

Appendix 1: An Exploratory Analysis of Individual Bank Performance

The body of this paper, and the accompanying tables, describe in detail differences in the regulatory regimes in the EU and G-10 countries. In some cases the differences are relatively minor, whereas in other cases they are quite significant. In particular, the U.S. appears to be “out-of-step” in a number of respects with the majority of the other industrial countries examined. As a first step in addressing whether the differences in regulatory regimes that have been identified in these countries significantly affect the performance of individual banks, an exploratory empirical analysis was conducted. Although our main aim in this appendix is to suggest some potentially fruitful avenues for future research, it is interesting to note how our results may add information to the debate on the range of powers permissible to banks.

The primary focus of inquiry is on the effects of restricted versus unrestricted banking activities on bank performance. There are two basic points of view. The banking “industry” position is that allowing banks a broader range of permissible activities will allow them to realize economies of scope (and, possibly, scale), which in turn will lead to lower prices and higher profitability. Diversifying into a broader range of activities, moreover, could result in less overall risk for a bank, as downturns in the demand for one product line are offset by increases in demand for another. A second point of view, which can be called the “overreaching” position, is that broadening the range of activities in which banks are permitted to engage will not result in either economies of scope or scale, and hence neither higher profits nor reduced risk. Instead, banks will tend to add product lines without being able to integrate them adequately into the overall operation of the organization, and/or inexpert management of new product lines will detract from proper management of traditional lines of business.

In order to test which of these two viewpoints is the most accurate, ideally one would like to assess the effect of various banking activities on measures of scope and scale economies and, more generally, measures of profitability and risk. As a first step, however, and in keeping with the exploratory nature of the analysis, the focus here is on investigating possible influences on bank profitability only from a standard set of bank-specific explanatory variables along with new variables taking account of cross-country differences in the regulatory environment in which banks operate.⁵⁷

The specific analysis conducted in an attempt to provide information useful in assessing the different points of view is based upon an earlier study of individual bank performance across selected countries by Barth, Gropper and Jahera (forthcoming), which in turn was largely motivated by a study of U.S. individual bank performance by Berger (1995). In particular, four alternative specifications of the following general model are estimated:

$$(1) \quad y_i = \beta_0 + \sum_{j=1}^m \beta_j X_{ij} + \sum_{j=1}^n \beta_j D_{ij} + \epsilon_i,$$

where $E(\epsilon_i) = 0$, $E(\epsilon_i \epsilon_i') = \sigma^2$ if $i = i'$, $E(\epsilon_i \epsilon_i') = 0$ if $i \neq i'$,
and i indexes banks, and j indexes the explanatory variables.

Rate-of-return on capital (ROE) is included in the model as the measure of performance (i.e., profitability) of individual banks and therefore is the dependent variable (y). This is a

⁵⁷The construction of proxies used in studies of bank performance is subject to well-known issues, primarily related to unavailable data and thus the appropriateness of relying on available data. For a recent discussion of such issues, and their attendant implications for analysis, see Berger and Mester (forthcoming). The focus here is on examining the profitability aspect of the range of the desired dimensions of bank performance, in part because there is an extensive literature upon which to draw for guidance, and in part because of harsher limitations across countries in suitable data for constructing standard proxies for other relevant measures of bank performance.

commonly employed, albeit criticized, measure of performance in the banking literature.⁵⁸ Berger (1995, p. 440), for example, states that his “goal is to explain the effect of capital on earnings (measured in equations with ROE as the dependent variable).” Barth, Gropper and Jahera (forthcoming), like Berger (1995), also employ ROE as the dependent variable. Still other studies employ this same variable as a measure of bank performance, but sometimes as one of two or more alternative performance measures. This is the case in the studies by Swamy, Barth, Chou and Jahera (1996), Goldberg and Rai (1996), Gorton and Rosen (1995), and Schranz (1993), among others. In many cases, the empirical results are essentially unchanged with respect to the particular measure of bank performance chosen, especially as between ROE and ROA (rate-of-return on assets).

Four alternative combinations of explanatory variables (X's and D's) are also included in the empirical model. The general approach to the specifications of the model is to take progressively into account bank-specific variables (X's), country-specific macroeconomic variables (X's) (since the banks being analyzed are located in different countries), and regulatory-specific variables (D's) in explaining bank performance. The bank-specific variables (X's) are total assets, equity-capital-to-asset ratio, loan-to-asset ratio, non-interest-expense-to-net-revenue ratio, and three-bank concentration ratio (although this latter variable is really a banking-wide, country-specific variable). These are commonly employed explanatory or control variables in many bank performance studies. In particular, in a study of performance for a sample of banks in four European countries, Molyneux, Lloyd-Williams and Thornton (1992) include a capital-to-

⁵⁸For examples of relatively early studies using this performance measure, see Bartholomew (1995) and Short (1979). Gilbert (1984) provides a comprehensive survey of the earlier bank performance studies.

asset ratio and a loan-to-asset ratio to account for bank-specific risk, on the grounds that their dependent variable (total interest revenue

per dollar of assets) is not risk-adjusted. In a similar vein, Samolyk (1994, p. 7) states that “Differences in loan/asset ratios and bank capitalization are important factors in assessing the relative profitability and risk of banks.” The other bank-specific variables employed here are found in other studies of bank performance. There are numerous studies of performance and very few, if any, employ the exact same set of bank-specific or, more generally, control variables. The macroeconomic variables (X 's) are the percentage change in the GDP deflator, the percentage change in real GDP, and the long-term interest rate minus the short-term rate. The regulatory variables are dummy variables (D 's) indicating whether specific bank activities are unrestricted or not. In addition, two dummy variables (D 's) are included to take into account whether the deposit-insurance scheme in a particular country is funded ex post or ex ante and whether an individual bank is located in an EU country or not. As in the case of the measure of performance employed here, future work should consider alternative explanatory variables, as well as alternative estimation techniques to ordinary least squares.

The individual bank data used in estimating the empirical model were obtained from Bank Scope (IBCA) and cover the 19 separate EU and G-10 countries. The sample of 142 banks consists of the largest 5 to 10 banks in each of these countries.⁵⁹ The cross-sectional analysis is

⁵⁹Danton (1992) and Frankel and Montgomery (1991), use similar sample sizes. For each country, the banks chosen for the sample account for a significant minority, or a substantial majority, of the banking assets in that country.

for 1993.⁶⁰ Table A.1.a presents information on the number of banks from each country and on the mean values of the variables included in the model. The mean values for other bank-specific variables are

⁶⁰Austria, Finland and Sweden joined the EU in 1995, and therefore are not counted as member countries of the EU in the regression analysis. It should also be noted that future work should broaden both the analysis by including other years and the coverage by including other countries.

included for informational purposes only. Clearly, there is substantial variation in the mean values of these variables across countries.

All of the bank-specific variables are ex post, accounting measures, which is also the case in many other studies of bank performance, including those studies that focus exclusively on assessing differences in the efficiency, or inefficiency, among individual banks.⁶¹ In this regard, Boyd and Gertler (1993, p. 19) state that “clean market value assessments of the overall portfolio are unavailable.” Gorton and Rosen (1995), moreover, state that “we would like... to provide evidence of the ex ante...return...[but] it is not possible to determine what bank managers think the expected return...is.” Schranz (1993, p. 307) simply states that “an accounting measure of profitability...is used rather than a market measure such as the rate of return on a firm’s common stock because risk-adjusted rates of return should be equivalent across regulatory regimes if markets are efficient.” More generally Rhoades (1995, p. 22) states that “At a conceptual level, there is merit to criticism of accounting profits for measuring economic concepts associated with resource allocation notions. However, such criticism may be of dubious importance in practice and especially when analyzing cross sections of firms in a single industry.” In any event, the goal here is not to resolve all these issues, but instead simply to specify an empirical model that generally comports with many of the previous bank performance studies, except for the inclusion of regulatory variables.⁶²

⁶¹In this regard, it is important to note that there are differences in accounting practices across countries. Yet, no source appears to exist that would allow one to adjust for different accounting conventions across countries.

⁶²For further discussion of some of these and other issues in the broader context of potential econometric problems and a potential resolution strategy, see Swamy, Barth, Chou and Jahera (1996).

The empirical results of estimating the model given by equation (1) are reported in Table A.1.b. In the first specification, only country dummy variables are included, with the U.S. the excluded country. In half of the countries, the estimated coefficients are negative and statistically significant, indicating that individual banks in those countries performed, on average, worse than banks in the U.S. Although these results do indicate there are differences in individual bank performance across countries, they provide no clear information as to which macroeconomic, bank and regulatory factors account for this situation.

The second specification replaces the country dummy variables with only the five bank-specific variables. In this case, two of the variables are negative and statistically significant: the loan-to-asset ratio and the non-interest-expense-to-net-revenue ratio. The latter variable is a rough measure of efficiency and therefore would be expected to be negatively related to ROE. Given all the banking problems in recent years it is not unexpected to find that the greater the percentage of a bank's assets in loans, the worse that bank's performance. This latter finding, moreover, is consistent with some of the results for the sample of European banks reported by Molyneux, Lloyd-Williams and Thornton (1992).

The third specification adds the macroeconomic variables to the bank-specific variables. In this case, three of the bank-specific variables are now statistically significant and all have negative signs. Two of these variables perform the same as in the previous specification. The additional significant variable is the equity capital-to-asset ratio. This particular variable has a negative effect on ROE, which is essentially the same result reported in Barth, Gropper and Jahera (forthcoming). With respect to the macroeconomic variables, only the percentage change in real GDP enters significantly, and with an expected positive sign.

The fourth and last specification adds the regulatory variables both to the bank-specific and to the macroeconomic variables.⁶³ In addition, a dummy variable for EU membership is included to account for the substantial interrelatedness of activities in the member countries. In this case, the results for the bank-specific variables are essentially unchanged. With respect to the macroeconomic variables, the percentage change in the GDP deflator is now significant and positive as expected, in addition to the percentage change in real GDP retaining its significantly positive sign. The EU membership variable is negative and statistically significant, indicating that, on average, the EU-banks under performed relative to non-EU banks in 1993. All of the regulatory variables are statistically insignificant based upon a two-tailed test. However, if one argues that the regulatory authorities should be most concerned about negative effects on performance, then a one-tailed test might be appropriate. In this case, one of the regulatory variables is both positive and statistically significant. In particular, the results indicate that unrestricted insurance activities have a significantly positive effect on ROE.

Despite the fact that the securities, insurance, real estate, and ownership variables when considered individually are not significant (perhaps due to multicollinearity), it nevertheless is possible that these “activities” variables taken together could have a significant effect on bank performance. To determine whether or not this is indeed the case, an F-test of the joint significance of the five “activities” variables was conducted. Based upon this test, one cannot reject the null hypothesis that the variables as a group have no impact. However, when one considers just the

⁶³Note that the regulatory dummy variables capture whether or not respective banking powers are available to banks in a given country; they are not continuous variables measuring the extent to which each bank in the sample exploited the powers available to it.

securities and insurance variables, the test results indicate that they are jointly significant at the 5 percent level. This latter finding provides very limited support for the position that loosening the restrictions on banking activities with respect to two important financial services – securities and insurance underwriting, brokering, and dealing – might enhance bank performance.

The exploratory empirical analysis conducted here fails to find any empirical evidence that unrestricted securities, insurance, and real estate activities adversely, or positively, affect bank performance. Nor do the empirical results indicate that broad powers with respect to bank investment in nonfinancial firms, and nonfinancial firm investment in banks adversely, or positively, affect performance. However, the joint significance of the securities and insurance variables provides weak support for the “industry” claim that allowing banks a broader range of permissible activities might lead to improved performance.⁶⁴

Overall, while neither the “industry” nor the “overreaching” positions receives much support from the regression analysis, the results are consistent with what can be characterized as a third

⁶⁴In an examination of securities activities, Benston (1990, p. 162) concludes that “...there is no reason to believe that banks would be more likely to become insolvent or in any way put additional strains on the federal ‘safety net’ were the Glass-Steagall Act repealed. Whether the banking industry would become much more profitable, and hence safer, also is doubtful. Banks and their customers probably would make some gains from economies of scope as banking and securities operations were conducted together.” Also, Litan (1992, p. 542) concludes that “Broader interstate authority, coupled with broader product-line freedom with suitable safeguards, clearly would reduce the risks associated with banking. It is less likely, however, that it would enhance the industry’s average profitability, since most of the cost savings would be passed on in the form of lower prices of financial services for consumers.” Furthermore, in a study more closely in the spirit of this paper, Steinherr and Huveneers (1994, p. 305) test “...with a set of 88 banks in 18 countries the effect of regulatory and other structural variables on the level and variability of bank performance.” They “...conclude that universal banks indeed achieve a better risk-return tradeoff.” More specifically, they find that “Economies of scope are not visible...”, but the variability of income is reduced. For other studies of these issues, see Boyd, Graham and Hewitt (1993), Brewer (1989), Kroszner and Rajan (1994), Kwast (1989), Mote (1992), Puri (1994), Rosen, Lloyd-Davies, Kwast and Humphrey (1989), and Wall (1987).

viewpoint on permissible banking powers. That “marketplace” view holds that broader activities for banks assure neither improved, nor diminished, performance. This position, in turn, is consistent with a public policy stance advocating reduced restrictions on banks, whose performance would then be determined more by market forces and less by regulatory measures.⁶⁵ Of course, extreme caution must be observed in drawing any policy implications from this exploratory and tentative empirical analysis. Nonetheless, the analysis could serve as a useful point of departure for further studies of bank performance seeking to take account of possible effects of regulatory variables.

⁶⁵According to Federal Reserve Bank of Cleveland President Jerry L. Jordan, “Banking companies should not be required to get permission from regulators before doing something new. Rather, they should notify authorities of their intentions. If regulators want to prevent the action, the burden should be on them to intervene in a timely way to demonstrate that the costs exceed the benefits” (see Jordan (1996)).

Table A.1.a
Sample of Large Banks in the EU and G-10 Countries: 1993
(percent, except as noted)

	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxembourg
Number of Banks	6	8	8	6	7	7	5	8	6	10
ROA	0.49	0.35	0.47	(0.75)	0.06	0.29	1.14	0.79	0.13	0.61
ROE	11.57	11.76	9.53	(16.21)	1.93	8.99	29.68	13.76	2.81	19.48
Net Interest Margin	2.40	1.76	3.06	1.62	1.45	1.80	2.14	4.70	2.40	0.93
Noninterest Expense-to-Asset Ratio	83.21	67.38	64.06	73.89	75.45	60.64	74.21	65.28	70.21	33.04
Equity Capital-to-Asset Ratio	4.22	2.99	4.78	4.34	3.18	3.19	3.28	5.94	4.62	3.18
Tier 1 Capital-to-Total Asset Ratio	NA	0.08	2.75	3.91	2.36	NA	NA	3.11	2.89	NA
Profits Before Tax-to-Total Asset Ratio	0.37	0.51	0.67	(0.75)	0.16	0.55	0.80	0.85	0.50	0.87
Total Assets (mil USD)	73,089	289,072	119,875	99,600	1,220,144	1,073,028	47,825	63,654	553,663	149,729
Off-Balance Sheet Items-to-Asset Ratio	5.23	103.97	9.96	18.37	32.90	20.49	10.04	5.27	12.08	13.27
Loans-to-Asset Ratio	53.00	34.60	47.83	52.93	41.49	65.78	28.14	58.19	53.54	24.86
Other Earning Assets-to-Asset Ratio	42.89	60.24	47.68	35.78	49.41	29.99	63.70	32.91	36.71	72.32
Fixed Assets-to-Asset Ratio	5.09	9.70	1.71	2.31	1.23	0.99	1.60	2.16	2.09	4.31
Non-Earning Assets-to-Asset Ratio	3.60	41.78	2.78	8.98	7.87	3.24	6.55	6.74	7.66	2.39
Customer and Short Term Funding-to-Asset Ratio	78.24	90.20	86.63	66.81	80.52	47.16	87.57	84.97	77.55	89.09
Other Funding-to-Asset Ratio	14.88	2.45	5.03	19.77	6.77	46.04	2.74	2.85	8.92	4.22
Other (Non-Interest Bearing)-to-Asset Ratio	2.57	4.34	3.57	8.62	9.01	3.04	6.41	6.25	8.59	3.51
Loan Loss Reserves-to-Asset Ratio	NA	NA	2.09	NA	0.53	NA	0.94	1.69	1.27	NA
Loan Loss Provisions-to-Asset Ratio	NA	3.78	1.11	1.72	0.63	0.51	0.27	0.68	0.54	2.80
Net-Charge Offs-to-Asset Ratio	NA	NA	1.11	NA	0.13	NA	NA	0.84	NA	NA
Hybrid Capital-to-Asset Ratio	8.06	NA	2.16	NA	0.51	0.49	NA	0.86	NA	0.05
Subordinated Debts-to-Asset Ratio	NA	2.18	0.83	3.55	1.69	1.25	NA	1.79	1.00	1.18
Non-Performing Loans-to-Asset Ratio	NA	NA	0.19	3.41	0.26	NA	NA	1.33	1.91	NA
Intangibles-to-Asset Ratio	NA	0.09	0.03	0.07	0.28	0.00	0.08	NA	0.30	NA

Table A.1.a (continued)

	Netherlands	Portugal	Spain	Sweden	United Kingdom	Canada	Japan	Switzerland	U.S.
Number of Banks	6	7	9	8	9	8	10	7	10
ROA	0.41	0.79	(0.42)	0.11	0.51	0.48	0.12	0.73	1.13
ROE	10.33	13.01	(7.66)	2.68	12.47	8.77	3.29	10.96	16.57
Net Interest Margin	2.12	4.36	2.94	2.18	2.81	3.05	1.30	1.47	3.73
Noninterest Expense-to-Asset Ratio	70.11	61.34	65.13	48.32	63.17	62.86	61.99	61.74	67.66
Equity Capital-to-Asset Ratio	4.11	5.97	4.68	4.38	4.08	5.46	3.82	6.55	7.14
Tier 1 Capital-to-Total Asset Ratio	NA	1.21	4.30	3.43	2.68	4.98	3.80	NA	6.85
Profits Before Tax-to-Total Asset Ratio	0.60	0.94	0.14	0.08	0.77	0.26	0.26	0.91	1.59
Total Assets (mil USD)	396,654	72,002	385,681	209,066	986,840	495,759	3,547,841	524,332	840,754
Off-Balance Sheet Items-to-Asset Ratio	16.55	16.89	5.82	8.09	33.92	55.80	10.58	0.29	NA
Loans-to-Asset Ratio	57.65	39.10	40.56	69.86	56.25	71.17	68.67	51.75	54.17
Other Earning Assets-to-Asset Ratio	36.20	43.24	50.73	22.93	32.94	23.25	27.56	39.97	30.90
Fixed Assets-to-Asset Ratio	1.45	3.67	2.81	2.03	1.60	1.22	0.70	2.37	2.37
Non-Earning Assets-to-Asset Ratio	4.70	14.02	5.89	5.18	9.21	4.37	3.04	5.90	12.56
Customer and Short Term Funding-to-Asset Ratio	83.82	85.75	86.97	54.62	80.76	83.14	87.71	75.06	66.27
Other Funding-to-Asset Ratio	7.10	2.17	3.36	33.49	4.73	2.41	4.22	10.03	18.40
Other (Non-Interest Bearing)-to-Asset Ratio	4.54	3.80	3.64	7.40	10.43	8.99	3.37	6.64	8.19
Loan Loss Reserves-to-Asset Ratio	NA	1.47	2.50	2.01	2.44	2.01	0.74	1.45	1.80
Loan Loss Provisions-to-Asset Ratio	0.35	0.70	1.31	1.66	0.86	(0.06)	0.28	0.67	0.62
Net-Charge Offs-to-Asset Ratio	NA	0.40	0.45	1.69	0.86	0.59	0.05	1.48	0.67
Hybrid Capital-to-Asset Ratio	NA	NA	NA	4.30	1.32	0.23	1.99	NA	NA
Subordinated Debts-to-Asset Ratio	1.98	1.33	1.12	2.91	1.52	2.18	14.61	1.07	NA
Non-Performing Loans-to-Asset Ratio	NA	2.38	1.78	5.34	4.62	1.92	NA	NA	1.67
Intangibles-to-Asset Ratio	NA	0.32	0.22	0.04	NA	0.18	NA	0.02	0.56

SOURCE: BankScope, IBCA.

Table A.1.b
Alternative Regression Specifications for ROE

Explanatory Variables	1	2	3	4
Intercept	18.1645*** (4.918)	32.3261*** (6.899)	27.3881*** (5.116)	23.7655*** (3.018)
Bank Size, Loan Share, Efficiency and Concentration				
Assets		-0.0000 (-0.895)	0.0000 (0.066)	0.0000 (0.628)
Equity Capital-to-Asset Ratio		-0.1194 (-0.943)	-0.2174* (-1.708)	-0.2226* (-1.695)
Loan-to-Asset Ratio		-0.1194*** (-2.964)	-0.1711*** (-2.930)	-0.1694*** (-2.778)
Non-Interest Expense-to-Net Revenue Ratio		-0.1543*** (-2.725)	-0.1674*** (-3.107)	-0.2046*** (-3.170)
3 Bank Concentration Ratio		-0.0708 (-1.654)	-0.0271 (-0.619)	-0.0060 (-0.092)
Macro economy				
Percentage Change in GDP Deflator			0.9544 (1.587)	2.0279** (2.439)
Percentage Change in Real GDP			2.0901*** (2.986)	1.7629* (1.682)
Long-Term Interest Rate Minus Short-Term Rate			0.4814 (0.872)	0.0704 (0.075)
Powers, Ownership, Deposit Insurance and EU Membership				
Securities Activities Unrestricted (=1)				1.9730 (0.408)
Insurance Activities Unrestricted (=1)				6.3882 (1.628)
Real Estate Activities Unrestricted (=1)				-1.3385 (-0.342)
Bank Investment in Nonfinancial Firms (=1)				2.8772 (0.729)
Nonfinancial Firm Ownership of Bank (=1)				1.3441 (0.344)
Ex Post Insurance System (=1)				-2.5291 (-0.723)
Geographical Branching Restricted (=1)				8.1494 (1.168)
EU Membership (=1)				-8.6177** (-2.248)

Table A.1.b (continued)

Explanatory Variables	1	2	3	4
Country Dummies				
Austria	-10.5667* (-1.752)			
Belgium	-7.9875 (-1.442)			
Canada	-8.5475 (-1.543)			
Denmark	-16.5514*** (-2.988)			
Finland	-23.5345*** (-3.902)			
France	-12.9745** (-2.254)			
Germany	-12.2958* (-1)			
Greece	5.0377 (0.787)			
Ireland	-7.8275 (-1.224)			
Italy	-14.8902** (-2.469)			
Japan	-15.0082*** (-2.873)			
Luxembourg	-0.0750 (-0.014)			
Netherlands	-11.2958* (-1.873)			
Portugal	-6.9228 (-1.203)			
Spain	-4.8200 (-0.898)			
Sweden	-14.4725** (-2.612)			
Switzerland	-9.2924 (-1.614)			
United Kingdom	-4.8783 (-0.909)			
F-Statistic	2.303	5.378	6.304	3.829
Adjusted R-Squared	0.1426	0.1344	0.2313	0.2430
Sample Size	142	142	142	142

NOTE: t-Statistics are in parenthesis. By a two-tailed test *** indicates statistically significant at the 1% level; ** indicates statistically significant at the 5% level; and * indicates statistically significant at the 10% level.