A Work Project, presented as part of the requirements for the Award of a Master's degree in Finance from the Nova School of Business and Economics.

THE IMPACT OF BANK MERGERS AND ACQUISITIONS ON INSTIUTIONAL RISK: EVIDENCE FROM THE LATIN AMERICAN MARKET

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17-12-2021

Abstract

This work project investigates the effect of bank consolidations on their idiosyncratic risk using the example of 218 transactions between 1998 and 2017 in Latin America. As a risk measure serves the bank z-score. The results show that banks gain stability through M&A with Latin American competitors. Furthermore, an OLS analysis with Huber-White robust standard errors reveals factors which influence the development of bank z-score through the consolidation. Product diversification and the relative size between acquirer and target increase the acquirer's stability, while its liquidity, net interest income and the integration of a publicly listed target have a destabilizing effect.

Keywords

Finance, Banking, Financial Institutions, Mergers And Acquisitions, Latin America, Bank Z-Score, Risk Management

Special credentials are given to my family who has supported me in all decisions and steps taken along my way. Thank you for always being motivating, uplifting, and guiding.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

Introduction

In Middle and South America, a large part of the population is still unbanked or at least underbanked. However, the younger generation is raising increasing demand for innovative and customer centric financial services. Economic progress, global financial crisis and digital trends have influenced the local financial sector. More and more on the agenda of international buy-side investors, it has experienced significant structural reshape during the past two decades, driven by M&A between local and from banks outside the continent. This work project uses the example of the Latin American market to deepen insights on M&A in the banking sector, who have been investigated by a variety of publications regarding their effect on efficiency and profitability, which generally are accepted as the main drivers for mergers. Less literature goes a step further and considers the effect on risk, though, a metric which nowadays goes hand in hand with bank profitability. The presented paper aims to close this gap using a sample of 218 bank mergers and acquisitions[1] from 1998 to 2017 in the Latin America and the Caribbean (LatAm) context. The paper is set up as follows: Part One starts with a short insight on the development and structure of the banking sector in LatAm. After that space is given to a detailed elaboration of two comprehensive interrogations, namely why banks undergo M&A and why banks engage in risk. Afterwards both parts are put in relation to each other, elaborating on their interconnectedness, whereby many intersections become recognizable. Part One incorporates numerous references on existing theoretical and empirical literature, however there was no such found that elaborates on the exact same topic within the LatAm context. Part Two conducts empirical research using statistical analysis on whether a significant change in risk has occurred for the sample institutions through the M&A transactions. As a measure of risk, the bank z-score is used. Part Two furthermore presents a

[1] The terms "mergers and acquisitions", "M&A", "mergers", "acquisitions" and "consolidations" are used synonymously hereafter, as the difference of their definitions is irrelevant to the purpose and outcome of this paper.

regression model that incorporates common bank risk factors and presents and discusses their effect on the z-scores across the sample.

Part I: Theoretical Background and Literature Review

I. The Latin American Banking Sector

For three decades the Latin American and Caribbean banking sector has undergone large structural changes, adapting some international regulatory standards and liberalization to encourage foreign entrance (De Carvalho & De Paula, 2014). Even though overall a significant number of competitors can be found, the sector is highly concentrated (Marketline, 2020) in terms of market share. From an oligopolistic level in the 1990s, markets have become increasingly monopolistic according to the average concentration index (compare Figure 1). Parallelly, not only the sector landscape significantly changed, but so did its performance. It is thinkable that the positive development during the recent years, driven by lower overhead costs and wider interest margins, is not least due to the entering of foreign players that were attracted by deregulation (Sáez-Fernández et al., 2015).

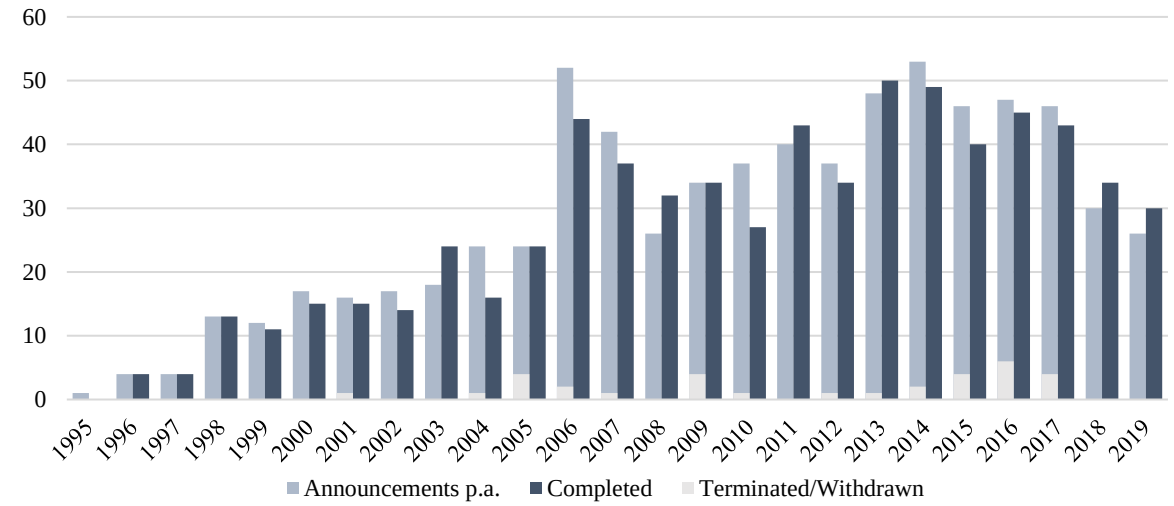
Their entry took place mainly within numerous M&A transactions since the 1990 that peeked in so-called merger waves. Through their observation of six Latin American countries from 1995 to 2010, Cortes et al. (2012) identified such waves in the local financial sector in 1997/98 as well as from 2007 to 2010, concurrent with such in the US, UK, and Continental Europe (compare Ngo, 2019). The number of foreign banks in LatAm has becoming on average larger during that period (Figure 2), with absolute numbers supporting the findings of Cortes et al. (2012). As World Bank Data shows, the financial crisis seems to have caused a jump in absolute numbers of foreign banks as well as their share on total bank assets held (see Figure 3, Claessens & Van Horen, 2014).

Different from past recorded merger waves, today the largest part of mergers is intra-regional with Brazil being by far both the main destination and investor. In the pre-pandemic years

2018 to 2019, financial services were the second most targeted sector for M&A activity in Latin America (Deloitte, 2019). However, driven by an increasing demand for digital banking solutions, today it is rather the evolving financial start-up scene that catches investors' interest than the classical banking sector, which seems to have passed its M&A heydays. Figure 4 shows that the number of M&A deals between banks has decreased in the pre-pandemic years.

Figure 4

Yearly bank and investment bank M&A announcements (of which terminated or withdrawn at later point) vs. completed transactions in South and Central American countries in absolute numbers



Source: S&P Capital IQ Transactions Overview, own graphic

II. Why do banks consolidate?

Different motives for M&A decisions often coexist (Ngo, 2019) but can entirely be grouped under the umbrella of an investment that is expected to generate financial return or value at a certain point in the future (Barros & Domínguez, 2013). In particular, the search of financial institutions for enhanced efficiency and higher profitability has made financial markets reshape over time through mergers within their boundaries and beyond, especially driven by the already mentioned deregulation and technological and financial innovations in emerging markets (Asandului et al., 2016).

On one side is the search for improvement of profitability in the classical sense, called static efficiency by Walter (2002), comprised of the relationship between costs and return. A higher profit margin can be generated by the employment of economies of scale: improving

performance through the acquisition-driven expansion of output volume and specialization, such as serving a larger group of similar bank customers, leading to cost advantages (Stimpert & Laux, 2011). It can also be generated with economies of scope: altering efficiency through greater product diversification (compare Vennet, 2002). They generate rather uncorrelated streams of cash flow that lead to a more stable income (Walter, 2002, 2004) as well as favourable funding environment, and hence a higher operating performance (Ngo, 2019). Partly opposing arguments for those findings come from Hassan & Giouvris (2021) which in their global study observe lower benefits from economies of scope in more competitive markets. Empirical evidence on the effect of diversification and profitability remains mixed.

Following Walter (2004), M&A is furthermore incentivized by dynamic efficiency, through innovations and technology contributed by the acquired entity to the enhancement of existing processes and infrastructures, which ultimately can improve their effectiveness.

M&A are a popular method to increase geographical diversification, cost-efficiently using the target's existing customer base and position in the new market (Sherman & Sherman, 2011). Acquiring a local firm can also help bypass entry barriers (Barros & Domínguez, 2013). In that case, the early exploitation of cross-border consolidation opportunities can create first mover advantages and ultimately shareholder value (Kolaric & Schiereck, 2014). According to Goddard et al. (2012), the expansion of geographical diversification is particularly beneficial for shareholder value when expanding to emerging markets such as LatAm. Geographical expansion can also help to exploit regulatory arbitrage (Weiß et al., 2014). According to Dong et al. (2011), this is particularly true to cross-border mergers from institutions coming from more heavily regulated economies. As mentioned, regulators of LatAm countries have in fact been slow in the adaption of Basel standards and show great discrepancies from one to the other. Thus, even two years after the end of this paper's observation period, only half of the local economies had so far employed a standard higher

than Basel I (World Bank, 2019). Possible reasons are the lack of supervisory and financial capabilities as well as an unfavourable cost-benefit trade-off (Beck et al., 2018).

M&A is also a way to expand power in a previously pervaded market. By increasing the bank's size, market power is gained compared to smaller competitors (Berrioategortua & Del Orden Olasagasti, 2018), if the target size is large enough to make the merger worthwhile. Market power allows banks to dictate price policy, experience monopolistic (Rose, 1995) or too-big-to-fail benefits (Walter, 2002).

Disregarding the principals' interests, it is also possible that managers incentivize M&A transactions in order to control their employment risk, this is losing their job or personal reputation, which cannot be minimized via diversification. They might also have reason to expect higher compensation through the expansion of the organization's size or operational scope (Kolaric & Schiereck, 2014; Venzin et al., 2018).

Additionally, Cortes et al. (2012) find certain macroeconomic, business environment and industry-specific factors that act enabling on M&A deals. A more favourable economic environment, reflected for instance by a strong GDP growth or a low unemployment rate, motivates players to rather grow organically than inorganically through consolidations. The same applies in business environments with high degrees of freedom. If players, however, are able to make use of a favourable financial environment with low tax rates that often can be found in emerging markets, their motivation to merge is rather high.

III. Why do banks take risks?

With volatile macroeconomic conditions, especially in emerging markets, an efficient risk management is inevitable for banks (Hassan & Giouvris, 2021). Stulz (2015) points out that risk in reality is comprised of possible losses (downside risk) as well as positive outcomes (upside risk), the latter being an essential part of their profit generation process. Banks therefore have a natural interest in engaging in risky transactions arising from the desire and

need to realize certain profit margins. Thus, measures that serve the simple reduction of risk might turn out as value destroying (Stulz, 2015). Given the previous findings, banks usually try to maintain their optimal level of risk that satisfies all stakeholders alike.

The competition for funding and deposit attraction requires an adequate management of its risk posture, as counterparties and customers might be reluctant to deal with an institution that is perceived too fragile. Besides, a negative public image can generate operational constraints such as not being able to attract qualified personnel (Stulz, 2015).

The motive to engage in excessive risk which exposes the institution to experience, or cause sever struggles, is not yet fully clarified. Bahri & Hamza (2020) provide some possible strong risk incentives, such as government-guarantees enabling excessive bank leverage, behavioral bias, or management compensation. In theory, the principal-agent conflict contrasts bank owners with limited liability (the principals) such as shareholders, and managers (the agents) which are typically more risk-averse (Kellner, 2017). History has shown, however, that limited transparency of management actions and imperfect control by outside shareholders can be the reason why managers might actively engage into excessive risk for their personal benefit (Bolton et al., 2010; Gorton & Rosen, 1995). An institution's large size, making it "too-big-to fail" can furthermore lead to a lax risk monitoring, assuming that potential losses will at least partly be restored by the regulator (Chionsini et al., 2003). The presence of strong oligopolistic players in highly concentrated markets such as Latin America might furthermore force smaller banks into stronger risk behaviour (Tabak et al., 2013).

Stulz (2015) defines the degree of risk appetite as a characteristic for the institution's type, its capital and income structure. Banks with a larger share of non-interest income are generally more risky than those with a lower share (Köhler, 2015; Maudos, 2017). It is worth mentioning that banks see themselves confronted with various types and sources of risks, of which each has its own characteristics and necessary measures to encounter them. Literature

commonly observes the effects of credit risk (Sun & Chang, 2011). The Basel Committee, however, has acknowledged the aspiring significance of bank risks arising from sources other than credits, such as market risks, operational risk, or liquidity risk, in the light of decreasing margins generated from the traditional lending business.

Experience has taught us the importance to monitor the behavior of banks, considering the sector's specialty that the failure of one player has potential strength to stagger the entire system (Mirzaei et al., 2013) and leading to regulators' conviction that high capital reserves contribute to a lower systemic risk contribution, empirically supported by Hassan & Giouvris (2021). Solely Martynova et al. (2015) oppose, arguing that too restrictive regulation can itself be the cause of higher idiosyncratic risk levels particularly if higher cost of funding inhibits profitability.

Being two most significant measurands for banks, the relationship between profitability and bank risk has been investigated in numerous studies on emerging (e.g., Arena, 2008; Havrylchyk, 2006; Lin & Yang, 2016) and developed markets (e.g., Cihák et al., 2006; Gorton & Rosen, 1995; Köhler, 2015; Martynova, 2020; Martynova et al., 2015; Pessarossi et al., 2020).

The majority of literature follows the argumentation presented by Keeley (1990) who argued that profitability is the cause for lower risk-engagement in order to increase profits. Being less exposed to downside risks, owners and principals of highly profitable banks are less incentivized to take on risk as their capital buffers and franchise values sufficiently equip them against shocks (Beck et al., 2006). Very recently, Martynova et al. (2020; 2015) and Pessarossi et al. (2020) opposed this concept and showed that because profitability enables easier lending, greater possibilities arise to engage into risky side transactions that could cause bank distress.

IV. Bank consolidation and risk taking

Besides the effect of bank mergers on their profitability and efficiency that has been explored in various research (e.g., Zou & Simpson, 2008), considering the significant changes that undergo consolidating institutions one should expect risk behaviour to be influenced. If, for instance, the decision about a consolidation is taken under wrong assumptions or with distorted future output estimations, so Barros (2013), synergies between target and acquirer might be weighted more significantly than they truly are. The outcome can result in a disappointing post-merger value creation and, thus, in the conscious or subconscious engagement of riskier lending transactions as a type of compensation. For example, an unanticipated excessive increase of overhead operations may lead to diseconomies of scale, attributable to the high portion of fixed-costs typical for the banking sector (Venzin et al., 2018). Through the interconnectedness between banks and other players and possible systemic and systematic spillover effects, the impact on risk clearly goes beyond ideocracy (Allen & Gale, 2004).

Consolidation implications on individual bank risk have remained largely untouched by literature. The debate on the "concentration-stability" ("competition-fragility") hypothesis, however, is elaborated by various authors with mixed empirical results (Bahri & Hamza, 2020). The works of Keeley (1990) and Allen & Gale (2004) have gained great popularity in this field. Both advocate the competition-fragility theory, providing frameworks for a competition-prohibiting regulation to support financial stability. Recent work covering developed countries such as the one by Buch et al. (2013) and Bahri and Hamza (2020) support their standpoint. Using the common Lerner-Index to observe competition in German and European countries, respectively, they conclude a significant positive correlation with the bank z-score of institutions. According to their findings, strong market power, such as it arises through the consolidation of entities, drives the banks' risk level down, as those institutions

have greater capabilities of building up loan loss buffers. For emerging markets, Mirzaei et al. (2013) see a reducing numbers of banks and a higher market share for single institutions supportive for overall stability. Through the penetration of foreign institutions in Latin America, which tendentially weakened local banking sector competition, Yeyati & Micco (2007) found lower levels of risk. Other popular publications conclude differently. Boyd & De Nicoló (2005) conducted first a literature review on the topic in which they discovered a fundamental incentive for risk taking in concentrated markets. Later they partly supported their own findings empirically (Boyd et al., 2009) measuring a negative relation of market concentration on the z-score. Applying their model on a sample of countries other than highly developed, they also found evidence that loan losses are prompted by market concentration. Tabak et al. (2013) investigate on whether a too-big-to-fail problematic was observable in different Latin American countries. Even though this could not be confirmed by their results, they conclude that market concentration harms the performance of smaller institutions, reduces cost efficiency, and ultimately increase the chance of an insolvency.

Getting back to the discussion of Section II, empirical evidence on the effect of diversification on profitability and risk remains mixed. In line with the "diversification-stability" argument, making use of diversification synergies with a target can lower credit risk attributes (Berrioategortua & Del Orden Olasagasti, 2018; Chionsini et al., 2003). Idiosyncratic risk therefore can be lowered by broadening the origin of assets on the bank's balance sheet (Wagner, 2010). Diversification effects lower default risk by lowering cash flow variability (Ngo, 2019), strengthen against business segments risk through the expansion to new segments that make the institution overall less vulnerable to macroeconomic factors, and credit risk when new customers are gained through a merger (Chionsini et al., 2003). Merged banks might actively try to improve the quality of their loan portfolio by strengthening the relationship with creditworthy clients. Oppositely, Wagner (2010) argues that greater

diversification among many banks might ultimately weaken the system, if their portfolio compositions converge.

Two alternative scenarios are described in the literature for banks conducting cross-border mergers. It is commonly argued that geographical diversification positively impacts banks' risk levels, as shocks in one geographical region are absorbed by positive development in the other, as long as there is a low correlation between assets in both regions (Amihud et al., 2002). However, strong evidence exists in favour of the "market risk hypothesis". Berger et.al. (2015), when observing U.S. commercial banks, find higher risk associated with foreign assets held due to FX risks, a different cultural environment, asymmetric information problems and missing operational network. Likewise, Buch et al. (2013), from a sample of German banks, as well as Cardozo et al. (2021) when most recently observing the international expansion of Chilean banks, come to the same conclusion.

Even in existing institutions without the integration of a different bank or firm, managers potentially face conflicts with other managers who are solely focused on the success of their own units (Stulz, 2015). In the environment of a merger, the clash of two different company cultures, combined with changes of processes and hierarchies, might cause the reluctance of single divisions or employees, increasing those conflicts. More simple, the consolidation of two differing risk cultures might result in the predominance of one which is in itself more risk affine, and therefore lead to at least a temporary change in the institution's risk engagement.

To the author's knowledge, current contributors to literature focusing on bank consolidation affecting idiosyncratic risk are solely two.

Firstly, Asandului et al. (2016) conduct an empirical study on how consolidations affect the credit risk behavior of banks in Eastern European countries before and after the financial crisis. They observe a reduction in credit risk as consolidations have negative effect on the loan books growth. As possible reasons they state fewer financial resources available to lend

due to the recent transaction, and the uncompleted integration of the new entity's operations, portfolio, and human resources into existing processes.

Secondly, a comprehensive analysis on the effect of bank M&A on default risk was conducted by Ngo (2019) via a global sample over a two-decades time period, observing closely the contribution of product and geographical diversification. Her analysis shows that mergers have significant negative impact on the acquiring banks' default risk level independent of whether they improve geographical diversification or not (opposing Berger et al., 2015), but indeed more when the deal is product-diversifying rather than focused. She further examines whether default risk is rather idiosyncratic, systemic, or systematic. Her model proves that there is a positive relationship between default risk and idiosyncratic risk, meaning that "M&As lead to safer banks individually" (Ngo, 2019).

Based on the discussions above and the consistent findings of literature most closely to this papers' research question, the driving hypotheses of the following empirical analysis will be:

H_0: *Idiosyncratic bank risk is lower after a consolidation with another financial institution*,

and consequently:

H_1: *Idiosyncratic bank risk remains equal or rises after a consolidation with another financial institution.*

Based on the previously described factors referred to by literature and that have empirically been shown to affect bank risk levels, it furthermore will be analyzed which of these factors have an influence on the potential change in risk.

Part Two: Empirical Research

I. Methodology

Measuring risk

One widely popular measure in literature of risk is the bank z-score (e.g., Andriosopoulos et al., 2015; Bahri & Hamza, 2020; Boyd et al., 2009; Cardozo et al., 2021; Mirzaei et al., 2013;

Tabak et al., 2013; Wu et al., 2019). It denotes a bank's capital buffer comprised of equity (Capital Ratio, CAR) combined with its profitability (Return-on-Assets, ROA) in relation to the volatility (Standard Deviation) of returns (World Bank, 2021): Z-Score = (ROA+CAR)/σ(ROA). Mathematically expressed, it denotes a bank's distance from insolvency expressed in standard deviations of return, or in other words the probability that current losses exceed the bank's capital causing a default event (Li & Malone, 2016). Following Yeyati & Micco (2007), the time-varying z-scores of the acquiring banks are calculated using the average standard deviation of quarterly ROA over eight quarters, combined with the average annual capital ratio and ROA over two years. Naturally, z-score is inversely related to risk, thus, a higher value implying a lower level of risk (Wu et al., 2019). As this paper focusses on the effect of M&A on the risk of an individual institution *i*, the change in z-score (hereafter: "delta z-score") is computed as the difference between the z-scores of *n* fiscal quarters prior and post the completion date *t*, whereby *n = 1, 2, 3, 4, 5, 6, 7, 8*.

$$\Delta ZSCORE_i = \overline{ZSCORE}_{i;c+n} - \overline{ZSCORE}_{i;c-n} \quad (1)$$

The Model

In a second step the model in Equation (2) examines potential factors that lead to a change in risk levels after an M&A transaction, such as diversification effects. A calculation description and rationale for all variables can be found in Table 1.

$$\Delta ZSCORE_{i;c-n;c+n} = \propto + \beta_1 PRODIV_i + \beta_2 GEODIV_i + \delta_k bank_{i;c+n} + \gamma_u macro_{p;c+n} + \varepsilon_i \quad (2)$$

$\Delta \mathrm{ZSCORE}_{i;c-n;c+n}$ denotes the change in average bank z-score in eight subsequent fiscal quarters pre- and post-transaction for the acquiring bank *i*. GEODIV_i and PRODIV_i are dummy variables for geographical and product diversification via the M&A transaction, respectively.

Furthermore, a row of bank-specific ($bank_{i;c+n}$) variables are included in the model, averaged over the post-completion phase $c+n$, and presented in Equation (2). These are well-accepted in literature on the determination of bank capital structure, namely balance sheet size (SIZE), indebtedness (DEBT), liquid assets relative to debt (LIQ), allowances for loan losses (ALL), as well as income structure measured as the net interest income ratio (NII), and profitability (ROE). Two transaction-specific variables are included at a later state of the analysis: a dummy variable for listed target institutions (LIST), and the relative size between acquirer and target in terms of total assets (RELSIZE).

$$Bank_{i;c+n} = \delta_1 SIZE_i + \delta_2 DEBT_i + \delta_3 LIQ_i + \delta_4 ROE_i + \delta_5 NII_i + \delta_6 ALL_i + \delta_7 LIST_i + \delta_8 RELSIZE_i \quad (3)$$

Equation (4) presents control variables included to account for macroeconomic conditions ($macro_{p;c+n}$) in the respective country p, such as GDP growth (GDP) and crisis (CRISIS), the interest rate level defined by the monetary policy rate (MPR), as well as the banking market structure, defined by concentration (C3), competition (LERNER), and share of foreign banks (FOREIGN). Taking into account the regulatory transition in the LatAm market (compare Part One, Section I), financial freedom (FF) measured by the Heritage Foundation is included as another variable.

$$Macro_{p;c+n} = \gamma_1 FF_p + \gamma_2 GDP_p + \gamma_3 CRISIS_p + \gamma_4 MPR_p + \gamma_5 LERNER_p + \gamma_6 C3_p + \gamma_7 FOREIGN_p \quad (4)$$

II. Data Sample and Descriptive Statistics

To form the data sample, M&A transactions from financial institutions are taken from the Mergermarket database as well as from Standard & Poor's Capital IQ. The latter also provides financial statements of the included banks. Transactions are included in the sample if at least the target's headquarter was located in LatAm at the time of the transaction and if the completion date lay in the time span from 1998 to 2017. The period is chosen such that it incorporates all identified merger waves according to Cortes et al. (2012). Both target and buyer industry group are defined according to the S&P Global Industry Classification

Standard (GICS) as either *Banks (4010)* or *Diversified Financials (4020)*. For the model estimation, the acquisition of minority stakes is excluded from the sample, except for minority stake acquisitions larger than 25% which made the acquirer a majority shareholder. Due to information unavailability, transactions are furthermore excluded afterwards for which no sufficient data on bank level is available. The final cross-sectional sample includes 218 transactions involving 22 LatAm countries. Table 2 and Table 3 cluster the transactions throughout the years of the observation period. As anticipated by Bohada & Romero (2019), Brazilian institutions are most active as acquirer as well as target for consolidations, followed by Argentina and Mexico.

III. Empirical Results

Results description

For the statistical analysis, Stata 14 is used. Z-scores are calculated for acquiring entities, which include financial institutions in LatAm and non- LatAm countries, based on collected data eight quarters before and after the consolidation completion date. The difference of the pre- and post-consolidation z-score is used as risk measure. The largest decrease in delta z-score is -76.23, the largest increase 128.93. The calculation results are displayed in Table 4.

Table 4

Paired t-test on the null hypothesis H_0: mean(diff) = 0 where mean(diff) is the average delta between the bank z-score calculated over eight quarters pre- and post-completion date *c*: mean(diff) = $z - score_{c+8} - z - score_{c-8}$.

	Min	Max	Mean	Std. Error	Std. Dev.	Obs
Pre transaction	0.084	342.91	71.000	4.322	63.380	215
Post transaction	0.116	878.72	91.673	7.196	105.507	215
Δ (diff.)	-76.23	128.93	13.084	5.955	87.318	215

Ha: mean(diff) < 0	Ha: mean(diff) != 0	Ha: mean(diff) > 0
Pr(T < t) = **0.999**	Pr(|T| > |t|) = **0.001**	Pr(T > t) = **0.001**

Source: S&P Capital IQ, Mergermarket, own calculations

On average, z-scores increase after the consolidation. The minimum and maximum values across the sample both increase, averaging 71.00 before the effective consolidation, and rising to 91.67 after the consolidation, with an average delta of 13.08. A Shapiro Wilk test of normality was conducted on the pre- and post-consolidation z-scores, revealing non-normality.

Therefore, a paired t-test was chosen as method to validate the change in risk level pre- and post-transaction.

The difference in z-score is significantly unequal to zero as well as positive at the 0.01 level (Table 4). Following the interpretation of the bank z-score, the average increase indicates a decrease in risk levels post-transaction. Hypothesis H_0 therefore cannot be rejected, whereas hypothesis H_1 is rejected: the idiosyncratic bank risk is lower after a consolidation with another financial institution.

Next, the change in risk is measured and tested simultaneously across different groups of institutions in the sample (Table 5). Acquiring banks that are headquartered in LatAm countries as well as in countries outside the continent experience a significant non-zero and positive increase in z-scores on a 0.01 and 0.05 significance level, respectively. It can be observed that the sample institutions from LatAm countries on average increase by 15.41 through the transaction. Their pre- and post-merger risk levels are almost double as high as those from non- LatAm countries, which increase on average by 31.48 in z-score. The formers' relative decrease in risk levels is also smaller (c.26%) compared to the latter (c.31%). Furthermore, cross-border as well as product diversifying consolidations both lead to an increase of z-scores post-merger, with a mean difference which is unequal to zero at a 0.01 level (for domestic and product focusing deals at a 0.1 level). Banks engaging in diversifying transactions are furthermore observed to already be more stable before the transition than those that undertake focused deals. Product and geographically diversifying consolidations both also lower the bank risk level relatively more in the diversifying groups than in the focused ones (c.30% vs. c.26% and c.33% vs. c.21%, respectively). The results of the grouped t-tests are in line with the results of the ungrouped t-test: in all cases, the difference in z-scores pre- and post-consolidation are significantly unequal to zero and positive.

After finding evidence of decreasing risk levels following a consolidation transaction with a bank from LatAm, in the next step the previously presented model was run as an OLS regression with Huber-White heteroskedasticity-robust standard errors. Delta z-score is previously winsorized at the 5% level, to even outliers that presumably occur from the limited and rather inconsistent data density for the observed markets. The model includes possible factors that are claimed to drive the change in risk levels through the consolidation. Following the qualitative description and expected impact of each variable on the bank z-score in Table 1, Table 6 contains the quantitative description of the dependent and independent variables of the model. As said, delta z-score is 13.08, with a standard deviation of 48.77.

Before the regression is run, the variables are checked for multicollinearity, as presented in Table 7. Variables are showing low correlation among each other. Geographical and product diversifying deals have a positive correlation with delta z-score, thus both factors are expected to have an elevating effect on bank stabilization. Size, GDP, financial freedom, and market concentration, among others, are also positively correlated to delta z-score. As anticipated, they affect stabilization positively. Anticipated were also the negative correlations between the loan loss allowances as well as the dummy CRISIS with delta z-score. The negative correlation between the liquidity ratio and the net interest income were not anticipated, neither was the positive correlation with efficiency, which suggests a risk reducing effect on the acquirer.

The regression analysis is conducted on three different model variations. The results of the regression on model (1), which is the base case with the independent variable being delta z-score and the independent variables including solely acquirer bank-specific and macroeconomic variables, are displayed in Table 8. The R-squared of the base model is 0.17, and the F-Stat is 2.39. The model reliably predicts the dependent variable, as the F-test is significant at the 0.01 level. Product diversification has a positive coefficient, while

geographical diversity has a negative coefficient. Surprisingly, no bank-specific variable is significant in the base model. Of the macroeconomic variables, the coefficients of concentration (0.62), and the number of foreign banks (75.09) both are positive and significant at the 0.01 level, thus affecting the change in risk positively and supporting a greater bank stability after the consolidation. The variable CRISIS on the other hand has a coefficient of -30.23, significant at a 0.01 level.

Table 9 contains different adjustments that are made to the base model. In model (2), the specific variables, relative size in terms of total assets and a dummy for listed targets, are added to the base model. In model (3), the OLS is run solely on transactions that happened within the Latin American continent, in other words when target and acquirer were headquartered there.

Through the limitation of criteria for the variation models and through the limited availability of data on certain target institutions, the number of observations in the regression is lowered from 181 to 136 when including transaction-specific variables, and to 92 when focusing on intra-Latin American transactions. Both modifications are large enough for a sophisticated analysis, the F-Stat is significant for all cases with values of 4.57 and 4.08. The expressive power of the model rises significantly with the narrowing of criteria. The R-squared is 0.27 for model (2) and highest for model (3), where it is 0.35, again showing the models' superiority over the "intercept-only" model.

Across the models, product diversification remains positively related to the change in delta z-score and becomes significant at the 0.05 level in model (3). Geographical diversification is significantly influencing the delta z-score in models (2) and (3) at the 0.1 and 0.05 level, respectively. The coefficient, as anticipated, remains negative, proposing that cross-border transactions lower stabilization compared to regional transactions. Both coefficients rise in value through the limitations imposed by the model variations. As anticipated in the

multicollinearity matrix, the liquidity ratio and NII have negative coefficients, and are significant in models (2) and (3) at the 0.05 and 0.1 level. The coefficient of NII rises significantly throughout the variations, stronger influencing stabilization in case of intra-

Table 9

Regression coefficients [Std. Err.] from OLS with Huber-White robust standard errors for different models such as (1) the base model using delta z-score as independent variable and as dependent variables acquirer bank-specific and macroeconomic variables, (2) an extension of the base model using delta z-score as independent variable and as dependent variables acquirer bank- as well as transaction-specific and macroeconomic variables, and (3) a limitation of model (2) by applying it solely on transactions in which the both parties are headquartered in Latin America, where delta z-score is the sum of returns on assets and capital ratio over standard deviation of returns on assets over a period of eight fiscal quarters pre- and post-consolidation completion date *c*. Bank specific independent variables are dummies for product (PRODIV) and geographical (GEODIV) diversifying consolidations, SIZE is the average acquirer's size in terms of assets, DEBT its debt- and LIQ its liquidity ratio, ROE its return-on-equity, NII its average net income as a share of total operating income, ALL its change in allowances for loan losses as a share of total gross loans. Transaction-specific variables are LIST, a dummy for listed target institutions, and RELSIZE, comparing the size of the target with the size of the acquirer in terms of total assets at completion date *c*. Macroeconomic control variables are three years averages including the Financial Freedom index by the Heritage Foundation (FF), the average GDP growth, the monetary policy rate MPR, the Lerner index as a measure of competition, C3 the share of the three largest banks in terms of total assets, and FOREIGN the share of foreign banks in the market.

	Base Model		**Transaction Specific**		**LatAm Transactions**	
PRODIV	8.955	[7.183]	13.381	[8.686]	**19.854****	[9.615]
GEODIV	-3.01	[8.837]	**-19.447***	[10.843]	**-43.192****	[16.774]
SIZE	2.73	[1.799]	3.172	[2.203]	-1.63	[2.796]
DEBT	-16.493	[30.665]	-8.5	[39.114]	42.809	[45.957]
LIQ	-0.004	[0.005]	**-0.011*****	[0.003]	**-0.012*****	[0.003]
ROE	15.496	[16.68]	-3.96	[21.13]	-1.811	[22.132]
NII	-0.35	[0.996]	**-2.432****	[1.051]	**-4.236*****	[1.165]
ALL	39.779	[65.128]	49.086	[67.575]	69.728	[65.333]
LIST			**-49.038*****	[10.123]	**-53.537*****	[12.425]
RELSIZE			10.931	[6.829]	**11.581***	[6.121]
FF	0.361	[0.289]	0.54	[0.384]	0.384	[0.488]
GDP	4.915	[166.187]	11.958	[197.068]	41.031	[208.439]
CRISIS	**-30.231*****	[10.787]	**-30.474****	[14.314]	5.57	[16.058]
MPR	-13.987	[25.406]	46.654	[50.619]	**133.265****	[61.211]
LERNER	-35.714	[35.795]	0.135	[38.284]	59.091	[46.079]
C3	**0.621*****	[0.225]	**0.948*****	[0.288]	**1.007****	[0.497]
FOREIGN	**75.088*****	[26.896]	**118.948*****	[29.632]	**186.6*****	[48.771]
Constant	**-89.087*****	[30.951]	**-141.888*****	[40.143]	**-153.938*****	[41.087]
R-squared	0.167		0.272		0.348	
F-test	2.394		4.565		4.082	
Prob > F	0.004		0.000		0.000	
St Err dep var	48.968		64.828		47.086	
Obs	182		136		92	

Source: S&P Capital IQ, own calculations

LatAm transactions. Different from many quoted empirical research papers by other authors, the variable for efficiency (ROE) is insignificant. The same applies for ALL, allowances for loan losses. When taking transaction-specific variables into account in models (2) and (3), LIST also is negative and significant at the 0.01 level in both models, and again particularly in model (3). Again, LatAm-based institutions tend to struggle more in terms of risk when

acquiring a listed target. The relative size becomes significant at the 0.1 level, with a positive coefficient.

The larger the target in comparison to the acquirer, the higher the stabilizing effect through the consolidation. Regarding macroeconomic factors, C3 and FOREIGN have positive effects on delta z-score at 0.01 significance levels in all three models. A higher concentration and a higher share of foreign banks in the home market therefore noteworthy support the increase of the bank z-score. CRSIS is found negatively influencing delta z-score at the 0.01 level, while interest rate levels only have a significant effect in case of intra-LatAm transactions, where the coefficient is comparatively high.

IV. OLS Assumptions Validation

For the OLS regression to be valid, it should meet four assumptions which are (1) the relationship between the dependent variable, the independent variables, and the error term being linear, (2) no multi-collinearity being identifiable between the independent variables, (3) the error terms being normally distributed, and (4) the error terms having constant variance (homoskedasticity). Assumption (1) was met in Part Two, Section I by defining the linear model. In Table 7 the correlation between the independent variables was displayed, with very few exceptions showing insignificant multicollinearity between them. Additionally, the variance inflation factors (vif) of the variables were calculated using Stata, revealing factors of maximum 2.22 (Table 10), again showing low correlation between them. For assumption (3) the Shapiro-Wilk-Test was conducted on the predicted residuals of the models and the associated Q-Q-Plots was plotted to visualize their distribution (Table 11 and Figure 5). Non-normal distribution was accounted for by winsorizing delta z-score at a 0.05 level, such that the Shapiro-Wilk-Test for model (1) reveals a probability of the Standard Normal Distribution of 0.013 at a z-value of 2.226. Statistically a 0.05 significance level is sufficient for assuming normality in the error terms. As the probability is still very close to 0.01, the significance is

regarded as weak. However, assumption (3) can be relaxed due to a sufficiently large sample size such that the Central Limit Theorem can be invoked (Pek et al., 2018). Models (2) and (3) have normally distributed error terms. Furthermore, by employing heteroscedastic corrected covariance matrix following White (1980), so-called Huber-White robust standard errors, which are consistent to heteroskedasticity, assumption (4) was accounted for. All in all, the relationship between the explanatory variables and the risk measure are assumed to be linear, and the results of the model to be accurate.

V. Discussion

Across the sample, the bank z-score increases after the consolidation. A paired t-test reveals the significance of the average increase. Following the definition of the z-score, its increase signifies a decrease in risk levels for the acquiring bank. In other words, the results lead to the conclusion that consolidations between financial institutions in Latin America elevate the acquirer's stability. The results are in line with related empirical findings which show that credit risk (Asandului et al., 2016) as well as general default risk (Ngo, 2019) are reduced after bank mergers. One general possible factor might be a reluctance of banks to take on new risk onto their balance sheet before risks brought by the target are fully scrutinized.

The empirical results show that banks headquartered in LatAm already have a z-score level approximately half of the observed banks that are headquartered outside of LatAm, making them significantly more risky before as well as after their inorganic growth. They also experience a smaller reduction of risk than non-LatAm acquirers. This can be caused by the generally more challenging conditions in Latin America compared to developed markets, due to market risks such as greater political instability, lower economic efficiency and performance, and volatile financial markets.

The results of the regression model reveal that, even though both product and geographically diversifying and non-diversifying M&As both lead to lower levels of risk, product

diversification evidently is a reason for the higher stability compared to product focused ones, as shown by the positive coefficient. The t-test and the regression model are in line, and correspond with the findings of Ngo (2019). Amihud et al. (2002) call this avoiding to put "all eggs in one basket". The results support the "diversification-stability" hypothesis that was mentioned earlier. Possible reason could be the exploitation of economies of scope in the new market which ultimately generates more stable returns and thus lowers the bank z-score, whereas the exploitation of economies of scale is not found to be improving risk levels.

In terms of geographical diversification, the results are not as clear. Across the sample institutions undertaking cross-border consolidations have lower levels of risk afterwards. However, the geographical diversification itself seems not to be a driver, but in fact has a reducing impact on the institutions' stability, as shown by the negative coefficient. It is thinkable, that the previously mentioned diversification benefits in this case have led to the opposite effect, which is an accumulation of economic hurdles and systematic instabilities that have resulted in a higher idiosyncratic risk level, such as it as described by Berger et al. (2015). It is also thinkable that the integration of an institution from a different country, culture and perhaps language has led to the same, like some authors such as Stulz (2015) and Cardozo et al. (2021) have described it. The results also lead to the conclusion, that regulatory discrepancies which might have been a desirable gain through the M&A with an institution from LatAm, in the end lead to an unbeneficial effect on the acquirer.

When acquiring another firm, it is not uncommon for the acquirer to take on new debt, however, no evidence was found for indebtness to be a driver of the change in risk after the merger.

Even though high liquidity often is associated with higher stability, it can also be a sign of expected instability due to volatile returns (compare Cornett et al. (2011) and Wu et al. (2019)). This argumentation is supported by the outcomes of this analysis, that show that the

liquidity of the bank negatively influences its stability, even though the liquidity coefficient might be comparatively low.

The negative NII coefficient is in line with the previous expectations based on Köhler (2015) and Maudos (2017). The more dependent a bank is on non-interest income, meaning the more it moves away from the traditional interest generating lending business, the better does the z-score develop after the M&A. This is again particularly significant in the case of transactions within institutions from the Latin American continent. It reflects the previous findings on product diversification. The alternative income sources cause a more steady stream of revenues, protecting the income from disruptions in the traditional lending business. Results from previously mentioned numerous existing research on the effect of M&A on profitability cannot be supported with this work.

The difference between the coefficients of the base model and the expanded models is particularly interesting. LIST has a negative and significant coefficient, thus whether the target is listed plays a very significant role in the development of the z-score. Institutions acquiring listed targets experience a drawdown in their stability level. This could be related to principal-agent problems caused by discrepancies between the target's shareholders and the change in the institution's management (agents), particularly when speaking about hostile takeovers.

The size of the target in relation to the acquirer has a stabilizing effect among LatAm situated companies, a possible sign for certain positive spillovers of e.g., know-how, efficient processes, or a profitable income base on the acquired entity, where it can be assumed that the larger the entity, the larger the effect. The positive coefficient of the relative size underlines what was discussed in Part One, Section II, and various literatures before. The acquisition of a relatively large competitor leads to a competitive advantage over smaller competitors, such as described by Berrioategortua & Del Orden Olasagasti (2018), whereby the institutions do not

seem to excessively engage into risky transactions which would lead to destabilization (as indicated by the "too-big-to-fail" paraoxon).

Additionally, as shown by the positive and significant coefficient of C3, higher concentration leads to greater idiosyncratic stability. Thus, both results go hand in hand, pointing towards the validity of the previously described "concentration-stability" theory. The results of the presented model return a positive effect on risk by the number of foreign banks in the market, accompanied by a high coefficient. This expands the findings of e.g. Yildirim & Philippatos (2007) who concluded that increased market penetration by foreign competitors has a positive effect on the efficiency of domestic banks and the local banking system. This paper has shown that non-LatAm banks overall have significantly lower risk levels. Through their penetration and the interconnectedness of the sector they particularly affect local banks' stability positively (compare model (3)), which explains the regression result.

The negative and significant coefficient for the crisis variable is not surprising. It is simple to recognize that a bank situated in a market which is experiencing an economic, political, or socioeconomic crisis suffers an increase in risk levels if it conducts an acquisition of another institution during that time. Financial freedom was not found to be a significant factor for the change in risk though the transaction. Even though anticipated, no valid prove can therefore be found for the exploitation of lax regulatory environment to harm or benefit the acquirer risk.

Conclusion

This work project investigated on whether the risk level of a bank increases when it consolidates with another bank in the Latin American context, using a sample of 218 M&A transactions from 1998 to 2017. Risk was defined as the change of the bank z-score, a common measure for bank default risk, through the transaction. First, space was given to a

comprehensive analysis on the theory of bank M&A and risk taking, supported by numerous existing literature references on related topics. Generally, literature does not reach a consent regarding the relation between bank consolidations and diversification on their profitability and risk. The following empirical analysis has led to a row of conclusions regarding bank M&A in LatAm. When acquiring a bank from LatAm, disregarding the origin of the acquiring bank, the risk level decreases, even though banks from LatAm on average have higher risk levels than non-LatAm banks. Thus, the reason for the higher stability achieved through the acquisition must arise from a source different than the mere location of the target. It can be concluded that by diversifying the product range the bank ultimately benefits from scope economies. A higher diversification in the P&L prior to the acquisition is also beneficial, shown by the positive impact of NII on stability. This can be particularly supportive in the Latin American market with its diverse customer base and needs. The relative size of the target increases the acquirer's market power and supports its stability. Acquiring relatively large competitors furthermore leads to higher concentration which through strong interconnectedness of the sector positively affects institutional stability. Even though the entry of foreign competitors affects the risk of other institutions positively, for the entering institution it has the opposite effect: geographical diversification has a destabilizing effect on the acquirer, possibly from riskier macroeconomic conditions and hurdles faced when combining differing company and business cultures.

The great interest of the recent two decades in LatAm's financial sector can be well justified from the results of this work project. Partly unsatisfied markets and groups of customers in terms of banking services and payment solutions create a promising base for the exploitation of revenue streams if emerging market hurdles are correctly accounted for and if the differences between local markets and societies are recognized. If done so, as could be seen, banks can benefit not only from higher revenue but from higher stability overall.

Appendix

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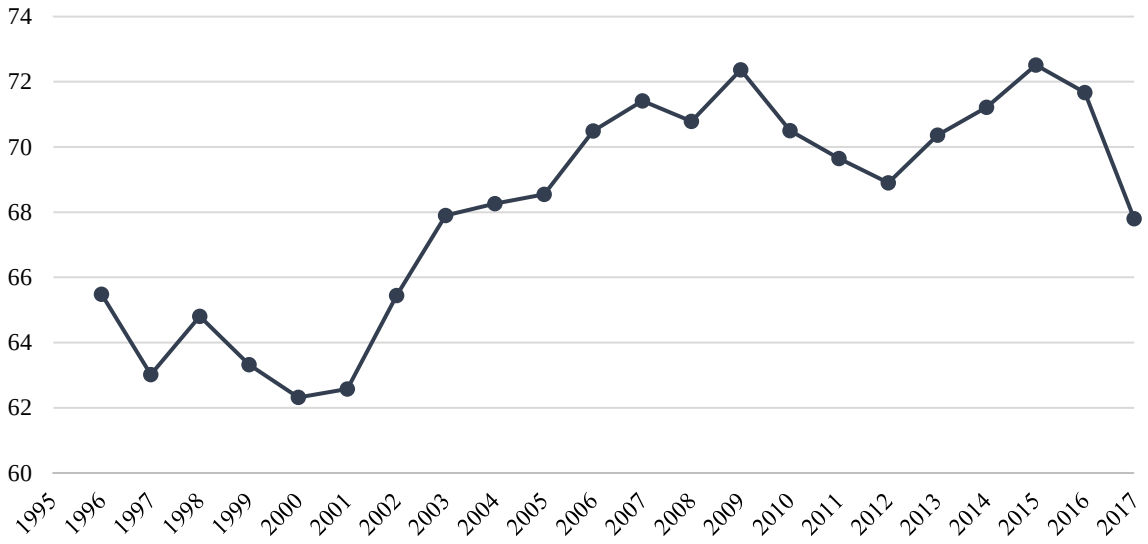
I. Figures

Figure 1

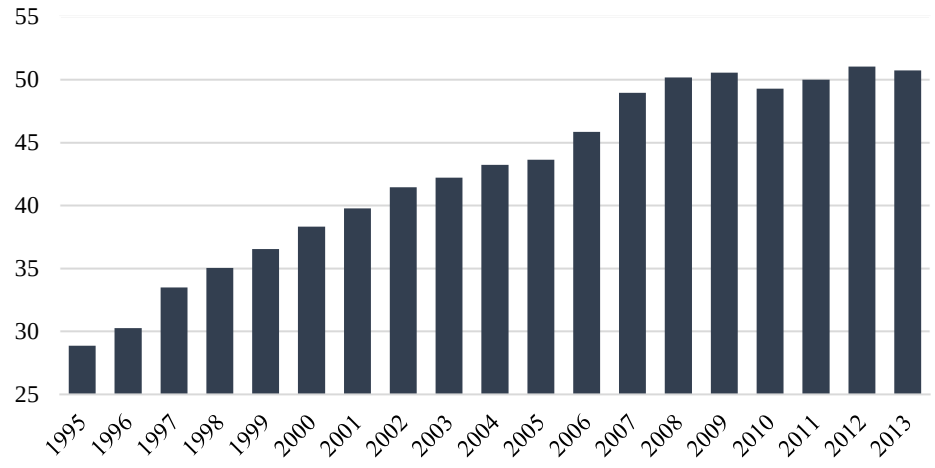
Concentration level in the Latin American bank market, measured by the market share of the three largest banks in terms of assets in percentages



Source: World Bank Global Financial Development Data Base 2019, own graphic

Figure 2

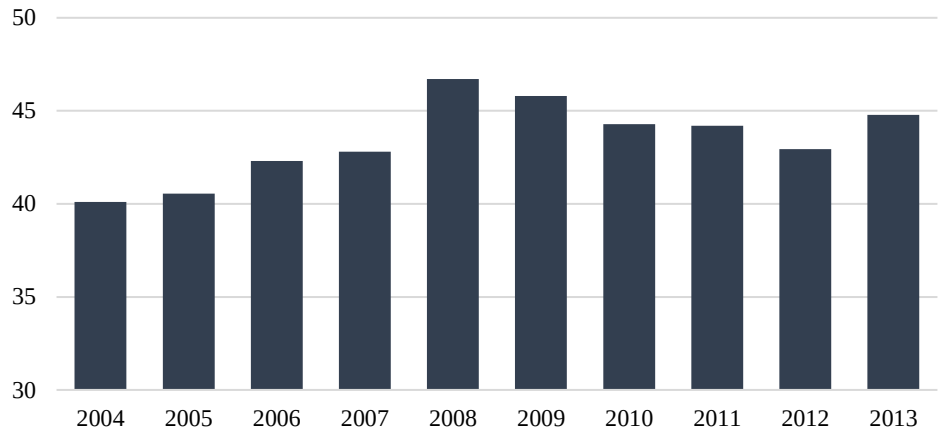
Absolute number of foreign banks as a percentage share of total banks operating in Latin America



Source: World Bank Global Financial Development Data Base 2019, own graphic

Figure 3

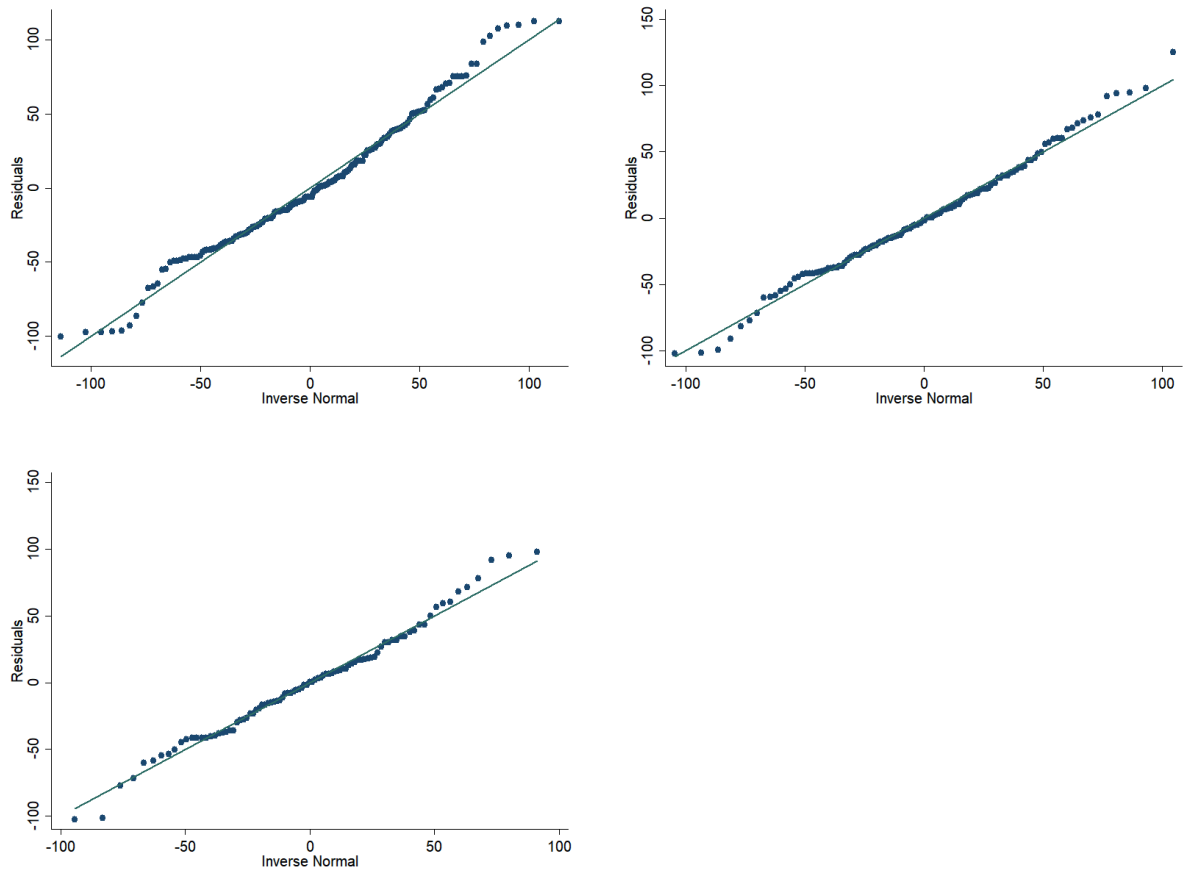
Assets held by foreign banks as a percentage share of total assets in the banking market in Latin America



Source: CLAESSENS, S. and VAN HOREN, N. (2014), Foreign Banks: Trends and Impact. Journal of Money, Credit and Banking, 46: 295-326, own graphic

Figure 5

Q-Q-Plot of the residuals of the regression model versions using delta z-score as dependent variable, with model (1) in the upper left chart, model (2) in the upper right chart, and model (3) in the lower left chart



Source: S&P Capital IQ, own calculations

II. Tables

Table 1

Calculation description, rationale, and source of the dependent, independent and control variables in the regression model

Variable	Variable name	Calculation	Rationale	Expected impact on risk	Source
Risk measure					
ZSCORE	Z-Score	$\text{Z-Score} = \frac{\text{ROA+Capital Ratio}}{\sigma(\text{ROA})}$	Inverse measure of risk: the higher the volatility of returns in comparison to capital and returns that serve as a proxy of buffers, the higher the risk and the lower the z-score. Returns are earnings before tax and special items		S&P Capital IQ, own calculations
Dependent variables					
GEODIV	Geographical Diversification	Dummy variable equaling 1 if the transaction was conducted cross-border, and 0 otherwise	From the conclusions drawn by Berger et al. (2015), Buch et al. (2013) and Cardozo et al. (2021), geographical diversification in this paper is expected to have a risk-increasing effect on merging banks	++	S&P Capital IQ, Mergermarket
PRODIV	Product Diversification	Dummy variable equaling 1 if the acquirer and the target do not share the GICS classification, and 0 otherwise	As proposed by Ngo (2019), the diversification effect of an acquiring bank's product range lowers default risk by lowering cash flow variability. Thus, a negative correlation is expected	--	S&P Capital IQ, Mergermarket
Bank characteristic and transaction specific variables					
SIZE	Bank size (post-merger)	Natural log of total bank assets	The aim for growth is one of the main rationales in M&A transactions (Alexandridis et al., 2010), as it increases individual market power and market concentration (Wu et al., 2019). A larger bank in terms of assets can, on one side, be less affected by shocks; on the other side, the too-big-to-fail paradox could draw them towards riskier behavior (Du & Palia, 2018)	++ / --	S&P Capital IQ, own calculations
DEBT	Indebtness	Debt as a share of total assets	Indebtness post-merger controls for the effect of the M&A transaction on short- and long-term institutional leverage. Leverage can positively and negatively affect bank risk, dependent on various factors	++ / --	S&P Capital IQ, own calculations
LIQ	Liquidity Ratio	Cash, cash equivalents and short-term investments as a share of total debt	Large liquidity reserves can be an indicator for precaution of higher expected liquidity risk the bank (Cornett et al., 2011), thus, they are expected to be positively correlated to bank risk	++	S&P Capital IQ, own calculations
ROE	Return on Equity	Net Income as a share of equity book value	ROE serves as a proxy for efficiency and profitability. These create a solid base for banks that protects them against the risk of distress ((Keeley, 1990; Lin & Yang, 2016). Returns are earnings before tax and special items	--	S&P Capital IQ, own calculations
NII	Net Interest Income	| Net interest income as share of total net income |	Income diversification serves as an indicator for the business model (Köhler, 2015) and strategy the bank conducts. From a sole risk perspective, a higher share of non-interest income is expected to decrease bank risk (Maudos, 2017) due to diversification effects (Köhler, 2015)	++	S&P Capital IQ, own calculations

ALL	Allowances for Loan Losses	$\frac{\text{ALL}}{\lvert\text{Allowances for Loan Losses}\rvert}$	Allowances as a negative balance item reduce gross loans to account for uncollectable loans and leases. Thereby they serve as a proxy of credit risk (Sun & Chang, 2011). The higher their share, the less stable the bank's loan book	++	S&P Capital IQ, own calculations
LIST	Publicly Listed	Dummy variable equaling 1 if the target is a publicly traded company, and 0 otherwise	Following Furfine & Rosen (2011), the consolidation with a private firm of a publicly traded firm is expected to elevate risk more due to the assumption that private firms in general are riskier than public ones	--	S&P Capital IQ, Thomson Reuters Eikon
RELSIZE	Relative Size	Target bank's total assets as a share of acquiring bank's total assets	Serves as a proxy of the power of the target institution to affect the acquiring bank and to spill over risky assets. Assuming that targeted banks tend to have a higher risk level than acquiring banks do and, thus, the correlation between the asset ratio and the level of risk post-merger is expected to be positive	++	S&P Capital IQ, Mergermarket, own calculations
Macroeconomic control variables					
FF	Financial Freedom		Degree of regulation of financial institution by the central bank and other supervisory powers. A higher degree of regulation is expected to positively influence the stability of banks	--	Heritage Foundation
GDP	GDP Growth	Average annual percentage change in GDP	Following numerous literature (e.g., Goddard et al., 2012; Wu et al., 2019); Bahri & Hamza, 2020; Chartareas, 2010; Asandului, 2016; Mizaei, 2013; Boyd, 2009) the variable serves as an indicator of economic business cycle fluctuations in the target market	--	World Bank Global Financial Development Data Base 2019
CRISIS	Economic/ Financial Crisis	Dummy variable equaling 1 if the target economy is in a crisis at the date of completion, and 0 otherwise	This variable accounts for uncommon macroeconomic conditions and stress levels during local and global crisis periods that can have significant extraordinary effects on bank risk (Cortes 2012). It includes financial, sovereign and currency crisis alike, as they are proven to often coincide (Laeven & Valencia, 2018)	++	Laeven, M. L., & Valencia, M. F. (2018). Systemic banking crises revisited. International Monetary Fund. Jácome H., Luis. I; (2008). Central Bank Involvement in Banking Crisis in Latin America. *IMF Working Paper*. International Monetary Fund.
MPR	Monetary Policy Rate	Monetary Policy Rate	The dual impact of low interest rates on bank risk is to be accounted for: they reduce risk on long-term outstanding credits but increase the risk of newly granted credits and invested assets, due to their negative impact on bank income margins (see ECB, 2007)	++ / --	National Central Banks
LERNER	Lerner Index	$= \frac{L}{\frac{P - MC}{\tilde{}}}$ where *P* is the priced output of the bank and *MC* is the marginal cost	Lerner's Index determines the degree of monopoly on institutional level through the percentage margin the bank is able to charge above its marginal cost level. It is said that the higher the value, the higher the market power of the institution	++	World Bank Global Financial Development Data Base 2019
C3	3-Bank Concentration	Assets of three largest commercial banks as a share of total banking assets	The fraction of assets (earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations) averaged over a one-year period held by the three largest commercial banks is a common measure for concentration in the banking market (Beck et al., 2006)	--	World Bank Global Financial Development Data Base 2019
FOREIGN	Foreign Banks	Number of foreign banks as a share of total banks	In this variable, a foreign bank is defined as one whose shares are owned 50 percent or more by foreigners	++ / --	World Bank Global Financial Development Data Base 2019

Source: see table

Table 2

Number of consolidation transactions per year and country of the targets' headquarters (acquirers' headquarters) in the sample

	Brazil	Argentina	Mexico	Colombia	Chile	Peru	Other[2]	Total
1998	5	1	0	0	1	0	0	7
1999	1	1	0	0	0	0	0	2
2000	6	1	1	0	0	0	2	10
2001	4	2	2	1	0	1	0	10
2002	4	2	2	0	3	0	1	12
2003	4	3	3	0	1	0	3	14
2004	6	2	1	1	1	0	2	13
2005	1	2	2	4	0	0	2	11
2006	3	2	3	0	0	2	9	19
2007	2	1	0	3	2	0	10	18
2008	3	1	0	0	1	1	4	10
2009	7	0	2	0	0	0	3	12
2010	1	3	0	1	1	0	3	9
2011	6	1	1	2	1	1	3	15
2012	3	2	1	4	1	0	3	14
2013	5	1	2	4	0	0	1	13
2014	1	0	1	0	0	2	2	6
2015	2	0	1	0	1	2	1	7
2016	4	0	0	0	2	1	2	9
2017	1	2	1	0	0	1	2	7
Total	69	27	23	20	15	11	53	218

Source: S&P Capital IQ, Mergermarket, own calculations

Table 3

Number of consolidation transactions per year and country of the acquirers' headquarters in the sample

	Brazil	Argentina	Canada	Mexico	Colombia	Spain	Other[3]	Total
1998	2	0	0	0	0	2	3	7
1999	1	0	0	0	0	1	0	2
2000	5	1	0	1	0	2	1	10
2001	3	2	0	1	0	3	1	10
2002	4	2	0	1	0	1	4	12
2003	4	3	1	1	0	0	5	14
2004	5	2	1	0	0	1	4	13
2005	1	2	0	2	4	0	2	11
2006	3	2	4	0	0	0	10	19
2007	4	1	1	0	2	0	10	18
2008	2	1	2	0	0	1	4	10
2009	6	0	0	0	1	1	4	12
2010	1	3	3	0	1	0	1	9
2011	6	0	2	2	1	1	3	15
2012	3	1	2	0	1	0	7	14
2013	2	1	0	2	3	0	5	13
2014	1	0	0	1	0	0	4	6
2015	1	0	1	2	0	0	3	7
2016	3	0	1	0	0	0	5	9
2017	1	2	0	1	0	0	3	7
Total	58	23	18	14	13	13	79	218

Source: S&P Capital IQ, Mergermarket, own calculations

[2] Being The Bahamas, Barbados, Bolivia, Cayman Islands, Costa Rica, Curaçao, Dominican Republic Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Puerto Rico, Saint Lucia, Trinidad and Tobago, Uruguay, and Venezuela

[3] Being Angola, Barbados, Bolivia, Chile, Costa Rica, Curaçao, Dominican Republic Ecuador, France, Germany, Jamaica, Luxembourg, Netherlands , Panama, Paraguay, Peru, Portugal, South Africa, Switzerland, Trinidad and Tobago, United Kingdom, USA, and Venezuela

Table 5

Z-score values pre- and post-consolidation for acquiring firms. Z-scores are calculated as an average over each eight quarters pre- and post-completion date *c*. Acquiring firms are grouped by (1) only those firms registered in Latin America vs. only those firms registered in the Rest of the World, and (2) firms that experienced a geographical diversification through the M&A transaction as the target was not registered in the same country than the acquirer, and (3) firms that experienced a product diversification through the M&A transaction by not sharing the same GICS industry classification code than the target.

	A	**Latin America**			**Rest of World**		
		Mean	St. Err.	Obs	Mean	St. Err.	Obs
Pre transaction		58.693	4.260	155	102.791	9.833	60
Post transaction		74.101	7.525	155	134.274	15.711	60
Δ (diff.)		15.408**	4.766	155	31.482***	11.826	60
ΔZ-Score > 0	N			86			37
	%			55%			62%
	B	**Cross-Border**			**Domestic**		
Pre transaction		97.317	7.067	92	51.314	4.691	123
Post transaction		129.144	13.584	92	62.283	6.334	123
Δ (diff.)		31.827***	11.637	92	8.444*	4.689	123
ΔZ-Score > 0	N			56			67
	%			49%			74%
	C	**Product Diversifying**			**Product Focused**		
Pre transaction		73.019	5.867	129	67.970	6.297	86
Post transaction		94.560	9.148	129	85.394	11.673	86
Δ (diff.)		21.541***	7.194	129	17.424*	10.304	86
ΔZ-Score > 0	N			76			47
	%			59%			55%

p-value significance level ***) 0.01 **) 0.05 *) 0.1

Source: S&P Capital IQ, own calculations

Table 6

ZSCORE is the sum of returns on assets and capital ratio over standard deviation of returns on assets, a risk measure over a period of eight fiscal quarters pre- and post-consolidation completion date *c*. Bank specific independent variables are dummies for product (PRODIV) and geographical (GEODIV) diversifying consolidations, SIZE is the average acquirer's size in terms of assets, DEBT its debt- and LIQ its liquidity ratio, ROE its return-on-equity, NII its average net income as a share of total operating income, ALL its change in allowances for loan losses as a share of total gross loans. Transaction-specific variables are LIST, a dummy for listed target institutions, and RELSIZE, comparing the size of the target with the size of the acquirer in terms of total assets at completion date *c*. Macroeconomic control variables are three years averages including the Financial Freedom index by the Heritage Foundation (FF), the average GDP growth, the monetary policy rate MPR, the Lerner index as a measure of competition, C3 the share of the three largest banks in terms of total assets, and FOREIGN the share of foreign banks in the market.

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
ΔZSCORE	215	13.084	48.765	-76.229	128.931
Bank specific variables					
PRODIV	218	0.596	0.492	0.000	1.000
GEODIV	218	0.427	0.496	0.000	1.000
SIZE	218	10.602	2.433	4.670	14.944
DEBT	217	0.268	0.282	0.001	3.429
LIQ	217	131.139	794.915	0.000	8066.601
ROE	218	0.205	0.184	-0.932	1.109
NII	218	2.126	2.206	0.000	23.841
ALL	209	0.037	0.037	0.000	0.445
LIST	218	0.596	0.492	0.000	1.000
RELSIZE	218	0.427	0.496	0.000	1.000
Macroeconomic variables					
FF	218	0.150	0.895	0.000	12.600
GDP	162	0.260	0.666	0.000	5.109
CRISIS	218	57.278	15.207	23.333	90.000
MPR	218	0.033	0.027	-0.053	0.103
LERNER	218	0.101	0.302	0.000	1.000
C3	218	0.106	0.116	0.002	0.912
FOREIGN	195	0.247	0.125	-0.217	0.500

**** p<.01, ** p<.05, * p<.1*

Source: S&P Capital IQ, own calculations

Table 7

ZSCORE is the sum of returns on assets and capital ratio over standard deviation of returns on assets, a risk measures over a period of eight fiscal quarters pre- and post-consolidation completion date *c*. Bank specific independent variables are dummies for product (PRODIV) and geographical (GEODIV) diversifying consolidations, SIZE is the average acquirer's size in terms of assets, DEBT its debt- and LIQ its liquidity ratio, ROE its return-on-equity, NII its average net income as a share of total operating income, ALL its change in allowances for loan losses as a share of total gross loans. Transaction-specific variables are LIST, a dummy for listed target institutions, and RELSIZE, comparing the size of the target with the size of the acquirer in terms of total assets at completion date c. Macroeconomic control variables are three years averages including the Financial Freedom index by the Heritage Foundation (FF), the average GDP growth, the monetary policy rate MPR, the Lerner index as a measure of competition, C3 the share of the three largest banks in terms of total assets, and FOREIGN the share of foreign banks in the market.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) ΔZSCORE	1.000																	
(2) PRODIV	0.041	1.000																
(3) GEODIV	0.103	-0.046	1.000															
(4) SIZE	0.099	-0.086	0.382***	1.000														
(5) DEBT	-0.010	0.051	-0.046	-0.013	1.000													
(6) LIQ	-0.102	-0.030	-0.010	-0.197***	-0.118*	1.000												
(7) ROE	0.060	-0.036	-0.098	0.051	-0.072	0.025	1.000											
(8) NII	-0.068	-0.077	-0.196**	-0.166**	-0.134**	0.155**	0.023	1.000										
(9) ALL	-0.043	-0.042	-0.329***	-0.188***	0.005	-0.027	0.270***	0.168**	1.000									
(10) LIST	-0.006	0.044	0.038*	-0.117	0.098	-0.020	-0.052	-0.104	-0.035	1.000								
(11) RELSIZE	-0.031	-0.126	-0.256***	-0.363***	-0.136*	0.211***	0.080	0.021	0.084	-0.019	1.000							
(12) FF	0.121*	-0.061	0.351***	0.299***	0.111*	-0.134*	-0.169**	-0.125*	-0.268***	0.008	-0.152*	1.000						
(13) GDP	0.045	0.103	0.075	-0.130*	-0.090	0.159**	0.223***	-0.092	-0.114*	-0.034	-0.110	-0.285***	1.000					
(14) CRISIS	-0.194***	-0.159**	0.050	0.065	-0.032	0.013	-0.161**	0.068	0.044	-0.056	0.206***	-0.008	-0.393***	1.000				
(15) MPR	-0.110*	0.031	-0.366***	0.020	-0.032	0.003	-0.068	0.101	0.356***	-0.001	0.114	-0.349***	-0.153**	0.014	1.000			
(16) LERNER	0.058	0.061	0.148**	-0.090	0.122*	-0.049	0.165**	0.072	-0.150**	0.065	-0.417***	0.334***	0.169**	-0.227***	-0.384***	1.000		
(17) C3	0.248***	0.051	0.283***	0.041	0.087	-0.033	-0.089	-0.070	-0.160**	0.034	-0.207***	0.216***	-0.019	-0.139**	-0.324***	0.176**	1.000	
(18) FOREIGN	0.131*	-0.069	-0.112	-0.409***	0.024	0.112	-0.031	0.080	-0.016	0.053	0.010	-0.095	0.114	-0.111	-0.091	0.287***	0.072	1.000

**** p<.01, ** p<.05, * p<.1*

Source: S&P Capital IQ, own calculations

Table 8

Base case regression outcome from OLS with Huber-White robust standard errors with delta z-score risk measures as dependent variable over a period of eight fiscal quarters pre- and post-consolidation completion date *c*. Bank specific independent variables are dummies for product (PRODIV) and geographical (GEODIV) diversifying consolidations, SIZE is the average acquirer's size in terms of assets, DEBT its debt- and LIQ its liquidity ratio, ROE its return-on-equity, NII its average net income as a share of total operating income, ALL its change in allowances for loan losses as a share of total gross loans. Transaction-specific variables are LIST, a dummy for listed target institutions, and RELSIZE, comparing the size of the target with the size of the acquirer in terms of total assets at completion date *c*. Macroeconomic control variables are three years averages including the Financial Freedom index by the Heritage Foundation (FF), the average GDP growth, the monetary policy rate MPR, the Lerner index as a measure of competition, C3 the share of the three largest banks in terms of total assets, and FOREIGN the share of foreign banks in the market.

ΔZSCORE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
PRODIV	8.955	7.183	1.25	0.214	-5.227	23.136	
GEODIV	-3.01	8.837	-0.34	0.734	-20.459	14.438	
SIZE	2.73	1.799	1.52	0.131	-0.821	6.281	
DEBT	-16.493	30.665	-0.54	0.591	-77.038	44.051	
LIQ	-0.004	0.005	-0.77	0.441	-0.015	0.006	
ROE	15.496	16.68	0.93	0.354	-17.436	48.428	
NII	-0.35	0.996	-0.35	0.725	-2.316	1.616	
ALL	39.779	65.128	0.61	0.542	-88.808	168.365	
FF	0.361	0.289	1.25	0.213	-0.21	0.932	
GDP	4.915	166.187	0.03	0.976	-323.198	333.029	
CRISIS	-30.231	10.787	-2.8	0.006	-51.529	-8.933	***
MPR	-13.987	25.406	-0.55	0.583	-64.148	36.173	
LERNER	-35.714	35.795	-1	0.32	-106.387	34.959	
C3	0.621	0.225	2.76	0.006	0.177	1.066	***
FOREIGN	75.088	26.896	2.79	0.006	21.985	128.19	***
Constant	-89.087	30.951	-2.88	0.005	-150.195	-27.978	***

Mean dependent var	12.475	SD dependent var	48.968
R-squared	0.167	Number of obs	182
F-test	2.394	Prob > F	0.004
Akaike crit. (AIC)	1930.627	Bayesian crit. (BIC)	1981.891

Source: S&P Capital IQ, own calculations

Table 10

Variance Inflation Factors (vif) of regression model variables. Bank specific independent variables are dummies for product (PRODIV) and geographical (GEODIV) diversifying consolidations, SIZE is the average acquirer's size in terms of assets, DEBT its debt- and LIQ its liquidity ratio, ROE its return-on-equity, NII its average net income as a share of total operating income, ALL its change in allowances for loan losses as a share of total gross loans. Transaction-specific variables are LIST, a dummy for listed target institutions, and RELSIZE, comparing the size of the target with the size of the acquirer in terms of total assets at completion date *c*. Macroeconomic control variables are three years averages including the Financial Freedom index by the Heritage Foundation (FF), the average GDP growth, the monetary policy rate MPR, the Lerner index as a measure of competition, C3 the share of the three largest banks in terms of total assets, and FOREIGN the share of foreign banks in the market.

	VIF	1/VIF
FF	2.224	0.450
SIZE	2.161	0.463
GDP	1.998	0.501
RELSIZE	1.979	0.505
MPR	1.957	0.511
CRISIS	1.929	0.518
GEODIV	1.921	0.520
LERNER	1.815	0.551
ROE	1.705	0.586
ALL	1.645	0.608
C3	1.593	0.628
FOREIGN	1.520	0.658
NII	1.290	0.775
DEBT	1.273	0.785
PRODIV	1.200	0.833
LIST	1.200	0.833
LIQ	1.188	0.842
Mean VIF	1.682	.

Source: S&P Capital IQ, own calculations

Table 11

Shapiro-Wilk test for normal distribution of error terms for different models such as (1) the base model using delta z-score as independent variable and as dependent variables acquirer bank-specific and macroeconomic variables, (2) an extension of the base model using delta z-score as independent variable and as dependent variables acquirer bank- as well as transaction-specific and macroeconomic variables, and (3) a limitation of model (2) by applying it solely on transactions in which the both parties are headquartered in Latin America, where delta z-score is the sum of returns on assets and capital ratio over standard deviation of returns on assets over a period of eight fiscal quarters pre- and post-consolidation completion date *c*.

	Obs	W	V	z	Prob>z
Model (1)	182	0.981	2.643	2.226	0.013
Model (2)	136	0.991	0.997	-0.007	0.503
Model (3)	92	0.988	0.899	-0.235	0.593

Source: S&P Capital IQ, own calculations

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