BANK CONSOLIDATION IN THE ECA REGION

ANNEXES

ANNEX 1: REVIEW OF THE LITERATURE

ANNEX 2: THE ECONOMETRIC FRAMEWORK

ANNEX 1: REVIEW OF THE LITERATURE

"The logic of Singapore's position is inescapable: if we want strong banks, then they have to be big banks, and if they are to be big banks, then we must have fewer banks." Hsien Loong (2001).

Introduction

This selective survey relates mainly to the interface between banking consolidation and financial sector development in a fairly general sense. This is the dimension of the problem most directly relevant to the World Bank's policy involvement in the topic in the ECA region. However, we must approach the task via several component issues that figure prominently in the literature:

- Consolidation's effects on individual banks' performance (an extension of the more general "Structure, Conduct, and Performance" industrial economics paradigm[1]);
- Consolidation's influence on the regulatory environment's stringency and nature;
- A more rather than less consolidated banking system's resiliency to external shocks and crises, an important aspect of banking systems safety; and
- The impact of consolidation on banking services availability, in particular how this affects the provision of small-scale lending and other banking activities, especially in out-of-the-way locations.

These subtopics are clearly interlinked with one another and with the general financial sector development theme. For example, the cost and input efficiency gains that much of the research associates with consolidation (the first bullet) are an important part of the progress associated with financial sector development (Federal Reserve Bank of San Francisco 2001). The same is true of the product mix's higher value (another aspect of the first bullet) that some researchers attribute to bank consolidation (for example, Akhavein [1997], Berger 1998). Bullet points 2, 3, and 4 also are important dimensions of what most people include in their definitions of "financial sector development."

Some good recent surveys of some of the main issues (notably Berger, Demsetz, and Strahan 1999; BIS 2001; Boyd and Graham 1998; and Goldberg and Rai 1996), have made the task of compiling this survey easier, as have a variety of important recent studies and collections on the ECA experience itself (for example, Bokros, Fleming and Votava 2001; Fries and Taci 2001,).

The view that economies of scale are critical to banking success and survival certainly has been the ex ante motivation for many of the large waves of bank mergers that we have seen internationally in the past 20 years. The fact that researchers have found a substantially mixed record on the ex post success of such mergers does not detract from this basic starting point. In some real sense the burden of proof that banking economies of scale are *not* critical lies with those that assert it. The comment by the chairman of the Monetary Authority of Singapore in the epigraph typify a more general attitude.

[1] The three terms are usually attributed the following definitions. "Structure" includes factors such as enterprises' relative and absolute size within an industry, ease of entry, and degree of monopoly or oligopoly control as reflected in concepts such as the elasticity of output demand. "Conduct" relates to enterprises' objectives and behavior regarding price setting, government interaction, and attitudes to competitors (actual or prospective). The maintained hypothesis is that Conduct will be strongly influenced by Structure. "Performance" relates to the outcomes achieved in terms such as profitability, cost levels and efficiency, and prices charged.

Much of the ex post scientific evidence to test such assertions is to be found in the U.S. literature, and the reasons for this are fairly obvious. The United States has the largest number of banks of any country in the world and also has seen serious bank consolidation business for almost 20 years. During that time it has seen very large reductions in independent banks—although absolute numbers remain high (see table A1.1) —and the emergence of the so-called megabanks[2] (such as Citicorp-Travelers, BankAmerica-NationsBank). Researchers had plenty of material even before the process accelerated in the 1990s with the passage of new interstate branching rules. The problem is that evidence based disproportionately on the U.S. experience of some very large banks may not be directly relevant to the ECA region, where most banks are quite small. Relatively few ECA banking systems can compare in total size and scope with the larger U.S. banks. Many other comparator countries either had smaller absolute numbers of banks to begin with, or have consolidated much less (see table A1.2). Therefore, there has been less raw material to study. ECA's situation is rather special, as we explain below.

This bias in the literature is indeed regrettable because it means that their mainstream results' applicability to other areas, including Europe and Central Asia, are at best subject to doubt and at worst misleading. Particularly problematic is that much of the U.S. literature seems to reject many bank practitioners' ex ante presumptions. (Boyd and Graham 1996). New research must steer a careful line between the negative consolidation results found in mainstream U.S. research, which may not be fully relevant to other regions, and the strongly positive but empirically unsupported consolidation expectations that come from bankers' practical perceptions.

Some Facts

Two main facts about bank consolidation stand out:

- The global tendency evident during the past two decades is for consolidation to also result in increased concentration; and
- The degree of Bank concentration still varies greatly from country to country.

The United States

Evidence for the first proposition is strongest in the United States, a country that traditionally has had a large number of individual banks with greatly decentralized activities.[3] Table A1.1 gives the number of U.S. banks and some standard measures of their concentration. It is evident from these data that (a) the number of both U.S. bank charters and banking organizations[4] has contracted since 1998 and (b) their degree of concentration has increased during that time; but (c) the number of separate banking offices has actually increased. The data show that the largest eight banks[5] (charters) now account for more than 35 percent of total bank assets, compared to

[2] The mergers in question typically involve individual banks with assets of more than US$1 billion each.

[3] Mishkin (1998) notes that from the 1930s to the mid-1980s the number of commercial banks (charters) in the United States was remarkably stable, in the 13,000–15,000 range. Pressures on profitability during the next decade shrank the number of banks through failures and consolidation.

[4] A banking organization is defined as a top-tier bank holding company or a standalone bank. Therefore there can be more charters than banking organizations.

[5] CR8 in the table refers to the eight-bank concentration ratio measured by reference to assets. The Herfindahl index is defined as the sum of squares of each bank's share in total deposits. It is calculated for the Metropolitan Statistical Areas only.

22 percent in 1988.[6]

Table A1.1. Concentration Trends in U.S. Banking

	No. of Charters	No. of Banking Organizations	No. of Banking Offices	CR8 (%)	Deposit Herfindahl (%)
1988	13,130	9,881	59,518	22.3	20.2
1989	12,727	9,620	60,720	22.6	20.1
1990	12,370	9,391	62,753	22.3	20.1
1991	11,949	9,168	63,896	25.7	19.8
1992	11,496	8,873	63,401	26.4	20.2
1993	11,001	8,446	63,828	28.1	19.9
1994	10,491	8,018	65,597	29.7	19.8
1995	9,984	7,686	66,454	30.4	19.6
1996	9,575	7,421	67,318	34.3	19.9
1997	9,216	7,234	69,464	35.5	19.5

Source: Berger and others (1997) from FDIC **[from an FDIC publication?]**

Behind this strong competition acceleration is the so-called "disintermediation" process. The erosion of banks' traditional intermediation and financial innovation roles has made it increasingly possible for various nonbank financial intermediaries (NBFIs) to offer competing products, especially to larger corporate borrowers. We refer to the rapid growth of the bond and derivatives markets and to savers' increasing propensity to prefer illiquid capital market instruments offered by pension funds and other parties to traditional liquid investment outlets (see Warburton 1999 for an account and critique of these trends). Disintermediation has pressured bank profits at the same time as banks' cost advantages in mobilizing funds (liabilities) have been squeezed by competition. This has provoked both an increasing search for cost economies of scale and scope and efforts to package banking services in more standardized and lower-cost packages (sometimes referred to as "commoditization").

Europe

Comparable time-series data for the major European countries are not so readily available. However, reasonably current point estimates for a variety of countries can be found in Goldberg and Rai (1996). They strongly confirm the second tendency indicated above—large cross-country variations in consolidation degree. Table A1.2 summarizes that information for 11 European countries.

Table A1.2. Concentration in European Banking

	Commercial Banks Only	Commercial and Savings Banks

[6] It has been noted that the Herfindahl measure indicates a modest reduction in bank concentration. This is mathematically consistent with the concentration ratios evidence the to the extent that size-equality within the population of banks as a whole is moving toward greater equality at the same time that a few banks are becoming larger and more dominant, as indicated by CR8. Evidently this is more likely to be possible in a situation such as that of the United States, where there is so large a number of banks. In some of the empirical studies cited below, differences in the estimating coefficients on a Herfindahl measure as compared to a CR3-type measure are used to differentiate between sectorwide consolidation as an influence and the relative market power of a few large banks.

	No.	CR3 (%)	Herfindahl (%)	Concentration Rating	No.	CR3 (%)	Herfindahl (%)	Concentration Rating
UK	68	60.0	15.0	High	135	50.0	12.0	High
Denmark	26	85.0	30.0	High	31	72.0	21.0	High
Sweden	5	70.0	23.0	High	5	70.0	23.0	
Switzerland	118	63.0	14.0	High	170	57.0	12.0	High
Belgium	35	71.0	22.0	High	42	57.0	13.0	High
Finland	7	91.0	29.0	High	7	91.0	29.0	High
France	119	51.0	12.0	High	151	49.0	11.0	Low
Austria	39	49.0	11.0	Low	50	41.0	8.0	Low
Italy	41	33.0	7.0	Low	58	28.0	6.0	Low
Spain	59	45.0	9.0	Low	125	27.0	4.0	Low
Germany	121	31.0	6.0	Low	214	26.0	4.0	Low

It has been noted that Europe's concentration measures indicate a generally greater degree of concentration than that found in the United States. Table A1.2 presents the share of total bank assets attributable to the three largest banks (the CR3 measure) rather than the CR8 measure shown for the United States. But even so the European concentration indices are typically much higher than the 35.5 percent found in the U.S. data. Indeed all seven of the European countries classified by Goldberg and Rai as highly concentrated have CR3 ratios of at least 50 percent (49 percent when savings banks are included), and a subset of those seven countries (notably Denmark and Finland) have CR3 ratios higher than 80 percent.[7] The wide variation in the concentration degrees across countries is clearly evident. The least concentrated countries (Germany and Italy) have CR3 ratios that are substantially below the U.S. numbers, while the more concentrated (Finland and Denmark) have very much higher ratios. Therefore, when studying the ECA countries it is not possible to claim that there is any global "norm" to which some eventual convergence is likely.

Emerging Markets

Similar conclusions emerge from reviewing consolidation in the emerging market economies. The general consensus seems to be that consolidation still has a long way to go in most emerging market economies, notwithstanding the bank closures that occurred in the aftermath of the various recent financial crises. For example, there were almost 12,000 deposit-taking institutions in Korea, Malaysia, the Philippines, and Thailand in 1999 (more than in 1990), of which more than 1,000 were banks. The concentration degree varies significantly across the emerging market countries as a whole. Thailand and Israel have concentration ratios (CR5) of more than 90 percent, while Colombia, Korea, and Malaysia have CR5s of around 30 percent. These ratios and other relevant data for a subset of emerging market economies are listed in Table A1.3. The countries listed here account for 178 of the world's 1,000 largest banks. But most of them are in just eight countries, led by Brazil, Hong Kong, India, Malaysia, and Russia. Most emerging economies have three or fewer banks in this category; banks that are small by international

[7] There is a small problem of interpretation of the Goldberg and Rai data. Their paper makes use of the Compustat Global Vantage database, containing data for Europe's largest banks. However, Table A1.2 contains commercially purchased data, from Sheshunoff's Investment Services. We do not have information on the coverage or definitions used for this source although it is certainly more comprehensive than the Global Vantage database. Table A1.2's results need to be read in that light.

standards are the norm in most emerging and developing economies. Once again the evidence from this set of countries provides few if any pointers to benchmarks that could guide consolidation policies in ECA.

Table A1.3. Bank Concentration in Emerging Markets

	Concentration CR5 (%)	No. of Deposit-Taking Institutions	No. of Top 1,000 Banks
China	75		14
India	42	300	17
Russia	80		5
Hong Kong	45	285	18
Singapore	na	217	5
Indonesia	62	9,556	4
Korea	33	3,738	12
Malaysia	32	1,448	14
Philippines	39	1,067	12
Thailand	94	4,928	6
Argentina	46	116	8
Brazil	51	1,542	14
Chile	54	30	5
Colombia	32	81	3
México	68	36	3
Peru	71	52	3
Venezuela	62	78	3
Czech Republic	66	42	1
Hungary	51	254	2
Poland	48	858	6
Israel	93	45	6
Saudi Arabia	75	11	10
South Africa	85	57	7

Source:???

Europe and Central Asia

The ECA countries' present situation reflects a partial adjustment to the monobanks' early breakups during 1987–1989. In the years immediately following, several ECA countries (mostly in the FSU) allowed relatively unrestricted entry to banking. Other countries (mainly in Central Europe) were more restrictive. Then again, from the mid-1990s the ECA countries showed some variability in the speed at which they reconcentrated banking. A brief overview of the current situation and the trends over the past decade can be found in Siegelbaum and Fleming (2000) and are summarized in table A1.4.

Table A1.4. Trends and Differences in the ECA Countries

Source:???

No. of Banks

	1991	1993	1997	2000		1991	1993	1997	2000
Central Europe					**CIS**				
Albania			9	10	Armenia			30	31
Bulgaria	78	41	34	35	Azerbaijan	43	164	99	59
Croatia		43	61	45	Belarus			38	27
Czech Republic		52	50	40	Georgia		179	53	33
FYR Macedonia			22	21	Kazakhstan	72	204	81	48
Hungary	35	40	41	39	Kyrgyz Republic	10	20	20	22
Poland		87	83	75	Moldova	15	16	22	20
Romania		20	33	35	Russian Federation	1306	2009	2526	2084
Slovak Republic		18	25	22	Tajikistan	1	15	28	17
Slovenia	40	45	34	25	Turkmenistan			67	13
Group Average	***51***	***43***	***38***	***34***	Ukraine	76	211	227	195
					Uzbeskistan	30	21	30	35
Baltics					***Group Average***	***194***	***315***	***268***	***215***
Estonia		21	12	6	***exc. Russia***	***35***	***104***	***63***	***45***
Latvia	14	62	32	22					
Lithuania		26	12	14					

In the three country groups studied, the trends conform to an inverted "U" pattern—an increase in the number of banks through the mid-1990s followed by a pronounced decline through to the year 2000. By that date the average number of banks in the Baltic states had converged to the low numbers found in several Northern European countries (table A1.2). The slightly higher number of banks found on average in Central Europe was broadly consistent with numbers seen in EU countries such as Austria, Belgium, and Italy, as was the typical number in the CIS countries excluding Russia. Russia certainly seems to be an outlier, although it is of course a much larger country.

Some Major Issues

A useful starting point for the analysis is the distinction emphasized by Goldberg and Rai (1996) between two competing interpretations of the possible relationship between concentration and bank performance. The first, the Structure, Conduct, Performance (SCP) view, holds that concentration enables banks to extract monopolistic rents, and reveals itself in lower deposit rates, high lending rates and, by implication, wider spreads.[8] The alternative interpretation is the Efficient Financial Structure (EFS) hypothesis, which states that concentrated banks achieve lower costs either through superior management or improved production processes.[9] This approach is closer to the viewpoint about ECA bank concentration proposed by Peachey and Roe (2000) and also to the intuitive judgements articulated by Mr. Hsien Loong (2001). The practical

[8] This has two variants. The first is where concentration is the source of market power and the second is where a strong relative market position provides the basis for achieving higher deposit rates, and so on.

[9] This also has two variants. The first presumes that the larger banks' greater managerial and production efficiencies derive purely from being further along the average cost curve. The second is where greater X-efficiency in the banks with better management and production processes enables them to achieve increased market share that in turn may result in greater concentration.

econometric problem is that if a market share measure is used to define "concentration" then it is hard to ascertain whether it captures larger firms' efficiency or market power (Shepherd 1986). One way around this problem is to include one or more direct bank efficiency measures in the equations being estimated—as Berger and Hannan (1993) do.[10]

Terms such as SCP and EFS are technical jargon that nonetheless represent some important commonsense ideas. On the positive side (EFS) it is clear that excessively small-scale and highly segmented banking (such as on a geographical basis) is a threat to competition and so sacrifices the bank clients' benefits that ought to flow from increased competition and size. It could also be a risk to bank safety insofar as the segmentation results in insufficient diversification and excessive bank risk concentration (for example, a bank's entire lending committed to one U.S. state, as was the case before the removal of interstate banking restrictions). At the same time, large banks competing at the nationwide level and in many different banking products may be expected to be less responsive to smaller business clients' and particular local banking needs—excessive standardization and cost-cutting can clearly harm consumer welfare. We also can be quite sure (the SCP viewpoint) that excessive market power in particular markets will result in attempts by banks to increase their charges—an effect that is easier to spot in highly concentrated banking systems such as the United Kingdom. It is also clear that greater concentration may increase banking risks if the new and larger banks use their financial power to move into new areas where they have little experience or their managerial systems to achieve effective control and risk management are lagging. The U.K.'s Midland Bank's ill-fated venture in North America and Allied Irish's more recent problems, also in the United States, are merely two prominent examples that illustrate a more general point.

Finally, the banking consolidation process poses many new challenges for any country's bank regulatory and supervisory system. In large consolidated banking systems, the balance of supervisory attention needs to shift from traditional capital requirements monitoring and other balance-sheet ratios. In particular, it needs to be much more alert to the adequacy or otherwise of the systems through which bank managements identify, measure, monitor, and control their large decentralized operations' risks. Bank supervisors cannot easily second-guess bank managements regarding the size and prospective damage that can arise from these risks—they must rely on careful internal control system audits. But where they have serious doubts about such systems mixed evidence of the sort presented here suggests that they should err in the direction of safety and soundness by restricting further merger and consolidation.[11]

Market Power

Earlier U.S. studies mainly using data from the 1980s frequently found support for the market

[10] The so-called "frontier methodology" involves econometric estimation of an efficient cost frontier for a cross-section of banks. For any given bank, the distance between its actual costs and the minimum cost of a similar bank in the efficient cost frontier is a measure of X-inefficiency. Piloff and Santomero in Ahimud and Miller (1998).

[11] The Basle Committee's idea that new banking standards should give a greater role to the internal risk management models of banks, has attracted criticism from Griffith-Jones ( ) **[provide date]** and others on the grounds that this may cause pro-cyclical adjustments in the volumes of available bank credit. Specifically, in time of recession a "good" internal risk management system will signal the need for a bank to hold higher levels of capital and to make fewer loans. In expansionary periods it will signal the opposite. To the extent that banks adjust their capital and lending in these ways, they will exacerbate cyclical swings. This in turn could indirectly harm their own long-term health.

power propositions—lower deposit rates and higher lending rates in concentrated banks (for example, Berger and Hannan 1989). This result generally persisted when efforts were made to control for efficiency. However, Berger, Demsetz, and Strahan (1999) suggest that this effect may have been diluted in the 1990s and beyond as deregulation in various forms (including the arrival of electronic banking, ATMs, and expanded credit card use) resulted in greater competition in financial services markets. The "commoditization" of many banking services during the 1990s may have added to this effect. However, this result does not command universal support, and quite recent evidence has been adduced that concentration in local markets results in higher pricing for small business loans (Cyrnak and Hannan 1998). There is a strongly supported view in the U.K. that the four largest banks (Barclays, HSBC, Lloyds, and Royal Bank of Scotland), which account for 83 percent of small-business loans, use their dominant position to seriously overcharge their clients (*Financial Times*, March 15, 2002). Many of the studies cited here are "static" in the sense that they look at broad bank populations without reference to whether they were recently involved in any merger activities. Such studies also indicate limited concentration effects on bank profitability, possibly a result of the "quiet life" approach to exploiting monopoly positions.

In their full sample of European banks, Goldberg and Rai (1996) find that both ROE and NIM are positively and significantly affected by market-share variables. In the same ROE equations direct efficiency and X-efficiency measures are not significant. This represents quite strong evidence in favor of a market-power view—the higher returns come from exploiting monopoly positions, not from efficiency gains. However, in the equation explaining NIM, efficiency variables are also significant, suggesting some support for the competing EFS arguments.

A "dynamic "study based on recently merged Italian banks produced interesting results that may help to clarify the ambiguity. Specifically, it showed that when there was market overlap involving the merging banks and the acquired bank's market share was relatively small, loan rates declined.[12] This study's circumstances and controls may make it more directly applicable to ECA than some of the other studies. In general it warns us not to look too literally at consolidation studies' results without some awareness of the specific context in which the consolidation took place. The same study is also one of a limited number suggesting a significant "external market power" effect. This is a merger's consequence on the nonmerged banks' implied increase in concentration. Specifically, it found that prices of nonmerged rival banks in the same market increased by amounts similar to those in the merged banks.

The BIS (2001) study of emerging market economies found in general that the size of banks was of little statistical significance in explaining bank-by-bank differences in rates of return. Indeed, the regression relationships for both Asia and Latin America found a negative link between size and rates of return. This relationship fitted the data very poorly, with huge variations being found between banks of broadly the same size.

Efficiency

Early U.S. studies on the effects of scale and scope on banking activities generally focused on costs and imposed a "U" shape on the average cost curve. Most results found that (a) banks needed to be very large before they hit their point of most efficient scale (between US$100

[12] Sapienza, 1998.

million and US$10 billion in total assets) and (b) the cost curves were relatively flat, only small cost savings being associated with substantial scale increase (typically 5 percent or less). Examples include Ferrier and Lovell (1990), Mester (1992), and Berger and Humphrey (1991). Similar results emerged from the technically more difficult studies of the economies of *scope*—are costs lower for institutions offering multiple rather than specialized financial services? Typically only limited costs savings seemed to be associated with different banks' output range consolidation. Examples include Berger and others (1987).

However, a relevant point about these studies from the ECA point of view is that they seemed to suggest a larger-scale efficiency point when the banks in the sample were themselves relatively large. The warning note, more generally, is that the size characteristic of the sample banks can have an effect on these types of studies' substantive results.

Again the evidence from the post-1990s data is somewhat different. Berger and Mester (1997) find substantial scale economies of the order of 20 percent of costs but again only for very large banks (assets US$10–25 billion). They advance three main arguments to account for this possible change since the 1980s. The first is the nature of technological banking progress in the direction of greater scale. The second is the deregulation movement that may have made it cheaper to increase scale. The third is generally lower open-market interest rates and such rates' strong influence on the cost of bank liabilities.

A further important dimension of efficiency with great relevance to ECA countries is the improved asset quality that potentially accrues from greater portfolio *diversification*. The U.S. results in this area seem to be contradictory. On the one hand, studies identified lower standard deviations for rates of return (less risk) in larger than in smaller banks.[13] But others suggest that banks respond to these potential risk-spreading gains from scale both by accepting more risky prospects than do smaller and less diversified banks and by lowering their equity ratio.[14] Clearly the plans for reforming Basle Committee standards for banks by using banks' internal risk-management models would be likely to intensify this tendency. In the ECA context this suggests that banking safety and soundness *can* be improved by bank concentration, but there is no inevitability about this result. Bank regulators might be well advised to try to capture some of the risk-reduction gains associated with concentration rather than allowing them to be absorbed in lower bank capitalization rates. In the U.S. context, other studies have found that larger scale based on diversification across state boundaries helped both to improve efficiency and lower insolvency risk. Increased scale without geographical diversification seemed to lower insolvency risk but not enhance efficiency.[15] The differentiating factor here is suggested to be macroeconomic risk diversification—again an important issue for the larger ECA countries such as Russia and Ukraine.

A related issue concerns the diversification performance benefits that arise from banks merging with NBFIs or even nonfinancial sector companies. As regards the former point, Llewellyn (1996) found that combining insurance and banking in the United Kingdom led to some competitive gains. As regards the second point, there are conflicting views and results about the

[13] McCallister and McManus, 1993.
[14] Demsetz and Strahan, 1997.
[15] Hughes and others, 1999.

merits of the German-style universal banking system[16] and, by implication, the Russian industry-banking groups.

Emerging market results again based on BIS (2001) indicate an extremely haphazard relationship between bank size and cost efficiency as measured by the ratio of operating costs to assets. This was true as a whole but also in the separate samples for Asian and Latin American countries. However, most banks in these countries are small by international standards and this may merely indicate that none have yet approached the size at which scale economies begin to matter. Certainly the average levels of operating costs are two to three times the levels found in the United States.

A further issue concerns bank consolidation and the *payments system*. One well-known study found that countries with more concentrated banking systems made greater use of electronic payments because of the greater ease of agreeing on standards, protocols, and technology and establishing centralized account information.[17] A counterargument is that these economies can be regarded as "network economies," which do not necessarily require bank mergers. The issue is whether separate payments systems' preexisting divergences and incompatibilities are so large that a move to concentrated ownership is necessary to achieve their unification. Arguably this may not be necessary in newer banking systems such as those in most ECA countries, where there is no preexisting and incompatible payments system to be dismantled before introducing an efficient new one.

In the United States, the possibility of reaping network economies is illustrated by the role of the large ATM networks such as Cirrus and the nationwide credit card associations such as Visa and MasterCard. In the days of interstate banking restrictions, large bank holding companies found that they could lease rather than own ATM-type facilities in other states and thereby offer some banking services there without being required to own branches. This stimulated the development of large network facilities such as Cirrus. Today, common access to these large electronic banking mechanisms makes economies of scale available to smaller banks, serving as a force against further consolidation.[18]

A final dimension of the efficiency studies is what Berger, Demsetz, and Strahan[19] call "Cost X-efficiency" studies. These control explicitly for input prices and product mix as one way of disentangling efficiency gains from market power changes that may get captured in prices. The earlier studies of this type replicate the results that suggest little or no efficiency improvement with scale. The general explanation is that the potential gains from combining computers systems, payments arrangements, and so on, are offset in part by the greater managerial costs of monitoring larger branch systems, integrating conflicting information technology systems, and merging different management cultures.

Availability and Other Banking Service Aspects

There are conflicting views as to whether bank consolidation leads to improved or deteriorated service provision to smaller retail customers and small businesses (SMEs). Organizational

[16] Allen and Gale, 1997.
[17] Humphreys and others, 1996.
[18] Mishkin, 1998.
[19] Berger, Demsetz, and Strahan, 1999.

diseconomies of scope as analyzed by Williamson[20] suggest that one motivation for mergers may be to concentrate business on types of activity requiring a relatively standard (across a large geographical area) set of policies and procedures. The intensive information gathering associated with small-business lending, it is suggested, may be excluded in the process. Banking based on close relationship arrangements (for exmple, a local bank manager with a small local firm) may be the main victim to the extent that this argument is valid. However, small businesses with strong balance sheets and low information-gathering costs may gain from consolidation to the extent that they gain access to a stronger institution and possibly more specialized skills. The merged institution's greater financial strength might also be argued to enhance the prospects of continuing to provide banking services to smaller firms in times of stress.

Most empirical studies find a negative consolidation impact on small-business lending. One example from Europe is Sapienza.[21] However, in common with other studies, it also found that the reductions were less marked when smaller banks were involved in the consolidation process. But an offset to the negative effect has been found in the responses of other nonmerged banks. In particular, Berger and others [22] found that new small-business lending by the nonmerged banks, including new entrants, tended to offset much of the negative effect of the merged banks' withdrawal from this business. As for broader service availability, Avery and others[23] found that mergers of banks with branches in the same ZIP code do tend to result in branch closures. At the same time, mergers over larger geographical areas seemed to result in little or no reduction in branch availability.

In general, bank consolidation's impact on service availability seems to depend on the importance or otherwise of relationship banking and the relatively intensive dependence on information gathering in the process of providing services. This being the case, it seems likely that the increasing commoditization and depersonalization of banking via the introduction of standardized products will lessen the damage to the SME customer and general retail business.

Politics and Regulatory Influence as Motives for Consolidation

Demirguc-Kunt and Levine offer one of the few studies to empirically examine the possible political motivations for bank consolidation. They note that many of the standard explanations for consolidation are relatively poorly supported by empirical results (achieving economies of scale, eliminating excess capacity, reducing banking risk). This being the case, it is a possible conclusion that public policies, not competitive forces, may lie behind the consolidation trend, at least in the United States. "In the end the banks are (maybe) seeking to exploit the too-big-to-fail policy and increase their influence."[24]

Their study uses a number of explanatory variables that link with this general point:

- An indicator of deposit insurance generosity—a principal component indicator based on certain deposit insurance design features.[25] Generous deposit insurance can both facilitate smaller banks' entry (less concentration) and encourage lobbying against the schemes by

[20] Williamson, 1988.
[21] Sapienza, 1998.
[22] Berger and others, 1998.
[23] Avery and others, 1999.
[24] Demirguc-Kunt and Levine, [date?], p. 13.
[25] Demirguc-Kunt and Detagiache 2000.

larger banks that already enjoy the "too large to fail" insurance.

- The degree of banking activity restrictions, based on the indices of such restrictions in Barth, Caprio and Levine.[26] The logic here is that the more intensive the restrictions, the more incentive banks may have to merge to achieve countervailing power over the restrictions.
- Four taxation variables (personal capital gains tax, dividend income tax, interest rates tax, and personal tax rates). Powerful banks may favor higher levels for some of these taxes but not others.
- Three indicators **[list them?]**of the degree of competition in the general economy.
- Five indicators of general governance quality (degree of corruption, adherence or otherwise to the rule of law, degree of tax compliance, strength of minority shareholders with regard to managers and majority shareholders, and quality of accounting).

Unusually, the Demirguc-Kunt and Levine study takes data from a large sample of up to 94 countries but uses broad-based country comparisons rather than detailed micro-information **[microeconomic information?]** about individual banks. Their results show that the concentration variable (CR3) exerts surprisingly little and often no effect on the regulatory and other issues listed in the bullet points. There is limited evidence from their sample that greater concentration is associated with less generous deposit insurance and looser banking restrictions, but these effects either are not robustly significant statistically or are quantitatively small.[27] There is somewhat stronger evidence that bank concentration is good for some governance dimensions. So, for example, the CR3 variable exerts a positive and significant influence on the degree of integrity (the negative of corruption)[28] and on the quality of accounting information.

Financial Development in General

The same paper by Demirguc-Kunt and Levine[29] also provides regression results for a broad sample of countries, covering 10 measures **[only 9 are listed]**of financial sector development. These include some of the variables already discussed. Their full list is:

- Net interest margin in banks as a share of bank assets;
- Bank overhead costs as a share of assets;
- Pretax and after-tax bank profits, each as a share of assets;
- Private credit outstanding relative to GDP (a comprehensive measure including bank credit, nonbank credit, and cross-claims of one group of intermediaries on the others; it is presented as a broad measure of an economy's degree of financial intermediation);

[26] Barth, Caprio, and Levine 2000.
[27] The authors also note the difficulty of interpreting the directions of cause and effect. For example, the negative coefficients attached to the banking restrictions variable may indicate either that (a) concentrated banks are effective in getting restrictions eased or (b) the relative absence of restrictions is part of the spur to greater concentration.
[28] Again, there is a problem of interpreting cause and effect. Do countries with less corruption worry less about the possible downsides of more concentrated banks, or does the mere fact of banks becoming more concentrated act as a spur to greater commercial integrity?
[29] Demirguc-Kunt and Levine 2000.

- Stock market capitalization relative to GDP;
- Total domestic equity securities trade relative to GDP;
- Stock market turnover (value traded divided by market capitalization);
- Public ownership (the public ownership of the 10 largest banks as a percentage of these banks' total assets); and
- Foreign bank assets (foreign banks' assets as a percentage of total banking sector assets).

Correlations calculated using the authors' data series indicate that more concentrated systems tend to have lower private credit levels (intermediation) and also lower stock market liquidity levels as measured by both value trade and turnover. In the regression analysis, the authors found little significant impact of the bank concentration variable on the various financial sector development indicators. This was true even in relation to variables such as profitability and NIM, where other studies had managed to find a link with concentration. A possible explanation of these differences is to be found in the study's very much broader country coverage compared to most other studies reported in this paper. This would add weight to one of our main conclusions, that cross-country banking structure diversity is substantial in spite of well-publicized globalization forces.

The in-depth studies for selected emerging markets undertaken recently for BIS (2001) indicate a variety of additional development/structural issues relevant to bank consolidation. Possibly the most important is that many mergers in recent years in Latin America and East Asia were driven by government efforts to restructure inefficient banking sectors or banking sectors wracked by systemic distress after major financial crises. For the most part, the limited consolidation that has occurred was *not* driven by market processes. However, in a few countries relatively successful liberalization and privatization programs have opened the way for market-driven consolidation led, in some case, by foreign bank entry. We suggest that this can be observed in some Central European countries. Only in very few more mature and stable emerging market economies, such as Hong Kong and Singapore, has the consolidation process been looked at explicitly as a device to achieve even greater competitiveness in the context of increasingly fierce global competition.

A variety of institutional and legal impediments to mergers and greater consolidation have been identified. In Brazil the merger process involving smaller inefficient banks has proceeded more slowly than expected because of tough resistance from the tight family ownership structures that still persist. Some governments, such as South Africa, have seen their official efforts to bring about bank mergers overturned by the courts. Malaysia established arrangements in which courts cannot overturn government-promoted mergers.[30]

Official promotion of bank mergers in pursuit of more efficient size is in most cases a controversial policy instrument. This is partly because of the ambiguity about size's benefits, as evident in, for example, the extensive U.S. literature. However, it also derives from the fact that total banking systems in most emerging market economies are significantly smaller than some individual large banks in Europe, Japan, and the United States. For example, the Indian banking system's capital is US$8 billion, compared to the Japanese Mizuho Financial Group's US$54 billion; the Malaysian banking system's capital is US$10 billion against HSBC's US$35 billion,

[30] BIS 2001, p. 17.

and so on. It may be that some countries would need a 100 percent concentrated system in order to fully realize supposed economies of scale. This of course would be difficult politically in most countries and potentially dangerous from an economic perspective.

What Might Be Different in the ECA Countries?

Fries and Taci,[31], Roe and Siegelbaum,[32] and numerous other authors referred to the unique development features that faced the ECA countries' financial systems after the end of the Cold War. To quote Fries and Taci, "these institutions were primarily book-keepers for the planned allocation of resources, providing 'monetary' accounts for resource flows. Credits were allocated to enterprises on the basis of planned investment priorities, and the repayment of credits was subject to bargaining. Moreover, to facilitate their role in the planning process, socialist banking systems were highly concentrated, with little separation of central banking and commercial banking activities."[33] The last phrase is key, from this paper's point of view. These banking systems started out in 1989 as concentrated systems. It was unlikely that their subsequent evolution would be unidirectional. Some deconsolidation would be likely to be a part of the creative destruction needed to create a market-friendly banking system from the socialist legacy. Hindsight tells us that this is indeed what has happened (Table A1.3). The monobanks and specialist sectoral banks rapidly split up to create a peak number of 2,576 banks in Russia in 1997, 230 by 1995 in Ukraine, and 210, 226, and 204 respectively in Azerbaijan, Georgia, and Kazakhstan by 1994.[34] A similar but more muted phenomenon was evident in the Central European economies. Most ECA countries have seen some limited reconsolidation subsequent to these mid-1990s peaks. However, only in a few isolated cases has this tendency been strong (Estonia is the strongest example), and in certain major countries (Russia, Ukraine) it has been very weak and possibly of little real significance.

There has been little direct analysis of the ECA countries' bank consolidation process and relatively few studies examine performance on a bank-by-bank basis. Most of the relevant literature indirectly provides insights into the consolidation issue. Noteworthy papers that have both worked with bank-by-bank data and tried to specify some of the particular circumstances of transition-country banking are Fries, Neven, and Seabright[35] and Fries and Taci.[36]

Central to the former paper's analysis is the notion that some ECA transition countries' banks operate with reasonably prudent lending policies and capitalization attitudes. In short, they are motivated much in the same way as Western banks and are likely to behave in ways that mirror the consolidation experiences of banks in mainstream market economies. If, for example, these banks face a threat or diminished profits, their commercial instinct will be to try to rebuild capital and otherwise defend their banking franchise. These banks can provide a benchmark against which to assess a second subset of banks, which deviate from sound risk management incentives in ways that would appear odd in Western banking but which students of banking in some transition countries know to be relatively common. Some or all of the following motivate this behavior:

[31] Fries and Taci 2001.
[32] Roe and Siegelbaum 1998.
[33] Fries and Taci 2001, p. 1.
[34] Siegelbaum and Fleming 2001.
[35] Fries, Neven, and Seabright 2001.
[36] Fries and Taci 2001.

i) The banks have severely impaired capital (and by implication a low value on their banking franchise) and therefore have little to lose by adopting extremely risky behavior.

ii) The banks operate in a seriously unreformed business climate in which it is hard to distinguish sound from unsound clients, in part because of unsatisfactory accounting practices. The climate's informational imperfections may make bank lending to unsound clients common.

iii) Some of the banks can afford to be reckless because they perceive that they have political protection, either because of "too large to fail" logic or of more insidious political connections.

iv) High inflation or high inflationary expectations distort the true state of balance sheets and profit and loss accounts and in turn bank decisionmaking.

Substantial evidence for Russia regarding point (ii) is presented in McKinsey (1999) and for Ukraine in **[citation missing]**…… (1998). A more elaborated discussion of some of these perverse banking incentives in (i) and (iii) can be found in Siegelbaum, Roe, and King (1997)

It is readily apparent that banks operating according to these distorted incentives will not respond to consolidation pressures in the same way as in, say, the United States (for example, low or negative profitability will not put them under increased pressure to merge). Nor is it likely that any mergers that do occur will result predictably in bank performance changes along the lines suggested by the market economy literature.

Fries and Taci (2001) and Fries and others (2001) attempt to confirm this bank behavior dichotomy by splitting a sample of 515 banks in 16 ECA countries between "high-reform states" and "low-reform states." They do this using standard EBRD transition indicators for both the banking reform components and enterprise components (including bankruptcy and corporate governance). The data period is 1994–1999. Their first finding is that in the high-reform states,[37] banks achieving faster loan growth rates generally have higher bank capitalization levels. By contrast, there is no statistically significant link between loan increase rate and capitalization in the low-reform states[38]: many banks expanded their loans very rapidly in the period in question on the basis of little or no capital. This broadly confirms the existence of the reckless bank behavior types suggested in the four points above.

More directly relevant to bank consolidation are the results that they present on bank costs, revenues, and margins:

- Banks enjoying higher market shares (measured by loan volume) have higher operating costs, especially in the high-reform states, but the magnitude of the cost increase is negligible (not much greater than 1.4 percent of costs): there is some market power exploitation but not very much.
- Variables designed to capture the effects of alternative bank governance show large and significant effects. For example, in the high-reform economies, new entrant banks, foreign banks, and privatized banks achieve general cost savings over others of as much

[37] Bulgaria, Croatia, the Czech Republic, Estonia, FYR Macedonia, Hungary, Poland, Romania, the Slovak Republic, and Slovenia.
[38] Belarus, Kazakhstan, Latvia, Lithuania, Russia, and Ukraine.

as 36 percent, 11 percent, and 21 percent, respectively.[39]

- These governance factors are generally nonsignificant in the low-reform economies. This in turn suggests that the poor bank operating climate's debilitating effects in such countries more than swamps the performance improvement that might have been expected to accrue from better bank management.
- An analysis of the revenue sources shows that banks in high-reform states generate significantly more revenue from lending activities and their nonloan portfolios than they do from deposits and their own equity.
- By contrast, banks in the low-reform states have insignificant revenue contributions from loans and nonloan assets. Their revenue derives predominately from deposit-taking activities, which enables them to achieve quite high returns on their limited equity.
- In the low-reform states, privatized banks, new entrant banks, and foreign banks operate with significantly lower margins than banks in general (about 10 percent less). The authors attribute this to market incumbents' historic advantages, perhaps because of their existing depositor base.

These results confirm our a priori position that care must be taken in applying standard consolidation results derived from U.S. and other market economy studies to ECA countries. Although an expanding group of ECA countries have banks that operate much like Western banks, these banks have not experienced the substantial consolidation pressures seen in the United States, such as disintermediation pressures from powerful NBFIs. Consequently the typical bank in most high-reform states remains relatively small and faces a reasonable amount of competition from other relatively small banks. Hence it is no great surprise to see market share's small impact on costs and pricing, found in the studies just cited. In these countries a far greater impact on cost efficiency, pricing, and no doubt on other bank performance indicators seems to coming from banking system restructuring through privatization and new entry, including foreign banks.

In the low-reform states, any bank consolidation results must be viewed through the fog of incomplete corporate restructuring, inadequate accounting information, large-scale but opaque political interventions, and substantially distorted incentives. Collectively these mean that many banking sector structural changes that might be expected to lead to improved bank performance will not necessarily do so.

Looking forward, the Fries and Taci study must be treated with some caution because it tests its idea about banking behavior's dichotomized nature by splitting the sample of ECA banks according to the countries in which they are located. In reality, the split between high-reform and low-reform states is fuzzy and changing in a fairly dynamic manner (for example, Latvia is a lot closer to moving from the second to the first category than, say, Belarus). The research question left unanswered is whether the same dichotomization would hold between groups of banks in the same country even where some aspects of the operating environment conform to the low-reform situation. In other words, do the "better" banks in a low-reform economy like Russia face some real consolidation incentives and could they derive significant benefits from consolidating ? Or

[39] Some of these gains are lower in the random-effects model, also reported by the authors.

have these processes of financial sector change been placed in limbo until some critical stage of *overall* reform has been achieved?

Conclusions

This brief review of a large literature presents many research challenges regarding bank consolidation in the ECA countries. The most significant conclusion relates to the large variation of experiences evident across different countries and regions. In spite of its popular connotations, "globalization's" competitive pressures have been experienced extremely unevenly by banks around the world. There may be increasing financial globalization, but it has not yet translated into international bank size and performance standards. The available cross-country cost and efficiency indicators suggest that there are huge differences between banks in different countries (operating costs in Latin America are almost three times those in the United States, for example). Although the U.S. banking industry has definitely experienced great competitive pressures in recent years, leading to big reduction in bank numbers, this has not been the general experience. Today there are more deposit-taking institutions in Asia than there were in 1990. In Europe, there is major cross-country variability in the number of banks and the degree of concentration of banking. This also is true generally in the emerging market economies and specifically in the ECA countries that are the main subject of this study.

Although bankers hold to the common view that larger banks are necessary for future competitive survival, it is very unclear what this means in practice for emerging and transition countries. The U.S. experience, usually based on data from very large banks, certainly offers evidence that cost and other efficiency gains increase with a bank's size. However, these gains typically occur at total asset sizes that are large by many ECA countries' standards—US$100 million to US$10 billion, depending on the study. But many of the largest banks in individual ECA countries are not much larger than the smaller of these two figures, and all are much smaller than US$10 billion. For example, the two dominant Russian banks, Sperbank and Vneshtorgbank, have total assets of US$27 billion and US$5 billion, respectively. We cannot automatically rely on other countries' evidence to formulate a view about the typical bank's "correct" size or "correct" concentration level. This conclusion is enhanced by the wide variation in bank size in mature banking systems, such as those in Europe.

A further important conclusion is that pressures on banks to consolidate are complex and involve far more than the strong market-based competitive pressures that are evident in the United States. In the emerging market economies, administrative decisions about sector liberalization, including bank privatization, have played a significant role in accelerating consolidation in some cases. But also important have been the force majeure interventions that were landed on the authorities in the aftermath of the various Latin American and Asian crises of the past decade. The fact that many banks in many countries survive for long periods with cost and other performance records that are woeful by international standards tells us that a variety of protective mechanisms are at work. These mechanisms dilute what would otherwise be a strong push from market forces, and are an important part of the answer to why consolidation proceeds at different rates in different countries. In ECA's transition countries it is to be expected that such factors would play an unusually significant role: after all, these countries are all transiting from full socialized control to market economies. They are certainly doing that at different speeds and in different ways.

ANNEX 2: THE ECONOMETRIC FRAMEWORK

The quantitative econometric work for this study was done using panel data analysis. The starting point of the general framework for the analysis is a regression model of the form

$$y_{it} = \alpha_i + \boldsymbol{\beta}^{\blacklozenge} x_{it} + \mu_{it} \quad \text{for i =1,2,…,N; and t = 1,2,…,T} \qquad (1)$$

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N and *T* are the cross-section and time-series dimensions respectively and x_{it} is a vector of *K* regressors. The regressors' definitions and the justification for their selection is provided in the main text of the report. The vector of disturbance terms u_{it} is assumed to be uncorrelated with the x_{it}s and the α_is have zero mean and constant variance, σ_u^2. This model restricts the coefficients on *x* to be common across *i* and *t*. A less restricted form could allow the slopes to vary over time, across donor-recipient pairs, or both.

The assumption about α_i has implications for the consistency and efficiency properties of estimates of β in equation (1). In the market share equation the group-specific term reflects a specific bank's idiosyncratic characteristics. If the group-specific effect is assumed constant (but allowed to differ across units), the model is called a fixed-effects (FE) model. Assuming heterogeneity across units in equation (1) implies that the effect of all omitted variables is the same for a given cross-sectional unit through time but varies across cross-sectional units for a given point in time.

The choice of estimation method is based on the resulting estimators' efficiency and consistency properties. One possibility is by using the variation within each group, *i*. This makes use of the idea of partitioned regression. To see this, rewrite equation (1) in terms of the group means:

$$\bar{y}_{i\bullet} = \alpha_i + \bar{X}_{i\bullet}\beta' + \bar{\mu}_{i\bullet} \qquad (2)$$

Subtracting equation (2) from (1) yields

$$(y_{it} - \bar{y}_{i\bullet}) = \beta'(x_{it} - \bar{x}_{i\bullet}) + (\mu_{it} - \bar{\mu}_{i\bullet}) \qquad (3)$$

ordinary least squares (OLS) can then be used to estimate the β coefficients from equation (3). This is known as the within-group (WG) estimator. The WG estimator for β is unbiased and consistent when either *N* and/or *T* goes to infinity. An estimate for α_i can then be retrieved as the mean residual from the *i*th group.[40]

Another estimator that our report uses is the idea that heterogeneity across units can be accounted for by treating the individual specific effects as random variables. Here the assumption is that the unit-specific effects cannot be observed or measured, represent "specific ignorance" for the modeler, and must be treated as part of our "general ignorance."[41] What this means is that the large number of factors that affect the dependent-variable value but are not explicitly accounted for in the model can be summarized by a random disturbance. If this assumption is made, then we call it a Random Effects (RE) model. Hence, in addition to a nonspecific error term μ_{it} there is also a group-specific error term α_i. Equation (1) is therefore written as

[40] See Baltagi 1995, among others.
[41] Matyas 1992, p. 50.

$$y_{it} = \beta' x_{it} + \upsilon_{it} \quad (4)$$

where $\nu_{it} = \alpha_i + \mu_{it}$ and

$E(\alpha_i) = E(\mu_{it}) = 0 \ \forall$ i, t

$Var(\alpha_i) = \sigma_\alpha^2$; $Var(\mu_{it}) = \sigma_\mu^2 \ \forall$ i, t

$Cov(\alpha_i, \alpha_j) = 0 \ \forall \ i \neq j$

$Cov(\mu_{it}, \mu_{js}) = 0 \ \forall \ i \neq j, t \neq s$

$Cov(x_{it}, \alpha_i) = 0$, $Cov(\alpha_i, \mu_{it}) = 0$

For the RE model, we still can use the WG estimator to obtain estimates for β in equation (1), as the coefficients are time-invariant. This is obvious when one considers the transformation that yields equation (3). Note that in equation (3) the α_i is absent and so estimating βs is independent of whether we assume a fixed-effect or random-effects model. The point worth noting here is that if we assume the α_is to be fixed, then the WG gives BLUE estimates. However if we assume α_is are random, then in finite samples the WG estimator is consistent but not efficient. This inefficiency is due to the fact that we are not making use of the information that there is a group-specific random component in the equation error term.[42]

In equation (4), because both ν_{it} and ν_{is} ($\forall \ s \neq t$) contain α_i, the residual will be autocorrelated. An efficient estimator is therefore the GLS **[spell out?]**. The transformation that gets rid of this serial correlation is:

$$y_{it}^* = y_{it} - (1 - \sqrt{\theta})\bar{y}_{i\bullet}$$
$$x_{it}^* = x_{it} - (1 - \sqrt{\theta})\bar{x}_{i\bullet}$$

where

$$\theta = \frac{\sigma_\mu^2}{\sigma_\mu^2 + T\sigma_\alpha^2}$$

The GLS therefore involves estimating by OLS the equation

$$y_{it}^* = \delta + \beta' x_{it}^* + \varepsilon_{it} \quad (5)$$

where ε_{it} is a white-noise error term.

It can be shown that the GLS estimator is a weighted average of the between-[43] and within-group estimator and is given by the expression

[42] Hsiao 1986, p. 34.

[43] The between-group estimator β_{BG}, is the OLS of the regression which uses just the group means, that is, OLS on equation (2).

$$\hat{\beta}_{GLS} = \frac{w_{xx}}{w_{xx} + \theta b_{xx}} \hat{\beta}_{WG} + \frac{\theta b_{xx}}{w_{xx} + \theta b_{xx}} \hat{\beta}_{BG} \quad (6)^{44}$$

This compares with the OLS estimator given by

$$\hat{\beta}_{OLS} = \frac{w_{xx}}{w_{xx} + b_{xx}} \hat{\beta}_{WG} + \frac{b_{xx}}{w_{xx} + b_{xx}} \hat{\beta}_{BG} \quad (7)$$

where

$$w_{xx} = \sum_i \sum_t (x_{it} - \bar{x}_{i\bullet})^2$$

$$b_{xx} = \sum_i \sum_t (x_{i\bullet} - \bar{x}_{\bullet\bullet})^2$$

The OLS estimator just refers to estimating equation (1) with a pooled sample. Compared with the GLS estimator, OLS places too much weight on the between-group variation (this is also obvious when one compares the weights on the between- and within group estimates). All the variation is attributed to the variation in the independent variables *X*, instead of attributing some of it to random variation across groups, which is the role θ plays in equation (6). When there is no variation within the group-specific effects, that is, $\sigma_{\alpha}^2 = 0$, then we have $\theta = 1$, which implies that $\hat{\beta}_{GLS} = \hat{\beta}_{OLS}$. Also as $T \to \infty$, $\theta \to 0$ and therefore $\beta_{GLS} \approx \hat{\beta}_{WG}$.

It is worth pointing out that the efficiency of the GLS estimator holds only if the independent variables (X_{it}) are uncorrelated with the random group–specific effects α_i. This, as we discuss shortly, is the basis of the Wu-Hausman test. The pooled OLS estimates are also reported for completeness.

Two tests are reported, forming the basis of our choice primarily between the WG and GLS estimator. The first is the Wu-Hausman test for the correlation between the regressors and the individual random effects.[45] The null and alternative hypotheses are respectively:

$$H_0 : cor(x_{it}, \alpha_i) = 0,$$

$$H_1 : cor(x_{it}, \alpha_i) \neq 0$$

Under the null hypothesis both β_{WG} and β_{GLS} are consistent and β_{GLS} is efficient as well. Under the alternative, however, the β_{GLS} is not consistent, whereas the β_{WG} is.

This test has a chi-squared distribution with *k* degrees of freedom. The test in this setting has low power when *T* is large. This is because as $T \to \infty$ $\hat{\beta}_{WG} \cong \beta_{GLS}$ as argued previously.

[44] Hsiao (1986) reproduces the derivation of this equation attributed to Maddala (1971).

[45] This is strictly speaking a test for efficiency against consistency, although many authors (see for instance Green 1997) consider it to be a test for random effects against the fixed-effects model.

The second test reported in the results is the Breusch-Pagan test. It tests whether for the random-effects model there is any variation in the group-specific term. The test is as follows:

$H_0 : \sigma_\alpha^2 = 0$

H_1 : Otherwise

Where $\hat{u}_{it}$ is the residual from regressing y_{it} on a constant and x_{it}. This statistic is distributed as a chi-squared with one degree of freedom. Under the null hypothesis the model is a fully pooled one, which would imply that $\hat{\beta}_{GLS} = \hat{\beta}_{OLS}$.

We tested for structural changes by estimating cross-section regressions for each time period for the individual countries. By this we are able to say whether the effects of the regressors are different for the individual time periods under consideration.

Results

These estimations' results are presented in the attached set of tables. We also prepared a brief box on each country, summarizing some of the results achieved. As noted in the main text, the results in general were disappointing, although they did provide some support to the wide variety of consolidation experiences found in the various case studies.

Market Shares Estimations

The Hausman tests in table A2.1.2 are not rejected for all countries except Armenia. This suggests that the GLS estimates are efficient. The Bruesch-Pagan tests, on the other hand, are rejected for all the countries, signifying that pooling over the years 1998–2000 is not appropriate. For ease of comparison coupled with the fact that GLS is not an efficient estimation technique for all the countries (as we reject Hausman tests for Armenia), we discuss only within-group or fixed-effects results (table A2.1.3), which are consistent. It is observed that asset deployment (**ad**) had a significant impact on banks' market shares only in Armenia, and this effect was positive. The only other variable that had a significant impact on market shares was banks' operating costs in Armenia and Bulgaria. The effect was negative, implying that the banks' market share decreased when their operating costs increased.

Growth in Market Share Estimations

For the growth in market share models, the Hausman test could not be computed for three of the countries in the sample (Bulgaria, Latvia, and Ukraine), and for one (Latvia), the null under the Bruesch-Pagan test is rejected (table A2.2.2). This implies that pooling is inappropriate for Latvia and we cannot say whether the GLS estimates are efficient (as we have no statistic for the Hausman test). Again, for ease of comparison we discuss only the results for within-group (fixed-effects) estimates in table A2.2.3.

We note that bank asset deployment (**ad)** had an insignificant effect on market share growth for all the countries in the sample. Operating income (**pea**) had a significant effect on market share growth in the Baltic states, Kazakhstan, and Ukraine, with the effect being negative in all these countries except Ukraine. In other words, Ukrainian banks that were able to increase their operating incomes (**pea**) experienced increased market share growth, but in the Baltic states and Kazakhstan these banks' market shares decreased. Banks' operating costs (**cea)** had a significant

and negative effect on market share growth in the Baltic states and Poland. Increasing bank **roan** in the Baltic states and Kazakhstan increased their market share growth.

Structural Changes Due to Time Effects

Here we look at the results of tables A2.3.1–3.9 to see if there were any significant[46] changes in the regressors' effects on market share and growth in market shares from 1999 to 2000.

For **ad** the results for market share models is consistent with the observations made earlier: in all countries for which this variable is significant the effect is negative. For Armenia, the Baltic states, and Hungary **ad** is significant in 1999 but not 2000. However, in Poland the reverse is true. The **cea** of Ukrainian banks becomes significant in 2000 and has a positive effect on market shares: that is, the high-cost banks gain market share better. The **roan** also assumes a significant and positive effect on market shares in 2000 for Bulgaria and Ukraine. These differences in results for the two time periods also can be observed in the growth in market share models, although they are not in the same sequence. A conclusion that could be reached from our observations is that these models' time effects are masked (if only to an extent) by the implicit averaging in our fixed-effects results. For instance, both **cea** and **roan** are insignificant in the fixed-effects model for Ukraine but are significant if the model is estimated only for the year 2000.

[46] "Significant" is used here in a non-statistical sense, as we do not formally test to ascertain different results' statistical significance.

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Box A2.1. Armenia

Market Shares = 0.068 – 0.009*AD + 0.16*CEA – 0.103*PEA + 0.044*ROAN

(6.86) (2.00) (0.27) (2.09) (0.43)

Increase in asset deployment and the operating incomes as a percentage of interest earning assets resulted in a loss in market share for banks in Armenia. For asset deployment, this is contrary to a priori expectations. Increases in operating costs as a share of interest-earning assets and the net return on average total assets on the other hand resulted in a gain in market share for these banks. The effect of banks operating costs on their market shares contradicts prior expectations. Only asset deployment and operating incomes had significant effects on the market shares of banks in Armenia.

Box A2.2. Baltic States

Market Shares = 0.085 – 0.039*AD – 0.167*CEA – 0.044*PEA + 0.043*ROAN

(4.68) (2.79) (1.65) (0.041) (0.37)

The market share of the Baltic states' market share was negatively affected by their asset deployments, operating costs, and income as a percentage of interest-earning assets. The effect of their asset deployment on their market shares is not consistent with theoretic expectations. The net return on average total assets had a positive but insignificant effect on the market shares. The only variable that had a significant effect on the Baltic states' banks' market shares is their asset deployment.

Box A2.3. Bulgaria

Market Shares = 0.111 – 0.030*AD – 0.018*CEA – 0.366*PEA + 1.137*ROAN

(4.26) (2.14) (0.08) (1.71) (2.29)

Two variables had significant effects on the Bulgarian banks' market share: asset deployment and net return on average total assets. Asset deployment had a negative effect on market shares, contrary to theoretic expectations, while net returns on average total assets had the expected positive sign. The operating costs and incomes as a percentage of interest-earning assets had negative but insignificant effects on the market shares.

Box A2.4. Hungary

Market Shares = 0.125 – 0.104*AD – 0.071*CEA + 0.296*PEA + 0.039*ROAN

(3.72) (3.65) (0.40) (1.23) (0.21)

Asset deployment by Hungary's banks had a negative and significant effect on their market shares. Operating costs as a percentage of interest-earning assets and net returns on average total assets had the expected effects on market shares but were insignificant. Operating income as a percentage of interest-earning assets had a positive but insignificant effect on banks' market shares.

Box A2.5. Kazakhstan

Market Shares = 0.208 – 0.056*AD + 0.032*CEA – 0.279*PEA – 0.045*ROAN

(2.89) (1.24) (0.05) (0.56) (0.07)

None of the model variables had a significant effect on Kazakh banks' market share. All the variables except operating income as a percentage of interest-earning assets had signs that are inconsistent with theoretic expectations—banks' asset deployment and net returns on average total assets had negative signs, while operating costs as a percent of interest-earning assets had a positive sign in the market share equation. The effect of operating income as a percentage of interest-earning assets could either be positive or negative.

Box A2.6. Poland

Market Shares = 0.024 – 0.008*AD – 0.122*CEA + 0.301*PEA – 0.327*ROAN

(1.23) *(0.97)* *(0.26)* *(0.82)* *(0.60)*

None of the model variables had a significant effect on Polish banks' market share. Banks' asset deployment and net returns on average total assets produced signs inconsistent with a priori expectations. Operating income as a percentage of interest-earning assets had a positive but insignificant effect on banks' market shares.

Box A2.7. Russia

Market Shares = 0.021 – 0.000*AD + 0.034*CEA – 0.036*PEA – 0.024*ROAN

(3.45) (0.19) (1.10) (1.13) (0.98)

Russian banks' market shares are not very well explained by the model variables. All the variables had statistically insignificant effects and mostly with the wrong sign in the sense that they are opposite to theoretic expectations. Banks' asset deployment and net returns on average total assets had negative effects, while operating costs as a percentage of interest-earning assets had a positive effect on market shares. Operating income as a percentage of interest-earning assets had a negative effect on market shares.

Box A2.8. Latvia

Market Shares = 0.057 – 0.027*AD – 0.139*CEA + 0.061*PEA – 0.053*ROAN

(3.11) *(2.02)* *(1.42)* *(0.60)* *(0.50)*

In Latvia, banks' market shares were significantly affected by their asset deployment. However, this effect was negative. Net returns' effect on average total assets was negative, contrary to expectations. Operating costs as a percentage of interest-earning assets and operating income as a percentage of interest-earning assets had negative and positive effects, respectively, on market shares.

Box A2.9. Ukraine

Market Shares = 0.090 – 0.086*AD + 0.108*CEA – 0.005*PEA – 0.164*ROAN

(4.96) *(4.93)* *(1.52)* *(0.09)* *(2.17)*

In Ukraine, both banks' asset deployment and net returns on average total assets significantly affected banks' market shares. However, their effects are inconsistent with a priori expectations, as the data show both having negative effects on market share. Operating costs as a percentage of interest-earning assets and operating income as a percentage of interest-earning assets had positive and negative effects, respectively, on market shares. For operating costs as a percentage of interest-earning assets, this is contrary to expectations.

Notes: absolute values of the z-statistic in parenthesis **[where does this belong? It doesn't seem to be associated with the boxes]**

Table A2.1.Market Share Models

Table A2.1.1. Pooled Regression Estimates for Market Shares, 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Russia	Ukraine
Ad	-0.009*	-0.039***	-0.030**	-0.104***	-0.056	-0.027**	-0.008	0	-0.086***
	-2	-2.79	-2.14	-3.65	-1.24	-2.02	-0.97	-0.19	-4.93
Cea	0.016	-0.167	-0.018	-0.071	0.032	-0.139	-0.122	0.034	0.108
	-0.27	-1.65	-0.08	-0.4	-0.05	-1.42	-0.26	-1.1	-1.52
Pea	-0.103**	-0.044	-0.366*	0.296	-0.279	0.061	0.301	-0.036	-0.005
	-2.09	-0.41	-1.71	-1.23	-0.56	-0.6	-0.82	-1.13	-0.09
Roan	0.044	0.043	1.137**	0.039	-0.045	-0.053	-0.327	0.024	0.164**
	-0.43	-0.37	-2.29	-0.21	-0.07	-0.5	-0.6	-0.98	-2.17
Const	0.068***	0.085***	0.111***	0.125***	0.208***	0.057***	0.024	0.021***	0.090***
	-6.86	-4.68	-4.26	-3.72	-2.89	-3.11	-1.23	-3.45	-4.96
Obs	57	99	62	86	32	55	101	92	47
Adj R-squared	0.17	0.08	0.13	0.16	-0.01	0.02	-0.01	-0.03	0.48

Absolute value of z statistics in parentheses.
*, **, and *** signify a rejection of the null at 10, 5, and 1 per cent respectively.

Table A2.1.2. Random Effects Regression Estimates for Market Shares, 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Russia	Ukraine
Ad	0.003	-0.003	-0.002	-0.006	-0.003	0	-0.001	0	-0.022**
	-1.29	-0.4	-1	-1.3	-0.23	-0.05	-0.27	-0.52	-2.02
Pea	0.002	-0.028	-0.011	0.007	-0.125	-0.017	0.002	0	-0.018
	-0.06	-0.98	-0.58	-0.21	-0.87	-0.78	-0.06	-0.02	-0.75
Cea	-0.099**	-0.016	-0.057***	0.014	-0.154	-0.014	-0.035	0	0.015
	-2.11	-0.49	-2.63	-0.61	-0.69	-0.58	-0.68	-0.02	-0.33
roan	0.055	0.005	-0.023	-0.015	0.118	-0.004	-0.047	-0.001	0.042
	-1.11	-0.19	-0.53	-0.65	-0.49	-0.18	-0.93	-0.24	-0.94
Constant	0.047***	0.032***	0.054***	0.037***	0.113***	0.026***	0.029***	0.016**	0.051***
	-5.32	-3.27	-4.06	-3.98	-3.45	-2.86	-3.55	-2.17	-3.91
Observations	57	99	62	86	32	55	101	92	47
No of banks	29	35	22	31	14	19	35	35	18
B-P	17.17***	82.49***	49.05***	77.99***	27.01***	45.95***	100.21***	93.18***	12.57***
Hausman	58.62***	5.18	0	0	0.75	1.41	0.42	0.24	0

B-P is the Bruesch-Pagan test, distributed as chi-squared with one degree of freedom.
The Hausman test is distributed as a chi-squared with 4 degrees of freedom. The test is not reported in cases where the program could not compute the statistic.

Table A2.1.3. Fixed Effects Regression Estimates for Market Shares, 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Russia	Ukraine
Ad	0.006**	0	-0.002	-0.005	0.001	0.001	0	0	-0.013
	-2.53	-0.01	-0.97	-1.03	-0.06	-0.19	-0.13	-0.51	-1.35
Pea	0.038	-0.024	-0.009	0.003	-0.125	-0.017	0.001	0	-0.011
	-1.24	-0.85	-0.53	-0.08	-0.82	-0.77	-0.03	-0.06	-0.53
Cea	-0.181***	-0.007	-0.056**	0.014	-0.197	-0.011	-0.036	0	-0.033
	-2.97	-0.2	-2.72	-0.65	-0.81	-0.46	-0.69	-0.06	-0.78
Roan	0.041	0.003	-0.027	-0.018	0.188	-0.004	-0.046	-0.001	0.023
	-0.84	-0.1	-0.65	-0.77	-0.68	-0.18	-0.89	-0.31	-0.56

Const	0.048***	0.029***	0.055***	0.039***	0.126***	0.024***	0.029***	0.018***	0.050***
	-6.18	-3.36	-15.34	-7.87	-5.22	-3.64	-10.27	-15.43	-4.62
Obs	57	99	62	86	32	55	101	92	47
No of bank	29	35	22	31	14	19	35	35	18
Adj R-squared	-0.49	-0.6	-0.31	-0.21	-0.58	-0.6	-0.54	-0.7	-0.58

Absolute value of z statistics in parentheses.
*, **, and *** signify a rejection of the null at 10, 5, and 1 per cent respectively.

Table A2.2. Growth in Market Share Models

Table A2.2.1. Pooled Regression Estimates for Growth in Market Shares, 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Ukraine
Ad	0.074	0.019	-0.54	-0.118	-0.412	-0.025	-0.03	1.579***
	-1.03	-0.07	-0.35	-0.87	-0.65	-0.09	-0.34	-2.97
Cea	0.256	3.260*	-3.265	-0.314	1.018	4.160*	6.035	-0.067
	-0.26	-1.68	-0.13	-0.37	-0.12	-1.96	-1.26	-0.03
Pea	-0.384	-4.794**	-15.221	-0.866	-0.103	-5.375**	-0.552	1.39
	-0.48	-2.37	-0.63	-0.76	-0.01	-2.4	-0.14	-0.86
Roan	3.290*	5.851***	1.412	-0.303	1.06	7.438***	7.3	0.541
	-1.99	-2.69	-0.03	-0.34	-0.12	-3.2	-1.29	-0.24
Constant	0.381**	0.517	3.773	0.381**	1.323	0.589	0.064	-1.150**
	-2.36	-1.49	-1.29	-2.39	-1.3	-1.47	-0.32	-2.09
Observations	57	99	62	86	32	55	101	43
Adjusted R-squared	0.08	0.04	-0.05	0.01	-0.13	0.11	0.03	0.23

Absolute value of z statistics in parentheses.
*, **, and *** signify a rejection of the null at 10, 5, and 1 per cent respectively.

Table A2.2.2. Random Effects Regression Estimates For Growth in Market Shares, 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Ukraine
Ad	0.071	-0.03	-0.54	-0.107	-0.51	-0.025	-0.042	1.579***
	-0.98	-0.09	-0.35	-0.72	-0.98	-0.09	-0.42	-2.97
Pea	-0.318	-5.079**	-15.221	-0.164	-10.632*	-5.375**	-1.419	1.39
	-0.39	-2.52	-0.63	-0.14	-1.84	-2.4	-0.36	-0.86
Cea	0.207	3.969*	-3.265	-0.467	14.216*	4.160*	8.581*	-0.067
	-0.21	-1.91	-0.13	-0.57	-1.66	-1.96	-1.69	-0.03
Roan	3.008*	5.902***	1.412	-0.868	15.023*	7.438***	9.264	0.541
	-1.81	-2.78	-0.03	-1.03	-1.77	-3.2	-1.64	-0.24
Constant	0.377**	0.555	3.773	0.313*	1.495	0.589	0.002	-1.150**
	-2.26	-1.22	-1.29	-1.87	-1.49	-1.47	-0.01	-2.09
Observations	57	99	62	86	32	55	101	43
No. of banks	29	35	22	31	14	19	35	17
B-P	0.11	2.56	0.11	6.34**	0.12	4.03**	2.56	0
Hausman	6.18	0.8		6.07	3.74		0.8	

B-P is the Bruesch-Pagan test, distributed as chi-squared with one degree of freedom.
The Hausman test is distributed as a chi-squared with 4 degrees of freedom. The test is not reported in cases where the program could not compute the statistic.

Table A2.2.3. Fixed Effects Regression Estimates for Growth in Market Shares 1998–2000

	Armenia	Baltic	Bulgaria	Hungary	Kazakhstan	Latvia	Poland	Ukraine
Ad	0.107	-0.228	-0.782	-0.045	-0.297	0.103	-0.094	1.51

	-0.85	-0.37	-0.26	-0.22	-0.51	-0.13	-0.37	-1.56
Pea	1.645	-4.889**	-13.472	0.492	-14.828**	-5.365*	-1.856	4.954**
	-1.01	-2.03	-0.41	-0.34	-2.34	-1.76	-0.37	-2.34
Cea	-1.291	5.208*	-7.398	-0.598	12.932	6.633*	13.788*	-8.252
	-0.4	-1.81	-0.2	-0.64	-1.28	-1.88	-1.97	-1.47
Roan	-0.477	5.882**	34.339	-1.209	28.369**	7.101**	10.256	4.218
	-0.18	-2.43	-0.46	-1.23	-2.49	-2.38	-1.5	-0.96
Constant	0.099	0.609	3.737	0.214	1.512	0.235	-0.168	-0.792
	-0.24	-0.82	-0.57	-1.01	-1.51	-0.25	-0.44	-0.7
Obs	57	99	62	86	32	55	101	43
No of banks	29	35	22	31	14	19	35	17
Adjusted R-squared	-1.15	-0.47	-0.67	-0.58	-0.45	-0.4	-0.39	0.07

Absolute value of z statistics in parentheses.
*, **, and *** signify a rejection of the null at 10, 5, and 1 per cent respectively.

Table A2.3. Cross-Country Regressions

Table A2.3.1. Cross-Section Regression Estimates for Armenia

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.031**	-0.007	-0.193	0.124
	-2.72	-1.26	-0.92	-1.4
Cea	-0.016	0.073	-1.202	0.759
	-0.15	-0.96	-0.63	-0.67
Pea	-0.09	-0.194**	0.06	-0.299
	-1.27	-2.32	-0.05	-0.24
Roan	0.153	0.157	4.297	4.052*
	-0.75	-1.12	-1.15	-1.93
Constant	0.093***	0.073***	0.738**	0.249
	-5.06	-5.28	-2.18	-1.21
Observations	28	29	28	29
Adjusted R-squared	0.23	0.19	0	0.16
Absolute value of t-statistics in parentheses				

*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.2. Cross-Section Regression Estimates for Baltic States

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.043*	-0.077	-0.078	-0.055
	-1.75	-1.56	-0.23	-0.06
Cea	-0.169	-0.195	-4.559	10.928***
	-0.78	-1	-1.53	-2.81
Pea	-0.106	-0.101	-0.614	-11.702**
	-0.6	-0.42	-0.25	-2.41
Roan	0.193	0.221	-1.243	6.084
	-1.13	-0.74	-0.53	-1.02
Constant	0.096***	0.128**	0.811*	0.847
	-3.01	-2.23	-1.85	-0.74
Observations	34	33	34	33

Adjusted R-squared	0.09	0.03	0.13	0.21

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.3. Cross-Section Regression Estimates for Bulgaria

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.035	-0.045	-0.043	-0.281*
	-1.03	-1.44	-0.31	-1.85
Cea	-0.578	1.159	-2.409	1.08
	-1.02	-1.44	-1.08	-0.28
Pea	-0.003	-1.091**	1.364	-1.075
	-0.01	-2.45	-0.53	-0.5
Roan	0.371	3.014***	-2.572	2.129
	-0.48	-3.48	-0.84	-0.51
Constant	0.134**	0.081	0.246	0.564**
	-2.35	-1.69	-1.09	-2.45
Observations	22	22	22	22
Adjusted R-squared	0	0.39	-0.12	0

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.4. Cross-Section Regression Estimates for Hungary

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.119**	-0.068	-0.319	0.276
	-2.55	-1.28	-1.68	-1.27
Cea	0.614	-0.055	-0.303	0.189
	-1.16	-0.11	-0.14	-0.09
Pea	-0.335	0.407	-1.333	-0.368
	-0.64	-0.84	-0.62	-0.18
Roan	0.648	0.233	1.385	6.893**
	-1.07	-0.33	-0.56	-2.35
Constant	0.145***	0.076	0.581***	-0.195
	-2.87	-1.14	-2.82	-0.71
Observations	28	30	28	30
Adjusted R-squared	0.13	0.07	0.12	0.14

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.5. Cross-Section Regression Estimates for Kazakhstan

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.096	-0.045	-0.488	-0.832
	-0.92	-0.56	-0.22	-1.79
Cea	-1.393	0.381	-6.647	-10.87
	-1.22	-0.29	-0.28	-1.42
Pea	0.829	-1.414	12.931	-4.292
	-0.87	-1.19	-0.64	-0.63
Roan	-1.288	-1.148	-16.129	-22.137
	-1.12	-0.52	-0.67	-1.72

Constant	0.282	0.34	1.223	3.908***
	-1.76	-1.87	-0.36	-3.73
Observations	12	12	12	12
Adjusted R-squared	-0.02	-0.17	-0.39	0.48

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.6. Cross-Section Regression Estimates for Latvia

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.04	-0.064	-0.175	-0.385
	-1.37	-1.21	-0.35	-0.47
Cea	-0.142	-0.168	-6.98	11.367***
	-0.58	-0.95	-1.69	-4.11
Pea	-0.079	0.143	-2.223	-13.173***
	-0.45	-0.55	-0.75	-3.29
Roan	0.131	0.037	-0.786	14.429***
	-0.77	-0.12	-0.27	-3
Constant	0.084*	0.088	1.397*	1.185
	-2.09	-1.53	-2.05	-1.32
Observations	19	19	19	19
Adjusted R-squared	-0.06	-0.13	0.24	0.56

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.7. Cross-Section Regression Estimates for Poland

	Market Shares		Growth in Market Shares	
	1999	**2000**	**1999**	**2000**
Ad	-0.009	-0.046*	-0.033	-0.054
	-0.82	-1.83	-0.23	-0.43
Cea	-0.004	0.117	22.700**	-16.577***
	-0.01	-0.13	-2.13	-3.7
Pea	0.439	0.252	-9.746	13.523***
	-0.67	-0.38	-1.15	-4.06
Roan	-0.143	1.341	18.134	-8.407
	-0.15	-1.09	-1.41	-1.36
Constant	0.008	0.044	-0.157	0.155
	-0.26	-1.23	-0.37	-0.86
Observations	34	34	34	34
Adjusted R-squared	-0.06	0.01	0.04	0.31

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.8. Cross-Section Regression Estimates for Market Shares, Russia

	1999	**2000**
Ad	-0.018	-0.007
	-0.45	-0.56
Cea	0.198	-0.005
	-1.55	-0.03
Pea	-0.21	-0.08

	-1.56	-0.65
Roan	0.117	0.041
	-1.02	-0.49
Constant	0.051	0.037
	-1.2	-1.53
Observations	29	35
Adjusted R-squared	-0.04	-0.1

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.

Table A2.3.9. Cross-Section Regression Estimates for Ukraine

	Market Shares		**Growth in Market Shares**	
	1999	**2000**	**1999**	**2000**
Ad	-0.085**	-0.092*	0.873*	-0.536
	-2.54	-2.12	-2.13	-0.72
Cea	-0.034	0.264*	2.972*	-0.304
	-0.27	-1.95	-1.89	-0.15
Pea	0.115	-0.09	-3.894**	1.913
	-1.01	-0.75	-2.8	-1.01
Roan	0.062	0.318*	0.364	1.682
	-0.52	-1.99	-0.25	-0.63
Constant	0.079**	0.098*	0.47	0.591
	-2.25	-1.89	-1.1	-0.66
Observations	17	18	17	14
Adjusted R-squared	0.36	0.5	0.41	-0.01

Absolute value of t-statistics in parentheses
*, **, and *** signify rejection of the null at 10, 5, and 1 percent respectively.