Mergers and Acquisitions in the Colombian Financial Sector: Impact on Efficiency (1990-2005)

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July 2006

(Summary)

Colombia has witnessed a renewed interest in merging and acquiring financial institutions during 2003-2005. These have been "complementary mergers" that seek to exploit economies scale and scope. This process contrasts favorably with those mergers & acquisitions that occurred during the mid-1990s, which involved mainly "twin institutions" that lacked potential for gaining multiproduct efficiency.

This document analyzes the need to remove some of the regulatory constraints that obstruct further exploitation of such economies of scale-scope and quantifies the "cost efficiencies" shown by the Colombian banking sector (1994-2005). At the aggregate level, we found (absolute) banking efficiency to be around 63%, a similar value to those found in related studies post-crisis. This implies that banks operating in Colombia have been able to recover their efficiency levels during post-crisis 2003-2005, except for mortgage institutions. We highlight regulatory barriers that could be removed to help the banking system move closer to the optimal production frontier.

JEL Classification: Financial Institutions (G200); Mergers & Acquisitions (G340); Financial Development (O160).

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I. Introduction

The Colombian financial sector has suffered from high volatility during the 1990-2005 period, fulfilling a complete cycle of recovery-expansion-overgrowth-crisis-recovery. During this cycle, those phases can be delineated as follows: redesign of the financial system and recovery (1990-1993); credit expansion and merger & acquisition frenzy (1994-1995); overgrowth and asset bubble, especially real estate (1996-1997); crisis (1998-2002); and financial recovery, except for the mortgage banking sector (2003-2005).

As will be shown, in terms of consolidation, there is a renewed interest in merging and acquiring institutions that provide new synergies through *diversified* financial markets. This process of consolidation contrasts favorably with what happened during the 1994-1997 period, when the sector witnessed "twin mergers." These mergers helped to diversify the loan book primarily in terms of region and population strata, but not by economic sector activity. Therefore, these mergers extended the prevailing activity, while the "complementary mergers" of the 2003-2005 period were able to expand and diversify the sources of the asset side of the balance sheet.

It is worthwhile mentioning the transformation of the "corporaciones de ahorro y vivienda" (CAV) from the 1972-1999 period into mortgage banks (BECH) from the 2000-2003 period. These banks already had foreign exchange operations and consumer credit (along with mortgages). The ensuing absorption of the BECHs by the commercial banks (2004-2005) has given rise to one of the most important banking consolidation processes in the financial history of the country. During this last phase of mergers and acquisitions, the tendency has been towards institutional arrangements where the majority of the commercial banks operates under a system which provides, "under the same roof", mortgage, commercial, and consumer credit. Furthermore, it supplies credit to the Small and Medium

Enterprises (SME), with a renewed interest even for the micro-enterprise (now with state guarantees).

On the deposit-taking and payment services areas, integration has been practically completed. Even those that, for branding reasons, do not operate “under the same roof”, have created cross-institutional networks that effectively replicate the universal banking system, especially on the liability side.

Banking and securities supervision in Colombia has also moved forward in an important way, with the merger, in December 2005, of both tasks under the new unified Superintendencia Financiera. Encompassing banking-securities supervision entails demanding organizational challenges and new data requirements. In historical terms, the weakest link in supervision stemmed from the securities markets, which were more focused on promotion than in surveillance. This bias affected negatively the crucial tasks of supervision, valuation and regulation of the securities and forex portfolios. The confidence-crisis of the public debt market (TES) in August of 2002 alerted the authorities on the importance of overcoming the supervisory deficiency in the securities market.

There has been extensive discussion regarding the “optimal-sequence” of the financial reform: should be reformed first the structure of the banking system or the regulatory institutions? However, on the one hand, the recent creation of the unified Superintendencia-Financiera is a *fait accompli.* On the other hand, the financial markets of Colombia have witnessed consolidation of quasi-universal operations (except for fiduciary businesses, leasing, investment banking and insurance). Therefore, what lies ahead is to examine the rationale behind these banking mergers and acquisitions and the supervisory-regulatory tasks that these process demands. In a similar vein, it will be crucial to examine constraints and limitations that impair further exploitation of economies of scale-scope. This consolidated system, both in its regulatory and operational structures, should allow

for the customer to have a larger “menu”, at a lower financial cost and representing a lower systemic risk.

Colombia has lacked financial depth (both on assets and liabilities) in historical terms. For example, the loan/GDP ratio was only 38.7% in 1997 (a peak historical value) and the financial savings/GDP ratio was 43.2% in that same year. By end of 2005, the loan/GDP ratio had declined to 23% and the financial savings/GDP ratio was down to 36.8%. In spite of the significant recovery of the real sector during 2003-2005, growing at an average annual rate of 4.6%, the financial sector has remained relatively stagnant.

There are several factors underlying this relative stagnation of the financial sector, being financial repression one of the most important ones. This repression has been induced by the Financial Transactions tax (ITF) and the judicial instability produced by several decisions of the high courts (Anif 2005a).

This new phase of financial mergers and acquisitions still has to face a double degree of uncertainty in the immediate future: the first one has to do with the moment where the financial deepening synchronizes (again) with the economic recovery cycle; the second one deals with the moment where these elements of financial repression that still weigh on the sector are removed. If these obstacles are removed, the financial sector consolidation and the unified supervision-regulation will allow Colombia to properly face the challenges posed by globalization, including the Free Trade Agreement with the US (in the process of ratification), Central America (being worked-out), and Europe.

The second part of this document deals with the institutional transformations of the Colombian financial sector during 1990-2005. The third section presents the econometric estimations of the cost efficiency in the Colombian financial sector, covering quarterly information for 30 banks during 1994-2005. This estimation is done following the stochastic frontier method, which takes a translog functional

form for the cost function. At the aggregate level, the results show that this efficiency is close to 63%, similar to the one found for the post-crisis period in other studies. This shows that, once the financial sector crisis was overcome, banks have been able to recover their efficiency levels.

II. Trends of the Colombian financial sector: 1990-2005

This section presents and overview of the Colombian financial structure, focused on the banking sector, during the past fifteen years. First, we will deal with the changes in structure, and later, we will analyze its performance at a quantitative level, relative to the economic cycle.

A. Structure of the financial sector

The Colombian financial sector went from being a highly regulated and uncompetitive system in the eighties to one of greater freedom and efficiency, based on subsidiaries, during the nineties. Currently, this set-up has advanced towards a system of financial services provided "under the same roof." The process of mergers and acquisitions (M&A) allowed commercial banks to "swallowed" mortgage institutions (BECH), consolidation financial services under the aegis of commercial banks.

Barriers to banking integration

It is clear, however, that several barriers to financial services universalization remain in place. Such barriers can be identified in three areas. The first barriers are legal. This is the case of leasing, the management of fiduciary (or trust-funds) resources and insurance services. All these services require, under current legislation, specialized vehicles. This specialization (a legacy of the subsidiary system) has worked against market trends that call for further integration.

A second type of obstacle results from “diffuse regulations”, which have been, in effect, superseded by the market’s own practices. This has been the case of investment banking, which has found mechanisms to offer its financial advisory services through different alternative channels (frequently foreign firms). Hence, investment banking offered through the Corporaciones Financieras (CF) has been agonizing, remaining only two out of seven CFs.

The rationale for CFs services can be tracked-back to the 1960-1980 period, when long-term intermediation vehicles were needed to help in the transformation of maturities for long-term investment projects (Ortega, 1982), where multilaterals and Central Bank’s played an important supporting-role. The sources of these loans (multilateral funding and expensive CDs) have changed in favor of foreign investment banks. Syndicate loans, bond advisory and structured credits now fulfill this task through multi-faceted commercial bank, just like it has been happening internationally with JPMorgan-Chase, Citibank-SSB, etc.. Moreover, the complementary advisory services in M&A and Project Finance have become truly globalized, and the investment bank’s good-will often plays a fundamental role in the selection process.

Finally, there are barriers related to market segmentations (Clavijo, 1984). This is the case of the revitalization of the (near-banks) finance companies (called Compañías de Financiamiento Comercial - CFCs), which were re-specialized in providing leasing services during the 1990s. Furthermore, CFCs are being used to provide banking services that traditional banks are not willing to offer due to concerns of money-laundry risks involved in the foreign exchange market tapped by some CFCs.

The potential economies of scale-scope and its exploitation by the banking sector needs to be re-examined under these new developments. There is a need for removing some of these barriers in order to promote further financial services integration. Lower regulatory and transactional costs should help in reducing

production costs in the banking firm, so that customers received a wider menu at a lower marginal cost.

B. Evolution of the Colombian Financial System

Since 1923, the Colombian financial system was conceived as a multi-banking system in which commercial banks managed diverse lending-saving operations in an integrated fashion. However, as time went by, the system became fragmented as a result of lacking market dynamics. Additionally, a complex political economy led the Central Bank to support specific economic sectors through subsidies loans.

Hence, the asset side of the banking system became rather specialized (coffee, livestock, commerce, industrial, mortgage), while the liability side remained rather "universal" (Ortega, 1982; Montenegro, 1983; Hernández, 2000; Urrutia and Caballero, 2005). The financial system ended up operating under a hybrid system, which consolidated during the 1970s and 1980s (Clavijo, 1992). On the asset side, CFCs were created to specialize in semi-durable goods, and the real-estate lending was performed almost exclusively by the CAVs. On the liability side, there were some steps towards universalization, especially when the CAVs were allowed to offer inflation-indexed savings accounts and CDs and CFCs and Corporaciones Financieras (CF) were allowed to gather deposits via CDs. However, even on the liability side, the specialized structure remained: the monopoly on current accounts was reserved for banks; inflation indexation for on-demand savings accounts was limited to CAVs; special conditions for medium-term deposit gathering were given to the CFs.

During the 1990s, deep financial reforms were undertaken to overcome the complex regulation and to give greater universality to the financial balance sheet, both on its deposit taking as well as in its loans (Hommes y Montenegro, 1989). An important flexibility on the active and passive interest rates was achieved; several compulsory investments were eliminated, reduced the weighted average reserve

requirements from a 25% to 5% and the requirements for entry and exit were relaxed. Overall, financial repression was reduced (Salazar, 2005; Villar *et. al* 2005) from and index value of 24 in 1990 down to 10 in 2003. These reforms gave way to a "universal" banking structure, where financial conglomerates, anchored on a core bank, started providing most of the services through their affiliates, where the laws 30 of 1990 and 45 of 1993 played a fundamental role. (Melo, 1993; Martinez, 1994).

As mentioned, despite the advances toward multibanking, other specializations structures were strengthened, especially between 1993 and 1997. (Urrutia, 1996; Carrasquilla y Zarate, 1997). While CAVs were allowed to broaden its loan operations towards consumer credit and FX operations, fiduciary operations, which used to be a section within commercial banks, were compelled to establish entities devoted to it. Likewise, regulation demanded CFCs to adopt specialized structures in order to provide leasing services, furthering segmentation, contrary to the gains obtained in the rest of the system. The adopted structure did not allow the complete use of several economies of scale and scope and the financial system continued to be segmented, expensive, and inefficient (Clavijo, 2000).

The financial services diversification coincided with the credit boom period (1993-1997). This led to an accelerated growth in the number of institutions, especially in the consumer credit area, generating an excessive number of bank and CAV branches as well as the offices dedicated to leasing and fiduciary business.

With the start of the crisis (1998-1999), those excess costs and rigidities were made obvious. Although late, the system recognized that it was oversized and the circumstances forced the system to a drastic reduction in the number of financial institutions. Something like this had already occurred with the CFCs in 1995-1996, but during the crisis, this wave of branch closings was throughout the sector.

CAVs were severely affected by the crisis and forced to recalculate their out

standings for mortgage credits (by Law 510 of 1990). CAVs were finally absorbed by commercial banks in the early 2000s (Carrasquilla et. al 2000; Urrutia, 2000; Cuéllar, 2002; Clavijo, et. al 2005).

The total number of institutions supervised by the Banking Superintendence (excluding the Central Bank, the exchange houses and the representation offices) has been reduced from 438 in 1995 to 349 in 1999 (a downsize of 89 entities). Similarly, the financial system's total assets stagnated, remaining close to 55% of GDP during 1997-1999.

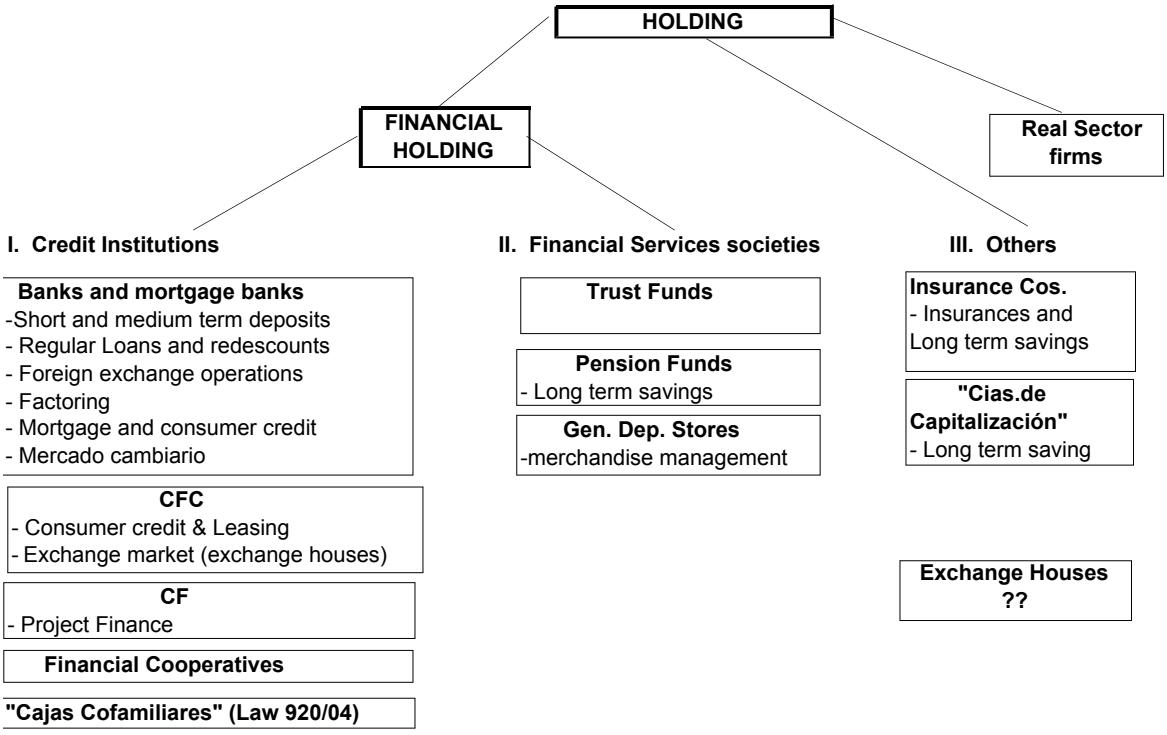
As has been shown, there was a generalized expansion phase during the recovery period (1990-1994) and credit boom (1995-1997), during which the CFCs took advantage of the specialization signs to expand, while the CAVs over-expanded during the entire 1993-1997 period. During the crisis (1998-2002), the system rearranged itself by closing some institutions (mainly CFCs), merging some of them (CAVs-BECHs). The process of consolidation around the commercial bank's expanded operations began during the recent recovery phase (2992-2005). Simultaneously, the CFs have almost disappeared as specialized entities.

It is clear, therefore, that, despite the advances, signs of specialized banking remain, with the barriers coming from regulation already discussed (CFs-fiduciaries-insurance), the ones induced by regulatory-fiscal (CFC-leasing) or by frictions within the system (CFC-exchange houses), which might be draining the capacity to fully exploit additional synergies within the banking sector. Graph II.1 shows the structure inherited from Law 510 of 1999 and the additional reforms by Law 795 of 2003, where the central theme has been the absorption of the BECHs by commercial banks, and, to a lesser degree, the appearance of a better regulatory framework for the financial cooperatives (based on Law 454 of 1998) and the possibility of deposit taking by the cajas cofamiliares from their affiliates, in order to feed their own financial institutions (according to Law 920 of 2004).

The entire process of mergers and strategic alliances, especially the most recent ones (2003-2005), makes relevant the debate about the best organizational form that the Colombian financial system must adopt, as well as its regulatory-supervisory structure. Before answering which has to be this new structure, which most likely will not deviate in any substantial form from the current tendencies, it is important to first examine the state of the financial sector as a whole.

Chart 1

Colombian Financial System under Laws 510/99 and 795/03



Source: Anif

C. Recent performance of the financial sector

Recent changes to its structure

Chart 1 illustrates that the number of financial institutions in the boom period reached 201 in 1995. During the crisis period it was reduced to 126 in 1999 and we have estimated that by year-end 2005, there would only be 80 institutions. This

implies a reduction of approximately 120 institutions (60%) during one decade, signaling the rearrangement of the sector. Note that the bulk of the system works around 18 properly consolidated commercial banks. The remnants are 1 BECH, 2 CFs and 25 CFCs (15 broad and 10 leasing, although this distinction has become a mere formality). On the financial services institutions (non-intermediaries) today there are six pension fund managers (AFPs) and 28 fiduciaries, all of them having suffered significant reductions in numbers in the 1995-2005 period.

Chart 1

Number of financial institutions in Colombia

	1995	1999	2004	2005	2006
Banks	32	26	21	19	17
CAVs-BECHs	10	5	7	1	1
CFs	24	10	4	2	2
CFCs	74	40	25	25	24
General	31	21	15	15	15
Leasing	43	19	10	10	9
Other entities	61	45	36	34	33
Pension Funds	14	8	6	6	6
Trust Funds	47	37	30	28	27
TOTAL	**201**	**126**	**93**	**81**	**77**

Sources: Superintendencia Financiera and Anif calculations

We have already explained the “structural” reasons behind these movements, so we will only mention them here. The mergers and acquisitions on the BECHs-commercial banks follow a “natural tendency” of a more efficient credit system where the credit risk on home loan, which is high, has been extracted by the securitization of this type of loan portfolio towards specialized vehicles for this purpose. The “extinction” of CFs is the result of the combination between synergies within the banks and the globalization of investment banking. The reduction in the number of CFCs fulfilled its first cycle in the mid-eighties (basically by over-expansion), which was basically slowed down by regulatory reasons dealing with

leasing and saw a renewed strength by the exchange houses. Finally, fiduciary business has kept certain operational specificities (agile in the specific mandates and with appropriate separation of the resources assigned), but, in principle, there does not seem to be a reason to believe that the same objectives could not be achieved inside the commercial banks, just as it used to be before this service was taken out of them in the early nineties.

Chart 2 shows that this merger process has represented an important change in the loan book mix. Actually, the financial sector is currently undergoing one of its most dynamic moments, and greater competition within it, with clear benefits for the financial services consumer. For example, the weighted average interest rate for all credits has fallen from a historical 15% in real terms at the end of the nineties to close to 8% in real terms currently. This process has accentuated and will continue to do so given the latest merger announcements that already affect more than 50% of the banking assets. Institutions are looking for larger sizes to multiply the services offered, at a lesser cost, and with a greater diversification of credit risk.

Chart 2

New Loan Book composition after mergers anouncements (%)

	% Assets	Commercial	Housing	Consumer	SMEs
Bancolombia Conavi Corfinsura	20	73	11	15	1
BBVA Banco Granahorrar	11	59	20	21	0
Banco Davivienda Banco Superior	7	26	25	49	0
Banco de Occidente Banco Aliadas Banco Unión	7	74	0	26	0
Banco Caja Social Banco Colmena	4	28	27	37	8
Banco Sudameris Banco Tequendama	2	62	0	38	0
Banco de Bogotá Megabanco	13	52	1	41	6
% of assets affected	**64**	**53**	**12**	**32**	**2**

Average composition (%)

Sources: Superintendencia Financiera (2006) and Anif calculations

For example, the merged Bancolombia- Conavi-Corfinsura has a new loan book that is 73% commercial, 15% consumer and 11% home loans. The recent BBVA-Granahorrar merger implies that the commercial loans will represent 59% of the entire book, home 21%, and consumer credit 20%. The Davivienda-Superior bank will have consumer credit representing 45% of total book, home 21% and commercial 28%.

However, as it will be analyzed further on, these mergers also end up generating additional costs, and it is still to be seen if this market positioning by type of credit is able to balance these new costs. For example, Bancolombia and Banco de Occidente will become focused as "commercial" (with 10 and 11 percentage points, above the market average, respectively); BBVA and Caja Social would become focused on home loans (10 and 18 points ahead), while Davivienda and Sudameris would potentially become geared towards consumer credit (21 and 11 points ahead), (see chart 3).

Chart 3

New Loan Book composition (Deviation from average)

	% Assets	Commercial	Housing	Consumer	SMEs	Focus
Bancolombia Conavi Corfinsura	20	20	-1	-17	-1	Commercial
BBVA Banco Granahorrar	11	6	8	-11	-2	Home
Banco Davivienda Banco Superior	7	-27	13	17	-2	Consumer
Banco de Occidente Banco Aliadas Banco Unión	7	21	-12	-6	-2	Commercial
Banco Caja Social Banco Colmena	4	-25	15	5	6	Home
Banco Sudameris Banco Tequendama	2	9	-12	6	-2	Consumer
Banco de Bogotá Megabanco	13	-1	-11	9	3,5	Consumer
% of assets affected	64	53	12	32	2	**Average composition (%)**

Sources: Superintendencia Financiera and Anif Calculations

The system's structural reorganization has also generated an asset recomposition of the financial intermediaries. This reshuffling privileged the assets of commercial banks-BECHs, which, in 2005 represent 89% of the system's total, up from 76% in 1995. However, as a result from the crisis and the adoption of the Financial Transaction Tax (ITF), these assets have lost importance in the macroeconomic leverage, from 55% of GDP in 1995 to only 45% in 2005 (chart 4). As a matter of fact, the establishment of the ITF has negatively affected financial intermediation throughout all social levels, and, in the aggregate, has made access to credit more expensive, especially for the weakest production units. The ITF was created in 1998 during an economic emergency as a temporary contribution with differential rates and its proceeds were destined to the improvement of the financial sector in order to safeguard the deposits from the general public to avoid a systemic risk. However, it has just completed eight years since its inception (Anif, 2005a). Furthermore its duration was extended, and its rate increased from 0.3% to 0.4% by Law 863 of 2003. This has exacerbated informality and distortions in the financial services. The increase in the use of cash has probably caused that the larger revenues due to ITF are compensated by the loss in revenues by income taxes and VAT. It is now clear the fall in the ITF productivity (graph 2).

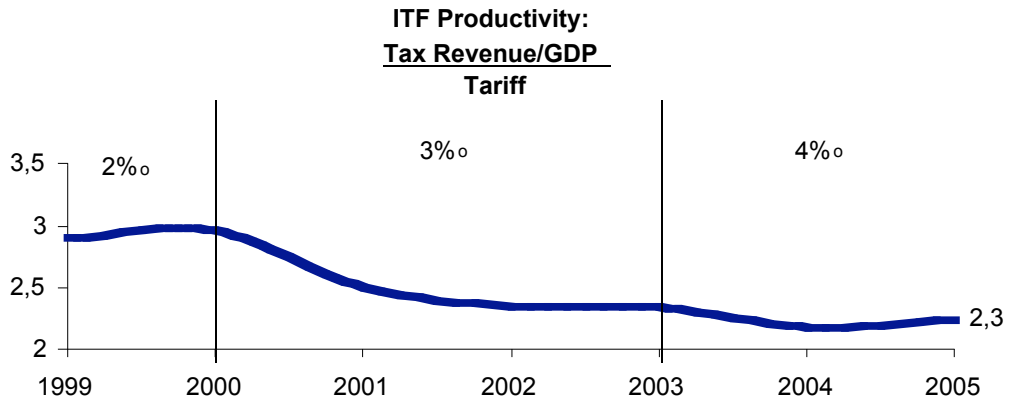
Chart 4

Financial System Indicators: Assets/ GDP

	1995	1999	2004	2005	2006
Banks	28,5	35,8	27,2	38,9	44,2
CAVs-BECHs	13,3	10,3	12,4	1,3	1,4
CFs	6,9	6,3	3,4	2,0	2,0
CFCs	5,9	2,6	3,0	3,5	3,9
General	3,3	1,4	1,1	1,2	1,2
Leasing	2,7	1,2	1,9	2,3	2,6
Other entities	0,3	0,5	0,6	0,6	0,6
Pension Funds	0,1	0,2	0,3	0,3	0,3
Trust Funds	0,2	0,3	0,3	0,3	0,3
TOTAL	**54,9**	**55,5**	**46,7**	**44,9**	**51,8**

Sources: Superintendencia Financiera and Anif calculations

Graph 2



Sources: Confis and Anif calculations

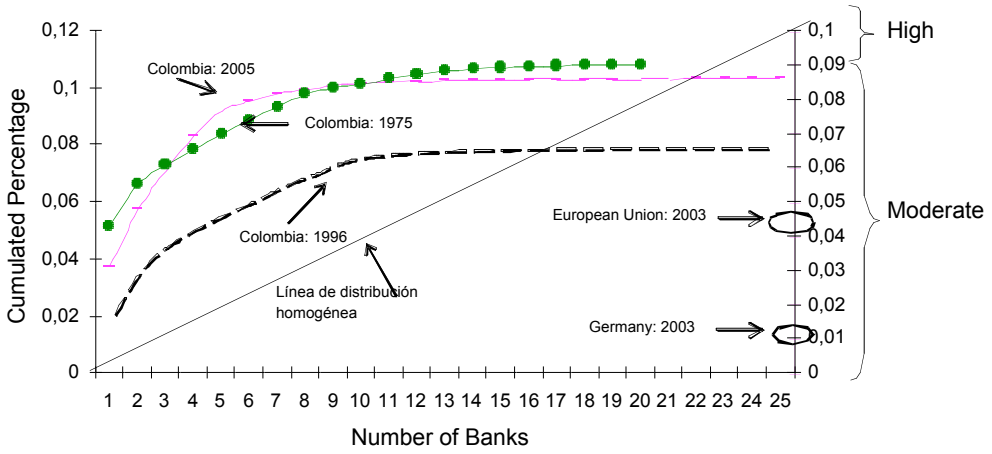
It has been discussed that this bundling of financial institutions and their loan books could generate a larger market power, with potential risks stemming from collusive oligopoly positions. It is clear, however, that the degree of banking concentration is not directly related to the organizational structure of the banking sector between multibanking or specialized banking (Anif, 2005b). For example, Germany has the most traditional multibanking system, but has the lowest concentration index among the EU. Japan, with a specialized system, also shows a low level. In Colombia, there was a dilution of banking assets in the mid-nineties, when the Herfindahl Index fell from 0.103 in 1975 to 0.075 in 1996 as a result of the dispersion of financial services (graph II.3). Between 1996 and 2005, there has been a reversion of this process, and this index shows a return to moderate levels of concentration (0.09). As will be shown later on, the mergers and the exploitation of the economies of scale has allowed the average bank cost in Colombia to fall, without generating an asset concentration that is worrisome at the current levels.

The current structure of the system has consolidated around commercial banks, with greater diversification in its loan book and clear efficiency gains relative to 1995. Despite this, the multi-bank structure still seems to show obstacles arising from different sources (regulatory, tax-induced o stigmatization). Comparing the

structure under Law 510/1999 with the one under Law 795/2003, it can be noted that the basic system is the same but with a reduction in the BECHs-CFs, and eventually the CFCs. Up to a certain point, this structure could eventually permeate the activity of the fiduciary institutions and the insurance system, depending on the goal of the regulator.

Graph 3

Herfindahl Index-IHH: International Comparation
(Respecto a los Activos Bancarios)



Sources: Asobancaria (Assets 1975 and 1996), Superintendencia Financiera and European Central Bank (Alemania and European Union 2003). Anif calculations

Summarizing, the analysis herein presented allows to arrive at two conclusions we consider to be important:

i) On the one hand, we have been able to contrast the "complementary" nature of the most recent mergers (2004-2005), where the loan book diversification has allowed further exploitation of additional synergies on the asset side of the balance sheet, complementing the ones achieved on the liability side during the previous M&A phase (1995-1999); and,

ii) Although we have witnessed a banking consolidation with bigger and more diversified institutions, the resulting degree of concentration is still

within a moderate range that should not threaten the competitive structure that is currently observed in the Colombian banking sector.

III. Efficiency and Effects of M&As in the Colombian banking sector

Over the past 15 years, there has been a significant wave of mergers and acquisitions in the banking industry worldwide. Over 10.000 firms were acquired by others in the industrialized countries during the 1990s. This phenomenon has been the bank's answer to the significant changes in regulation, the advancement of technology and telecom, as well as the industry's desire to improve its efficiency levels. It is about pushing the banking frontier, with a greater population and geographical coverage, while simultaneously offering a growing variety of banking products (Van den Berghe et. al, 1999; Amel, *et. al*, 2002; IMF, 2004; IADB, 2004).

The goal of this section is to present the results of the econometric estimation performed on the quarterly information for 30 Colombian banks in the 1994-2005 period. This estimation was done under the stochastic frontier approach that uses a translogarithmic functional form for the cost function. Additionally, an analysis is performed on how the efficiency of certain entities involved in merger processes during this period changed.

A. Efficiency concepts and methodologies used in the literature

The notion of efficiency is a concept that encompasses several dimensions. One the one hand, there are the concepts of efficiencies of scale and scope. As such, a firm is efficient if it is operating at an optimal plant level (efficiency of scale) or produces an optimal combination of products (efficiency of scope), for a given set of prices of its input. The other concept is the X-efficiency, which refers to the technical efficiency, where a firms is considered to be efficient in costs if it minimizes these given an production level and is efficient in benefit if it maximizes

those for a given combination of input and output. In the latter, size and technology are given. Therefore, diverse concepts lead to different forms of measuring efficiency.

In the empirical literature, there are several methods of estimating technical efficiency, which can be characterized as parametric and non-parametric methods. The main characteristic of the former is the assumption of a functional form for the cost (or benefit) function, either Cobb Douglas, Translog o Fourier Flexible, establishing a relationship between amounts and prices of input and output. Simultaneously, different methodologies can be used to estimate the cost frontier: i) stochastic frontier, SFA, ii) de “thick” frontier, and iii) distribution free approach, DFA.

Under the first approach, firms that appear to be more efficient, as measured by their historical indicators, are separated from those that are less so. In this case, the cost frontier of the more efficient group of banks is assumed to be the optimal one. The difference between the costs of each bank in the group of lower achievement relative to the “optimal” frontier reflects its inefficiency level.

The stochastic frontier approach econometrically estimates a cost (or benefit) function for all the banks. The regression errors capture the firm’s inefficiency and the purely random shocks. The error decomposition into these two components is what allows us to obtain an efficiency measure for each firm.

The DFA approach does assumes that the entire error captures the inefficiency of the firm, and therefore, does not decompose the random term. In other words, assumes that the random error has a zero mean in the period under study. The efficiency measure obtained is relative, as it is measured relative to the bank that obtains the lowest level of inefficiency.

Finally, the non-parametric methods do specify a functional form for the cost or benefit function but rather build this frontier based on observed points (cost, output) for the firms in the sample. These methods use linear programming. Among the non-parametric methods, the most widely used are the “Data Envelopment Analysis”, DEA and “Free Disposal Hull”.

B. Literature Review on banking efficiency and mergers

1. International Review

There are multiple studies in the international literature that have estimated the efficiency for several countries en regions. Therefore, making a comprehensive review is beyond the scope of this study; as a matter of fact, several studies have already taken on this task. We will use those to make a brief summary on that debate.

Berger and Humphrey (1997) analyzed 130 case studies from 21 countries where estimates of efficiency for the banking sector had been made and inquired on the consistency of the results. They found that, on average, the efficiency of the financial institutions is around 77%, although the variation in the results is relatively high; the standard deviations of those results was close to 13 percentage point. On the other hand, for same within-country cases, there was a high variation in results. Their revision suggests that part of these differences is due to methodological differences, related to sample and study periods. However, the dispersion of the results and the impossibility to achieve a consensus also led them to suggest improvements to the methods, with the goal of achieving more precise, consistent and useful efficiency measurements.

The US has been the country where the production of studies on banking efficiency has been more prodigal. Berger and Mester (1997) review the literature on efficiency in the commercial banks and try to provide more evidence using 6.000

pieces of commercial bank data for US banks that operated continuously between 1990 and 1995. They tried to find if the discrepancies in the results were due to issues such as: i) differences in the concept of efficiency used by the analysts, ii) differences in the methodology used to measure efficiency, and iii) elements that can be correlated with the efficiency but that are not taken into account, or are not controlled by them in the estimations. With respect to the concepts of efficiency, the authors examine efficiencies in cost, standard benefits and alternative benefits. They find that each one of the efficiency concepts adds information (independently) and that the cost efficiency does not appear to be related to the efficiency in benefits. However, both measures do appear to keep a relationship with the bank performance, measured through other indicators. Similarly, the variables that are correlated with efficiency, but that are not included in the estimation, have different relationship with the three measures of efficiency.

On the topic of efficiency and consolidation, Amel *et al* (2002) make a detailed review of the empirical literature worldwide. The authors review several works that measure the efficiency after the mergers in the financial systems in developer countries over the past twenty years in order to find common patterns that transcend national and sector specificities of each country. The authors find that, although efficiency gains have been observed in the previous 10 years, the effects of the mergers in the performance of the institutions involved are not fully understood. Their review suggests that the gains derived from the use of economies of scale and scope have been less than what is commonly believed. Furthermore, the gains in efficiency that result from better administrative practices are not clear for the large and complex institutions. Overall, there seems to be a consensus around the fact that the mergers in the financial sector provide benefits only up to a certain firm size, as they allow reaching economies of scale. Another conclusion that has also been reached is that it is difficult to extract robot lessons on the exploitation of economies of scope given the multi-product studies are scarce due to lack of data or measurement problems. Finally, their review shows

that there is no evidence of a systematic reduction in administrative costs due to mergers.

These results, however, might respond to several issues. In many countries, mergers took place under a rather regulated environment. For example, in the US, the strict regulation on branches and geographic expansion that remained until not long ago might have avoided that the efficiency gains were fully exploited. Second, the selection of the control group, against which gains in efficiency are evaluated, might obscure the results; furthermore, in some cases, such group has effects on the mergers themselves. Finally, it is possible that the merger effects become materialized over long period of time, which suggest that the gains of recent mergers might be under-estimated.

2. Review of some studies for Colombia

There are several studies that have taken on the topic of efficiency in the Colombian banks. This section, instead of pursuing the methodological detail of each of those works, will focus on summarizing the main results derived from the. Additionally, we will emphasize the studies that evaluate the effect of mergers on the efficiency of the sector, highlighting those referring to the Colombian case.[1]

During the eighties, most of the studies for the Colombian case revolved around the estimation of economies of scale, trying to evaluate the impact of the increase in the units of product on the costs of the bank. That was reach through the estimation of a cost function that depended on the product level. The first studies, such as the one by Bernal and Herrera (1983), estimated a Cobb-Douglas cost function, whose ease lied on the linearity of its logarithmic form, which eased the estimation of the cost elasticity to changes in the banking product, deriving from them the economies of scale. One of the biggest critique to that study was that the

[1] Specifically, we will not summarize the results of works such as Badel (2002) and Mora (2002) whose goal was to make an international comparison on efficiency.

results (elasticity of production costs to product less than 1, between 0.88 and 0.93, for the 1976-1981 period) implied a negative slope for the average cost curve. This suggested that the economies of scale were never ending and that, therefore, an optimal production scale did not exist, as cost savings would always occur by marginally increasing the product level. Additionally, the degree of economies of scale was constant, independent from the product level, as this type of cost functions did not allow to adjust U-shaped unitary cost functions (Suescún, 1987).

This limitation of the work by Bernal and Herrera led to the use of another functional form for the cost function. Suescún (1987) and Ferrufino (1991) tried to correct the previous exercises using translog functional forms, which are more flexible when modeling costs. Additionally, they considered other banking products different from the loan book (number of asset and liability accounts). The results obtained suggest that the commercial banks at the time had increasing returns to scale, with average scale economies of 0,71. This percentage was reduced when the organization's costs were considered as a whole; that is, the greater costs generated by the expansion of the operation based on the widening of the branch network (0.83). An additional result indicated that, if the average size of the account doubled, costs only increased by 43%. Finally, the marginal cost of jointly producing a service was reduced in about 30% relative to the individual production. Ferrufino (1991) extended the analysis by Suescún (1987) to the CAVs and the CFs, finding very similar results. However, both works found that economies of scale were non-exhaustible, which made impossible to find the optimal firm size.

Another limitation of the previous works was that they assumed that all the banks were located in the efficient cost frontier (i.e. are equally efficient) and, therefore, any deviation relative to such frontier was a random error. This implied that the gains in efficiency were only due to the exploitation of economies of scale. Trying to correct these failures, Suescún and Misas (1996) studied other aspects of bank efficiency: i) economies of scale; ii) technological change; and iii) X-inefficiency,

that, as has already been explained, refers to the ability firms have to control their costs relative to the ideal situation, that is, relative to the least possible use of inputs to generate the same amount of product. They used the “thick frontier” approach (TFA), from where the relative behavior of the financial intermediaries that operate under the same financial regime is compared. Similarly, they performed the econometric exercises on a sample of 22 banks for the 1989-1995 (half-year data).

The authors find that, in effect, Colombian banks are inefficient, overall due to the X-inefficiency, and not as much as the lack of economies of scale. Effectively, total inefficiency equates to 30.8% of the total operational costs of commercial banks, of which 85% can be explained by the x-inefficiency (27% of total costs). According to these results, the inefficiencies arise from the differences in administrative abilities of each bank to control costs. From this it can be inferred that if all banks operated at efficient levels (one which minimizes averages cost), the operational costs of the sector would only be reduced by 3 or 4%.

One of the main criticisms to the work by Suescún and Misas was that they did not include the cost of financing in the cost structure of the banks. This omission is problematic, as the financing costs represent close to 66% of total expenses, and this would be underestimating the degree of real inefficiency of the financial system (Janna, 2004).

Castro (2001) addressed the X-efficiency of the Colombian banking sector through the Distribution Free Approach (DFA) for the period 1994-1999. He used the financial intermediary approach, where deposits, capital and labor were used as inputs, while loans and portfolio investments performed as outputs of the firm. Costs related to operational factors (including interest payments).[2] He found that

[2] This approach differs from the approach on production where banks are considered to be firms that use capital and labor to produce deposits and loans. In this approach, the product is measured as the number of asset and liability accounts ant the only relevant costs are the operational ones. The large

the banking structure helped in explaining costs variance across firms-efficiency, where public banks were less efficient that private ones and no significant differences were found between local and foreign banks.

Janna (2002) also used the intermediation approach, but decided for a one-step translogarithmic function which makes hard to interpret those results. He estimated the efficiency-cost of the banking system (28 firms over the period 1992-2002). His SFA-approached focused on the absolute efficiency, instead of the relative efficiency, finding an average value of 34%, where higher inefficiency seems to be correlate with the conditions of being a local bank and preferences for lending to individuals rather than firms.

Estrada and Osorio (2004) used a similar approach, but including financial capital in order to test as well for efficiency in benefits (not only in costs). Efficiency in costs, of about 50% for the system, showed higher variance than in benefits.

Finally, Estrada (2005) studied the effect of M&A on cost-efficiency and market prices for the 1994-2004 period. He found that M&A not only promotes higher efficiency for the banking system as a whole, but that gains were more pronounced in the case of the firms that were less efficient before the merged.

C. Estimating Cost-Efficiency in Colombia (1994-2005)

1. Methodology

We will follow the Distribution Free Approach (DFA) to estimate the X-efficiency of the Colombian banking during 1994-2005, similar to the one used by Castro (2001).

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disadvantage from this approximation is that it does not consider interest cost, which represents an important part of the total costs of the banks. Additionally the empirical estimation requires information that is not always easy to obtain.

We shall focus on commercial and mortgage banks, which represent about 80% of financial intermediary's assets', including 30 firms. We aim at finding both aggregate efficiency for the system and temporal (or individual) firm efficiencies.

Under the intermediation approach, we shall use labor, capital and deposits as inputs, while loans and portfolio investments stand as outputs. Our cost function deals then with operational costs (including interest payments).

We shall estimate and stochastic-production frontier (SFA) in order to compute the firm's deviation with respect to that optimal frontier. The cost function can be written as:

$$Ln\, c_{it} = Ln(y_{it}, w_{it}) + \varepsilon_{it} \qquad i = 1,2,...,N \; y \quad t = 1,2,...,T$$

where c_{it} is total cost of bank *i* at moment *t;* y_{it} is the output vector; w_{it} is the inputs vector and ε_{it} is the error term. This error term depicts the difference with respect to the efficient frontier, such that:

$$\varepsilon_{it} = \nu_{it} + \mu_{it}$$

Hence, under the SFA, the error can be decomposed between a random component u_{it} and the inefficiency component v_{it}. As usual, we shall assume that u_{it} follows an iid normal $N(0,\sigma^2_u)$, while v_{it} follows a truncated normal $N(\mu_v, \sigma^2_v)$, taking only positive values and independent of u_{it}.

Following Battese and Coelli (1995) methods of maximum-likelihood, the variance components were reparametrized so that $\sigma^2 = \sigma^2_u + \sigma^2_v$ y $\gamma = \sigma^2_v / \sigma^2_u + \sigma^2_v$. In consequence, the efficiency of the *i* will be given by:

$$ET_i = E\left[\exp(-v_i)/\varepsilon_i\right]$$

Note that ET_i takes values {0, 1}, where 1 represents optimal efficiency. A more flexible measure of efficiency is provided by panel data under:

$$v_{it} = v_i \,.\, (\exp(-\eta[t - T]))$$

where η is a parameter to be estimated and v_i represent the positive values of the truncated normal function. Hence, it becomes possible to estimate time-varying parameters according to the position of η.

Our translogarithmic cost-function can be computed as follows, using two products (credit and investments) and three inputs (capital, labor and deposits), (where we omit time and bank subscripts for simplification):

$$\ln C = \beta_0 + \sum_{j=1,2} \alpha_j \ln(Y_j) + \sum_{n=1,2,3} \beta_n \ln(w_n) + \frac{1}{2} \sum_{j=1,2} \sum_{k=1,2} \alpha_{jk} \ln(Y_j) \ln(Y_k) + \frac{1}{2} \sum_{n=1,2,3} \sum_{m=1,2,3} \beta_{nm} \ln(w_n) \ln(w_m) + \sum_{j=1,2} \sum_{n=1,2,3} \delta_{jn} \ln(Y_j) \ln(w_n) + u + v \quad \textbf{(1)}$$

We shall assume homogeneity of input prices, using physical capital as the scalar, such that:

$$\sum_{n=1,2,3} \beta_n = 1$$

$$\sum_m \beta_{nm} = 0 \quad \forall\, n \qquad \text{and} \qquad \sum_n \delta_{jn} = 0 \quad \forall\, n$$

Let's assume as well symmetry conditions:

$$\alpha_{jk} = \alpha_{kj} \qquad for \quad i \neq j$$

$$\alpha_{jk} = \alpha_{kj} \qquad for \quad i \neq j$$

Hence, the cost-function to be estimated takes the form of:

$$\ln\left(\frac{c}{w_k}\right) = \beta_0 + \alpha_c \ln(y_c) + \alpha_i \ln(Y_i) + \beta_l \ln\left(\frac{w_l}{w_k}\right) + \beta_2 \ln\left(\frac{w_d}{w_k}\right)$$
$$+ \frac{1}{2}\alpha_{cc}\left[\ln(y_c)\right]^2 + \frac{1}{2}\alpha_{ii}\left[\ln(y_i)\right]^2 + \alpha_{ci} \ln(y_c)\ln(y_i)$$
$$+ \frac{1}{2}\beta_{ll}\left[\ln\left(\frac{w_l}{w_k}\right)\right]^2 + \frac{1}{2}\beta_{dd}\left[\ln\left(\frac{w_d}{w_k}\right)\right]^2 + \beta_{ld} \ln\left(\frac{w_l}{w_k}\right)\ln\left(\frac{w_d}{w_k}\right) \quad \textbf{(2)}$$
$$+ \delta_{cl} \ln(y_c)\ln\left(\frac{w_l}{w_k}\right) + \delta_{cd} \ln(y_c)\ln\left(\frac{w_d}{w_k}\right) + \delta_{il} \ln(y_i)\ln\left(\frac{w_l}{w_k}\right) + \delta_{id} \ln(y_i)\ln\left(\frac{w_d}{w_k}\right)$$
$$+ u + v$$

where sub-script *c* represents credit, *i* investment, *k* capital, *l* labor and *d* deposits.

2. Data

Bank data corresponds to official reports to the Bank-Superintendence, where we benefited from Asociación Bancaria data files (including number of employees). Figures correspond to (real) Colombian million pesos of September 2005.

Data sample was restricted for 1991-1993, so that actual estimation includes Q1-1994 through Q4-2005, for 30 banks, excluding: Estado, Bancoop, Interbanco, Coopdesarrollo, Aliadas, UCN, Uconal, Of America, Standard Chartered Colombia and Boston, because they did not perform as fully commercial banks. *Dummy* variables were introduce to capture the effect of M&A.

3. Econometric Results

Chart 5 summarizes main finds. The parameter γ = 0.94 shows the explanatory power of the inefficiency term (v) with respect to the error term variation (ε=v+u). This result indicates that cost-inefficiency is the main source of variations with respect to the optimal stochastic frontier.

Knowing that efficiency is in the range {0,1}, we can conclude that average efficiency for the Colombian banking system is 0.63. Asset-weighted efficiency is 0.59. This implies that the banking system of Colombia could save up to 40% in costs if the optimal production frontier could be reached. We have already detail in previous chapters the regulatory barriers that could be removed to help the banking system move towards that optimal production frontier.

Chart 5

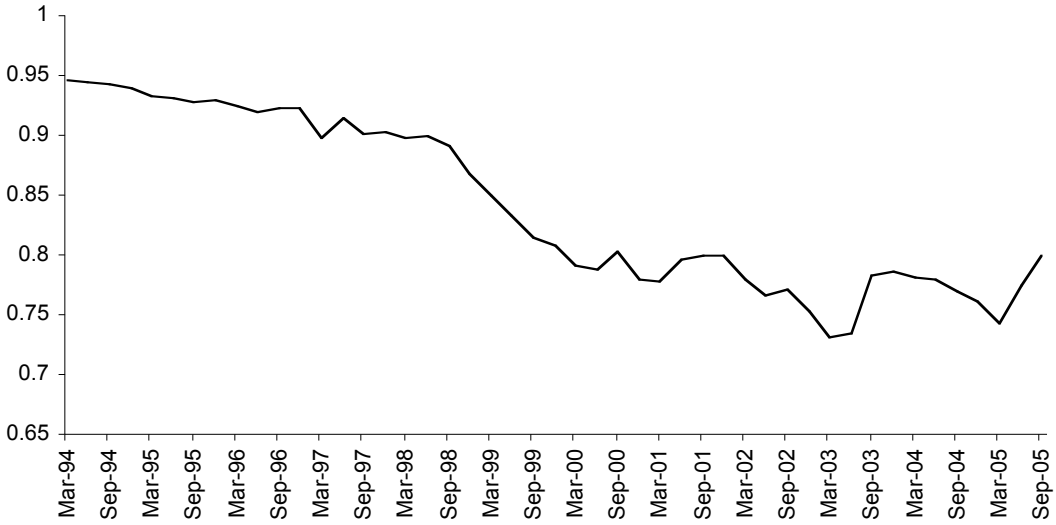
Cost Function Model estimation results

	Agregated		Trend		Trend Square	
	Coefficient	t stad	Coefficient	t stad	Coefficient	t stad
?0	-1,59	-1,44	-2,60	-2,51	-2,48	-2,45
?c	-0,95	-4,93	-0,38	-1,81	-0,44	-2,10
?i	1,89	10,60	1,37	8,05	1,42	8,29
?l	-0,10	-0,34	-1,04	-3,72	-1,23	-4,31
?d	0,25	1,08	0,90	4,18	0,90	4,17
?c,c	0,22	9,02	0,17	6,63	0,18	6,82
?i,i	-0,04	-2,01	-0,01	-0,45	-0,02	-0,82
?c,i	-0,10	-5,22	-0,09	-4,54	-0,09	-4,51
? i,c	-0,10	-5,22	-0,09	-4,54	-0,09	-4,51
?l,l	0,06	1,18	0,12	2,42	0,12	2,32
?d,d	0,02	0,56	-0,02	-0,60	-0,00	-0,13
?l,d	-0,01	-0,39	-0,06	-1,70	-0,08	-2,38
?d,l	-0,01	-0,39	-0,06	-1,70	-0,08	-2,38
∂c,l	-0,01	-0,34	0,06	1,88	0,08	2,36
∂c,d	0,15	6,02	0,05	2,22	0,06	2,63
∂i,l	0,05	1,83	0,03	1,26	0,03	1,03
∂i,d	-0,14	-7,70	-0,09	-4,69	-0,10	-5,18
M&A dummy	0,16	6,00	0,01	0,39	-0,01	-0,63
Models with technological trend						
t			0,11	7,38	0,19	6,84
1/2 t2					-0,00	-6,34
?2	0,08	8,31	0,50	8,18	0,24	11,20
?	0,61	15,51	0,94	107,30	0,89	64,89
Iterations	22,00		34,00		41,00	
Log Likelihood	250,41		101,35		106,21	
Average Efficency	0,63		0,87		0,85	
Ponderated Efficency	0,59		0,86		0,84	

Graph 4 depicts the historical evolution of aggregate bank efficiency (which is not directly comparable to the 0.63 value reported above). Note the relative stability of such variable during 1994-1998, before the eruption of the mortgage crisis. After the crisis, the efficiency declines and only shows a slight recovery in early 2005, but without attaining the pre-crisis level.

Graph 4

Aggregated Cost Function Model estimation results



This result is a novelty within post-crisis studies, since this is the first one to report this late-recovery in efficiency of the banking system (see Chart 6 for a comparison with other aggregate results). Micro-analysis at the level of the different banks indicates that mortgage banks were the more stable before the 1998-crisis, but they have been the more affected by the crisis. In fact, mortgage loans only represent about 3% of GDP by end-2005, while they record a 12% GDP participation in 1997.

Chart 6

Summary of findings

Article	Period of analysis	Methodology **	Efficiency	Average Efficiency
Before crisis				
Suescún y Misas	1989-1995	TFA	Relative	73%
Crisis				
Castro (2001)	1994-1999	DFA	Relative	49%
Badel(2002)*	1998-2000	DFA	Relative	73%
Janna(2003)	1992-2002	SFA	Absolute	34%
Estrada y Osorio	1989-2003	SFA	Absolute	28%
Recovery				
Anif(2005)	1994-2005	SFA	Absolute	63%

* The estimated cost frontier includes banks of Costa Rica, Colombia and Mexico.
** Thick Frontier Analysis (TFA), Distribution Free Approach (DFA), Stochastic Frontier Analysis.
*** The Estrada and Osorio paper studies few years of the recovery period,
therefore their stimations are pricipaly biased by the crisis

M&A Effects

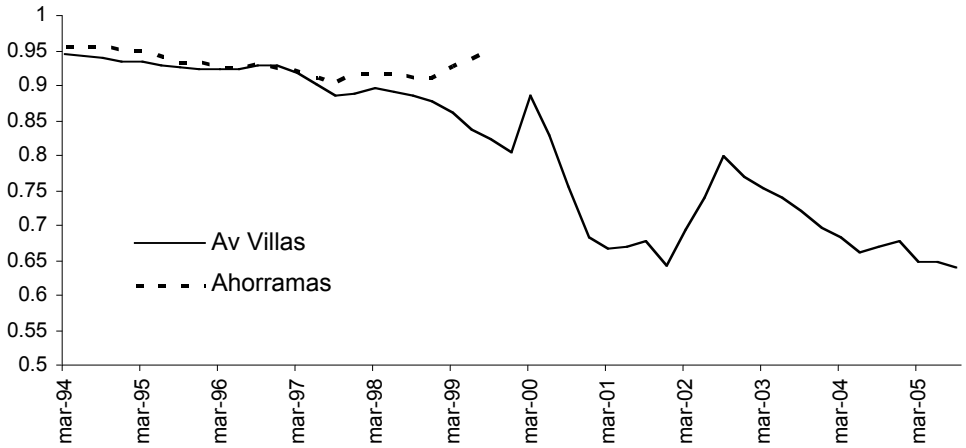
In order to capture the effect of M&A on banking efficiency, we have selected the cases: i) Las Villas-Ahorramás, ii) Bancafé-Concasa, iii) Colpatria - Red Multibanca. iv) BIC - Bancolombia,

i) Las Villas – Ahorramás: Graph 5 shows that the M&A process of these institutions negatively affected its efficiency since it occurred during the crisis and the economies of scale were possible to be exploited. Furthermore, since the mortgage crisis has prevailed, recovery has been slow for these joint-institutions.

ii) Bancafé – Concasa. Graph 6 indicates a similar process for these public institutions, badly hit by the mortgage crisis. However, recovery has been more satisfactory in the later years, although in part supported by public-budget allocations.

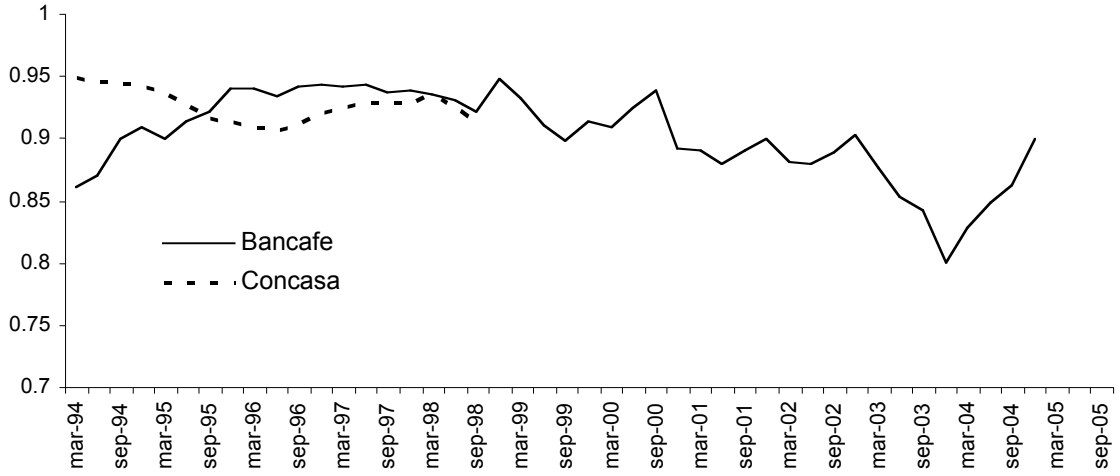
Graph 5

M&A: Villas-Ahorramas



Graph 6

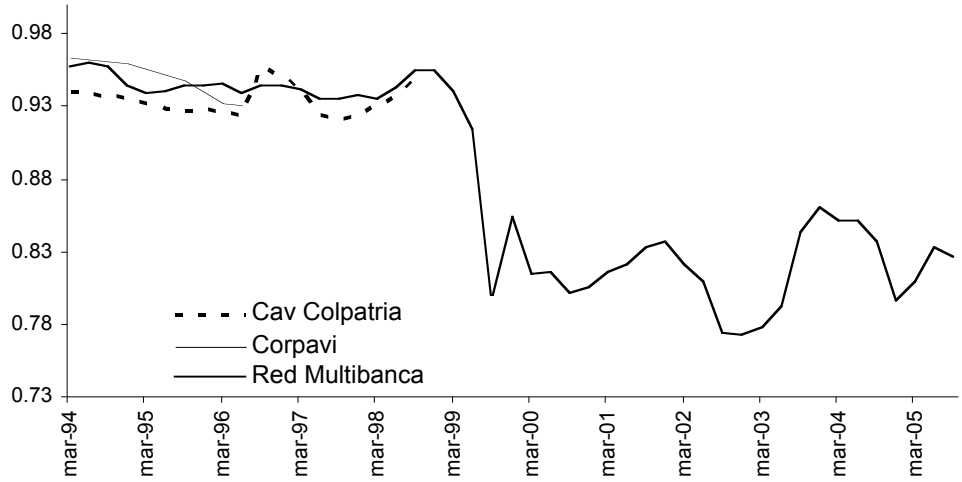
M&A: Bancafe-Concasa



iii) Banco Colpatria – CAV Colpatria – Red Multibanca Colpatria. Graph 7 shows similar results to other mortgage banks. However, this joint-institution was particularly badly hit by the crisis.

Graph 7

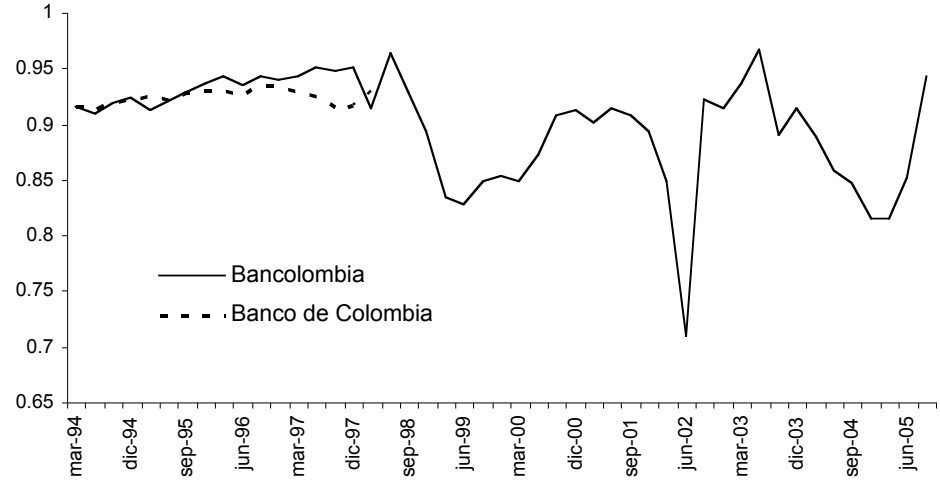
M&A: Colpatria Red Multibanca



iv) BIC – Bancolombia. Graph 8 shows a notable recovery during pos-crisis, given the fact that this is a non-mortgage institution. In this case the exploitation of economies of scale apparently had a better opportunity.

Graph 8

M&A: BIC BANCOLOMBIA



In order of brevity, we skip here reporting sensibility analysis, which showed robust results when altering different scalars regarding the homogeneity assumption. We also assessed the effect of technological changes by introducing time and time-square variables. Main results were not altered in a significant manner.

IV. Conclusions

We have studied the renewed interest in merging and acquiring financial institutions in Colombia during 2003-2005. These have been "complementary mergers" that seek to exploit economies scale and scope. This process contrasts favorably with those mergers & acquisitions that occurred during the mid-1990s, which involved mainly "twin institutions" that lacked potential for gaining multiproduct efficiency.

In this document we have analyzed the need to remove some of the regulatory constraints that obstruct further exploitation of such economies of scale-scope and quantifies the "cost efficiencies" shown by the Colombian banking sector (1994-2005). At the aggregate level, we found (absolute) banking efficiency to be around 63%, a similar value to those found in related studies post-crisis. This implies that banks operating in Colombia have been able to recover their efficiency levels during post-crisis 2003-2005, except for mortgage institutions. We have highlighted regulatory barriers that could be removed to help the banking system move closer to the optimal production frontier.

References

Amel, D., C. Barnes, F. Panetta and C. Salleo (2002) “Consolidation and Efficiency in the Financial Sector: A Review of the International Evidence” (G-10 Report on Financial Sector Consolidation).

Anif (2005a) “El Impuesto a las Transacciones Financieras y su Metamorfosis Informe Semanal (No. 810, Noviembre 28).

Anif (2005b) “Fusiones y Consolidaciones Bancarias: ¿Hacia la Multibanca?” Informe Semanal (No. 774, Marzo 22).

Berger A. and D.B. Humphrey (1997) “Efficiency of Financial Institutions: International Survey and Directions for Future Research” European Journal of Operational Research (Special Issue).

Berger A., Mester L. (1997). “Inside the Black Box: What explains differences in the inefficiencies in financial institutions?”, Working Paper N° 97-1, Federal Reserve Bank of Philadelphia.

Bernal, O. y S. Herrera (1983), “Producción, Costos y Economías de Escala en el Sistema Bancario Colombiano”, Ensayos Sobre Política Económica, Banco de la Republica, No. 3

Carrasquilla, A., A. Galindo y D. Vásquez (2000) “El Gran Apretón Crediticio en Colombia: Una Interpretación” Coyuntura Económica (Fedesarrollo, Marzo).

Castro, C. (2001), "Eficiencia-X en el sector bancario colombiano", Desarrollo y Sociedad, Universidad de los Andes, No. 48, Septiembre

Clavijo, S. (1992) "Overcoming a Financial Crisis during Transition from a Repressed to a Market-based System: Colombia 1970-89" in The Colombian Economy (edited by A. Cohen and F. R. Gunter (Westview).

Clavijo, S. (2002) “Towards Multibanking in Colombia: From ‘Patchwork’ to Financial Holdings” Money Affairs (January-June).

Estrada D y P.Osorio (2004), Effects of Financial Capital on Colombian Banking Efficiency, Borradores de Economía, Banco de la República.

Estrada D. (2005) Efectos de las fusiones sobre el mercado Financiero Colombiano Borradores de Economía No 329 Banco de la República Marzo de 2005

Ferrufino, A. (1991) "Reestimación y Ampliación de la Evidencia sobre Economías de Escala en el Sistema Financiero Colombiano" Ensayos Sobre Política Económica, (No.19 Diciembre).

Herring, R.J. and Santomero, A.M. (1990) "The corporate structure of financial conglomerates", Journal of Financial Services Research, 471-497.

IMF (2004) Global Financial Stability Report: Risk Transfer and the Insurance Industry (Chapter, III).

Inter-American Development Bank - IADB (2004) “Unlocking Credit: The Quest for Deep and Stable Bank Lending” (Washington, DC).

Janna, M. (2003), "Eficiencia en Costos, Cambios en las Condiciones Generales del Mercado, y Crisis en la Banca Colombiana: 1992-2002", Borradores Semanales de Economía, Banco de la República, No. 260.

Mester L. (1993). “Efficiency of Banks in the Third Federal Reserve District”, Working Paper, Financial Institutions Centers, University of Pennsylvania.

Salazar, N. (2005) "Represión Financiera y Márgenes de Intermediación" Revista Carta Financiera (Septiembre, N°131).

Suescún, R. (1987), "Nueva Evidencia Sobre Economías de Escala en la Banca Colombiana", Ensayos Sobre Política Económica, Banco de la Republica, No. 12.

Suescún, R. y M. Misas (1996) "Cambio Tecnológico, Ineficiencia de Escala e Ineficiencia- X en la Banca Colombiana" Borradores Semanales de Economía (No. 59).

Urrutia, M. (1996) "Primeros Efectos de las Reformas al Sector Financiero" Revista del Banco de la República (Enero, No.819).

Urrutia, M. y C. Caballero (2005) "El Impacto Del Sector Financiero en el Crecimiento" Asobancaria-Mayo 2005.

Van den Berghe, L.A.A, S.W.M. Carchon, and K. Verweire (1999) "Convergence in the Financial Service Industry" (OECD, Report, September).

Villar, L. D. Salamanca y A. Murcia (2005) "Treinta años de ciclos crediticios y represión financiera" Revista Carta Financiera (Abril, N° 130).