

The Performance of US Banks: 1994-2007

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October 28, 2009

Research Question

- Determinants of bank performance
- Classic question: the relative importance of industry and firm effects
- Inter-industry study: no industry effects, but consider location effects
- Decompose the performance of US banks
- Develop evidence on the permanent and transient influences of year, location, business focus, and firm effects on bank performance
- Banks in the U.S. from 1994 to 2007

Outline

- 1 Previous Literature
- 2 Methods
- 3 Data
- 4 Empirical Results

Structure-Conduct-Performance

- Schmalensee (1985), Wernerfelt and Montgomery (1988), Rumelt (1991) etc.
- A. McGahan, *The Performance of US Corporations:1981-1994*, 1999
 - Decompose the performance of US public firms into year, industry, corporate-focus and firm effects.
 - 3 performance measures
 - : Tobin's q, ratio of earnings to assets, and return on the replacement value of assets
 - Inter-industry study, but not include financial firms
- In general, firm effects were more important than industry effects.

Banking Literature

- Short (1979), Goddard (2004) etc.
- Berger et al. (2000)
 - Examine the persistence of bank profits 1970-1997
 - 3 performance measures
 - : rate of return on equity (ROE), Rate of return on assets (ROA), Revenue-to-cost ratio (R/C)
 - Strong determinants of persistence
 - : banking market competition, info. opacity (proprietary info, organizational complexity)
 - Sensitive to regional/macroeconomic shocks.

Possible Effects on Performance

- Year effects
 - : reflect macroeconomic fluctuations
 - : the business cycle and broad changes in financial markets are main drivers
- Location (defined as state) effects
 - : arise when the avg. performance of direct competitors is abnormally high or low
 - : capture the part of performance variety due to differences *across* states
 - Permanent: reflect impediments to product or resource flows (barriers to entry, inherent regional economic conditions)
 - Transient: reflect the common tendencies in performance among direct competitors for specific years in the panel

Possible Effects on Performance: continued

- Business focus effects

- : McGahan(1999) uses corporate focus effects

- : retail banking focus effects (discussed later)

- Permanent: the overall impact of the retail banking over the whole period

- Transient: variation by year in the degree of retail banking

- Firm effects

- : arise when the performance of a bank differs from the avg. for its locations (given the year and degree of retail focus)

- : capture the part of performance variety due to differences *within* states

- : the avg. competitive advantage or disadvantage of the bank across its businesses

- Permanent

- : reflect a unique impediment to product or resource flows for the entire period that the bank appears in the panel

- : the bank's sustainable competitive advantage over the 13-year period

- Transient: reflect unique influences on the bank that vary in each year

Use accounting profitability, ROA (overall performance measure)

- ROA = Net Income divided by Gross Total Assets
 - GTA is superior to Total assets because GTA does not depend on the performance status of the assets (Berger and Mester 2003)
- Criticized because anomalies in reporting and measurement can generate any type of aforementioned effects
 - : there was a merger wave during the sample period
 - : there was a change in the accounting methodology in 2001 (esp. related to merger activities)

Estimation Specification

- The aforementioned effects are estimated using the following model (McGahan(1999)):

$$p_{k,t} = \mu + \gamma_t + \sum_m \alpha_m a_{m,k,t} + \beta D_{k,t} + \phi_k \quad (1)$$
$$+ \sum_m \delta_{m,t} a_{m,k,t} + \omega_t D_{k,t} + \epsilon_{k,t}$$

where

- $p_{k,t}$ = Performance of bank k at time t ;
- γ_t = Effect of year t ;
- α_m = Permanent locational effect being in state m ;
- $a_{m,k,t}$ = Proportion of k 's branches in m at t
- β = Permanent effect of business focus;
- $D_{k,t}$ = Vector of business focus measures for k at t ;
- ϕ_k = Permanent firm effect of k ;
- $\delta_{m,t}$ = Transient locational effect being in m at t ;
- ω_t = Transient effect of business focus;
- $\epsilon_{k,t}$ = Residual: transient firm effect for k at t

Estimation Specification: features

- Colinearity
 - : trans. location effects for all years and perm. location effects
 - : perm. firm effects among direct competitors and perm. location effects
 - : dealt by reporting the incremental explanatory power of each set of estimated effects
- Linear Additive
 - : simple and equal to prior studies
- Results presented in the form of ANOVA
- Permanent versus Transient
 - : depend on the length of the period, permanent effects are relevant to the 13 years

Estimation Specification: features (cont'd)

- Permanent firm effects
 - : identified from multiple observations on a bank
 - e.g) Perm. firm effect on ROA for BoA
 - : the avg. amount over time by which BoA outperformed the weighted avg. for 50 states and D.C. after controlling for BoA's degree of retail banking
- Retail banking focus (degree of retail banking, retail intensity) effect
 - : the ratio of core deposits to total domestic deposits, the ratio of retail loans to total loans, branches-per-assets (Hirtle and Stiroh (2007)), small business loan indicator
 - : retail banking is a relatively stable activity (but a low return)

S&P, "an increasing emphasis on the retail sector has become the stand-out characteristics supporting the success of these institutions (in reference to six of the largest US bank holding companies)"

- Sample period: July 1994-June 2007
- Call Reports and Summary of Deposits (SOD)
 - Call Reports
 - : ROA, core deposits, retail loans, total loans, total assets, small business loan indicator etc.
 - SOD
 - : the geographic dist. of branches, total domestic deposits, the number of operating states etc.

Sample Construction

- Size: a basic control typically used when examining performance
- Define four size categories based on total assets in 1994:
 - Mega: more than \$10 billion
 - Big: between \$1 billion and \$10 billion
 - Medium: between \$100 million and \$1 billion
 - Small: less than \$100 million
- Due to the huge size of the dataset, need to divide the sample into sub-samples
: cannot run the estimation with over 100,000 firm fixed effects!

Characteristics of the Dataset

By Year, Size: The Number of Banks

Year	No. Banks				
	Mega	Big	Medium	Small	Total
94	54	374	3,086	7,759	11,273
95	51	351	2,872	7,441	10,715
96	44	316	2,653	7,203	10,216
97	35	262	2,460	7,067	9,824
98	28	226	2,277	6,930	9,461
99	27	207	2,115	6,784	9,133
00	26	187	1,970	6,742	8,925
01	24	175	1,843	6,570	8,612
02	22	168	1,748	6,455	8,393
03	22	152	1,713	6,359	8,246
04	22	132	1,658	6,282	8,094
05	20	120	1,589	6,204	7,933
06	20	121	1,540	6,175	7,856
07	20	112	1,490	6,088	7,710
Total	415	2,903	29,014	94,059	126,391

Characteristics of the Dataset

By Year, Size: Avg. Total Assets (\$1000)

Year	Avg. Total Assets				
	Mega	Big	Medium	Small	Total
94	33,300,000	3,189,701	247,999	43,474	363,181
95	35,700,000	3,645,927	283,394	46,444	397,439
96	42,200,000	4,043,485	322,811	51,764	427,054
97	56,600,000	4,829,408	383,910	59,573	469,277
98	73,000,000	5,754,814	451,149	77,059	518,608
99	68,500,000	6,542,280	538,225	83,791	537,679
00	94,200,000	7,474,609	442,039	94,041	599,648
01	105,000,000	8,171,077	509,129	97,401	641,638
02	118,000,000	9,505,068	555,604	91,866	686,579
03	132,000,000	11,100,000	604,083	101,516	759,085
04	142,000,000	12,700,000	634,872	107,542	806,980
05	168,000,000	13,200,000	681,928	120,289	854,047
06	182,800,000	13,600,000	725,226	131,744	918,891
07	199,000,000	15,300,000	766,868	122,178	983,159
Total	103,592,857	8,504,026	510,517	87,763	640,233

Characteristics of the Dataset

By Year, Size: Avg. No. Operating States

Year	Avg. No. Operating States				
	Mega	Big	Medium	Small	Total
94	1.11	1.02	1.00	1.00	1.00
95	1.16	1.02	1.00	1.00	1.00
96	1.50	1.08	1.01	1.00	1.01
97	2.97	1.18	1.02	1.01	1.02
98	3.29	1.35	1.04	1.01	1.03
99	3.33	1.57	1.06	1.01	1.04
00	4.08	1.72	1.07	1.01	1.05
01	4.96	1.93	1.09	1.02	1.06
02	5.36	2.06	1.11	1.02	1.07
03	5.86	2.16	1.12	1.02	1.08
04	6.50	2.39	1.14	1.02	1.08
05	7.45	2.55	1.16	1.03	1.09
06	7.55	2.82	1.17	1.03	1.10
07	8.25	3.17	1.18	1.04	1.12
Total	4.53	1.86	1.08	1.02	1.05

- Mega banks: the number of operating states significantly increased.

Performance Measure: ROA

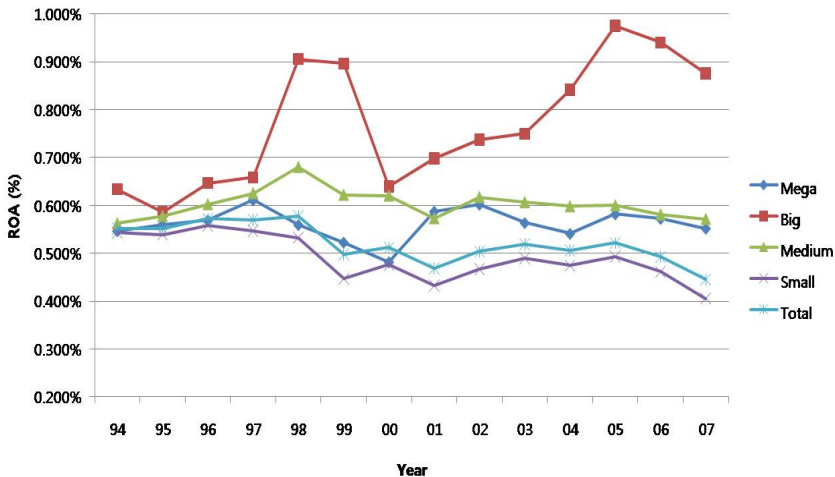
Average and Standard Deviation of ROA (%)

	ROA (%)				
	Mega	Big	Medium	Small	Total
Average	0.5608%	0.7337%	0.6030%	0.4931%	0.5241%
St. Dev.	0.2517%	1.2288%	0.6571%	0.7278%	0.7289%

- Big banks: the highest avg. ROA with largest variation

By Year and Size: ROA

Avg. ROA (Percent), 1994-2007



- Exclude transient location effects
 - : not significant at all (no explanatory power, large negative adj. R-sq.)
 - : too many RHS variables in the regression for Mega and Big banks
 - Mega: R-squared is 1!
 - Big: adj. R-squared is -0.0907 while R-squared is 0.4028
- F-stat is omitted in the ANOVA tables, but explained in words.

ANOVA Results: Mega Banks

Model	Incr. R-squared	Incr. Adj. R-squared	Ser. Corr. ^a
<i>(a) Mega: 415 obs.</i>			
Year	0.015	-0.017	0.002
Perm. Location	0.207	0.081	-0.040
Perm. Biz Focus	0.037	0.034	-0.049
Trans. Biz Focus	0.114	0.041	-0.058
Perm. Firm	0.265	0.240	-0.102
Model	0.638	0.379	-0.102

^a Serial correlation in residuals from the model including each effect and the previously listed effects.

- Year effects: not significant
- Perm. retail deposit ratio: statistically significant
- Perm. firm effects (59 banks): statistically significant

ANOVA Results: Big banks

Model	Incr. R-squared	Incr. Adj. R-squared	Ser. Corr. ^a
<i>(b) Big: 2,903 obs.</i>			
Perm. Location	0.018	0.000	0.004
Perm. Biz Focus	0.049	0.049	-0.011
Trans. Biz Focus	0.041	0.025	-0.015
Perm. Firm	0.261	0.159	0.001
Model	0.369	0.233	0.001

^a Serial correlation in residuals from the model including each effect and the previously listed effects.

- Year effects: not significant
- Perm. retail loan ratio: statistically significant at 95% confidence level
- Most trans. retail intensity variables: significant, but not significant for trans. small biz loan
- Perm. firm effects (417 banks): statistically significant

ANOVA Results: Medium banks

Model	Incr. R-squared	Incr. Adj. R-squared	Ser. Corr. ^a
<i>(c) Medium: 29,014 obs.</i>			
Year	0.002	0.002	0.055
Perm. Location	0.008	0.006	0.047
Perm. Biz Focus	0.021	0.021	0.038
Trans. Biz Focus	0.012	0.010	0.037
Perm. Firm	0.303	0.220	0.012
Model	0.346	0.259	0.012

^a Serial correlation in residuals from the model including each effect and the previously listed effects.

- Year effects, Perm. firm effects (3,291 banks): statistically significant
- Perm. retail loan ratio, branches-per-assets, small biz loan: significant
- All trans. retail intensity variables: significant
- Rate of serial correlation diminishes because the introduction of each set of effects relieves the residual from carrying their fixed influences.

ANOVA Results: Small banks

Model	Incr. R-squared	Incr. Adj. R-squared	Ser. Corr. ^a
<i>(d) Small: 94,059 obs.</i>			
Year	0.004	0.004	0.242
Perm. Location	0.009	0.009	0.234
Perm. Biz Focus	0.041	0.041	0.213
Trans. Biz Focus	0.007	0.006	0.211
Perm. Firm	0.462	0.407	0.210
Model	0.523	0.467	0.210

^a Serial correlation in residuals from the model including each effect and the previously listed effects.

- Year effects: statistically significant
- All perm. and trans. retail intensity variables: significant
- Perm. firm effects (9,405 banks): significant
- Rate of serial correlation diminishes

Contribution to Adj. R^2 of the Various Effects

Model	Mega		Big		Medium		Small	
Year	n/a		0.006	2.5%	0.002	0.7%	0.004	0.8%
Perm. Location	0.081	20.5%	0.000	0.1%	0.006	2.4%	0.009	1.9%
Perm. Biz Focus	0.034	8.5%	0.049	20.6%	0.021	8.1%	0.041	8.7%
Trans. Biz Focus	0.041	10.4%	0.025	10.4%	0.010	3.9%	0.006	1.4%
Perm. Firm	0.240	60.7%	0.159	66.5%	0.220	85.0%	0.407	87.2%
Model	0.396	100.0%	0.238	100.0%	0.259	100.0%	0.467	100.0%

- McGahan (1999)
 - : adj. R-squared is 0.361 with year, perm. industry, focus, firm and trans. focus effects
 - : perm. firm > perm. industry > year
- Firm effects are more important than any other effects
 - : organizational capabilities are important to competitive processes
- Big banks: more variation in ROA than other type of banks