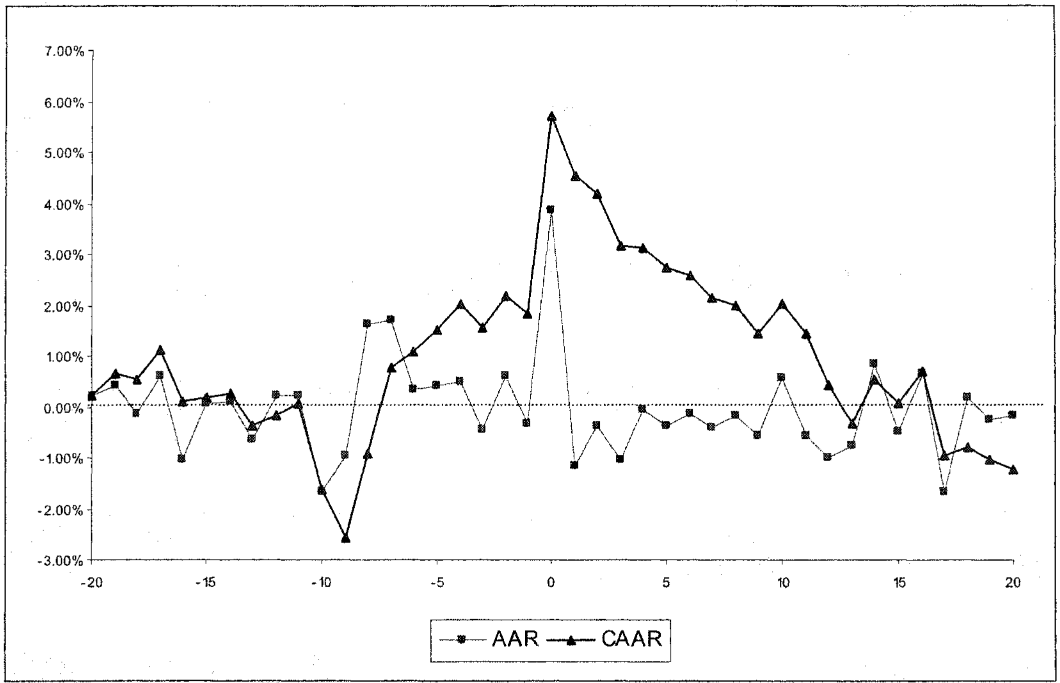

Figure 2

AARs and CAARs for Entire Sample

Table 6

Cumulative Average Abnormal Returns

Combined	
Windows	%CAAR
Day 0	3.88 **
(-2 to +2)	2.63
(-3 to +3)	1.14 **
(-4 to +4)	1.58
(-5 to +5)	1.63
(-10 to 10)	1.96
(-15 to 15)	-0.06
(-20 to 20)	-1.23

Note: *, **, *** Indicates significant results at the 10, 5 and 1 percent level.

Figure 3 depicts the CAARs for both small and large Latin American target banks. It is quite clear that the CAARs for large banks are generally higher than the CAARs for small banks. Note that for large bank mergers, the CAARs are positive 18 days before to 11 days after the announcement and a day after (+12) exhibit a sharp decline reaching negative CAARs. For the case of small bank mergers, the CAARs are slightly negative during the period before the announcement and then display a sharp increased after the day -9 and afterwards the CAARs are positive. However, the differences between large bank merger CAARs and the small bank merger CAARs are very moderate in amplitude.

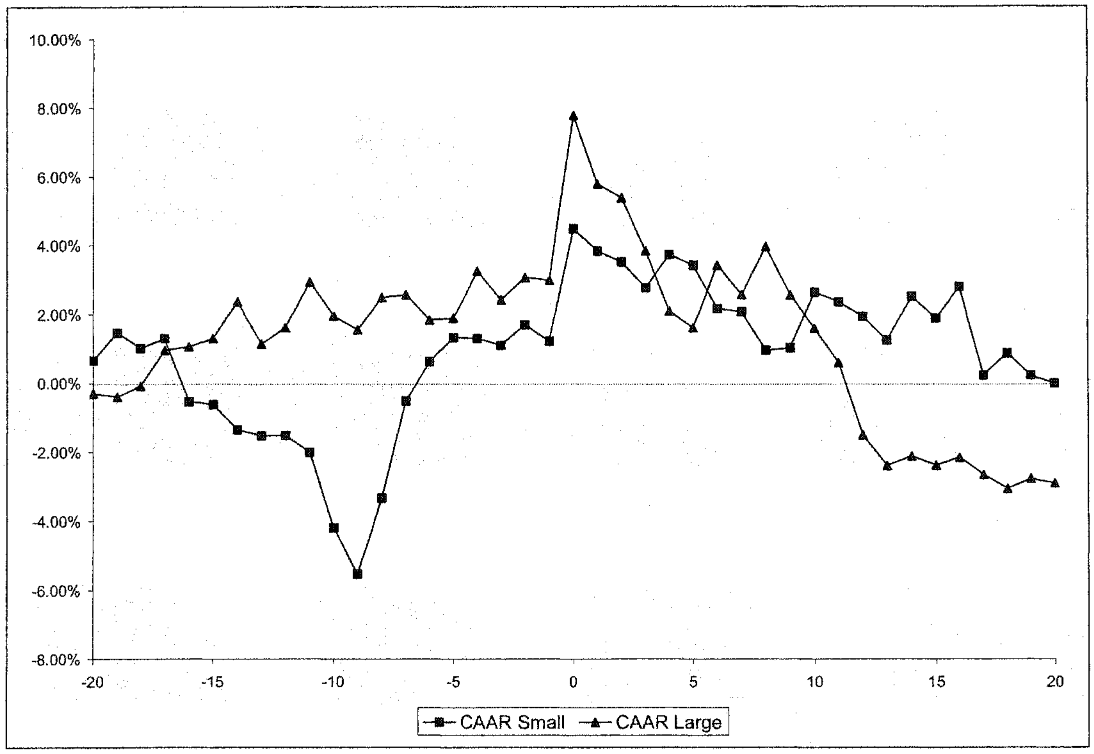

Figure 3

CAARs for Small Bank Targets vs. Large Bank Targets

It was expected that small bank mergers should outperform large bank mergers since small merging banks have greater potential to use economies of scale and scope. However, the results reported in Table 7 show not significant wealth effect differences between small bank mergers and large bank mergers in Latin America. When analyzing each group individually, results indicate that for small banks mergers the CAARs are all positive and in some cases insignificant (Table 7). Alternatively, large bank mergers experience positive and significant CAARs for the windows (-1 to 1) and (-2 to +2), but a negative and significant CAAR for the (-10 to +10) window. When looking at each case individually, results indicate that small bank mergers and acquisitions create positive wealth effects while the results for large bank mergers indicate mixed effects. However, when testing the difference between these two groups, the results indicate that large bank mergers do not lead to greater wealth effects than small bank mergers create greater wealth.

Table 7

Bank Merger and Acquisition Size Effects

	Small Banks	Large Banks	Difference
Windows	CAAR (%)	CAAR (%)	CAAR (%)
Day 0	3.26 **	4.80 ***	-1.54
(-1 to +1)	2.13	2.71 **	-0.58
(-2 to +2)	2.41	2.95 ***	-0.54
(-3 to +3)	1.47 ***	0.58	0.89
(-4 to +4)	2.39 ***	0.20	2.19
(-5 to +5)	2.79 *	-0.23	3.02
(-10 to 10)	4.65	-1.34 **	5.99
(-15 to 15)	2.43	-3.43	5.86
(-20 to 20)	0.00	-2.90	2.90
# of Banks	20	10	
Average Size (Mil. US$)	4,793	29,376	

Note: *, **, *** Indicates significant results at the 10, 5 and 1 percent level. The difference was calculated as $CAAR_{SMALL} - CAAR_{LARGE}$. An unpaired t-test was used to test for statistically significant differences between small and large banks mergers.

Figure 4 shows the CAARs for both cross-border bank mergers and domestic bank mergers. Note that both trends tend to mimic each other. However, the cross-border CAARs are generally higher than the domestic CAARs. In addition, the cross-border CAARs are positive from 20 days before to 18 days after the announcement date, while the domestic CAARs are positive only from 5 days before to 11 days after the announcement date. However, the differences between the cross-border merger CAARs and the domestic merger CAARs are not very large. Thus, even though the CAARs for cross-border mergers are higher than the CAARs for domestic mergers, the CAARs differences between these groups are not statistically significant (except for the day of the announcement).

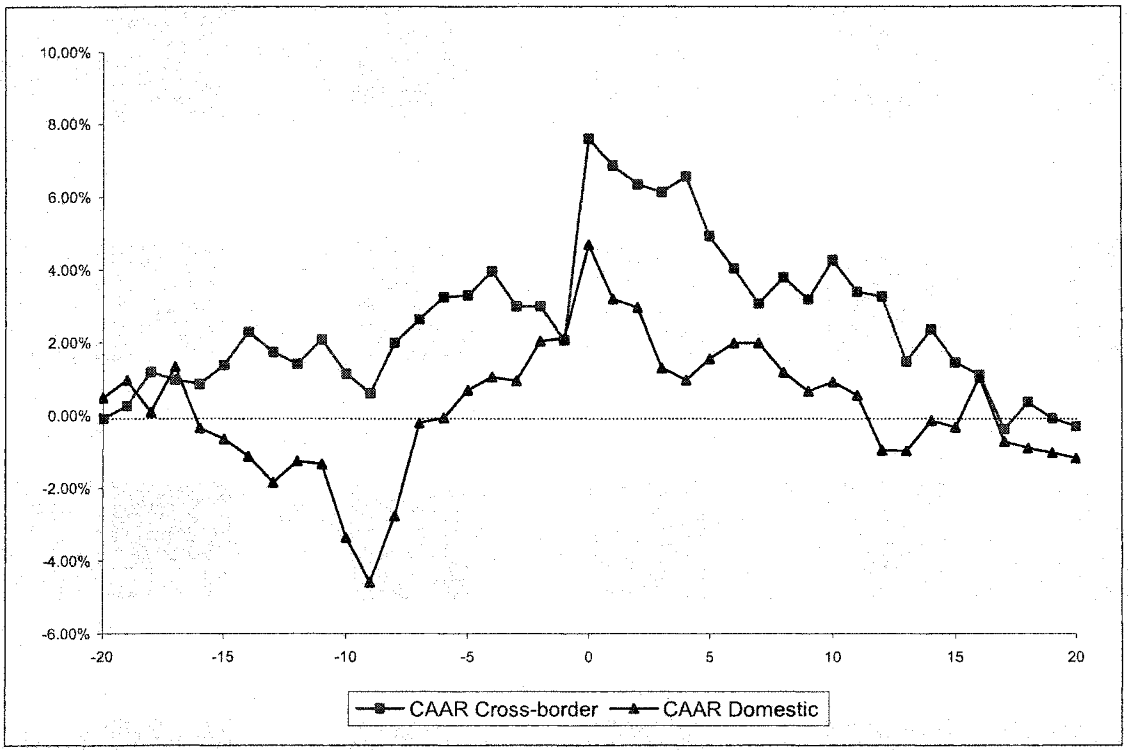

Figure 4

CAARs for Cross-border Mergers vs. Domestic Mergers

Table 8 reports the CAARs for cross-border bank mergers and domestic bank mergers. The results indicate that cross-border bank mergers have significant and positive wealth effect 3 days around the announcement date, while domestic bank mergers have positive and significant wealth effects from 4 days before through 4 days after the merger announcement date. However, even though cross-border and domestic mergers report positive CAARs of 5.53 and 2.58 percent (respectively) for the day of the event, only the cross-border merger CAARs are significant. In fact, it is only for the day of the announcement that the results indicate significant difference between these two groups suggesting that cross-border bank mergers have greater positive and significant wealth effects compare to domestic bank mergers but only during the day of the announcement. This result is in line with the assumption that cross-border merger outperform domestic mergers due to technology and/or efficiency transfer, diversification effects and low likelihood of financial distress.

Table 8

Cross-Border Versus Domestic Bank Mergers

	Cross-border Mergers	Domestic Mergers	Difference
Windows	CAAR (%)	CAAR (%)	CAAR (%)
Day 0	5.53 ***	2.58	2.95 ***
(-1 to +1)	3.85	1.17	2.69
(-2 to +2)	3.35	2.02	1.33
(-3 to +3)	2.17 *	0.25	1.92
(-4 to +4)	3.28	0.29 **	2.99
(-5 to +5)	1.69	1.62	0.07
(-10 to 10)	2.18	2.26	-0.08
(-15 to 15)	0.60	0.01	0.58
(-20 to 20)	-0.30	-1.18	0.88
# of Banks	11	19	

Note: *, **, *** Indicates significant results at the 10, 5 and 1 percent level. The difference was calculated as $\text{CAAR}_{\text{CROSS-BORDER}} - \text{CAAR}_{\text{DOMESTIC}}$. An unpaired t-test was used to test for statistically significant differences between cross-border bank mergers and domestic bank mergers.

Figure 5 shows the CAARs for small transaction bank merger deals and for large transaction bank merger deals. The CAARs for large transaction deals are mostly positive (except for days -10 to -12) during the entire period under examination, while CAARs for small transaction deals are negative during the period before the announcement date, positive from the day of the announcement to 6 days after the announcement date, and thereafter the CAARs are negative again. This figure clearly depicts that large transaction bank merger deals have higher CAARs than small transaction bank merger deals. Note that the strongest differences between these groups are for the periods of 5 days to 2 days before the announcement and for the period beginning 10 days to 20 days after the announcement. In fact, it is only for the day of the event and for the one day before to a day after the announcement date period that small and large transaction deals have significant wealth differences.

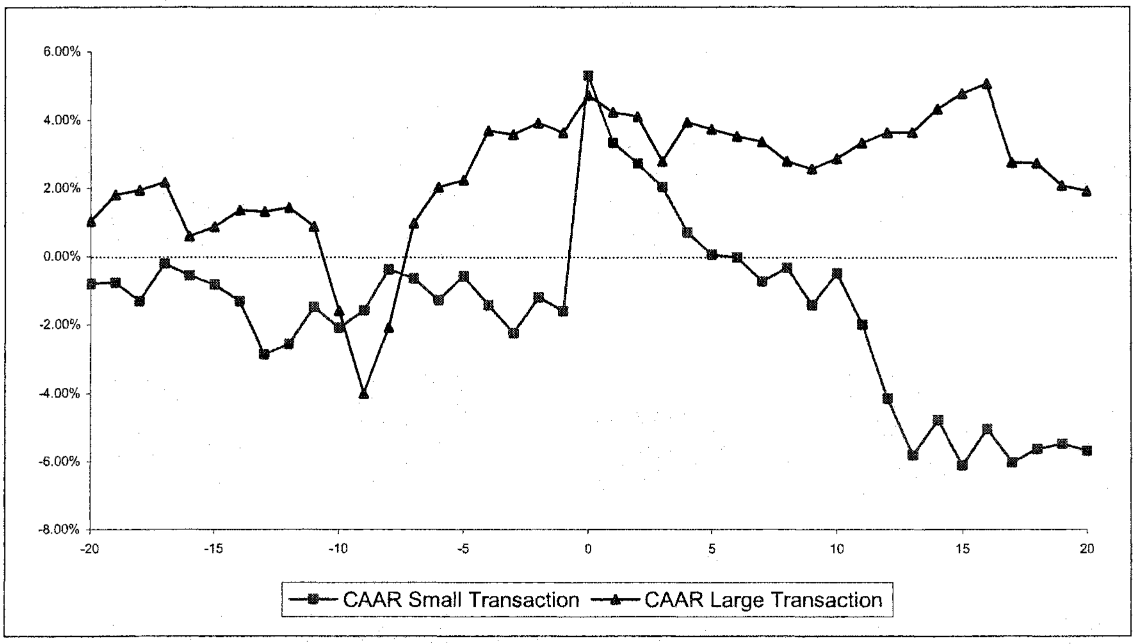

Figure 5

CAARs for Small Transaction Deals vs. Large Transaction Deals

Table 9 reports the CAARs for small transaction bank merger deals and large transaction bank merger deals. The difference in CAARs suggest that large transaction bank merger deals have positive, significant, and greater wealth effects than small transaction bank merger deals during the day of the event and for the window (-1 to 1). When analyzing each group separately, the results indicate that large transaction bank merger deals have positive and significant wealth effect during the day of the announcement and for the (-2 to 2) window, but negative and significant wealth effect for the (-15 to +15) and (-20 to +20) windows. This result suggests that for longer periods, large transaction bank merger deals negatively affect Latin American bank shareholders. Alternatively, the results indicate that small transaction bank merger deals have negative and significant wealth effect during the (-3 to 3) window, but positive and significant wealth effects for longer periods, i.e., the (-15 to +15) and (-20 to +20) windows. However, the difference in CAARs tests suggests that there are no significant wealth effects between these groups for long periods, as for there are for short periods.

Table 9

Large Transaction Deals Versus Small Transaction Deals

	Large Transactions	Small Transactions	Difference
Windows	CAAR (%)	CAAR (%)	CAAR (%)
Day 0	6.91 ***	1.08	5.82 ***
(-1 to +1)	4.54	0.32	4.22 *
(-2 to +2)	4.98 *	0.52	4.45
(-3 to +3)	3.46	-0.89 ***	4.36
(-4 to +4)	1.29	1.70 *	-0.41
(-5 to +5)	1.34	1.70	-0.36
(-10 to 10)	1.00	2.02	-1.02
(-15 to 15)	-5.54 ***	4.20 **	-9.73
(-20 to 20)	-5.68 ***	1.92 *	-7.61
# of Banks	8	15	

Note: *, **, *** Indicates significant results at the 10, 5 and 1 percent level. The difference was calculated as $CAAR_{SMALL\ TRANSACTION} - CAAR_{LARGE\ TRANSACTION}$. An unpaired t-test was used to test for statistically significant differences between large transaction deals and small transaction deals.

Figure 5 shows the CAARs for minority owned merged banks and majority owned merged banks. Note that CAARs for majority owned mergers are constantly positive all during the time period studied. However, the CAARs for minority owned mergers are negative before the announcement date, positive during the announcement date, and negative 8 days after the announcement date. This figure suggests that majority owned bank mergers produce larger positive wealth effect than minority owned bank mergers. In addition, it is notable that largest spreads between the minority owned CAARs and majority owned CAARs are for day -9 and latter after the announcement date they diverge apart.

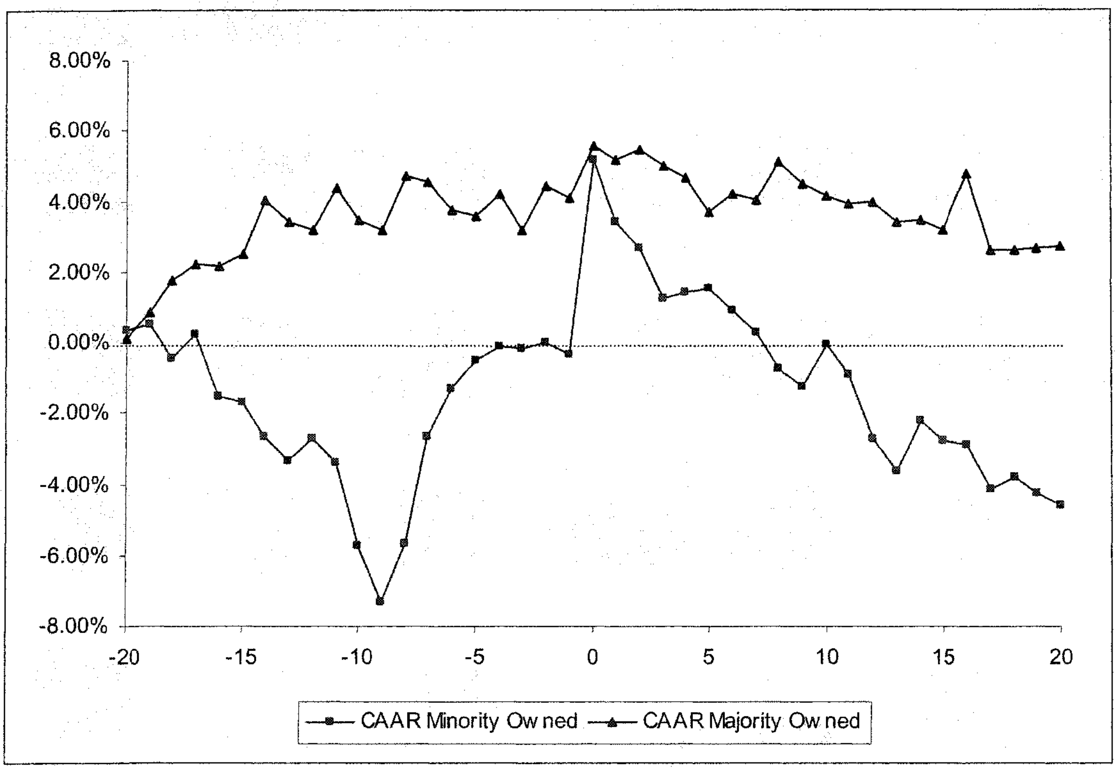

Figure 6

CAARs for Majority Owned vs. Minority Owned Bank Mergers

However, the results presented in Table 10 indicate that there is significant wealth difference between minority and majority owned bank mergers only for the announcement date. This result suggests that minority owned bank mergers generate greater positive wealth effects than majority owned bank mergers. When evaluating the wealth effect of each group separately, the results indicate that minority owned bank mergers create significant and positive wealth effects during the (-10 to 10) window and significant but negative wealth effects during the (-20 to +20) window. For the case of majority owned mergers the opposite occurs. The results show negative and significant CAARs for the (-5 to +5) and (-10 to +10) windows but positive and significant wealth effects for the (-20 to +20) window.

Table 10

Majority Owned Versus Minority Owned Bank Mergers

	Minority Owned	Majority Owned	Difference
Windows	CAAR (%)	CAAR (%)	Return (%)
Day 0	5.51 **	1.43	4.08 ***
(-1 to +1)	3.40	0.75	2.65
(-2 to +2)	2.87	2.26	0.60
(-3 to +3)	1.38 *	0.79	0.59
(-4 to +4)	1.96	1.08	0.88
(-5 to +5)	2.82	-0.05 *	2.87
(-10 to 10)	3.36 **	-0.26 *	3.62
(-15 to 15)	-1.25	1.03	-2.28
(-20 to 20)	-4.61 **	2.72 *	-7.33
# of Banks	18	12	

Note: *, **, *** Indicates significant results at the 10, 5, and 1 percent level. The difference was calculated as $\text{CAAR}_{\text{OWN LESS THAN 50\%}} - \text{CAAR}_{\text{OWN MORE THAN 50\%}}$. An unpaired t-test was used to test for statistically significant differences between minority owned and majority owned bank mergers.

Summary

This chapter provides the first analysis of the effects of mergers and acquisitions on the wealth of Latin American target banks. In this chapter, the commonly used event study approach was used to analyze the wealth effect of mergers and acquisitions. To calculate the abnormal returns, I used the trade-to-trade returns approach and a single market model regression adjusted to correct for heteroscedasticity to deal with the issue of thinly traded stocks present in Latin American banks. To test whether mergers and acquisitions increase or decrease shareholder wealth a nonparametric rank test was used. The effects of mergers and acquisitions on shareholder wealth were further analyzed by dividing the sample of target banks into four different subgroups: (1) large vs. small mergers, (2) cross-border vs. domestic mergers, (3) large transaction deals vs. small transaction deals, and (4) majority ownership mergers vs. minority ownership mergers.

The results suggest the bank mergers and acquisitions created significant shareholders wealth effects for Latin American target banks during the day of the announcement and during the (-3 to +3) window. The findings also indicate that in Latin America: (a) large bank mergers do not result in greater wealth effects than small bank mergers, (b) cross-border mergers have greater positive and significant wealth effects compare to domestic mergers,(c) large transaction merger deals have greater wealth effects than small transaction deals, and (d) minority owned merged banks have greater wealth effects than majority owned merged banks.

CHAPTER III

THE EFFECT OF MERGERS AND ACQUISITIONS ON THE RISK OF LATIN AMERICAN BANKS

Introduction

In the literature regarding the risk effect of mergers and acquisitions two opposing views can be found. The first view claims that mergers have the potential to reduce bank risk (Amihud *et al.*, 2002; Vander Vennet, 1996). This argument is based on the notion that diversification is the typical method by which banks manage the trade-off between risk and returns (Choi & Tsai, 2003; Dages *et al.*, 2000). The second view claims that mergers and acquisitions increase bank risk since some banks believe they are too-big-to-fail (Hughes *et al.*, 2001; De Nicoló, 2000; Berger, 1998; Berger *et al.*, 1999; Hughes *et al.*, 1999; Amihud & Miller, 1998). This argument is based on the moral hazard created by larger banks undertaking risky projects because they expect the indisposition of bank regulator to let them fail in the event of insolvency problems (Hughes *et al.*, 1996; Levy & Micco, 2003).

The number of empirical studies that have examined whether bank mergers and acquisitions increases or decreases risk is very limited (Amel *et al.*, in press). The study by the Group of Ten (2001) documents that the empirical evidence regarding this issue is mixed. For example, one group of studies find that risk reduce after mergers and acquisitions (Craig & Cabral Dos Santos, 1997; Hughes *et al.*, 1999) while a second group of studies finds bank risk increases after mergers and acquisitions (Berger, 2003; Acharya *et al.*, 2002; De Nicoló, 2000; Berger *et al.*, 1999).

It is obvious that missing from the present literature are studies that have examined the effect of mergers and acquisitions on the risk of Latin American banks. This chapter adds to this scant literature by providing evidence from the wave to mergers and acquisitions that have occurred in Latin America over the last few years. In Latin America, the value of bank mergers and acquisitions that occurred between 1995 and 2003 amounted to US$ 102 billion (see Table 11). This recent wave of bank mergers and acquisitions in Latin America has led to the following questions: Do bank mergers and acquisitions affect the risk of banks in Latin America? Do large bank mergers result in greater risk than small bank mergers? Do cross border bank mergers yield greater risk than domestic bank mergers? Do large transaction merger deals lead to greater risk than small transaction merger deals? Are majority owned merged banks riskier than minority owned merged banks? The response to this question is not only important to bank manager and shareholders but also to bank regulators who are concern about the risk exposure banks experience due to mergers and acquisitions. Therefore, the overall purpose of this chapter is to evaluate the effects of mergers and acquisitions on the risk of Latin American banks.

This study contributes to the literature in two regards. First, this is the first study to evaluate the effect of mergers and acquisitions on the risk of Latin American banks. Second, this the first study to examine this issue using a method that accounts for infrequently traded stocks. Thus, using banking data from Brazil, Chile, and Mexico, I find that, Latin American bank targets did not experience an increase in risk due to mergers and acquisitions. In addition, the results indicate that there are no significant differences between small bank mergers and large bank mergers regarding risk changes. When comparing cross-border bank mergers and domestic bank mergers risk differences, the results indicate that there are no significant differences between the two groups. Lastly, the difference in changes in risk between minority and majority owned bank mergers and large and small transaction bank deal mergers are all also found to be insignificant suggesting that there are no risk effect differences between these groups. Since bank regulators and shareholders are mainly interested in total risk and market risk (respectively), the results suggest that both Latin American bank regulators and shareholders should not be concerned, at present, with the effect of mergers and acquisitions on the risk of Latin American banks.

Table 11

The Value of Bank Merger and Acquisition Deals by Year in Latin America

Year	Brazil	Chile	Mexico	Sub-total	Other LA Countries[a]	Total LA Countries
1995	1,934	1,537	3,085	6,556	1,144	7,700
1996	195	1,368	1,256	2,819	2,864	5,682
1997	5,045	346	595	5,986	6,457	12,443
1998	6,428	869	899	8,196	3,036	11,231
1999	1,438	3,258	442	5,138	1,533	6,670
2000	12,852	749	5,436	19,038	5,023	24,061
2001	3,361	1,185	14,875	19,421	1,083	20,504
2002	3,918	1,817	4,323	10,057	834	10,890
2003	3,910	364	1,445	5,719	879	6,598
Total	39,081	11,492	32,355	82,929	22,852	105,780

Notes: [a] Other Latin American (LA) countries include: Argentina, Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Nicaragua, Panama, Paraguay, Peru, Surinam, Uruguay, and Venezuela.

The rest of this chapter is organized as follows: In section 2, the method used to measure the risk effect of mergers and acquisition is discussed. A description of the data used in this chapter is presented in Section 3. The empirical results and their discussion are presented in Section 4 and the last section contains the summary and implications gained from this study.

Methods

To analyze the effect of mergers and acquisitions on the risk of Latin American banks, I compare the bank's risk after a merger and acquisition is completed (post-merger risk) with the bank's risk before a merger and acquisition is announced (pre-merger risk). This study employs total relative risk and market risk as measures of risk, since regulators are mainly concerned about total relative risk while bank shareholders are interested about market risk (Konishi & Yasuda, 2004; Amihud *et al.*, 2002).

The total relative risk (TRR_i) for bank *i* in each country is estimated by dividing the standard deviation of the bank's daily returns ($SD(R_{it})$) by the standard deviation of market returns ($SD(R_{mt})$), that is:

$$TRR_i = \frac{SD(R_{it})}{SD(R_{mt})}. \tag{12}$$

The total relative risk measure is estimated for both the pre-merger period and the post-merger period. The pre-merger period is defined as -150 to -10 days prior to the announcement of the merger while the post-merger period is defined as +10 to +150 days after the merger is completed.

To examine whether bank mergers and acquisitions have a positive or negative significant effect on risk, following Amihud *et al.* (2002), I calculate the changes in risk as:

$$\Delta TRR_i = TRR_i^{(post)} - TRR_i^{(pre)} \tag{13}$$

where TRR_i is the total relative risk of bank *i* defined in equation (12), $TRR_i^{(post)}$ is the post-merger total relative risk, and $TRR_i^{(pre)}$ is the pre-merger total relative risk.

In the literature, market risk is commonly estimated by using the single factor market model. However, it should be noted that the stocks of Latin American banks are infrequently traded and this will bias the betas if I estimate them using least squares (Dimson, 1979; Dimson & Marsh, 1983; Luoma *et al.*, 1996; Luoma *et al.*, 1994; Maynes & Rumsey, 1993). Thus, to avoid this problem I use the trade-to-trade returns approach and a regression that corrects for the heteroscedasticity that result from using the trade-to-trade approach. This model has been shown to be the most appropriate method for dealing with the issue of infrequently traded stocks (Dimson & Marsh, 1983; Luoma *et al.*, 1996; Luoma *et al.*, 1994; Maynes & Rumsey, 1993). Following, Maynes and Rumsey (1993) the trade-to-trade returns approach model is written as:

$$\frac{R_{it}}{\sqrt{d_t}} = \alpha_i \frac{1}{\sqrt{d_t}} + \beta_i \frac{R_{mt}}{\sqrt{d_t}} + \varepsilon_{it} \tag{14}$$

where R_{it} is the continuously compounded return for bank *i* during period *t*, *t* is the period between two observed trades for bank *i*), R_{mt} is the continuously compounded return of the market index matching the same calendar time period *t*, d_t is the number of days over which the return is calculated, α_i is the continuously compounded return per day during the estimation period, β_i is the market risk for bank *i*, and ε_{it} is the disturbance term.

To examine whether bank mergers and acquisition have significant positive or negative effects on market risk, the change in market risk is calculated by:

$$\Delta Beta_i = \beta_i^{(post)} - \beta_i^{(pre)} \tag{15}$$

where $\Delta Beta_i$ is the change in market risk for bank *i*, and $\beta_i^{(post)}$ and $\beta_i^{(pre)}$ are the post and pre-merger market risk parameters estimated from equation (14).

To further evaluate the effects of mergers and acquisitions on the risk of Latin American banks, this study divides the sample into four different categories. Specifically, I examined whether (a) large bank mergers result in greater risk than small bank mergers, (b) cross-border bank merger yield greater risk than domestic bank mergers, (c) majority owned merged banks are riskier than minority owned merged banks, and (d) large transaction mergers lead to greater risk than small deals mergers.

The effect of the size of a bank on risk is not clear and depends on several factors. Demsetz and Strahan (1997) argue that in the past large banks might increase risky lending operating with low capital ratios and higher overall risk. They sustain that if current mergers follow this pattern, then one should expect an increase in risk. In addition, Hughes *et al.* (1999) argue that even though diversification enhances banks' risk-return tradeoffs, it does not mean that value-maximizing banks will prefer less risky investment strategies. Thus, if bank mergers lead to expected economies of scales and profit improvements, banks might chose to increase their risk exposure. If this increase in risk is proportionately higher than the benefits of diversification (economies of scope and scale, market power, profit maximization or cost minimization, etc.) then the risk-return tradeoff is unbalanced (Hughes *et al.*, 1999).

Regarding the effects of cross-border bank mergers and domestic bank mergers on risk, it is expected that banks operating across-countries should benefit from diversification and may be able to reduce risk (Demsetz & Strahan, 1997; Levonian, 1994). Lastly, the effects of large merger transaction deals vs. small merger transaction deals and majority owned mergers vs. minority owned mergers on bank risk are included in this study to understand better how bank risk is affected by the value of the transaction and the size of ownership control. Since large transactions mergers might imply the disbursement of large amount of cash or number of shares, I expect that large transaction mergers will increase Latin American banks' risk. Correspondingly, I expect that minority owned mergers might either increase or decrease the risk of Latin American banks. If the bank incentive for merger and acquisition is to diversify, then a reduction in risk is expected. However, if merger and acquisition results with banks of large size that are willing to take on more risk ("too big to fail" argument), than an increase in risk is expected.

Data

The sample consists of 28 Latin American target banks. This study only includes target banks since the number of publicly traded bidder banks was not large enough. The sample of banks was selected after analyzing bank mergers and acquisitions from SDC-Platinum database in which the target bank was located in Brazil, Chile, and Mexico between 1995 and 2003[5]. I only selected mergers in which the date of announcement was available, the deal was closed, the target was a Latin American bank, and the target was listed on the stock market. Daily market indexes for Brazil, Chile, and Mexico were obtained from DataStream and daily stock prices and financial information from Economatica.

Empirical Results

In this dissertation the total relative risk and market risk of Latin American banks were calculated to examine whether bank mergers and acquisitions increased or decreased the risk of Latin American banks. The total relative risks and the market risks where statistically tested to determine if the mergers and acquisitions generate significant changes in the risk of Latin American banks. The results are presented next.

Table 12 presents the aggregate descriptive statistics of the estimated total relative risks and market risks for the pre and post-merger periods[6]. From Panel B, it can be observed that the average market beta is positive for all cases, suggesting that an increase in market returns leads to an increase in bank excess returns (Choi and Elyasiani,1997; Flannery & James, 1984; Reichert & Shyu, 2003 obtain similar results). For the entire sample both the average total relative risk and the average market risk increased from

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[5] This study includes only these three countries because they represent about 80% of the Latin American banks market share for the period 1995-2003. These countries also represent around 50 percent of the Latin American banks mergers and acquisitions deals for this period. Additionally, these countries have the most complete and up to date banking data available in Latin America.

[6] The market model presented in equation (14) is estimated for each of the 28 bank contained in the sample. Each estimated regression was tested for serial correlation and the test failed to reject the null hypothesis of no serial correlation. This estimation process resulted in a separate market beta (β_{mj}) for each Latin American bank (see Appendix A, Tables A1).

0.0308 and 0.5708 during the pre-merger to 0.0319 to 0.5906 during the post-merger period. For the case of Mexico, the average total relative risk and average market risk decreased during the post merger period. However, for Brazilian banks both the average total relative risk and the market risk increase from the pre to the post merger period. For the case of Chilean banks, the total relative risk increased while the market risk decreased during the post merger period.

Table 12

Descriptive Statistics of the Estimated Total Risks and Market Betas for Latin American Banks

	Brazil	Chile	Mexico	Entire Sample
Panel A. Estimates Total Relative Risks				
Post Merger Statistics				
Mean	0.0332	0.0386	0.0226	0.0319
Standard Dev.	0.0273	0.0103	0.0118	0.0211
Maximum	0.0996	0.0512	0.0453	0.0996
Minimum	0.0065	0.0246	0.0100	0.0065
Pre-Merger Statistics				
Mean	0.0310	0.0303	0.0309	0.0308
Standard Dev.	0.0165	0.0183	0.0120	0.0154
Maximum	0.0674	0.0557	0.0477	0.0674
Minimum	0.0095	0.0093	0.0183	0.0093
Panel B. Estimated Market Beta				
Post Merger Statistics				
Mean	0.4502	0.7473	0.7145	0.5906
Standard Dev.	0.3478	0.3433	0.4830	0.3960
Maximum	1.1641	1.1067	1.1265	1.1641
Minimum	-0.1355	0.3259	-0.0348	-0.1355
% Positive	92.85	100.00	85.71	92.86
% Significant	64.28	85.71	85.71	75.00
Pre-Merger Statistics				
Mean	0.3430	0.8750	0.7224	0.5708
Standard Dev.	0.2585	0.3277	0.4354	0.3937
Maximum	0.7918	1.3406	1.0924	1.3406
Minimum	0.0728	0.4667	0.0343	0.0343
%Positive	100.00	100.00	100.00	100.00
% Significant	57.14	85.71	71.43	67.86
Number of banks	14	7	7	28

Table 12 also presents the percentages of positive and significant betas. On average and across the three countries, the post-merger market betas are positive and significant in about 93% and 75% of the cases, respectively. While the pre-merger market betas are positive and significant in about 100% and 68% of the cases respectively.

Table 13 reports the statistical tests regarding the change in total relative risk and market risk during the sample period of the analysis. For the entire sample, the results for the two measures of risk indicate no significant risk changes due to bank mergers and acquisitions. This suggests that bank mergers and acquisitions do not affect bank risk in Latin America. This results are in line with the findings of Amihud *et al.* (2002) in which changes in total relative risk and changes in market risks are not significantly different from zero.

Table 13 also reports whether the small bank mergers or large bank mergers, cross-border bank mergers or domestic bank mergers, minority owned mergers or majority owned mergers, and small transaction merger deals or large transaction bank merger deals have any effect on the risk of Latin American banks after mergers and acquisitions. Regarding the size of the merged banks, the results indicate that small merged banks increased total relative risk while decreased the market risk. However, none of these changes in risk is statistically significant. For the case of large merged banks, the results indicate that total relative risk decreased while market risk increased. However, these changes in risk are statistically insignificant. In addition, the total relative risk difference and the market risk difference between large and small banks are both statistically insignificant.

Table 13

Changes in Total Relative Risk and Market Risk by different groups

	ΔTRR	ΔBeta
Sample (Number of Cases)	Mean (*t*-statistic)	Mean (*t*-statistic)
Entire Sample (28)	0.10	0.02
	(0.47)	(0.34)
Small banks (19)	0.15	-0.001
	(0.47)	(-0.02)
Large Banks (9)	-0.01	0.06
	(-0.06)	(1.06)
Small (19) vs. Large (9) [a]	0.16	-0.07
	(0.47)	(-0.64)
Cross-border Mergers (10)	-0.01	0.08
	(-0.03)	(1.21)
Domestic Mergers (18)	0.16	-0.02
	(0.51)	(-0.20)
Cross-border (10) vs. Domestic (18) [a]	-0.17	0.10
	(-0.43)	(0.93)
Minority Ownership Mergers (12)	-0.21	-0.02
	(-0.84)	(-0.18)
Majority Ownership Mergers (16)	0.33	0.05
	(1.01)	(0.98)
Minority (12) vs. Majority (16) [a]	-0.54	-0.07
	(-1.31)	(-0.56)
Large Deal Mergers (15)	-0.12	-0.01
	(-0.85)	(-0.13)
Small Deal Mergers (7)	0.27	0.11
	(0.38)	(1.11)
Large (15) vs. Small (7) [a]	-0.42	-0.11
	(-0.57)	(-1.06)

Note: *, **, *** indicates significance at 10%, 5%, and 1%. [a] Indicates the mean differences between groups. TTR = total relative risk of target bank i = SD(R_i)/SD(MR_k). SD(R_i) is the standard deviation of the daily return on target bank and SD(MR_k) is the standard deviation of the daily market index returns from country k. ΔTRR = TRR(post) – TRR (pre), where "post" is days +10 to +135 after the consummation of the merger, and "pre" is days –135 to –10 before the announcement of the merger. ΔBeta is the change in beta coefficient of the target's return after the merger minus the preannouncement beta coefficient. The unpaired t-statistics test the hypothesis that the change in the given measures of risks is equal to zero.

Note also in Table 13 that for cross-border mergers, the results indicate that cross-border merged banks decreased total relative risk while increased the market risk. However, none of these changes in risk is statistically significant. For the case of domestic merged banks, the findings show that total relative risk increased while market risk decreased. Note also that no significance difference in risk is found. In addition, the total relative risk difference and the market risk difference between cross-border and domestic bank mergers are statistically insignificant.

Table 13 shows the results the effect of ownership on both total relative risk and market risk. The results indicate that minority owned merged banks decreased both total relative risk and market risk. However, these changes in risk are not statistically significant. For the case of majority owned merged banks, the findings show that both total relative risk and market risk increased. Note also that no significance difference in risk is found. In addition, the total relative risk difference and the market risk difference between minority and majority owned bank mergers are statistically insignificant.

Lastly, the changes in risk for large and small deal mergers are also reported in Table 13. Note that there is a reduction in the two measures of risk when large deal mergers occurred, however these results are insignificant. Conversely, when small deal mergers occurred, there is an insignificant increase in total relative risk and market risk. The changes in risk between large vs. small deal mergers are all insignificant suggesting no differences between these groups.

Summary

This study provides the first empirical analysis of a sample of 28 Latin American banks over the period 1995–2003 that examines the effects of mergers and acquisitions on the risk of Latin American target banks. This study employs two measures of risk, namely total relative risk and market risk. The effects of mergers and acquisitions on risk are further analyzed by dividing the sample into four subgroups: (1) large vs. small mergers, (2) cross-border vs. domestic mergers, (3) large vs. small transaction deals, and (4) majority vs. minority owned mergers.

The results indicate that Latin American banks did not experience any significant changes in their total relative risk and market risk due to mergers and acquisitions. This suggests that bank mergers and acquisitions do not affect bank risk in Latin America. This result is in line with the findings of Amihud *et al.* (2002) in which changes in total relative risk and changes in market risks (between pre and post period) are insignificantly different from zero. The policy implication of this finding is that Latin American bank shareholders and regulators should not be concern with increases in risk due to mergers and acquisitions.

The results also indicate that none of the categories (large or small merged banks, cross-border or domestic mergers, minority owned or majority owned mergers, and large transaction or small transaction merger deals) have any effect on the risk of Latin American banks after mergers and acquisitions. Again, these findings suggest that Latin American bank shareholders and regulators should not worry about mergers and acquisitions effects on the risk of Latin American banks.

CHAPTER IV

THE EFFECT OF MERGERS AND ACQUISITIONS ON THE EFFICIENCY OF LATIN AMERICAN BANKS

Introduction

In general, theory suggests that mergers and acquisitions have the potential to increase efficiency (Berger & Humphrey, 1992b; Shaffer, 1993; Rhoades, 1998; Garden & Ralston, 1999). It argues that bank mergers and acquisitions lead to increased efficiency since they force management to consider much needed operational improvements, it substitutes for inefficient management, and/or implements new, but unpleasant reorganizational processes (Berger, 2003). Alternatively, it also argues that costs (e.g., consultant fees, severance pay, legal expenses, etc.) associated with mergers and acquisitions along with downsizing disruptions, the merging of organizational cultures, and/or managerial turf battles lead to decreased efficiency (Berger, 2003).

Much of the empirical literature regarding the effect of bank mergers and acquisitions on bank efficiency has attempted to test these theoretical arguments and the results have been mixed (Fried *et al.*, 1999). In the US, a group of studies indicate there are positive merger and acquisition effects on bank efficiency (Akhavein *et al.*, 1997; DeLong, 2003; Ely & Song, 2000) while another group of studies provide evidence of no efficiency improvements (Peristiani, 1997; Berger, 1998; Rhoades, 1998). The results for European banks are also mixed. Here too, some studies find that bank mergers and acquisitions improve bank efficiency (Resti, 1998; Haynes & Thompson, 1999) while other studies show that this result does not hold for all European countries (Vander Vennet, 1996; Altunbas *et al.*, 1997; Focarelli *et al.*, 2002). Lastly, for the case of developing economies, the results indicate that bank mergers and acquisitions improved the efficiency of banks in Turkey (Isik & Hassan, 2003) and Taiwan (Yu & Luu, 2003).

It is obvious from the above-cited studies that missing from the literature are studies that have examined the effect of mergers and acquisitions on the efficiency of Latin American banks. An examination of this issue for Latin American banks is timely and important, given that between 1995 and 2003 bank mergers and acquisitions (both cross-border and domestic) in Latin America amounted to US$ 102 billion (see Table 1, Chapter I). This remarkable increase in bank mergers and acquisitions in Latin America has raised the following questions: Do bank mergers and acquisitions affect the efficiency of banks in Latin America? Are the effects of bank mergers and acquisitions similar across Latin American countries? Are large merged banks more efficient than small merged banks? Are cross-border merged banks more efficient than domestic merged banks? Do large transaction merger deals lead to greater bank efficiencies than small transaction merger deals? Are majority owned merged banks more efficient than minority owned merged banks? [7] The answer to these questions is relevant not only for bank shareholders and investors but also for regulators who are interested in knowing how mergers and acquisition affect the efficiency as well as the safety and soundness of Latin American banks.

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[7] In this study, majority owned merged banks refers to those Latin American banks that still control more than 50% of the shares after a merger and acquisition, while minority owned merged banks control less than 50% of the shares after a merger and acquisition.

The overall purpose of this chapter is to examine whether mergers and acquisitions affects the efficiency of Latin American banks.[8] To my knowledge, this is the first study that provides a systematic understanding of this issue for the case of Latin American banks. Because of the paucity of bank data in Latin America, I focus only on the banks from Brazil, Chile and Mexico, which account for about 80% of the value of bank merger and acquisition deals in Latin America (see Table 1, Chapter I). Overall, the results indicate that bank mergers and acquisitions increased the efficiency of Latin American banks. In addition, the results suggest that mergers and acquisitions have a positive effect on the efficiency of Brazilian banks, while no effect is found for the case of Chilean and Mexican banks. I also find that in Latin America, (a) large merged banks are more efficient than small merged banks, (b) cross-border bank mergers are not more efficient than domestic bank mergers, (c) small transaction deals lead to greater efficiency than large transaction deals, and (d) minority owned merged banks are less efficient than majority owned banks.

In the next section, the methods necessary to measure the effect of bank mergers and acquisitions on efficiency is presented. In section 3, the data and its sources as well as its summary statistics are presented. The empirical results are presented in section 4 and section 5 provides concluding comments and implications regarding this chapter.

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[8] In this study, I focus on Latin American banks that are the targets of the merger and acquisition deal. I do not examine bidder banks since they are very few and some of them did not have complete data.

Theoretical Framework and Model Specification

To investigate the effect of bank mergers and acquisitions on the efficiency of Latin American banks a two-stage approach is employed. In the first stage, an efficiency score for each bank is obtained by computing the input-oriented variable returns to scale data envelopment analysis (DEA) approach developed by Banker *et al.* (1984). In the second stage, these efficiency scores are regressed against a dichotomous variable, which indicates whether or not the bank is a merged bank and a set of independent variables to determine the statistical significance of the relationship between efficiency and Latin American bank mergers and acquisitions.

Measuring Banking Efficiency

DEA is a mathematical programming approach that constructs a production frontier that ranks the units (banks) under analysis. The production frontier is formed as piecewise linear combinations that connect the set of "best-practice banks" in the data set (Coelli *et al.*, 1998). The DEA efficiency score (ranking) for each bank is defined relative to the other banks in the data set (Coelli *et al.*, 1998).

I use DEA since: (1) DEA does not require a particular functional form to determine the most efficient bank (Avkiran, 1999); (2) DEA does not require the specification of a cost function and the use of input price data (Drake & Hall, 2003), which is nearly impossible to obtain for Latin American Banks; and (3) when applying parametric and nonparametric approaches to the same data, the average efficiency scores are similar in most cases (Ferrier & Lovell, 1990; Bauer *et al.*, 1993; Berger *et al.*, 1993).

However, DEA is not without its caveats and therefore I address the following three important aspects: (1) whether to use an input or output orientated DEA approach;

(2) the selection of inputs and outputs; and (3) constructing a within country or a cross-country efficiency frontier. To date, there is no agreement in the theoretical literature regarding whether the input or output oriented DEA approach is best. The input orientated DEA seeks to reduce input usage for a given level of output, whereas the output orientated DEA is concerned with increasing output production without changing input usage. Similar to other studies (Grifell-Tatje & Lovell, 1996; Resti, 1998; Mukherjee *et al.*, 2001), in this dissertation I use an input orientated DEA approach because Latin American banks are constantly looking for ways to reduce costs due to both competition and government regulations (Casu & Molyneux, 2002). In addition, the input or output oriented DEA approaches yield precisely the same efficient frontier and identify the same set of efficient banks (Casu & Molyneux, 2002).

Different input and output selection approaches have been identified in the literature.[9] Unfortunately, there is no consensus regarding which inputs and outputs should be selected. Still, researchers agree that the selection of inputs and outputs have to reflect the objectives of the banks. In this study, the selection of inputs and outputs follows the intermediation approach suggested by Taylor *et al.* (1997). Under this approach, the banks primary function is assumed to be one in which banks borrow funds from depositors and lend these funds to borrowers to generate profits. This approach includes two inputs and one output. For this study, I use total deposits[10] and non-interest expenses as inputs, and for output, I use income. Since the requirements for comparable bank data from different Latin American countries impose strong restrictions on the inputs and outputs that can be used, the availability of these variables makes them the an appropriate selection for this analysis.

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[9] The most common approaches are the production approach and the intermediation approach (Benston *et al.*, 1982). The differences between the production and intermediation approaches are discussed in Clark (1988). There are other approaches such as asset approach, user cost approach, value added approach, profit maximization approach, risk approach and the mix approach among others, which are variants of intermediation and production approaches (Berger & Humphrey, 1992a; Favero & Papi, 1995 and Berger & Humphrey, 1997).

The last important factor that needs to be addressed when implementing a DEA approach is whether to compute the efficiency frontier as a common multi-country frontier or to compute a separate efficiency frontier for each country individually. Various studies (Ruthenberg & Ricky, 1996; Berger *et al.*, 1993; Fecher & Pestieau, 1993) have compared the efficiency of banks in different countries by focusing on banks operating within each country rather than operating across country . Alternatively, other studies (Maudos *et al.*, 2002; Zaini & Karim, 2001; Wagenvoort & Schure, 1999; Allen & Rai, 1996; Ruthenberg & Ricky, 1996; Fecher & Pestieau, 1993) have evaluated the efficiency of banks across different countries. In general, their findings illustrated that the banks of some countries are considerably more efficient than the banks of other countries; however, the efficiency ranking among countries occasionally fluctuate across the studies. Although this later group of studies are enlightening, Berger *et al.* (2000) caution against reaching any conclusion regarding cross-border efficiency for two important reasons. First, banks located in different countries face different economic environments (e.g., level of supervision system, regulations, competition, level and quality of services, capital market development, and labor and production factors) which may substantially bias efficiency measures. Second, merged banks might face foreign difficulties such as differences in language, culture, currency, laws, and increased monitoring costs, which are very difficult to control across countries. For this reasons, in this study, banking efficiencies are computed on a per country basis.

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[10] Some authors argue that using total deposits as an input fails to give the adequate importance to deposits because banks produce both earning assets and deposits, incurring productions and interest costs (Rangan *et al.*, 1988; Aly *et al.*, 1990; Berger & Humphrey, 1991). Alternatively, other studies use deposits as inputs arguing that is the ability of the banks to manage those funds (deposits) what matters

Thus, the DEA employed in this dissertation is the variable returns to scale (VRS) model developed by Banker *et al* (1984) and which follows Taylor *et al.* (1997) intermediation approach. Following Banker *et al.* (1984), the VRS-DEA model is computed as follows:

$$\min_{\theta,\lambda} \theta, \text{subject to} \tag{16}$$

$$\begin{aligned} &-y_i + Y\lambda \geq 0, \\ &\theta x_i - X\lambda \geq 0, \\ &N1'\lambda = 1, \\ &\lambda \geq 0, \end{aligned}$$

where, the elements in the vector θ are less than or equal to one and N1 is an Nx1 vector of ones.

For the i^{th} bank, x_i represents a column vector of inputs and y_i denotes a column vector of outputs. The KxN input matrix, X, and the MxN output matrix, Y, represent the data for all N banks. λ is an Nx1 vector of constants. The elements of the vector θ represent the efficiency score for each bank in the analysis. If an element of θ is equal to

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(Elyasiani & Mehdian, 1990; Taylor *et al.*, 1997; Berger & Humphrey, 1997). In this dissertation, deposits are used as inputs following Taylor *et al.* (1997).

1, the bank is said to be efficient relative to the other banks (Farrell, 1957). The variable returns to scale DEA approach presented in equation (16) is computed for each country studied in this dissertation (i.e., Brazil, Chile, and Mexico).

Measuring the Effect of Mergers and Acquistions on Banking Efficiency

Once the efficiency scores are computed in the first stage (Equation 16), they are regressed on the variable MERGE and several control variables. The regression model is specified as follows:

$$\begin{aligned} EFFICIENCY_i &= \beta_0 + \beta_1 \text{MERGE}_i + \beta_2 \text{LOANS}_i + \\ &\quad \beta_3 \text{EQUITY RATIO}_i + \beta_4 \text{TOTAL ASSETS}_i + \\ &\quad \beta_5 \text{ECON FREEDOM}_i + u_i \end{aligned} \tag{17}$$

where the dependent variable EFFICIENCY is the efficiency score for bank i obtained from the VRS-DEA model; MERGE is a dichotomous variable that takes a value of 1 if the bank merged and 0 otherwise; LOANS, EQUITY RATIO, ASSETS, and ECON FREEDOM represent a set of control variables which are explained below; β_1 through β_5 are parameters that will be estimated; and u_i is the disturbance term.

The variable MERGE is included to determine whether mergers and acquisitions affect the efficiency of Latin American banks. A positive MERGE coefficient indicates that mergers and acquisitions lead to increased efficiencies (Berger & Humphrey, 1992b; Shaffer, 1993; Rhoades, 1998; Garden & Ralston, 1999), while a negative MERGE coefficient indicates that mergers and acquisitions result in decreased efficiencies. An insignificant MERGE coefficient indicates that mergers and acquisitions do not affect the efficiency of Latin American banks.

Mukherjee *et al.* (2001) states that loans represent the most risky and the least liquid asset for a bank, but at the same time they represent the most important source of operating income. Consequently, banks with large loan values are not required to maintain high capital levels, and this increases the banks' ability to operate efficiently (McAllister & McManus, 1993). Thus, a positive relation between LOANS and the efficiency of Latin American banks is expected.

Regulators and bank managers consider the variable EQUITY RATIO as an important capital adequacy indicator when evaluating bank performance (Mukherjee *et al.*, 2001). Economic theory asserts that a high EQUITY RATIO (lower leverage) implies a low risk-taking propensity, which might result in lower borrowing costs (Casu & Molyneux, 2002). In addition, banks with higher EQUITY RATIO are better able to absorb losses or other asset values declines (Mukherjee *et al.*, 2001). Thus, a positive relation between EQUITY RATIO and the efficiency of Latin American banks is expected.

Theory also implies that large banks will be less likely to fail than small banks, since large banks have the potential to diversify (Mukherjee *et al.*, 2001; Garden & Ralston, 1999). Since large banks have better diversified asset portfolios, TOTAL ASSETS serves as a proxy that measures the bank's capability to diversify (Shyu & Reichert, 2002; Mester, 1993). Thus, a positive relation between TOTAL ASSETS and the efficiency scores of Latin American banks is expected.

Lastly, the variable economic freedom (ECON FREEDOM) is an annual index estimated by the Heritage Foundation.[11] This variable is included to control for economic and regulatory differences between Brazil, Chile and Mexico, because equation (17) is estimated using the efficiency scores from these three countries. According to this index, Chile is classified as "mostly free" whereas Brazil and Mexico are classified as "mostly unfree." Consequently, ECON FREEDOM is a dichotomous variable that takes a value of 1 if the country is "mostly unfree" (Brazil and Mexico) or 0 if it is mostly free (Chile).

To examine the effect of mergers and acquisitions on bank efficiency within each of the three countries (i.e., Brazil, Chile, and Mexico) I estimate three separate regressions. These three separate regressions are specified as in equation (17) except that they do not include the variable ECON FREEDOM.

Lastly, to determine whether particular categories of merged banks are more or less efficient than others, the following regression is also estimated:

$$\begin{aligned} \mathit{EFFICIENCY}_i = {} & \beta_0 + \beta_1 \text{LOANS}_i + \beta_2 \text{EQUITY RATIO}_i + \\ & \beta_3 \text{ECON FREEDOM}_i + \beta_4 \text{LARGE BANKS} + \\ & \beta_5 \text{CROSS-BORDER} + \beta_6 \text{LARGE TRANS DEALS} + \\ & \beta_7 \text{MINORIY OWN MERG} + u_i \end{aligned} \tag{18}$$

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[11] The index represents an average of 10 distinct sectors that permits one to classify countries as free, mostly free, mostly unfree, or repressed. The 10 sectors include trade policy, government intervention, foreign investment, wages and prices, regulation, fiscal burden, monetary policy, banking and finance, property rights, and black market. In this study, I used both the banking and finance sector and the average index and the results do not change significantly. Thus, I used the average index as ECON FREEDOM, since it comprises other factors that could indirectly affect the banking sector.

where, the variables EFFICIENCY, LOANS, EQUITY RATIO, and ECON FREEDOM are defined above; β_1 through β_7 are parameters that will be estimated; and u_i is a disturbance term.

LARGE BANKS is a dichotomous variable that takes a value of one if the merged bank is a large bank (greater than the median of total assets) and zero otherwise. If the coefficient associated with the variable LARGE BANKS is significant and positive, it implies that large merged banks are more efficient than small merged banks. The opposite holds if the coefficient of LARGE BANKS is significant and negative. If the coefficient is insignificant, it implies that bank efficiency is not affected by mergers among large or small banks.

The variable CROSS-BORDER takes a value of one if the merged banks are from different countries and zero if the merged banks are from the same country. This variable was included to determine whether cross-border mergers lead to greater bank efficiency than domestic mergers in Latin America. If the CROSS-BORDER coefficient is significant and positive, it implies that cross-border bank mergers are more efficient than domestic bank mergers. The opposite holds if the coefficient is significant and negative. If the coefficient is insignificant, it implies that efficiency is not affected by whether the merger is cross-border or domestic.

The variable LARGE TRANS DEALS takes a value of one if the value of the merger deal was a large transaction (greater than the median of transaction deal) and zero otherwise. Similarly, the variable MINORIY OWN MERG takes a value of one if the Latin American bank controls less than 50% of shares after the merger and acquisition and zero if it controls more than 50% of the shares after the merger and acquisition. The coefficients for these two last variables are interpreted similarly as the coefficients for LARGE BANKS and CROSS-BORDER except that they refer to the case of large transaction deals and ownership.

Data and Summary Statistics

The data employed in this chapter was obtained from four different sources: the SDC Platinum database, the BankScope database, the Heritage Foundation webpage, and information published by the central banks of Brazil, Chile and Mexico. Specifically, merger and acquisition announcement dates, the effective date of merger and acquisition, the names of the target and bidder bank, the country of origin for both target and bidder banks, the percentage owned after the merger of acquisition, and the transaction value of the deal were obtained from the SDC Platinum database.

The financial statements containing the data used for the VRS-DEA model (TOTAL INCOME, TOTAL DEPOSITS, and TOTAL NONINTEREST EXPENSES) as well as the variables used in the OLS regressions (NET LOANS, EQUITY RATIO, and TOTAL ASSETS) for both domestic and foreign banks operating in Latin America were obtained from the BankScope database and information published by the Central Bank of Brazil, Chile and Mexico. Lastly, the ECON FREEDOM data was obtain from the Heritage Foundation webpage.

After a detailed examination of the merger and acquisition data and the financial statements of banks operating in Brazil, Chile, and Mexico, the final data set consisted of 182 banks, 116 from Brazil, 27 from Chile, and 39 from Mexico. The descriptive statistics and other bank characteristics of the 141 non-merged banks and 41 merged banks are presented in Table 14. The mean efficiency level of all the banks in the sample is 0.77 while the mean efficiency level of the non-merged banks is 0.75 and the mean efficiency level of the merged banks is 0.86. The difference between the mean efficiency level of the merged and non-merged banks was tested using an unpaired t-test. The null hypothesis for this test is that there is no difference between the efficiency scores of merged banks and non-merged banks. The unpaired t-test rejects the null hypothesis (see Table 14) implying that there are significant differences between the efficiency scores of merged banks and non-merged banks. However, it should be caution that this test serves only as an initial test since it does not control for other factors that may influence the efficiency of banks.

Table 14

Descriptive Statistics of Merged and Non-Merged Banks

Sample (# Cases)	Stats	Efficiency	Equity Ratio	Total Equity [a]	Loan [a]	Total Assets [a]
Entire Sample (182)	mean	0.77	0.18	442	2,124	3,406
	sd	0.21	0.17	918	4,986	8,815
	max	1.00	0.90	5,259	36,200	72,000
	min	0.20	0.02	5	1	5
Non-merged (141)	mean	0.75	0.19	338	1,553	2,655
	sd	0.21	0.18	709	3,717	7,674
	max	1.00	0.90	4,608	25,900	72,000
	min	0.20	0.03	5	1	5
Merged (41)	mean	0.86	0.15	800	4,088	5,990
	sd	0.20	0.14	1,371	7,684	11,700
	max	1.00	0.75	5,259	36,200	48,600
	min	0.31	0.02	6	0	6
t-test		3.05	1.64	2.89	2.04	1.72
		(0.00)	(0.10)	(0.00)	(0.04)	(0.09)

Note: [a] Values in Millions of US$. P-values are in parentheses.

The unpaired t-tests for the other bank characteristics (i.e. equity ratio, total equity, loans and total assets) are provided in Table 14 and they reject the null hypothesis. This result implies that there are significant differences between the equity ratio, total equity, loans, and total assets of the merged banks and non-merged banks.

Empirical Results

Five regressions were estimated using OLS: one for the entire sample (merged and non-merged banks), one for each country, and one that used only the merged banks data.[12] Each regression was tested for heteroscedasticity using the Breusch-Pagan/Cook and Weisberg test and except for the entire sample regression, there was no need to correct for heteroscedasticity. Thus, the entire sample regression was estimated using robust standard errors which correct the problem of heteroscedasticity (Hamilton, 2003; Greene, 2003).

As can be observed, all the coefficients for the entire sample regression have the expected sign and are significant (Table 15). The coefficient for the variable MERGE is positive and significant, suggesting that mergers and acquisitions increase the efficiency of Latin American banks. This result is in line with the findings of studies from other countries (see Berger & Humphrey, 1992b; Shaffer, 1993; Rhoades, 1998; Garden & Ralston, 1999).

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[12] A number of studies (Isik & Hassan, 2002; Mukherjee *et al.*, 2001; Garden & Ralston, 1999) have also used OLS to estimate the effects of a set of variables on the efficiency of banks. However, other studies have used a Tobit estimator since in certain cases the efficiency scores tend to cluster (or be censored) around zero and/or one (Casu and Molineux, 2002; McAllister and McManus, 1993). Since the efficiency scores obtained in the DEA section of this Chapter do not indicate signs of clustering, I use the OLS estimator instead of the Tobit estimator.

Concerning the control variables, the coefficient for LOANS is positive and significant as expected. This result suggests that as the variable LOANS increases the efficiency of Latin American banks also increases. This result is in line with the notion that banks with large loan values are able to operate more efficiently (McAllister & McManus, 1993).

Table 15

Regression Results on Efficiency Scores

	Entire Sample[a]	Brazil	Chile	Mexico	Merged Banks[a]
Constant	0.850***	0.722***	0.883***	0.347***	1.026***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LOANS	0.007***	-0.002	0.005	0.042***	0.016***
	(0.010)	(0.725)	(0.960)	(0.000)	(0.010)
EQUITY RATIO	0.227***	0.148*	0.093	0.938**	0.552*
	(0.002)	(0.074)	(0.466)	(0.022)	(0.071)
TOTAL ASSETS	0.005***	0.006**	0.008	-0.112*	
	(0.003)	(0.043)	(0.906)	(0.066)	
MERGE	0.062*	0.090**	0.031	0.046	
	(0.073)	(0.023)	(0.555)	(0.521)	
ECON FREEDOM	-0.196***				-0.200***
	(0.000)				(0.005)
LARGE BANKS					0.122*
					(0.073)
CROSS-BORDER					-0.018
					(0.794)
LARGE TRANS DEALS					-0.290**
					(0.038)
MINORITY OWN MERG					0.131**
					(0.049)
R-Squared	0.257	0.169	0.094	0.504	0.562
Breusch-Pagan / Cook-Weisberg test		0.780	5.780	0.000	
		0.376	0.016	0.948	
No. of banks	182	116	27	39	41

Note: [a] Indicates regression with robust standard errors to correct for heteroscedasticity. P-values are in parentheses. *, **, *** indicate level significance at 10, 5, and 1 percent, respectively.

Similarly, the coefficient for EQUITY RATIO is positive and significant as expected. This result implies that efficiency increases as the EQUITY RATIO of Latin American banks increases. This result is in line with the argument that banks with higher equity ratios are better able to absorb losses or other declines in asset values and hence are more efficient (Mukherjee *et al.*, 2001).

Regarding TOTAL ASSETS, its coefficient is significant and positive as expected. This result indicates that the efficiency of Latin American banks increases as they get larger. This finding is in line with the proposition that larger banks have the potential to diversify and benefit from economies of scales and therefore are more efficient (Mukherjee *et al.*, 2001; Garden & Ralston, 1999).

Lastly, the variable ECON FREEDOM is negative and significant, indicating that banks from mostly unfree countries (such as Brazil and Mexico) are less efficient than banks from mostly free countries (such as Chile). This implies that banks operating in countries with lower regulatory and institutional restrictions result in a banking sector that is more efficient as compare to bank operating in countries with higher regulatory and institutional constraints.

Table 15 also presents the regression results for each country. Note that the coefficient for the variable MERGE is only significant and positive for the Brazilian banks, suggesting that mergers and acquisitions increase the efficiency of banks in Brazil. In addition, the coefficients for EQUITY RATIO and TOTAL ASSETS are positive and significant suggesting that Brazilian banks with large equity ratio and total assets positively affect the efficiency of these banks in Brazil. For the case of Chile, banking efficiency is not affected by any of the independent variables. In Mexico, the coefficients for LOANS and EQUITY RATIO are also positive and significant as is the case of Brazil, suggesting that banks with large loan values and large equity ratios positively affect the efficiency of banks operating in Mexico. Lastly, the size of banks operating in Mexico appears to have a negative and significant relation with the efficiency of banks in this country. This result is not in line with the diversification theory expectations, suggesting that larger banks in Mexico might not have the potential to diversify asset portfolios or might suffer from diseconomies of scales (Mukherjee *et al.*, 2001; Garden & Ralston, 1999).

The OLS results for the group of merged banks from all three Latin American countries are reported in Table 5. The coefficients for LOANS and EQUITY RATIO are positive, significant, and similar as those for the entire sample, suggesting that merged banks with large loan values and large equity ratios significantly increase the efficiency of merged banks in Latin America. Additionally, the ECON FREEDOM coefficient is negative and significant, suggesting that banks from mostly unfree countries (such as Brazil and Mexico) are less efficient than banks from mostly free countries (such as Chile).

The coefficient of LARGE BANKS is significant and positive as expected, indicating that large merged banks are more efficient than small merged banks in Latin America. The CROSS-BORDER coefficient is negative but insignificant, suggesting that there is no efficiency differences between cross-border bank mergers and domestic bank mergers. Regarding the size of the transaction merger deal, the results indicate that large transaction merger deals lead to lower efficiency scores than do small transaction merger deals. Lastly, the coefficient for MINORIY OWN MERG is significant and positive, suggesting that minority owned merged banks are more efficient than majority owned merged banks in Latin America.

Summary

The overall purpose of this chapter was to examine whether mergers and acquisitions affects the efficiency of Latin American banks. This issue is examined by employing a two-stage approach. In the first stage, the efficiency scores of banks operating in Brazil, Chile, and Mexico were computed using an input-oriented variable return to scale DEA model. The efficiency scores for each country were computed separately. In the second stage, the efficiency scores were regressed on a dichotomous variable (which takes the value of 1 if bank was involve in a merger and acquisition transaction, 0 otherwise) along with other control variables such as net loans, equity ratio, total assets, and economic and regulatory restriction under which the banks operates. To further, assess the efficiency effects of merger and acquisitions, the efficiency scores of the merged banks were regressed on dichotomous variables such as large banks, cross-border mergers, large transaction deals, and minority owned mergers.

Overall, the results indicate that bank mergers and acquisitions increased the efficiency of Latin American banks. In addition, the results suggest that mergers and acquisitions have a positive effect on the efficiency of Brazilian banks, while no effect is found for the case of Chilean and Mexican banks. Lastly, the results indicate that (a) large merged banks are more efficient than small merged banks, (b) cross-border bank mergers are not more efficient than domestic bank mergers, (c) small transaction merger deals lead to greater efficiency compared to large transaction merger deals, and (d) minority owned merged banks are more efficient that majority owned merged banks.

CHAPTER V

CONCLUSION

Overview of Research

Over the last few years, mergers and acquisitions within Latin America's banking sector have significantly increased. From 1995 to the third quarter of 2003, Latin American countries experienced more than one thousand bank merger and acquisition deals. In the literature, it is recognized that in Latin America government authorities initiated the merger and acquisition process, while in developed countries this process can be characterized more as market driven.

Several motives have been advanced in the literature to explain why Latin American governments liberalized the entry of foreign banks into their country. It was believed that mergers and acquisitions would: (1) improve the scope and quality of financial services, (2) provide newer and more advance banking technologies and managerial skills, (3) increase access to international capital, (4) provide a "safe haven" for local depositors, (5) improve domestic banking regulatory and supervisory process, (6) increase competition in the banking sector, (7) increase the ability of domestic banks to assess and supervise risk more critically, and (8) make the Latin American banking system more dynamic and efficient.

Given the potential benefits of mergers and acquisitions and besides the increasing number of bank mergers and acquisitions in Latin America, not much is known regarding the effect of bank mergers and acquisitions in this region. As such, the objective of this dissertation is to examine whether bank mergers and acquisitions are beneficial or not to banks in Latin America. Specifically, this study contributes to the literature in three important aspects. First, this study presents evidence on the effect of mergers and acquisitions on the shareholders wealth of Latin American banks. Second, it provides evidence on the effects of mergers and acquisitions on the risk of Latin American banks. Lastly, the study provides empirical evidence on the effect of mergers and acquisitions on the efficiency of Latin America banks.

Chapter II provided empirical evidence on the effect of mergers and acquisitions on the shareholders wealth of Latin American banks. In addition, this chapter examines whether there are any abnormal return differences between large vs. small merged banks, cross-border vs. domestic mergers, large vs. small transaction merger deals; and majority vs. minority owned merged banks. Using banking data from Brazil, Chile, and Mexico the findings suggest that Latin American banks experience significant wealth gains. The finding also indicate that in Latin America: (a) large merged banks do not lead to greater wealth effects that small merged banks, (b) cross-border bank mergers have greater wealth effects than domestic bank mergers, (c) large transaction merger deals have greater wealth effects than small transaction merger deals, and (d) minority owned merged banks have greater wealth effects than majority owned merged banks.

Chapter III investigated the merger and acquisition effects on the risk of Latin American banks. Since results are insignificant, the findings for the entire sample indicate that Latin American banks experience no significant risk (total relative risk and market risk) changes due to mergers and acquisitions. Thus, this result suggests that bank mergers and acquisitions do not affect risk in Latin America. Regarding the risk effects of the different categories of merger and acquisition, the results are all insignificant. This finding indicates that none of the categories (large or small merged banks, cross-border or domestic mergers, minority owned or majority owned mergers, and large transaction or small transaction merger deals) create any risk effect after mergers and acquisitions. The policy implications of these findings suggest that Latin American bank managers and shareholders as well as policy-makers and regulators should not worry about the effect of mergers and acquisitions on the risk of Latin American banks.

Chapter IV examined whether mergers and acquisitions affect the efficiency of Latin American banks. Overall, the results indicate that bank mergers and acquisitions increased the efficiency of Latin American banks. In addition, the results suggest that mergers and acquisitions have a positive effect on the efficiency of Brazilian banks, while no effect is found for the case of Chilean and Mexican banks. I also find that (a) large merged banks are more efficient than small merged banks, (b) cross-border bank mergers are not more efficient than domestic bank mergers, (c) small transaction merger deals lead to greater efficiency compared to large transaction merger deals, and (d) minority owned merged banks are more efficient that majority owned merged banks.

Limitations and Future Research Suggestions

Although, this is the first empirical study that provides a systematic understanding of the effects of mergers and acquisitions on the wealth, risk, and efficiency of Latin American banks, the results should be interpreted with caution due to a number of limitations. First, because of the paucity of banking data (financial and market) in Latin America, I focused only on the banks from Brazil, Chile, and Mexico, which account for about 80% of the value of merger and acquisition deals in Latin America. Second, data on mergers and acquisitions is not detailed, in the sense that the method of payment (cash deals, stocks deals), and the type of deals (mergers vs. acquisitions) are not reported. Similarly, the numbers of banks listed in the stock markets are not abundant. Lastly, the lack of available historical data, the highly aggregated nature of the data and the paucity of standardized reporting requirements posit a strong limitation to appropriately examine bank merger and acquisition effects in Latin America.

However, further research is possible in different areas. First, it would be interesting to compare the wealth effects of Latin American bidder and target banks, as well as to analyze the combined effects (target plus bidder) of mergers and acquisitions as suggested by several authors. Second, it would be important to examine the wealth effects of mergers and acquisitions using managerial efficiency measures (such as return on assets and/or return on equity), the type of deal (mergers vs. acquisitions), and controlling for time effects. Third, future research should examine the effects of mergers and acquisitions on credit risk and credit discrimination, to assess whether mergers are creating new and accessible sources of funds to customers that did not have access to them before. Fourth, it is believed that mergers and acquisitions can be motivated either by wealth maximization or by manager initiative. In this regard, nothing is known in the context of Latin American banks. Fifth, the insignificant risk effect results obtained in this dissertation might be the product of using the best yet limited methodology to measure risk, thus further research is warrant in this matter. Lastly, an analysis of the determinants of mergers and acquisition in Latin America is important and missing from the literature.

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APPENDIX A

Table A1

Regression Estimates for Single Market Model Adjusted for Thinly Traded Stocks

	Post Merger			Pre Merger		
Bank	Constant	Beta	R-Squared	Constant	Beta	R-Squared
Bra01	0.0060	0.6073 ***	0.15	-0.0047	0.1860	0.05
Bra02	-0.0045	0.1596	0.02	-0.0111 *	0.1872	0.04
Bra03	-0.0116	0.5105 **	0.10	-0.0068 *	0.0728	0.03
Bra05	0.0036	0.6124 ***	0.18	-0.0018	0.6444 ***	0.24
Bra06	0.0030	1.1641 ***	0.52	-0.0001	0.7918 ***	0.41
Bra07	-0.0007	0.0369	0.00	0.0034	0.1884	0.03
Bra08	-0.0002	0.2951 ***	0.35	0.0008	0.2033 ***	0.20
Bra09	-0.0023	0.2204	0.02	-0.0046	0.0846	0.06
Bra10	-0.0002	0.6479 ***	0.22	0.0133 **	0.2541	0.09
Bra11	0.0044	0.7560	0.02	0.0020	0.6355 ***	0.15
Bra12	0.0006	0.3111 ***	0.14	-0.0021	0.2242 ***	0.10
Bra13	-0.0009	0.2779 ***	0.30	-0.0030	0.3798 ***	0.40
Bra14	-0.0186 *	-0.1355	0.06	0.0017	0.1578 ***	0.23
Bra15	-0.0009	0.8394 ***	0.33	-0.0018	0.7915 ***	0.45
chi01	0.0099 **	0.3506	0.10	0.0014	0.4667 **	0.05
chi02	-0.0002	1.1067 ***	0.20	0.0012	0.7292 ***	0.09
chi03	0.0004	0.9205 ***	0.17	0.0016	0.6501 ***	0.12
chi04	0.0003	0.3259 **	0.05	0.0026 *	1.3406 ***	0.33
chi05	0.0008	1.0201 ***	0.22	-0.0006	0.7401 ***	0.36
chi06	-0.0021	0.4902 **	0.10	-0.0016	0.9113	0.05
chi07	-0.0012	1.0169 ***	0.38	-0.0002	1.2869 ***	0.80
mex01	0.0008	1.1265 ***	0.47	-0.0010	1.0061 ***	0.25
mex02	0.0018	0.9756 ***	0.50	0.0007	0.8640 ***	0.27
mex03	0.0001	1.1031 ***	0.49	0.0027	0.9189 ***	0.47
mex04	0.0002	1.0113 ***	0.45	-0.0001	1.0924 ***	0.44
mex05	0.0007	0.7065 ***	0.27	0.0018	0.9839 ***	0.41
mex07	0.0007	0.1136 **	0.10	0.0106 **	0.1573	0.05
mex08	0.0101 ***	-0.0348	0.18	0.0191 ***	0.0343	0.12

Note: Significance is indicated as follows: * significant at 10%; ** significant at 5%; *** significant at 1%

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