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Post-Crisis Bank Behavior:
Lessons from Mercosur

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Abstract

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Did the occurrence of systemic banking crises in the 1990s and 2000s significantly alter the behavior of banks in the Mercosur? The objective of this paper is to answer this question by analyzing changes in bank behavior after crises in the Mercosur region. To our knowledge, this is the first paper to apply the convergence methodology—which is common in the growth literature—to post-crisis bank behavior. Using a panel dataset of commercial banks during the period 1990–2006, we analyze the impact of crises on four sets of financial indicators of bank behavior—profitability, maturity preference, credit supply, and risk. The paper finds that most indicators of bank behavior, such as profitability, in fact revert to previous or more normal levels. However, a key finding of the paper is that private sector intermediation is significantly reduced for prolonged periods of time and that high levels excess liquidity persist well after the crisis.

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I. INTRODUCTION

Most of the banking crisis literature has concentrated on the determinants of systemic banking crises (Calomiris 1990, Demirgüç-Kunt and Detragiache 1998, 2005). With the exception of studies such as Barajas and Steiner (2002), Demirgüç-Kunt *et al.* (2006a) and Dell'Ariccia *et al.* (2008), little attention has been given to the longer-term effect of crisis on the behavior of bank fundamentals, particularly credit supply. Even though the recovery of some bank functionality can be implicitly assumed to be part of the post crisis stabilization process, evidence of some protracted recovery exists particularly regarding patterns of intermediation Demirgüç-Kunt *et al.* (2006a).[2]

The impact of bank credit contraction on the economy is typically more severe in countries that have experienced repeated crises, and where alternatives to bank credit do not readily exist. This is because well functioning financial institutions mobilize savings for productive investments, diversify risk and ease external financing constraints on firms all of which is crucial to factor productivity (King and Levine 1993, Bencivenga *et al.* 1995, Dirmirguc-Kunt and Detragiache 1998, Dirmirguc-Kunt and Detragiache 1997, Kroszner *et al.* 2007).

Contraction in bank credit may not always be supply-induced. For example, a worsening economic outlook may lead to higher intermediation spreads or reduce profitable investment opportunities, either of which will reduce credit demand. On the other hand, supply-side factors such as capital erosion as asset prices slump or a run on deposits in domestic banks will typically affect the banks' willingness and ability to extend credit (Chen and Wang 2008). An analysis of simple aggregates suggested in the literature by Kashyap *et al.* (1994) and Bernanke and Gertler (1995) to compare demand and supply shocks to credit supply shows a greater effect of the latter in the Mercosur.[3] As shown in the table below, deposits and levels of capitalization fall after the systemic crisis. The credit decline in the aftermath of systemic crises reflects a "flight to liquidity" as banks restructure their portfolio towards highly liquid public securities and cash reserves and disproportionately decreases private sector credit.

This basic analysis is limited in its ability to fully disentangle the demand and supply effects as doing so necessitates rigorous analysis of the demand and supply function of bank credit which is beyond the scope of this research. However, the evidence shows the impact of

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[2] Identifying the residual impact of crises on bank fundamentals is a considerably complex task because of the following two reasons. First, macroeconomic conditions and institutional frameworks may alter bank behavior over time irrespective of whether a banking crisis has occurred or not. Second, because of the peculiarities in each banking system, the concept of a benchmark for "normal" bank behavior becomes difficult to conceptualize theoretically and empirically measure.

[3] Argentina, Brazil, Paraguay, and Uruguay.

adverse supply shocks on private sector intermediation only weakly explains the resulting change in bank credit allocation in the region. This further motivates our work in analyzing whether or not the decline in private sector intermediation in the region has unexplainable components.

Overview of Demand and Supply Conditions on Credit Allocation in the Mercosur **(percentage average growth rate after systemic crisis)**								
	Bank Credit				Demand- side factors		Supply-side factors	
	Total credit 1/	Private credit 2/	Public credit 3/	Liquid reserves 4/	GDP growth	Spread 5/	Deposits 6/	Capital 7/
Argentina	3.0	-2.9	15.2	27.7	2.5	13.2	3.6	2.4
Brazil	1.2	-4.0	10.7	4.1	7.6	-3.5	3.3	4.1
Paraguay	-3.1	-3.4	17.2	-0.2	2.3	10.3	-2.3	-1.0
Uruguay	-23.3	-22.4	-18.1	4.4	12.7	-39.3	-9.7	-10.2
Average	**-5.5**	**-8.2**	**6.3**	**9.0**	**6.3**	**-4.8**	**-1.3**	**-1.2**

Sources: Bankscope, IMF(*IFS*), and authors' calculations.
1/ Total credit provided by deposit money banks.
2/ Credit provided to the private sector by deposit money banks.
3/ Credit provided to the public sector by deposit money banks.
4/ Ratio of liquid reserves to GDP for deposit money banks.
5/ Intermediation spread (lending rate-deposit rate).
6/ Ratio of deposits to assets of deposit money banks.
7/ Ratio of equity to assets of deposit money banks.

This paper analyzes the post-crisis behavior of banks in the Mercosur—a region that has witnessed a significant number of banking crises—using both aggregate and bank-level data during the period 1990–2006. We primarily focus on credit supply but also analyze variables related to profitability, risk, and liquidity. We employ convergence methodology—which is often used in the growth literature—to identify the evolution of bank behavior in the region after crises. To the best of our knowledge, this is a novel approach in this area. An added advantage of using this approach over others currently used in the literature is that we can empirically quantify the rate of convergence and the institutional and macroeconomic factors that condition the convergence. Moreover, the methodology allows one to identify—in some hierarchical order—factors that condition this persistent deviation from "normality."

We rely heavily on the premise that banks' main economic function is efficient financial intermediation. This is the profitable mobilization of deposits to originate loans to finance productive concerns within the economy (Rajan 1994, and Boyd and Gertler 1994). Efficiency, however, also means that banks also have a responsibility to minimize risks on their balance sheet. This makes the level of credit supplied by banks correlated with the macroeconomic conditions as it affects the credit quality of borrowers. In other words, banks' natural hedge to institutional volatility will be credit contraction. If this is the case, bank efficiency will correspond to lower credit supplied even if it is at cross-purposes with the notion of traditional financial intermediation.

Bearing in mind the above issues, we measure "normal" post-crisis bank behavior variables as convergence to two benchmarks. The first is the pre-crisis average levels, which has the advantage of reflecting the strategy chosen to minimize risk after systemic distress. The second is using carefully chosen regional and international benchmarks. These involve comparing the banking systems in the Mercosur to other countries in order to assess to what extent banks in the Mercosur perform the traditional intermediation role. In this case, the conflict between risk minimization and financial intermediation may pre-empt the lack of convergence to external benchmarks. Furthermore, by further identifying factors that condition convergence, we shed light on how to mitigate the adverse effects of crises on bank fundamentals. This is of particular interest to bank supervisors and regulators alike who are seeking to hasten post-crisis recovery in banks.

The main finding of the paper is that banks in the Mercosur exhibit notable weaknesses within the specified parameters in two areas: insufficient private sector intermediation and holding of high levels of excess liquidity. These relate to the long-run persistence of non-convergence toward comparator benchmarks only. For example, the paper shows that other bank fundamentals, such as capitalization, profitability and other measures of the risk profile of banks are similar to regional comparators and also to pre-crisis levels, and could support increased lending. These effects are more pronounced in domestic banks.

The rest of the paper is organized as follows: Section II discusses the literature concerning post-crisis bank behavior as well as the evolution of crises in the region. Section III discusses sample selection and methodology, while Section IV presents the empirical results. Section V presents robustness tests, and Section VI concludes.

II. BANKING CRISES IN MERCOSUR

A. General Overview of Post-Crisis Banking Behavior

There is a general consensus in the literature on the following as leading indicators of banking crises. First, financial liberalization undertaken in conditions where financial institutions are underdeveloped, law enforcement is weak and regulatory supervision is inadequate can sow the seeds of a financial crisis (Hassan and Hussain 2006). Second, credit booms, if followed by weak and deteriorating economic fundamentals, can lead to weaknesses in bank balance sheets. Third, inconsistencies between fiscal and monetary policies and exchange rate commitments can lead to the simultaneous occurrence of currency and banking crises (Kaminsky and Reinhart 1999). Finally, speculative attacks on the currency, often combined with investor-herding behavior such as experienced in Argentina in 2001, deepens the crisis (Bleaney *et al.* 2008).

In the literature, the following types of post-crisis bank behavior have been typically reported. First, there is often a substantial decline in credit to the private sector which may be demand or supply related (Kaminsky and Reinhart 1999, Gosh and Gosh 1999, Barajas and Steiner 2002, Demirgüç-Kunt *et al.* 2006a, and Dell'Arriccia *et al.* 2008). The financial

accelerator effect, first proposed by Bernanke (1983), can explain, to some extent, the behavior of bank credit and its relationship with the persistence and amplitude of cyclical fluctuations in the economy. In the presence of credit-market frictions and asymmetric information, there is an external finance premium, or the difference between externally sourced funds and the opportunity cost of funds raised internally within a firm (Bernanke *et al* 1998). The external finance premium is inversely related to borrowers' net worth because borrowers with little wealth contribute less to project financing, leading to potential divergence of interests between borrower and lender. The latter thus needs a larger premium as compensation. In this case, there will be acceleration in downswings in borrowing, and thus investment, spending and production during and after crises. This is all the more because financial crises typically destroy what Bernanke calls "informational capital" when some banks go bankrupt.[4]

Second, there is a decline in bank profitability. The negative effect of crises on bank profitability is often linked to the high levels of non-performing loans on banks' balance sheets (Carvalho and Cardim 1998, Pangestu 2003). Nonetheless, there is evidence of a quick recovery in profitability documented in Demirgüç-Kunt *et al.* (2006a) as banks typically get rid of their loans, and find new business lines such as fee-based activities and investment in government securities. For instance, in Brazil recovery of bank profitability was not a result of greater intermediation *per se,* but of the reorientation of banks portfolios towards liquidity, predominantly government securities (De Paula and Alves 2003).[5]

Third, an increase in intermediation spreads and dollarization often ensues (Gupta 2005, Honohan 2005). The increase in spreads is synonymous with macroeconomic volatility that may occur at or around the same time as a banking crisis. This is persistent in countries with poor legal infrastructure, concentrated banking systems and continued macroeconomic uncertainty (Gelos 2006). If banking crises occurs simultaneously with currency crises, depositors often lose faith in the local depreciating currency. Dollarization is therefore a rational attempt to hedge against this risk as well as others, such as the collapse of the monetary regime and the return of high and unstable inflation (De Nicoló *et al.* 2003).

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[4] Banks play a key role in screening and monitoring borrowers in order to mitigate information asymmetries and incentive problems. This expertise and on-going relationship with customers constitutes "informational capital".

[5] According to Pangestu (2003) bank holding of government securities is used to maintain capital adequacy requirements as the level of capitalization is often eroded during crises and existing levels cannot be stretched further to cover riskier loans.

B. The Evolution of Bank Crises in Mercosur

The main common causal factors of banking crises in the Mercosur region are financial liberalization without adequate prudential safeguards, significant exposure to government risk (with the exception of Uruguay), currency mismatches on banks' balance sheet, and contagion. Multiple factors often combine to increase the frequency, depth and cost of banking crisis. These included sharp macroeconomic imbalances that weakened the operating capacity of the banking system, and inadequate regulatory and supervisory frameworks, allowing an incipient problem to reach systemic proportions. Moreover, financial globalization makes the contagious effects of instability more likely especially in emerging economies (IADB 2005). Furthermore, the interaction between currency pegs and banking stability has proven to be significant in the Mercosur region in the 1990s as deposit runs provided the liquidity necessary for a successful speculative attack on the currency. Expected high returns from currency speculation may also destabilize an otherwise stable banking system (Bleaney *et al.* 2008). According to Gourinchas *et al.* (2001), the effects of credit growth after financial liberalization made the economies in Latin America considerably more volatile and vulnerable to financial and balance of payments crises than other regions around the world.

In what follows, we aim provide some stylized facts on episodes of bank crises in the region from the 1990's until present.

Argentina

In 1991, Argentina adopted a currency board and implemented a convertibility law to fight hyperinflation and discipline fiscal governance.[6] While the economy performed well in the early 1990s, the continued success of the convertibility law was highly dependent on protecting its areas of vulnerability. First, there was insufficient budgetary control leading to significant fiscal deficits. Subsequent real appreciation of the peso led to a decline in international competitiveness, and worsened the current account position (Hornbeck 2003). The 1994 Tequila crisis in Mexico raised doubts about the stability of Argentina's financial system, leading to large capital outflows in Argentina and triggering the 1995 crisis. The resulting effect was a net deposit withdrawal of $8 billion from the banking system and closure of a large number of financial institutions. It is worth noting that during 1991–97 Argentina was one of the fastest growing economies in Latin America with an average growth rate of 6.7 percent (Barajas *et al.* 2006).

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[6] The convertibility law legally guaranteed the convertibility of peso currency to dollars at a one-to one fixed rate.

Broadly speaking, the banking crisis in Argentina in 2001 evolved in three similar stages to the 1995 crisis. First, there was a build-up of commercial bank foreign currency assets and liabilities. Second, an accumulation of government debt followed. Finally, the run on deposits ensued. The dollarization of the liabilities side of the balance sheet left banks exposed to currency risks and increased default risk as borrowers' incomes was typically in domestic currency. In addition, as its financing needs rose and its ability to tap the international capital markets declined, the government increased reliance on banks for its financing. Domestic banks subsequently used government securities to dollarize the asset side of their balance sheet, resulting in an increased exposure of the banking system to the risk of government default. Finally, the exposition of risks in banks' balance sheets a spurred a significant withdrawal of deposits and by the end of 2001 the banking system had lost about 20 percent of deposits. In order to stem the massive drain on the banking system the government implemented the "*corralito*".[7] This exacerbated the deposit run in subsequent months. With no sign of economic recovery and government default in December 2001, banks experienced a significant loss in the value of their assets (Barajas *et al.* 2006). In January 2002, when the government declared default and depreciated the peso by 29 percent, Argentina found itself with another systemic bank crisis, a currency crisis, and a debt crisis (IADB 2005)**.**

Brazil

In the run up to the 1994 crisis, Brazil was deemed to be in general good economic health. The pre-1994 high inflation climate helped Brazilian banks remain profitable despite relatively low levels of intermediation because banks were able to generate easy revenues by paying negative low real interest rates. The end of high inflation and the implementation of the "Real Plan" were accompanied by a rise in consumer expenditure. During this period two factors impaired the stability of the banking system: First, the rise in credit supply, against a backdrop of poor credit risk management, and a regulation framework that did not keep pace with the levels of financial innovation/liberalization.[8] Second, on the macro economic side, the appreciation of the domestic currency, financial liberalization and the deterioration of fiscal and external balances (Cinquetti 2000).

The nexus between banking system and economic instability quickly became evident in Brazil. While increased interest rates raised loan defaults, loan defaults further worsened macroeconomic activity by increasing unemployment. By August 1995, Banco Economico

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[7] The "*corralito*" is the informal name for the economic measures taken in Argentina at the end of 2001 in order to stop the massive withdrawal of deposits, which prevented withdrawals from U.S. denominated accounts.

[8] The Real Plan had similar characteristics with other currency stabilization programs in Latin America. It involved using a fixed or semi-fixed rate of exchange as a price anchor in combination with more open trade policy. It differed from the Argentina's convertibility plan by building in some flexibility into the permitted currency movements, rather than pegging the domestic currency at one-to-one parity with the U.S. dollar (De Paula and Alves 2003).

(Brazil's eighth largest private bank) went bankrupt. Other bank liquidations and restructurings followed as a combination of poor economic condition and high interest rates made it impossible for banks to recover profitability. Non-performing loans of the entire banking system rose from about 5 percent in September 1994 to 15 percent throughout most of 1997 (Baer and Nazmi 2000). In the wake of financial crisis in Asia and Russia in 1997 and 1998, respectively, interest rates rose, capital flight continued and economic conditions and asset quality continued to worsen.

However, Brazil implemented drastic stabilization measures to calm markets and create the foundations for a relatively quick economic turnaround without further putting the banking system at risk (Cadim De Carvalho 1998). In 1999, Brazil abandoned a crawling peg currency regime, adopted an inflation-targeting framework for monetary policy, and allowed the currency to float. The overall effect is an economic system that is much more stable in comparison to the pre-crisis period (Goldfajn 2000, Tabak and Staub 2007).

Paraguay

Paraguay had a series of recurrent financial crisis from 1995 to 2003. During that period, more than half of the banks and two thirds of non-bank financial institutions closed or liquidated (Mlachila 2008). Prior to 1990, the financial systems as well as major economic activities were heavily regulated and restricted. In 1989, the country underwent a significant number of market-based structural economic reforms, and the exchange rate was unified and the *guaraní* floated. With hindsight, financial liberalization was premature, since suitable regulatory and supervisory institutions was absent (Fuertes and Espinola 2006).

Despite relatively high inflation during 1989–94, the economy was strong. Real GDP growth averaged over 3.5 percent. The external sector also remained robust in part spurred by a sharp depreciation in the real effective exchange rate, which resulted in current account surpluses during most of the period. Significant financial deepening also occurred as the M2/GDP ratio increased from 22 to 37 percent and private sector credit grew rapidly. A large number of banking and finance companies emerged in 1990–94 because of the speed of financial liberalization. The effect of this was increased competition, high deposit rates, and even higher lending rates were charged, and thus contributing to the maintenance of high intermediation spreads.

By late 1994, citing liquidity needs, several banks sought support from the central banks and in mid-1995, the central bank had intervened four banks and several finance companies. After this, the financial system remained weak, and the lack of decisive action especially regarding the resolution of technically insolvent banks in the first crisis solidified the foundation for the next one. In addition, by 1996 and the first half of 1997, Paraguay was witnessing a systemic run on its deposits with depositors fleeing to foreign-owned banks, which were perceived as less risky than locally owned banks. Once again, the authorities

chose further regulatory forbearance and accounting flexibility, coupled with central bank support, rehabilitation programs, and the transfer of public sector deposits to weak banks.

The combination of the economic recession from 1999, the full-blown currency crisis of 2001, and the slow pace of recovery as well as contagion effects from neighboring Argentina brought about the 2002 crisis. Virtually all indicators point to the fact that financial disintermediation occurred in the aftermath of the financial crisis. First, the financial deepening ratio (M2/GDP) declined considerably after the first crisis from over 35 to less than 30 percent in one year, and has steadily declined over time, to less than 25 percent at end 2006. A similar pattern is observed in private sector credit, as recovery is weakened by further bouts of distress.

Uruguay

The banking crisis in Uruguay in 2002 developed in three phases: a run by depositors on foreign banks (mainly Argentine); the deterioration of domestic sentiment regarding the stability of the exchange rate; and the imposition of a bank holiday. The effect of contagion was felt in Uruguay as 40 percent of bank deposits in Uruguay were held by Argentines. Following the imposition of the "corralito" in Argentina, there were large deposit withdrawals from two large banks with very strong Argentine links representing about 20 percent of total deposits within the banking system in early 2002. Although the Uruguayan banking system did not have the same level of exposure to government default risk as in neighboring Argentina, the risks from dollarization were similar. About 80 percent of the loans were dollar-denominated and half of the dollar loans were extended to borrowers with Uruguayan peso-denominated accounts.

Second, the initial withdrawal of deposits resulting from contagion in Argentina and the worsening economic conditions raised fears that the government would also impose a "deposit freeze" similar to Argentina. This caused further runs on domestic banks, which subsequently started experiencing liquidity problems.

Finally, after further deterioration in market sentiment in July and months of widespread deposit withdrawals and substantial liquidity support to the banking system, it became clear that the situation was untenable. Since the low levels of reserves were insufficient to service increasing external debt, and to continue backing the still highly dollarized banking system, the authorities allowed the peso to float freely. The subsequent depreciation of the exchange rate as a result of capital outflows further worsened the deposit run and by the end of July 2002 total withdrawal of deposits had reached 42 percent and the government was compelled to declare a 5 day bank holiday by the end of July (IADB 2005, De La Plaza and Sirtaine 2005).

III. METHODOLOGY AND DATA ISSUES

A. The Concept of Convergence and Bank Behavior

Overview

To empirically analyze post crisis bank behavior, we use the concept of convergence extensively used in the economic growth literature. For instance, Barro and Sala-i-Martin (1992) and Mankiw *et al.* (1992) use it to analyze how long it typically takes poor countries to "catch up" with rich countries in terms of per capita GDP.[9] For convergence to occur, the measure of dispersion between countries should decrease over time. The growth rate and standard deviation form the basis for measuring the so-called σ-convergence in the growth literature. Therefore for countries to become similar over time the cross sectional standard deviation of their real per capita GDP should decrease over time (Salai-i-Martin 1996). We use a similar analogy to construct our measures of dispersion. In our study, post crisis recovery will correspond to a decrease in measures of deviation between current levels of credit supply and the specified benchmarks of normal levels of intermediation.

Our approach differs from others used in the literature by comparing post crisis bank behavior to a specific benchmark. While the choice of benchmark may be debatable it anchors the interpretation of results. For instance, the lack of post-crisis recovery in private sector credit reported in the literature is an immediate effect of crisis that can become problematic if it persists for a long period.

Defining Convergence

We construct two measures of deviations of bank behavior from pre-crisis levels as follows:

$$Y_{ij,t} = \ln\{X_{ij,t}/\overline{X}_{ij}\} \qquad \text{for all } t>t_0 \qquad (1)$$

$$D_{ij,t} = \ln\{(X_{ij,t} - \overline{X}_{ij})/\overline{X}_{ij}\} \qquad \text{for all } t> t0 \qquad (2)$$

$$\overline{X}_{ij} = \sum_{t=t_0-3}^{t_0-1} X_{ij,t} \Big/ 3 \qquad (3)$$

t_0 is year of occurrence of systemic crisis, $X_{ij,t}$ is the post-crisis level of the variable of interest in bank j in country i at time t, and $\overline{X}_{ij}$, the benchmark, is calculated as the average of the observation three years before the onset of a crisis for each bank. We have chosen three years because a longer time series may reflect the effects of structural changes in the economy and banking system unrelated to the episode of distress, while a shorter time series

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[9] The general results in the economic literature indicate low levels of economic convergence (about 2 percent per year).

would probably give too much weight to the most recent observations which may be too close to the crisis. Abnormal bank behavior is deemed to occur if $Y_{ij,t}$ and $D_{ij,t} \neq 0$.[10]

While the methodology has recently been used in the literature on bank productivity Fung (2006) and bank efficiency in the new European Union member states and the OECD countries by Mamatzakis (2007) and Dahl et al. (2008), to the best of our knowledge this is the first study to use this method to analyze post crisis bank behavior. Following the ideas in previous studies, we analyze two main concepts of convergence: *β-* and *σ*-convergence. Convergence of the *β*-type considers whether the growth in bank fundamentals, e.g., credit supply, exhibits a negative correlation with its current levels. In other words, for the level of intermediation to converge back to its pre-crisis level, subsequent rates of growth will decline if the initial level is higher than the pre-crisis level and vice versa. Convergence of the *σ*-type means dispersion of between current levels and the benchmark decreases over time.[11]

The current tests for *β*-convergence used in the literature regresses the annualized growth rate of per capita GDP on its initial level to test for absolute convergence and on its initial levels and other "conditioning variables" (e.g., technology and behavioral parameters) to test for conditional convergence.

Absolute convergence in our case implies growth rates $Y_{ij,t}$ are equal for all banks and the benchmark $\overline{X}_{i,j}$ is the same for all banks. In other words, the occurrence of crisis is the only reason why bank behavior deviates from a common benchmark. However, the conditions necessary for this assumption to be consistent are stringent and require all bank—or country-specific heterogeneity to be captured by the benchmark. If this is not the case, factors that drive dispersion embedded in the error term may affect the estimates of α_1 (Evans 1997). Since we do not want to be unduly constrained by this assumption, we also estimate conditional convergence.

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[10] The choice of an internal benchmark is not without limitations that taint the credibility of the benchmark itself. To control for this, we also use an external time varying benchmark.

[11] In the literature on post-crisis behavior of banks, some studies have used disequilibrium models (Kadiyali *et al.* 1999, Gosh and Gosh 1999, Barajas and Steiner 2002) to determine if there is a credit crunch after banking crisis and whether the crunch is caused by demand or supply deficit. This methodology is better suited for analyses that focus on one aspect of bank behavior such as credit supply. However, since we survey a number of bank characteristics, we find that employing this methodology will quickly be too cumbersome. We are aware that duration models which have been used extensively in the banking and financial stability literature, e.g., Ongena and Smith (2001), Glennon and Nigro (2005), Schaeck *et al.* (2006), Mecagni *et al.* (2007) can also measure transition dynamics, but their use is not justified in this case. The duration model is also sensitive to survivorship bias problems that may cause the estimates of the speed of convergence to be higher. Since it is impossible to measure speed of convergence for failed banks, choosing a model that is not reasonably affected by the survivorship bias in the sample is more appropriate.

B. The Regression Framework

The regression equations of the test for absolute β- and σ-convergence, respectively, have the following forms;

$$Y_{ij,t} = \ln\{X_{ij,t}/\overline{X}_{ij}\} = \alpha_0^{\,y} + \alpha_1^{\,y}\ln(\overline{X}_{ij}) + \varepsilon_{it}^{\,y} \tag{4}$$

$$D_{ij,t} = \ln\{(X_{ij,t} - \overline{X}_{ij})/\overline{X}_{ij}\} = \alpha_0^{\,d} + \alpha_1^{\,d}\ln(\overline{X}_{ij}) + \varepsilon_{it}^{\,d} \tag{5}$$

Absolute convergence implies that $\alpha_1^{\,(\cdot)} < 0$.

The test for conditional convergence is specified as follows:

$$D_{ij,t}^{\,d} = \ln\{(X_{ij,t} - \overline{X}_{ij})/\overline{X}_{ij}\} = \gamma_0^{\,d} + \gamma_1^{\,d}\ln(\overline{X}_{ij}) + \gamma_2^{\,d}Z + \varepsilon_{it}^{\,d} \tag{6}$$

Nested OLS regressions are estimated to quantify the additional information added to the estimates of $D_{ij,t}$ by introducing the conditioning variables *(Z)*. Conditional sigma convergence implies that $\gamma_1^{\,d} < 0$. Z is a vector of conditioning characteristics in the Mercosur, which hold the benchmark constant for each bank *j*. Because of the preference of σ over β in measuring convergence, we only estimate conditional σ-convergence. This is because β-convergence can still be observed as a result of measurement error and random shocks. Therefore if β-convergence is to measure real convergence it must coincide with σ-convergence (Salai-i-Martin 1996 and Fung 2006).

The three sets of conditioning variables used are as follows. The first set controls for differences in bank characteristics that may condition convergence in bank behavior. They are size (measured by the logarithm of total assets); profitability (measured by return on assets); and capitalization (measured as the ratio of equity to total assets).

The second group of control variables reflects the overall institutional quality in the country. This is because of the well-established link between the quality of the regulatory and institutional framework and the levels of intermediation particularly in the area of contract enforcement and protecting the rights of investors as reported in Levine (2002), La Porta *et al.* (2000) and Beck *et al.* (2006). We use the Kaufman, Kraay and Mastruzzi (2008) governance indicators to build a composite index of six dimensions of governance based on the following sub-groupings: voice and accountability, political stability, government effectiveness, regulatory quality, the rule of law, and the control of corruption. This broad measure has been widely used in empirical studies such as (Dimirgüç-Kunt *et al.* 2006b). We also control for bank activity regulation using the Heritage (2008) index of financial freedom as well as a measure of the stringency of capital requirements (Caprio *et al.* 2008). This group also includes a control for differences in the structure of the banking system, the total assets held by the three largest banks in the country as reported in Bankscope (2008).

The third set of controls reflects the macroeconomic environment. We use real GDP growth, inflation, and the percentage of total reserves to external debt (as an indicator of the strength of the external balance).[12]

While we have tried to construct our measures of deviation as close as possible to traditional measures of *β-* and *σ*-convergence used in the literature, some differences exist particularly with the measure of *σ*-convergence. In the growth literature, *σ*-convergence is deemed to occur if $\sigma_{t+t_{T_o}} < \sigma_t$, where σ_t is the time t standard deviation of log $(y_{i,t})$ across i, where log $(y_{i,t})$ is the logarithm of economy i's GDP per capita at time *t*. Most studies on convergence analysis use the cross sectional standard deviation, or some other convenient measure of variation suited to the particular objective of the analysis as suggested in (Barro and Sala-i-Martin (1992), Dalgaard and Vastrup (2001)). Using this standard measures involves estimating variations from the arithmetic mean—a proxy of a long-term trend from which deviations are measured. Since we assume that the occurrence of systemic crisis led to a deviation from this long-term trend, using standard measures based on the arithmetic mean will not yield meaningful interpretations. We therefore model our measure of *σ* based on a simple measure of dispersion $D_{ij,t}$.

Since the validity of our results is based on the quality of the internal benchmark as a measure of normal bank behavior we also use two external benchmarks to assess the robustness of our results— one is Norway, an OECD country and the other is (Chile), a regional benchmark.[13] Using a regional benchmark incorporates controls for specific regional peculiarities in the banking system that may cause banks in Latin America, for example, to

Summary of Coverage of Crises and Banks

	Systemic Crises	No. of Banks in sample	No.of Banks in the Banking System (Bankscope) 2005	Fraction of Total Assets
Argentina	1995, (2001)	62	111	65
Brazil	1994- 1999	20	201	56
Paraguay	1995-1999	13	26	100
Uruguay	2002	20	49	66
Total		115	387	

Sources: Bankscope and authors' calculations.

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[12] Other studies such as Islam (1995) and Serra *et al.* (2006) have suggested introducing country and time dummy variables instead of explicitly identifying a set of conditioning factors. In a similar study, but not using convergence, measures Dimirgüç-Kunt et al. (2006a) also include time and country dummy variables to control for heterogeneity across countries, but infer that identifying conditioning factors may enhance understanding of post-crisis recovery.

[13] Regarding using an internal benchmark, there are also criticisms in the literature about the relevance of convergence studies especially in panel data microanalysis like ours since pre-crisis average varies by banks hence banks are converging to different steady states. According to Islam (2005), there is probably little solace to be derived from finding which countries in the world are converging at a faster rate if the point to which they are converging is different.

behave differently from other banking system in the world. Implicit in this is the fact that bank fundamentals in the Mercosur do not necessarily need to move in line with the rest of the world to be considered normal.

The test for absolute and conditional σ-convergence to external benchmarks is conducted by estimating equation (5) and (6) with the following modification to the measures of dispersion:

$$Y_{i,t} = \ln\{X_{i,t}/X_{i',t}\}$$

For all $i = \{Argentina, Brazil, Paraguay, Uruguay\}$, $i' = \{Chile, Norway\}$ and across all $t's$.

$$X_{i,t} = \sum_{j=1}^{J} X_{ij,t} \bigg/ J \ , \ X_{i',t} = \sum_{j=1}^{J} X_{i'j,t} \bigg/ J \quad j = 1, 2 \ldots J \text{ (averaging is across banks)}$$

$D_{i,t} = $ The cross sectional standard deviation between i and i'.

C. Data Sources and Issues

For the identification and timing of systemic banking crises, we rely on a widely used database by Caprio and Klingebiel (2003). Accordingly, a systemic crisis episode is characterized by large-scale bank failures, the adoption of emergency measures by the government, significant bank runs, high levels of non-performing loans and significant bailout costs.

We use a panel of banks, using bank-level data from the Bankscope database compiled by Fitch IBCA, for which we have 115 existing banks in the baseline sample. Macroeconomic variables are from the IMF *(International Financial Statistics, IFS)* and the World Bank *(World Development Indicators, WDI)* databases.[14] The sample period is 1990–2006 and the following systemic crisis episode occurring within the period is considered: Argentina (1995), Brazil (1994), Paraguay (1995), and Uruguay (2002). Observations are measured in yearly intervals from the onset of the systemic crisis. Hence the first year, will correspond with observations occurring in 1995 for Argentina and Paraguay, 1994 for Brazil, and 2002 for Uruguay. Treating post-crisis observations this way creates an unbalanced panel of post-crises observation, which poses some estimation problems. On the other hand, this allows for sharper characterization of the issues at hand.

Of the four countries, Argentina is the only country to have experienced systemic crises more than once within the sample period; first in 1995, and in 2002. Even though the 2002 crisis was arguably the more severe of the two, we only consider the 1995 crisis in our analysis. This is to ensure consistency with the way other countries are treated within the sample and

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[14] A fuller description of data sources and definitions is given in Appendix 1.

also ensures that the lingering effect of the previous crisis on the variables does not bias the credibility of the internal benchmark chosen.

IV. THE RESULTS

In this section, we present two sets of results. We first conduct a preliminary descriptive analysis of the data, and then provide a more detailed analysis of overall bank behavior in the Mercosur.

A. Descriptive Statistics

Tables 1 and, 2 show summary statistics for the variables of interest. Due to the poor depth of higher frequency data we use yearly observations in the period within 1990–2006 for all the banks in the sample.

Within the sample period, the average level of profitability (ROA) is negative. However the difference between the mean and median shows the influence of relatively lower levels of profitability in Uruguayan banks compared to the Mercosur on the average, the median is comparable to the sample of banks we use from Chile and Norway, which are 0.74 and 0.97 respectively (summary statistics for Chile and Norway not shown). Over the sample period banks in the Mercosur on average held a higher level of liquid assets (36 percent) of total assets compared to banks in Chile (with a much lower average of 9 percent). Also regarding the pattern of intermediation, the Mercosur countries compared to the external benchmarks are more heavily involved in government financing. Private and public sector credit by commercial banks is 26 and 12 percent of GDP, respectively, in the Mercosur compared to Chile where the levels are 90 and 1 percent of GDP. In Norway, the commercial banks credit to the private sector is 67 percent of GDP and 7 percent to the public sector.

Table 2 shows the correlation coefficients between intermediation measures and other fundamental bank characteristics such as spreads, profitability and liquidity. Evidence of some sub-optimal intermediation patterns and volumes can be seen. For instance, banks' preference for public sector financing is highlighted by the correlation coefficients between total credit supplied by banks and the proportion that goes to the public sector. Another apparent anomaly is the negative correlations between bank profitability and credit supply (-0.10), compared a strong positive relationship with the proportion of liquid assets held by banks (0.13).

Table 1. Mercosur: Bank Behavior Summary Statistics						
Variable		**Mean**	**Median**	**SD**	**Min**	**Max**
Profitability						
Return on Assets (ROA)	*Aggregate*	*-0.46*	*0.79*	*8.14*	*-135.07*	*22.06*
	Argentina	-1.54	0.37	8.62	-94.58	22.60
	Brazil	1.67	1.44	3.15	-9.25	18.75
	Paraguay	1.79	2.19	3.31	-23.72	11.21
	Uruguay	-1.63	0.06	13.05	-135.07	6.20
Net Interest Margin	*Aggregate*	*7.39*	*6.02*	*8.62*	*-38.74*	*101.45*
	Argentina	5.45	4.62	6.86	-36.73	82.54
	Brazil	12.24	8.90	13.46	-2.74	101.45
	Paraguay	10.38	10.49	3.11	4.53	19.34
	Uruguay	4.94	5.01	5.72	-38.74	18.94
Risk						
Ratio of Equity to Asset	*Aggregate*	*15.96*	*11.61*	*18.82*	*-172.88*	*99.05*
	Argentina	18.65	12.45	20.18	-110.35	99.05
	Brazil	14.14	9.91	14.27	-45.56	99.04
	Paraguay	14.24	13.17	4.51	4.70	27.92
	Uruguay	8.86	7.85	18.66	-172.88	81.87
Spread (Lending- Deposit)	*Aggregate*	**16.04**	**10.46**	**15.75**	**1.98**	**58.36**
Credit Supply						
Bank Loans/Asset Ratio	*Aggregate*	*47.50*	*47.73*	*20.21*	*-10.18*	*99.72*
	Argentina	44.14	45.69	18.82	-10.18	86.88
	Brazil	38.22	36.83	13.88	-0.01	89.53
	Paraguay	49.26	53.12	14.43	5.47	83.54
	Uruguay	73.91	78.15	17.55	16.98	99.72
Domestic Money Bank Credit to the Private Sector/GDP	*Aggregate*	**0.26**	**0.22**	**0.17**	**0.10**	**1.33**
Domestic Money Banks Total Credit to the Public sector/GDP	*Aggregate*	**0.12**	**0.09**	**0.11**	**0.00**	**0.42**
Total Credit by Deposit Money Banks/GDP	*Aggregate*	**43.91**	**33.99**	**24.94**	**14.92**	**181.46**
Maturity Preference						
Banks Total Deposits/Assets ratio	*Aggregate*	*0.63*	*0.68*	*0.24*	*0.00*	*3.04*
	Argentina	0.61	0.67	0.24	0.00	3.04
	Brazil	0.38	0.38	0.18	0.01	1.09
	Paraguay	0.70	0.72	0.11	0.87	0.27
	Uruguay	0.89	0.89	0.27	0.18	2.54
Liquid Liabilities (Demand Deposits/Total Deposits and Short term Funding)	*Aggregate*	*0.22*	*0.11*	*0.27*	*0.00*	*1.53*
	Argentina	0.16	0.10	0.20	0.00	1.53
	Brazil	0.09	0.08	0.08	0.00	0.47
	Paraguay	0.64	0.80	0.33	0.00	1.00
	Uruguay	0.57	0.92	0.42	0.03	0.95
Liquid Assets (Liquid Assets/Total Assets)	*Aggregate*	*0.36*	*0.34*	*0.19*	*0.00*	*1.18*
	Argentina	0.38	0.34	0.20	0.03	1.18
	Brazil	0.42	0.42	0.14	0.00	0.73
	Paraguay	0.37	0.34	0.14	0.10	0.88
	Uruguay	0.19	0.14	0.16	0.00	0.77

Sources: Bankscope, *WDI, IFS* and authors' calculations.

Table 2. Correlations Between Selected Variables								
Sigma convergence	Loans	ROA	Spread (overall)	Bank Loans to Assets	Banks Credit to Private Sector/GDP	Banks Credit to Public Sector/GDP	Total Bank Credit/GDP	Liquid Assets to Total Assets
Loans	1.00							
ROA	0.07	1.00						
Spread	0.38	0.02	1.00					
Bank Loan/Assets Ratio	-0.10	-0.02	0.00	1.00				
Deposit Money Bank Credit to Pvt. Sector/GDP	0.15	-0.09	0.64	0.33	1.00			
Deposit Money Bank Credit to the Pub. Sector/GDP	0.41	-0.04	0.52	-0.35	0.03	1.00		
Total Credit by Deposit Money Banks/GDP	0.39	-0.10	0.77	-0.08	0.54	0.83	1.00	
Liquid Assets/Total assets	0.11	0.13	0.00	-0.73	-0.19	0.16	0.00	1.00

Source: Authors' calculations.

B. Regression Analysis

Overall results

In Table 3, we estimate equations (4)-(6) using nested OLS regressions. We report the regression coefficients α_1^y, α_1^d and γ_1^d and their associated standard errors. We also report the incremental R^2 (through nested regressions) to reflect the additional information (if any) that holding a specific group of control variables constant adds to the rate of convergence. To aid interpretation, we explain the results in light of the extent to which the benchmark is an appropriate measure of normal bank behavior.

Since the measure of β-convergence must coincide with σ-convergence for real convergence to occur, we focus our attention on σ-convergence measures, even though we report both in our canonical model. There are instances where the coefficients of β- and σ-convergence yield very different estimates, particularly for variables where convergence is "bottom up"—in which case absolute values of $Y_{ij,t}$ will increase for convergence to occur, while absolute values of $D_{ij,t}$ will decrease to show convergence. This further highlights the bias that can be caused by relying on the β instead of σ to show convergence.

The most notable result is the lack of convergence in two measures of intermediation (*credit by banks/GDP* and *private credit/GDP*). The estimates of α_1^d and γ_1^d are positive and significant, which implies that the total credit supplied by banks as well as the proportion of credit to the private sector, have yet to recover to the pre-crisis level. This result remains robust to the inclusion of control factors. In other words, holding constant the possible effect the macro economic condition, institutional adequacy, as well as bank specific characteristics may have on the recovery of private sector intermediation does not change the results.

That said, if banking crisis is preceded by an unsustainable growth in credit, we might not find convergence to the pre-crisis levels of credit supply. Hence we do not identify problematic bank behavior solely based on non-convergence in levels of intermediation without looking at changes to the pattern of intermediation.

Table 3. Summary Results for Absolute and Conditional Convergence 1/

	Absolute Convergence		Conditional Convergence		
			Bank level controls	Macroeconomic Controls	Institutional & Markert Structure Controls
	β -conv	σ- conv	σ- conv		
	1	2	3	4	5
Profitability					
Return on Assets	**-0.668***	**-0.602***	**-0.706***	**-0.606***	**-0.662***
	0.059	0.065	0.064	0.065	0.068
			0.22*	**0.04***	**0.03***
Risk					
Capitalization	**-0.417***	**-0.360***	**-0.452***	**- 0.383***	**-0.313***
	0.055	0.09	0.107	0.086	0.099
			0.05*	**0.03***	**0.02***
Spread (Lending –Deposit Interest Rate)	**-0.326***	**-0.238***	**-0.193***	**-0.076***	**0.367***
	0.024	0.039	0.049	0.052	0.073
			0.05*	**0.31***	**0.41***
Credit Supply					
Loans/Assets	**-0.418***	**-0.347***	**-0.448***	**-0.378***	**0.345***
	0.083	0.104	0.119	0.106	0.118
			0.00	**0.02***	**0.06***
Credit by banks/GDP	**-0.547***	0.106***	**0.016**	**0.304***	**0.761***
	0.01	0.021	0.039	0.029	0.051
			0.12*	**0.21***	**0.28***
Private Credit/ GDP	**-0.525***	0.549***	**0.349***	**0.765***	**0.764***
	0.013	0.018	0.038	0.029	0.085
			0.08*	**0.20***	**0.45***
Public Credit/GDP	**-0.582***	**-0.723***	**-0.780***	**-0.791***	**-0.498***
	0.006	0.003	**0.011**	**0.013**	0.013
			0.02*	**0.02***	**0.15***
Liquidity					
Total Deposits/Assets	**-0.905***	0.424***	0.424***	0.396***	0.341***
	0.04	0.047	0.035	0.04	0.035
			0.06*	**0.09***	**0.007***
Demand deposits/Total Deposits	**-0.360***	**-0.216**	**-0.290***	**-0.258******	**-0.375***
	0.078	0.092	0.085	0.083	0.088
			0.02*	**0.06***	**0.26***
Liquid Assets/Total Assets	**-0.723***	**-0.769***	**-0.729****	**-0.704***	**-0.680***
	0.031	0.11	0.113	0.109	0.117
			0.00	**0.05***	**0. 03***
Res/GDP	**-0.230***	**-0.912***	**-1.004***	**-0.558***	**-0.989***
	0.024	0.034	**0.042**	**0.036**	0.045
			0.14*	**0.19***	**0.23***

Source: Authors' calculations.

1/ The first row is the parameter estimate, the second row is the standard error, and the final row shows the incre mental R^2. Nested OLS regressions including all banks. ***, **,* indicates statistical significance at the 1%, 5% and 10% level respectively

We find a high rate of convergence (-0.72) in *public credit* which indicates that pre-crisis levels of government financing will typically be exceeded within two years after crisis.[15] This increased public sector financing may explain the declining levels of credit to the private sector. Figure 1 and 2 show significant differences between levels of public and private sector intermediation in the Mercosur and the external benchmarks.

Although we also find evidence of convergence in the *loans/asset* ratio we are cautious in interpreting this as a rise in private sector credit for two reasons. First, because the variable does not distinguish between loans recipients (private or public sector) it is likely that the coefficient is simply capturing the effects of increased public sector financing. Second, since the condition imposed in the data collection process is for banks to be in existence before and after crisis, bank level data may indicate survivorship bias, as only the largest and most profitable intermediaries will have survived systemic banking.[16]

Figure 1. Ratio of Public Sector Credit to Gross Domestic Product
Mercosur vs Benchmarks

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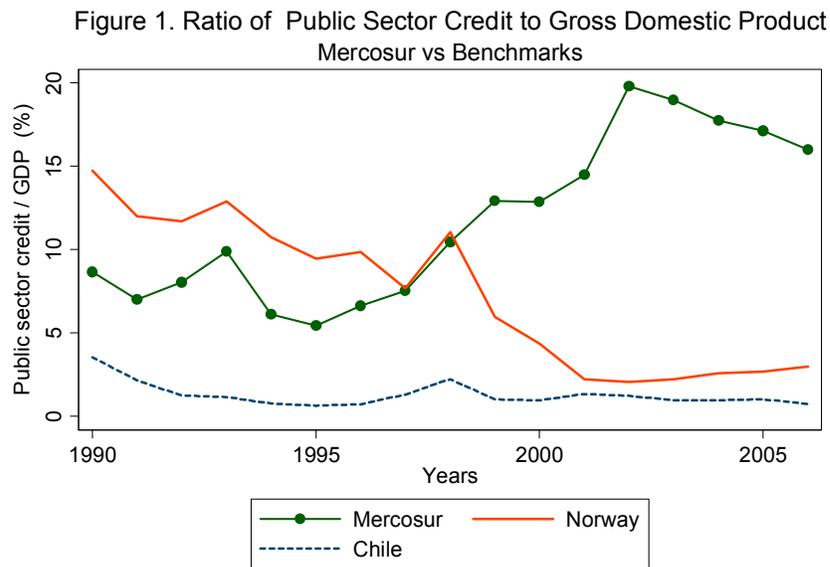
[15] The estimates of α_1^d and γ_1^d shows the yearly rate of recovery, for example, the rate of convergence in public sector credit of (-0.723) means that approximately 72 percent of the "gap" between current and pre-crisis levels of public sector intermediation will be closed annually. This implies that within 2 years pre-crisis levels of public intermediation will be exceeded.

[16] As variables measured on the bank level is subject to some evidence of survivorship bias, where both bank level and aggregate variables are reported, we will focus more on the aggregate measures. In order to mitigate some of the problems with survivorship bias in bank-level data due to mergers and acquisitions that may occur during a systemic crisis, we take the following steps. When we can identify a merger or acquisition and information is available for both banks (the acquiring and new bank), we treat them as one from the beginning of the sample otherwise the bank is dropped. This approach is similar to the one taken in the literature on post-crisis behavior Demirgüç-Kunt *et al.* (2006a). Taking this approach did not significantly change the sample composition in countries except in Brazil, which experienced a significant consolidation in the banking industry after systemic crisis.

Figure 2: Ratio of Private Sector Credit to Gross Domestic Product
Mercosur vs Benchmarks
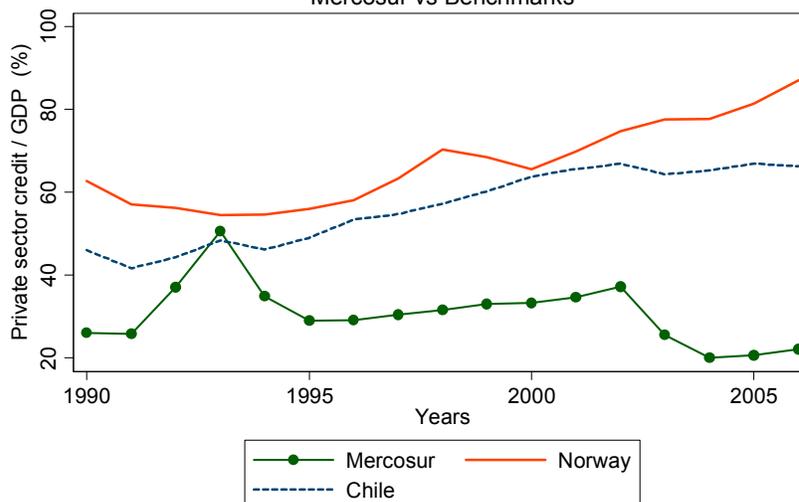
Another possible explanation for the lack of convergence in levels of intermediation may be because other bank fundamentals have not recovered to their pre-crisis levels and hence cannot sustain higher levels of intermediation in the Mercosur. We thus examine whether or not there is convergence in levels of profitability, risk, as well as the maturity composition and funding structure of the banks portfolio.

The results in Table 3 regarding convergence in bank profitability (*ROA*) show a high and significant rate of convergence (-0.60), which shows that banks quickly recover pre-crisis levels of profitability (within 2 years). This is intuitive considering that only the most resilient banks will survive a banking crisis. It is therefore difficult to ascribe lower levels of intermediation to lack of profitability in banks.

To assess whether the lower level of intermediation is determined by increased default or credit risk, we look at the speed of convergence of banks' capitalization (equity-to-assets ratio) and spreads. Lower levels of intermediation may occur if a systemic crisis leads to an erosion of bank capital and hence the existing capital cannot be stretched to cover additional loans. In this case, banks will experience a portfolio shift into highly liquid secure government securities that attract a smaller capital charge. A second scenario is that macroeconomic volatility—often synonymous with systemic crises in the region—may increase borrower default risk and result in higher intermediation spreads. If either bank *capitalization* or *spreads* fail to converge back to their pre-crisis level, this would be a *prima facie* reason for the fall in intermediation. However, this is not the case. The results show that

levels of capitalization and intermediation spreads converge to their pre-crisis level.[17] While intermediation spreads within the region are still relatively high, they are nonetheless trending downwards. For example, in Brazil spreads have declined by about 17 percentage points between 1997 and 2006 and in Uruguay by about 30 percent within the same period. This fact is empirically supported by the low rates of convergence in intermediation spreads within the region. We also find that the estimates of α_1^d and γ_1^d for *capitalization* and *spread* are robust to the inclusion of control factors. There is evidence of a significant influence of macroeconomic conditions on intermediation spreads in banks within the Mercosur. When the macroeconomic condition is held constant the speed of convergence of intermediation spreads reduce from about 24 percent (-0.238) to 8 percent (-0.076) per year.

We also look at whether the lower levels of intermediation can be explained by the funding structure and the liquidity composition of the banks asset portfolio. Lower levels of private sector intermediation in banks can be explained, if banks hold more liquidity after a banking crisis. Both measures of liquid asset holding *(ratios of liquid assets/total assets* and *bank reserves/GDP)* converge at a very high speed. This is evidence that banks preference for liquidity including holding of government securities and excess reserves, may pre-empt lower levels of intermediation in the region. However, the lack of convergence in deposits (*total deposits/assets*) and well as the low rates of convergence in demand deposits (*demanddeposits/total deposits*) shows that the persistent run on deposits particularly time deposits are additional factors that may hinder convergence in credit supply.[18]

In summary, we find evidence of persistent decline in private sector credit after systemic banking crises in the Mercosur even though the levels of other bank fundamentals have converged back to the pre-crisis levels and are such that can support increased levels of intermediation. We also find that post-crisis recovery of banks is largely predicated on holding highly levels of liquidity and lending to the public sector, typically in the form of purchasing highly liquid government securities and holding excess reserves, which is also a sub-optimal pattern of intermediation. Our results also hold in the presence of controls for other bank characteristics, the condition of the macroeconomy, and importantly the level of institutional development as well as the structure of the banking system.

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[17] Capitalization as an indicator of bank default risk may be inadequate as it may be significantly driven by regulation in a way that cannot be unambiguously lined to bank stability, especially when there is a potential for capital arbitrage.

[18] Continued deposit dollarization in the region causes a shift in deposits from domestic to foreign currency particularly for longer-term deposits. This may explain the lack of convergence of bank deposits since we do not differentiate between deposits in the domestic currency and deposits in foreign currency.

There may be endogeneity issues embedded in convergence analysis, as the levels of bank fundamentals may affect factors that condition the movement of bank fundamentals and vice versa. For example, the level of private sector intermediation is dependent on the macroeconomic environment, even though it is possible that the direction of causality may be reversed if economic growth is hampered by lack of intermediation to the private sector—a well-established link in the literature. We therefore also estimate conditional convergence in which we hold factors that may affect convergence independent of the occurrence of crisis constant. The existence of this bias is worth mentioning even though our results remain robust to it. In the next section, we analyze how our results vary across countries.

Results by country

We estimate equation (4) and (5) for individual countries only using bank-level data and present estimates of α_1^d and γ_1^d in table 4 and 5.[19] We also introduce *the ratio of loan loss provisioning to net interest revenue* to capture another element of bank risk, which may further explain lower levels of intermediation.

Argentina

We do not find evidence of post-crisis recovery in measures of intermediation (*loans and loans/asset ratios*) even when the other conditioning factors are held constant. As in the analysis of the full sample, we cannot attribute these lower levels of intermediation to lack of profitability in banks. However, the fact that we also find a very high rate of convergence in *loan loss provisioning,* liquid asset holdings and a continued run on deposits in domestic currency may explain the persistent decline in levels of intermediation.

Brazil

In Brazil we find the high level of convergence in the measure of intermediation (*loans/assets*) is highly conditioned by the overall institutional adequacy and banking system structure. This highlights the effective role played by the stabilization measures implemented to strengthen the financial system after crisis on the recovery of bank credit. (Cadim De Carvalho 1998, Goldfajn 2000, and Tabak and Staub 2007).

Contrary to the full sample result, we do not find convergence in holding of liquid assets and levels of capitalization. The lack of recovery of deposits more or less reflects the shrinking of the institutions surveyed as opposed to a continued on deposits since aggregate levels of deposits remain stable.

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[19] Estimating aggregate data is impossible in the panel of banks by country and the measures will not vary across panels.

Paraguay

In line with the full sample, we find high rates of convergence in liquid asset holdings, and loan loss provisioning. However, there is no convergence in the measure of intermediation *(ratio of loan to assets)* and in the level of deposits especially longer-term deposits. It also appears that systemic crises and subsequent bouts of banking distress in the region have eroded the level of capitalization of banks as evidence by the lack of convergence, which may have contributed to the shrinking loan portfolio in banks.

Table 4. Results for Absolute and Conditional Sigma Convergence by Country 1/								
	Absolute				Conditional			
	Argentina	Brazil	Paraguay	Uruguay	Argentina	Brazil	Paraguay	Uruguay
					Bank-specific controls			
Profitability								
Return on Assets	**-0.583***	**-0.852***	**-0.727***	0.463	**-0.710***	**-0.913***	**-0.616***	0.400
	0.068	0.221	0.189	0.593	0.069	0.206	0.196	0.615
					0.29*	**0.27***	**0.06***	**0.23***
Risk								
Loan Loss	**-0.761***	**-1.115***	**-0.711***	**-0.837**	**-0.689***	**-1.105***	**-0.690***	**-0.797**
Provisioning/net	0.097	0.102	0.085	0.215	0.106	0.121	0.088	0.281
interest revenue					**0.09***	**0.15***	**0.11***	**0.14**
Capitalization	**-0.421***	0.166	0.405	**-0.840***	**-0.545***	0.176	0.417	**-1.159**
	0.103	0.129	0.307	0.393	0.126	0.132	0.347	0.477
					0.05*	**0.24***	0.01	**0.46***
Net interest Margin	**-0.660***	**-1.069***	**-0.540***	0.172	**-0.717***	**-1.028***	**-0.472***	0.395***
	0.097	0.167	0.305	0.116	0.101	0.174	0.302	0.125
					0.05*	**0.05***	**0.06**	**0.30***
Credit Supply								
Loans	-0.065	**0.058***	**-0.538***	-0.097	**0.640***	**0.057***	**-1.827***	0.316
	0.043	0.018	0.144	0.103	0.074	0.014	0.158	0.245
					0.25*	**0.01**	**0.49***	0.08
Loans/Assets	-0.112	**-0.726**	-0.406	**-1.772***	-0.178	**-0.876**	-0.632	**-1.250**
	0.145	0.348	0.511	0.485	0.155	0.356	0.614	0.574
					0.04*	**0.10***	0.04	**0.09**
Liquidity								
Total	-0.054	**0.410**	-0.703	**0.797***	-0.120	**0.193**	-1.007	**0.999***
Deposits/Assets	0.170	0.173	1.226	0.325	0.109	0.078	1.284	0.095
					0.11*	**0.03***	0.03	**0.34***
Demand	-0.051	**-0.400***	**-1.450***	...	-0.071	**-0.795***	**-1.103***	...
deposits/Total	0.046	0.109	0.610	...	0.051	0.111	0.431	...
deposits				...	**0.073***	**0.07***	**0.10**	...
Liquid Assets/Total	**-1.382***	-0.011	**-0.812**	**-0.505**	**-1.360***	-0.115	**-0.813***	**-0.428***
Assets	0.078	0.14	0.323	0.253	0.079	0.124	0.302	0.253
					0.01	**0.06***	**0.07**	**0.11***

Source: Authors' calculations.
 1/ The first row is the parameter estimate, the second row is the standard error, and the final row shows the
 incre mental R^2. Nested OLS regressions including all banks. ***, **,* indicates statistical significance
 at the 1%, 5% and 10% level respectively

					Conditional			
Table 5. Results for Absolute and Conditional Sigma Convergence by Countries								
	Argentina	Brazil	Paraguay	Uruguay	Argentina	Brazil	Paraguay	Uruguay
		Macroeconomy				Institutions		
Profitability								
Return on Assets	**-0.606***	**-0.864***	**-0.728***	0.462	**-0.620***	**-0.993***	**-0.712***	0.316
	0.068	0.211	0.189	0.593	0.077	0.221	0.186	0. 619
	0.10*	**0.08**	0.00	0.09	**0.09**	0.02	**0.06**	0.09
Risk								
Loan Loss Provisioning/Net Interest Revenue	**-0.761***	**-1.191***	**-0.712***	**-0.807***	**-0.827***	**-1.080***	0.717***	**-0.817***
	0.100	0.113	0.086	0.226	0.117	0.140	0.081	0.229
	0.04*	**0.04***	0.00	**0.12**	**0.04***	**0.05***	**0.06**	**0.12**
Capitalization	**-0.430***	0.114	-0.389	**-0.766**	**-0.394***	0.096	-0.388	**-0.770**
	0.104	0.125	0.310	0.396	0.114	0.131	0.313	0.395
	0.00*	**0.12***	0.02	**0.13**	0.01	**0.04***	0.00	**0.13***
Net interest Margin	**-0.657***	**-1.079***	**-0.541***	-0.236	**-0.682***	**-1.167***	**-0.592**	-0.232
	0.098	0.166	0.307	0.159	0.102	0.173	0.294	0.164
	0.02	0.02	0.01	**0.25**	0.02	0.01	**0.08***	**0.25**
Credit Supply								
Loans	-0.064	0.058***	**-0.550***	0.141	-0.055	0.059***	**-0.549***	-0.141
	0.044	0.018	0.145	0.106	0.045	0.020	0.146	0.107
	0.00	0.01	**0.04***	**0.11***	0.01	0.01	**0.12***	0.11
Loans/Assets	-0.026	**-0.732**	-0.450	**-1.741***	0.143	-0.635	-0.469	**-1.741**
	0.147	0.351	0.508	0.530	0.155	0.387	0.534	0.537
	0.04*	0.00	0.02	0.03	**0.04***	0.03	0.02	0.03
Liquidity								
Total Deposits/Assets	-0.052	0.379***	-0.702	**0.811***	0.029	0.213***	-0.661	0.811***
	0.171	0.149	1.240	0.232	0.173	0.075	1.243	0.234
	0.00	**0.04***	0.06	**0.05**	0.01	**0.04***	0.01	**0.05***
Demand deposits	-0.040	**-0.408***	**-1.404***	...	0.000	**-0.551***	**-1.278***	...
	0.044	0.101	0.484	...	0.046	0.080	0.095	...
	0.08*	0.142	0.01	...	**0.14***	**0.08***	0.01	...
Liquid Assets	**-1.391***	-0.027	**-0.791***	**-0.486**	**-1.402***	.-0.078	**-0.794**	**-0.484***
	0.079	0.137	0.320	0.243	0.079	0.133	0.323	0.245
	0.03*	0.07	0.03	0.08	**0.02***	**0.01**	0.022	0.08

Source: Authors' calculations.

1/ The first row is the parameter estimate, the second row is the standard error, and the final row shows the incre mental R^2. Nested OLS regressions including all banks. ***, **,* indicates statistical significance at the 1%, 5% and 10% level respectively

Uruguay

Unlike for the other countries, we find rapid recovery in levels of intermediation *(loans/assets ratio)*. Other measures of bank fundamentals such as *loan loss provisioning/net interest revenue*, *capitalization,* and *liquid assets/total assets* ratios also show rapid rates of convergence. We do not find convergence in levels of deposits and intermediation spreads. Since the crisis in Uruguay is comparatively more recent than in the other Mercosur countries it is possible that post crisis-recovery is still ongoing and results may be significantly different in a couple of years.

In summary, we find variations in results in individual countries compared to the overall sample, particularly with respect to the role played by the conditioning variables on the rates of convergence. However, some trends remain common. The first is the high liquidity characteristic of the balance sheet *(liquid assets and loan loss provisioning)*, which may be sub-optimal for lending. While the observed bank behavior regarding intermediation and liquidity may indeed be related to past experiences with instability in the region, it becomes a deterrent to private sector intermediation if it nurtures risk aversion. Unfortunately, the lack of convergence in private sector intermediation reported in the overall results may persist since banks in the Mercosur have maintained profitability independent of private sector intermediation.

V. ROBUSTNESS TESTS

A. Alternative Benchmarks

In this section we are interested in analyzing changes in bank behavior over time (without distinguishing between pre- and post-crisis period). To do this, we choose an external time-varying benchmark, which also has the following added advantages. First, the use of pre-crisis average of bank fundamentals itself may be a flawed benchmark for normal bank behavior. For example, levels of credit supply may be at an unsustainable high before the crisis and hence banks may now be at an equilibrium point that is different from their pre-crisis levels (Kaminsky and Reinhart 1999). Structural changes, regulatory and macroeconomic developments are other factors that can also pre-empt the lack of internal convergence.

Second, the use of a pre-crisis average as a benchmark for normal bank behavior means that each bank is converging to a different benchmark even though the method of constructing the benchmark remains the same. In other words, the fact that there are different rates of convergence to different benchmarks may sometimes impair the interpretation of convergence. The use of alternative benchmarks mitigates this problem as convergence is not to an internal benchmark which would be unique for each bank, but to a single external benchmark. This enhances the meaning and comparability of the rates of convergence.

In addition, for robustness of our classification of bank behavior as sub-optimal or not, we compare bank behavior in the Mercosur to other countries that have experienced systemic banking crises. If some of the sub-optimal bank behavior reported in the previous section, particularly regarding private sector intermediation, is due to the fact that the pre-crisis levels of the variables represent an unstable equilibrium for banks in the Mercosur, then we should expect higher rates of convergence (more similarity) to the relatively more stable banking systems that we use as external benchmarks.

We term our approach to the choice of alternative benchmarks as a "maximum of all feasible standards approach." Since banks differ by characteristics such as size, capitalization and profitability—which implicitly determine their systemic relevance—lack of convergence of

some relatively smaller and regional firms will be of less systemic importance. On the other hand, the lack of post-crisis recovery of some large and systemically important bank may further interact with macroeconomic conditions to bias aggregate measures of credit supply downwards. Hence, some of the results in the previous section that show high levels of convergence may be reflecting the ease at which some of these largely capitalized and profitable banks can attain the pre-crisis standards. Hence the need to choose alternative benchmarks high enough to be able to capture behavior of this group of banks, but also low enough to ensure that it is realistic enough that banks in the Mercosur can converge to.

The choice of external benchmark is Chile (regional comparator) and Norway (OECD benchmark). Chile's last systemic banking crisis was in 1981–86 and Norway in 1987–93 (Caprio and Klingebiel 2003). The Norwegian banking crisis also has similar elements to crises in some of the countries in the Mercosur—a rapid economic boom and deregulation during 1984-87. However, sound macroeconomic conditions and well functioning institutions made for much quicker and effectively aided post-crisis stabilization.

B. Results

We assemble the panel dataset in this exercise in a different way from the canonical model. In using alternative benchmarks, we aggregate all banks within each country in the original dataset by mean values of the variables of interest to end up with a panel dataset identified by countries. We also obtain bank level data for the banks in Chile and Norway and aggregate in the same way. Mean values are used as a basis of aggregating the data to limit the influence of extreme values on the results. The results are presented in Table 6. We only condition for the macroeconomic environment and institutional adequacy, and not bank specific variables because of the manner in which the data has been aggregated.

The results also show a lack of significant convergence in the amount of credit supplied particularly to the private sector to both external benchmarks. A more notable peculiarity is the fact that the coefficient of private sector credit is positive and significant (divergence). This means private sector credit has grown at a faster rate in Chile and Norway than in the Mercosur. Figures 3 and 4 reveal some peculiarities in volumes and nature of intermediation in the Mercosur countries. In Figures 3 and 4, there is a steady growth in the ratio of loans to assets and private sector credit in the benchmarks as opposed to the decline observed in the Mercosur.

Regarding other bank characteristics, in general there are higher levels of convergence to the regional benchmark than there is to the OECD benchmark even though overall levels of convergence to the external benchmark is lower than to the internal benchmark. Specifically, levels of bank *profitability* in the Mercosur are similar to both benchmarks as shown in Figure 5, even though the estimates of α_1^d and γ_1^d have the right sign, but lack significance when the OECD benchmark is used.

Table 6. Summary Results for Sigma Convergence Using Chile and Norway as Alternative Benchmarks

| | Absolute | | Conditional | | | |
| | | | Macroeconomy | | Institutions | |
	Chile	Norway	Chile	Norway	Chile	Norway
Profitability						
Return on Assets	**-0.476****	-0.093	**-0.409***	-0.353	-0.516	-0.152
	0.197	0.230	0.205	0.231	0.986	0.309
	0.040	0.17***	0.21*	0.23**		
Risk						
Capitalization	**-0.992****	0.287	**-1.147****	3.090***	**-1.590****	1.720***
	0.284	0.687	0.271	0.832	0.705	0.934
	0.14***	0.13***	0.17**	0.190		
Spread (Lending –Deposit Interest Rate)	-0.401	-0.150	**-1.476***	**-3.457****	0.402	2.64
	0.732	0.739	0.792	1.041	0.757	3.871
	0.14**	0.21***	0.33***	0.37***		
Credit Supply						
Loans/Assets	3.042**	0.310	3.193***	-0.666	1.286	3.919
	1.515	1.000	1.652	0.930	1.920	2.716
	0.09***	0.040	0.200	0.35***		
Credit by Banks/GDP	0.441	-1.570	0.478	1.745	-0.566	2.874*
	0.535	1.886	0.665	1.253	0.921	1.435
	0.130	0.26**	0.47***	0.39***		
Deposit Money Banks Private	1.544***	1.544***	1.752***	1.601***	2.673*	1.594
Credit/GDP	0.473	0.373	0.478	0.255	1.436	1.090
	0.13***	0.17**	0.14**	0.15*		
Deposit Money banks	0.158	0.089	-0.460	0.183	1.078	0.009
Public credit/GDP	0.328	0.275	0.327	0.301	0.682	0.552
	0.33***	0.030	0.51***	0.29*		
Liquidity						
Res GDp	-0.349	**-0.455****	-0.448	-0.206	0.198	-0.574
	0.567	0.200	0.567	0.220	0.681	0.544
	0.060	0.11*	0.100	0.120		
Demand deposit/GDP	0.225	0.991***	-1.299	0.957***	0.919	1.012***
	0.845	0.039	0.818	0.038	1.104	0.044
	0.32**	0.01*	0.29**	0.04***		
Liquid Assets/Total Assets	-0.686*	0.560	-0.630	-0.564	**-0.606****	**-1.865****
	0.380	0.520	0.380	0.566	0.212	0.848
	0.020	0.020	0.110	0.11**		

Source: Authors' calculations.
 1/ The first row is the parameter estimate, the second row is the standard error, and the final row shows the
 incre mental R^2. Nested OLS regressions including all banks. ***, **,* indicates statistical significance
at the 1%, 5% and 10% level respectively

Figure 3. Ratio of Loans to Assets
Mercosur vs Benchmarks
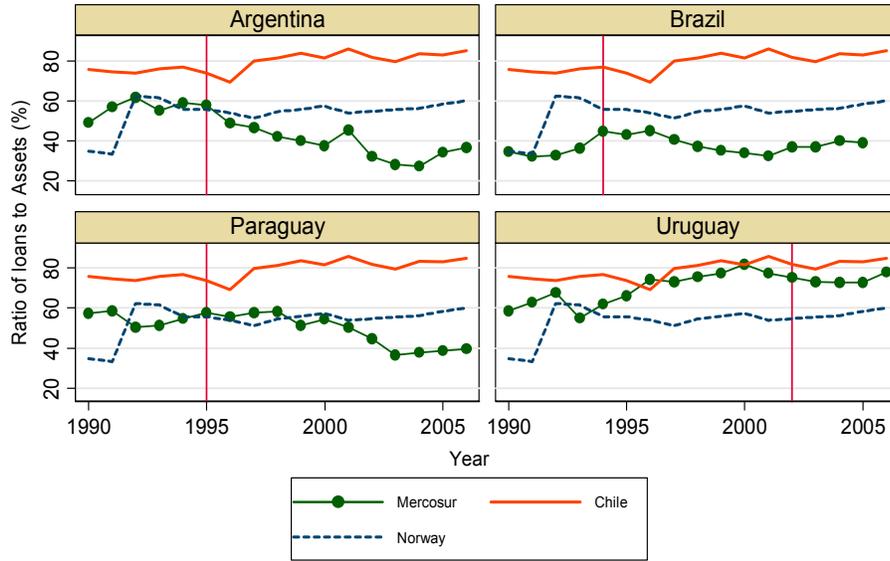
Vertical line shows the occurence of systemic crisis

Figure 4. Ratio of Private Sector Credit to Gross Domestic Product
Mercosur vs Benchmarks
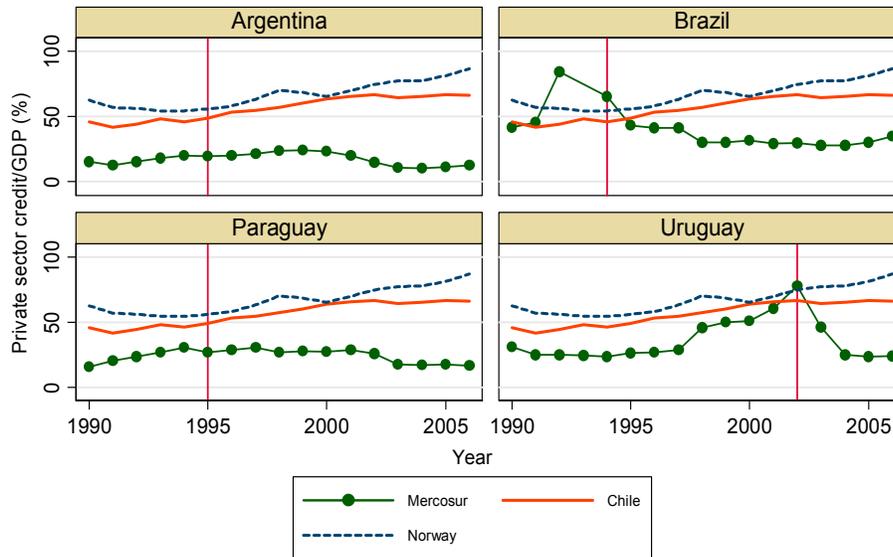
Vertical line shows the occurence of systemic crisis

Figure 5 shows levels of capitalization in the Mercosur to be between the regional and OECD benchmark. Hence we find rapid convergence to the regional benchmark, but find no convergence to the OECD benchmark as the average levels of capitalization in the OECD benchmark exceed the Mercosur's.

Furthermore, intermediation spreads are also higher in the Mercosur than the benchmark countries. We find that macroeconomic conditions in the Mercosur are the main reason behind the lack of significant convergence in spreads to any of the external benchmarks. This reflects the relatively higher levels of interest rates in the region, as banks typically set higher interest rates in response to their risk exposure (Gelos 2006 and Angbazo 1996).[20]

Figure 5. Capitalization
Mercosur vs Benchmarks

Vertical line shows the occurence of systemic crisis
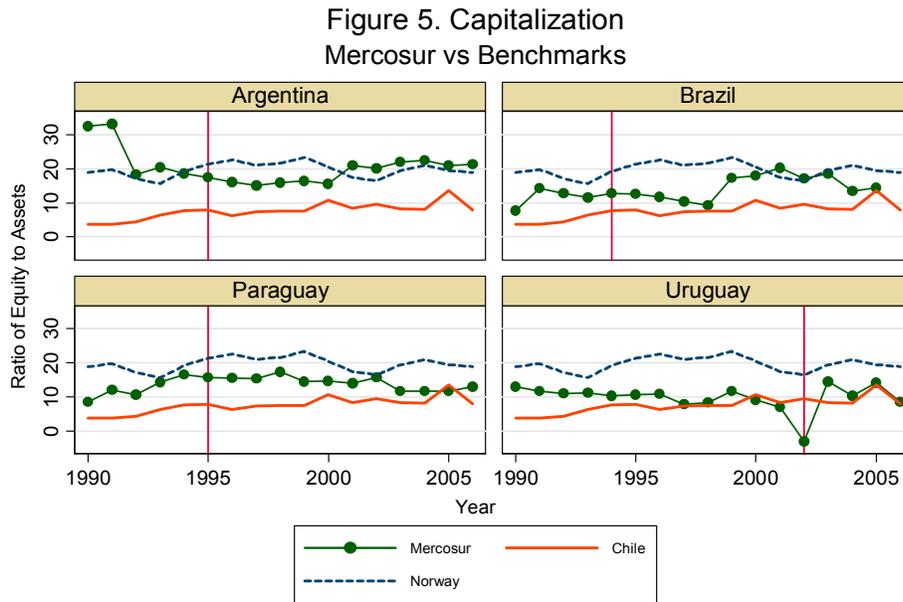
In addition, we find that the level of liquidity (Liquid assets and reserves) is consistently higher in the Mercosur particularly after crisis as shown in Figure 6. However, we find that the results are reversed when we hold constant the impact of institutional quality in the Mercosur.

Our results show that the behavior of banks in the Mercosur within the sample period is generally not inline with external benchmarks except in terms of profitability and capitalization even though we expected more similarity with the regional benchmark Chile. The convergence to the regional benchmark in terms of profitability and capitalization is not

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[20] Rojas-Suarez (2001) argues that spreads in emerging economies can be interpreted differently compared to industrialized financial markets. This may be because narrow spreads in the latter reflect efficiency but in emerging economies may indicate increased risk taking in banks.

surprising as profitability may be necessary for the continued existence of the banks, and levels of capitalization may be driven by regulatory requirements. The wide disparity that we observe between the Mercosur and the benchmark seems to have been present before systemic crisis. However, it shows levels of private sector intermediation that are persistently low with no signs of recovery.

Figure 6. Commercial Bank's Reserves to Gross Domestic Product
Mercosur vs Benchmarks
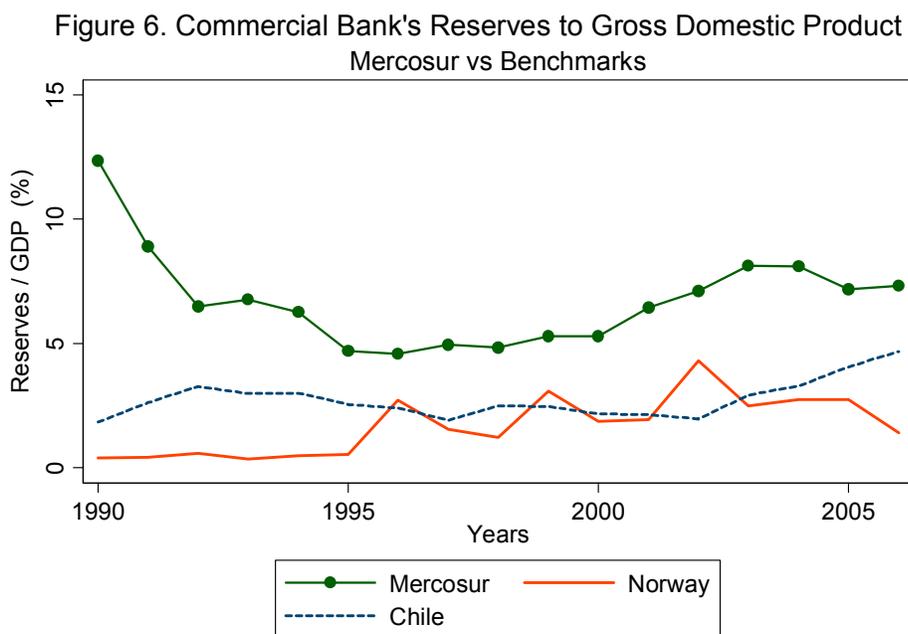
C. The Behavior of Foreign and Large Banks

As a second robustness test, we also check if the results regarding our canonical model reported in Table 3 are conditioned by type of bank. The reasons are two-fold: First, we expect foreign ownership in banks to be negatively related to the likelihood of failure because of the ability to resort to upstream financing which may stabilize the supply of credit during bad times (Odesanmi and Wolfe 2008). Second, large banks benefit from implicit guarantees ("too-large-to-fail"), which makes them more likely to have a higher speed of post-crisis recovery. Both types of bank are systemically important, as post-crisis recovery in large banks may drive the total supply of credit in the economy, while the role of deposit stabilization as a result of depositors "flight to quality" played by both types of banks in times of banking distress helps mitigate the net loss of deposit in the banking system.[21]

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[21] The reverse was the case in Uruguay when the run on deposits initially started with the Argentine foreign banks in Uruguay, which also coincidentally were also the large banks in the system hence aggravating the net loss of deposit.

As shown in Table 7, the results regarding σ-convergence for foreign and large banks closely mirror the results of our canonical model in Table 3 with some notable differences. On average, large banks in particular tend to recover *profitability* and *capitalization* quickly. However, they are also key drivers of *intermediation spreads* as shown by the high rates of convergence. This is because their significant market share grants them some monopoly power with which they are able to charge higher spreads. Levels of intermediation *(loans-to-asset* ratios*)* are higher in large and foreign banks than in the overall sample. However, this may also be for two reasons, larger banks may be more active in government financing while foreign banks may provide credit mainly to large corporations- if this is the case, supply of credit to the private sector will be lower.[22] While the rate of convergence in demand deposits is lower in large banks, the rate of convergence of liquid assets is almost double that of the total sample confirming our suspicion that large banks are more active in government financing.

Table 7. Absolute Sigma Convergence by Bank Type				
	All Banks	Domestic	Foreign	Large banks
Profitability				
Return on Assets	**-0.602***	**-0.669***	**-0.774***	**-0.922***
	0.065	0.071	0.191	0.078
Risk				
Capitalization	**-0.360***	**-0.485***	**-0.258**	0.183
	0.09	0.098	0.208	0.116
Net Interest Margin	**-0.619***	**-0.597***	**-0.694****	**-0.779***
	0.084	0.093	0.127	0.099
Credit Supply				
Loans/Assets	**-0.347***	-0.171	**-0.682***	**-0.719***
	0.104	0.121	0.249	0.191
Liquidity				
Total Deposits/Assets	**-0.905***	0.182	0.490***	-0.344
	0.04	0.116	0.032	0.295
Liquid Liabilities	**-0.360***	-0.053	0.114	**-0.134****
	0.078	0.064	0.102	0.057
Liquid Assets	**-0.723***	**-1.275***	-0.067	**-1.476***
	0.031	0.077	0.167	0.153

Source: Authors' calculations.
  1/ The first row is the parameter estimate, the second row is the standard error,
   and the final row shows the incremental R^2. Nested OLS regressions
 including all banks. ***, **, * indicates statistical significance at the 1%, 5%
and 10% level respectively

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[22] We only present bank level results, as the results using aggregate data will not differ from what is shown in Table 3.

As extra measures of robustness, we use alternative measures of risk (loan loss provisioning) and alternative measures of credit supply (total loans) and rerun the regressions in Tables 3 to 5. The result using this other measures are not significantly different from what is reported on variables measuring similar bank behavior.

In summary, our robustness tests reconfirm the key findings regarding volumes and patterns of intermediation as well as the maintenance of high intermediation spreads particularly in domestic banks. While the levels of capitalization, profitability and risk of banks are such that can accommodate increased private sector lending, we find the macroeconomic and institutional volatility is far more significant in preventing convergence in private sector intermediation and spreads.

VI. CONCLUDING REMARKS

The paper explores the post-banking crisis behavior of banks in the Mercosur, with particular emphasis on fundamental and undesirable changes. Using both bank-level and aggregate data for countries in the Mercosur over the period 1990–2006, a time marked by numerous banking crises, we have explored the relationship between bank behavior before and after the occurrence of a systemic crisis using convergence analysis, focusing on volume and nature of intermediation. The paper characterizes as problematic a behavior whereby there is lack of convergence to *both* the pre-crisis average and to an external benchmark. This two-way analysis is important because categorization by only using other countries banking systems as external benchmarks can be misleading. To the extent that the pre-crisis levels of bank behavior is a peculiarity of the Mercosur countries and not a standard for normal bank behavior, banks in the Mercosur will be different from external benchmarks.

The paper has the following key results. We find a persistent decline in private sector intermediation which is out of line with internal and external benchmarks. This can be attributed to the role played by macroeconomic and institutional volatility that has nurtured a relatively high level of risk aversion in banks in the Mercosur. We also find that fundamental bank characteristics such as profitability and risk are typically not seriously affected by crises and rapidly converge back to benchmarks. This notwithstanding, intermediation to the private sector is curtailed. These results show a greater influence of supply factors on the reduction in bank lending. Therefore, policies aimed at stimulating bank lending should place emphasis on increasing credit supply. Moreover, we find evidence of increased government financing and holding of liquid assets and cash reserves.

Some caveats are in order. First, one of the weaknesses of the convergence measure is its inability to correctly deal with overshooting—current levels of a variable overshooting their pre-crisis average (very high speeds of convergence).[23] A second concern is that the rate of

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[23] This issue is less of a problem in the growth literature from which the methodology has been adapted, as poor countries GDP per capita do not tend to outstrip that of rich countries (Lucke 2008).

convergence may be biased by the choice of benchmark for normality. The rate of convergence may be more rapid when comparing a bank's post-crisis to its pre-crisis level, and otherwise when comparing different banking systems. While these concerns may not be fully alleviated, the main results still stand. In line with the literature, we find that estimating conditional convergence increases the rate of convergence and mitigates some of the downward bias from using an alternative benchmark.

Finally, some general policy conclusions for post-crisis recovery in bank fundamentals can be drawn from our results. The most fundamental recommendation is to implement policies that bring about a sustained increase of confidence in the banking system. As starting point, a stable macroeconomic environment alongside improved prudential institutional frameworks. In addition, it is important to understand the structure of the banking system that may emerge after systemic crises. This is important if the less desirable effects of concentration and market segmentation are to be mitigated. For example, increased market share of public banks post-crisis may have a detrimental effect on the patterns of intermediation particularly to the private sector while a concentrated banking system may facilitate the maintenance of high spreads.

Appendix I. Variable Definitions and Sources

Variable name	Definition	Source
Bank Behavior Variables		
Profitability		
Return on Assets	Return on average assets	Bankscope 2008
Net interest Margin	Ratio of net interest income expressed as a percentage of earning assets	Bankscope 2008
Risk		
Loan Loss Provisioning/Net Interest Revenue	Ratio of loan loss provisioning to net interest revenue	Bankscope 2008
Capitalization	Ratio of equity to total assets	Bankscope 2008
Spread (Lending –Deposit interest Rate)	Interest rate spread (lending rate-deposit rate)	IFS/WDI
Credit Supply		
Loans	Net loans	Bankscope 2008
Loans/Assets	Ratio of net loans to total assets	Bankscope 2008
Credit by banks/GDP	Domestic credit provided by banking sector (percent of GDP)	WDI
Private Credit/GDP	Credit provided to private sector by commercial banks (percent of GDP)	Own calculation from IFS
Public Credit/GDP	Credit provided to public sector by commercial banks (percent of GDP)	Own calculation from IFS
Liquidity		
Total Deposits/Assets	Ratio of total deposits to total assets	own calculation using Bankscope 2008
Demand Deposits	Ratio of demand deposits to total deposits and short term funding	Bankscope 2008
Liquid Assets	Ratio of liquid assets to total assets	own calculation using Bankscope 2008
Res/GDP	Ratio of commercial banks reserves/GDP	Own calculation from IFS
Control Variables		
Macroeconomy		
GDP Growth	Annual percentage growth rate of GDP at market prices	IFS/WDI
Inflation	Inflation as measured by the consumer price index	IFS/WDI
Total Reserves/External debt)	International reserves to total external debt. (RES/EDT)	WDI
Institutions		
Governance	Average of 6 indicators measuring, voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption	Kaufman Kraay and Mastruzzi (2008)
Financial Freedom	A measure of banking security as well as independence from government control	Heritage Index of economic freedom (2008)
Capital Regulation	Capital Regulatory Index: summary measure of capital stringency--sum of overall and initial capital stringency. Higher values indicate greater stringency.	Own calculalations using the formula prescribed in the World Bank bank regulation and supervision database
Bank Concentration	Assets of three largest banks as a share of assets of all banks	own calculations using Bankscope (2008)

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