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Determinants of Commercial Bank Automobile Loan Rates

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DETERMINANTS OF COMMERCIAL BANK AUTOMOBILE LOAN RATES

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I. Introduction

Several studies (Edwards [2], Meyer [8], and Phillips [9]) have investigated differences in commercial bank business loan rates associated with market structure, bank size, geographic, and loan size differences. Additional studies (Kaufman [7], Taylor [12]) have investigated similar phenomena to determine the extent to which they influence the ratio of gross loan receipts to loans outstanding for individual commercial banks. However, little attention has been given to the determinants of interbank differences in consumer auto loan rates.

Shay [10] is the only previous investigator to analyze microeconomic data on bank auto loan rates. Although his study primarily concentrated on rates charged by auto sales finance companies, it also contained an analysis of data collected from a sample of bank auto loans in a 1954-55 Federal Reserve survey.

In analyzing his data, Shay noted that bank auto loan rates in the West exceeded rates in the South, which in turn exceeded the nearly identical rates prevailing in the North and North-Central part of the country. Shay did not test these geographic differences for statistical significance. Additionally, Shay noted that, of the eight states that had auto loan rate ceilings, only three had ceilings sufficiently low that they might have affected mean loan rates (on loans by all lenders), but two of those three were located in regions with generally low loan rates, so the likely effect of rate ceilings on mean loan rates was slight. All rate ceilings reported by Shay considerably exceeded the mean, rate charged on bank auto loans (9.48%).

In another study, Stafford and Dunkelberg [11] estimated auto loan rates paid by various consumers in a cross-section survey of consumer debt taken in 1967. While their analysis was not restricted to commercial bank loans, they found that the place of residence of the borrower was associated with the level of rates paid. In particular, they found that borrowers in the South paid significantly higher rates than borrowers in the Northeast. They also found rates charged in the West and North-Central regions to be very similar and intermediate in level--once demographic characteristics of borrowers had been taken into account. In addition, they found that rural borrowers tended to pay more than urban customers, but the differences were not statistically significant.

Finally, Greer and Nagata [5] investigated the determinants of commercial bank direct new auto loan rates using aggregate data for 43 states. They found that these rates were positively related to statewide measures of bank concentration and the logarithm of statewide average time and savings deposit rates. They also tested various branching dummy variables without conclusive results. In all equations, limited branching dummy variables were not significant, while the sign of the statewide branching dummy was significantly positive in one equation and significantly negative in another equation (when used as an independent variable in conjunction with, insignificant, cross-product terms for bank concentration and the branching dummies).

In this study, we look at 36-month "most-common" direct new auto loan rates charged in the first week of the month by the 316 and 315 banks, respectively, that reported auto loans in the Federal Reserve Board's consumer loan rate surveys of May and September 1975. The largely identical banks represented in the two samples

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are not necessarily typical of banks in the nation as a whole--since the survey design disproportionately sampled large banks and responses were voluntary. However, the data provided can be used to determine whether loan rates charged by respondent banks vary with bank size, location, or different aspects of the regulatory milieu, such as state loan rate ceilings, restrictions on creditors' remedies, or bank branching laws.

II. Factors Affecting Bank Loan Rates

The "most-common?" loan rate reported by a commercial bank generally applies to typical customers. A number of factors may influence typical loan rates charged by a given bank, either by affecting consumer demand for its loans or by affecting its willingness to supply such credit.

Demand-related factors that may affect the rate of charge and/or quantity of auto loans made by a bank include (i) the socio-economic characteristics and willingness to acquire debt of the population in the bank's market area,¹ (ii) consumer demand for new automobiles, and (iii) the cost and availability of auto credit from competing banks, finance companies, or credit unions. To investigate these factors fully, micro-economic analyses must ideally be conducted on the number and characteristics of customers and competitors in each individual bank's local market. Lacking such information, in this study we focus on the narrower issue of whether factors that presumably affect the number of competitors in banks' local market areas also affect bank auto loan rates.

In general, the greater the number of relatively low rate competitors in the bank's local market area, the greater the elasticity of demand for any one bank's credit, and the closer one would expect loan rates to be to the bank's net marginal cost of making the loan. Thus, other things being equal, one would expect banks located in rural areas to be able to charge higher loan rates than similar banks in urban markets where rates would likely be constrained by the existence of a greater number of competitors. Similarly, one might expect banks located in limited branching states (where branching in local markets by principal banks and high costs of entry in local markets may increase bank concentration) to be able to charge higher rates than banks located in unit banking states, as the latter might encounter more intense local market rate competition. In state-wide branching states, greater bank concentration on a statewide level may be offset on a local level by reduced costs of entry of new competitors into local markets. Thus, it is not clear whether banks in statewide branching states would have greater or lesser ability to raise rates in local markets without being severely constrained by competitive forces.

Factors that might influence the quantity, rate, or terms of direct auto loans that a bank is willing to supply include: (i) expected yields, risk adjusted, on alternative uses of funds, (ii) expected incremental costs, including losses, from making and servicing auto loans, and (iii) compensating considerations that a bank feels it can obtain by making such loans. Compensating considerations increase the expected marginal revenue from making a loan. Possible compensating considerations include consideration of profits that can be made on incremental demand or time deposits attracted by making direct auto loans or consideration of possible incremental non-deposit related business that may be obtained by making such loans.

Bank operating statistics compiled by the FDIC show that large banks pay, on average, higher rates to attract time deposits and obtain higher net yields on their loan portfolios (as a percentage of loans outstanding).²

¹ Taylor [10], for instance, noted that "tradition, political climate, educational levels, management practices, the sophistication of the public, the structure of financial institutions, and other qualitative factors..." may help account for geographic differences in loan rates.

² As reported by the FDIC [3], in 1974, banks with under \$100 million in deposits earned an average net return (including fees and interest) on their loan portfolios of between 8.95 and 9.11 percent, while banks with \$100-\$500 million in deposits earned a return of 9.51 percent, banks with \$500-\$1000 million in deposits earned a return of 9.94 percent, and banks with \$1 billion or more in

This suggests that large banks, in general, may attempt to obtain higher net yields on consumer loans than small banks--although they may do so by taking greater risks. In addition, possible compensating considerations may be less important to large regional or national money center banks than to small banks (which typically operate in closely-knit market areas where such considerations might come into play more readily). If so, any tendency for larger banks to charge higher rates would be reinforced. However, large banks are likely to have lower marginal costs of consumer loan service since their larger volumes may allow them to employ more highly specialized consumer loan billing and collection personnel and procedures.³

Another factor that can have an important effect on consumer loan rates is state regulation. Where state loan rate ceilings are effective, one would expect consumer loan rates (as well as credit availability) to be lower than would otherwise be the case. In addition, where bank collection costs and/or losses are potentially increased by severe restrictions on their ability to collect on defaulted auto loans--due to legal restrictions on repossessions, deficiency judgments, or other collection procedures--one would expect banks to be less willing to supply auto credit without a compensating increase in rates.

Finally, loan rates may vary regionally for a number of reasons. Such reasons, which are not explicitly investigated in this study, might include regional differences in security or down payment requirements, loan payment practices, consumer loan demand, non-bank loan rate competition, or the availability of investible funds.

The preceding discussion suggests that state regulations on bank branching, rate ceilings and creditors' remedies and differences in bank size and rural-urban and regional location may all influence bank loan rates. Thus, empirical tests were designed to determine whether such factors influence bank loan rates in the expected manner.

III. Empirical Tests

To determine whether bank auto loan rates are affected by state regulations, bank location, and bank size, as hypothesized, several regressions were run using micro-data on most-common bank auto loan rates as the dependent variable, and dummy variables for state rate ceiling and creditor remedy restrictions, branching laws, bank size, and rural-urban and geographic location as independent variables. Because it was felt that the creditor remedy, rate ceiling, branching, bank size, and rural-urban variables might be correlated with the geographic region dummy variables, the equations were run both with and without the geographic region variables. Dummy variable category definitions and regression results for May and September 1975 auto loan rates are presented in Table 1.

In all equations the omitted categories for each set of dummy variables were, respectively, no remedy restrictions, restrictive rate ceilings, unit banking, bank size group land non-SMSA (rural) banks. In equations (3) and (4), the dummy variable for geographic region 1 was also omitted. Coefficients for the bank size, rural-urban, rate ceiling, creditor remedy, and branching variables represent deviations from the omitted categories.

The results presented in Table 1 support the following conclusions.

deposits earned a return of 10.21 percent. Similarly, average interest rates paid by banks on their time deposits in 1974 rose monotonically from a range of 5.34 to 5.77 percent, for banks with under \$100 million in deposits, to 7.62 percent for banks with \$1 billion or more in deposits.

³ Meyer [8], for instance, found that larger banks apparently obtain economies of scale in making loans that are not available to smaller banks.

- (i) Auto loan rates charged by banks located in states with restrictive creditors' remedies available on defaulted auto loans were significantly higher than rates charged by banks in other states in both May and September 1975. This finding is consistent with the notion that banks seek higher loan yields to compensate for increased risks of loss when remedies are curtailed.⁴
- (ii) Bank auto loan rates were sufficiently high in 1975 that rate ceilings significantly reduced the most-common rate charged by banks located in states with restrictive rate ceilings.⁵
- (iii) When the geographic region variables were omitted, limited branching was positively associated with bank auto loan rates, possibly because it enhances bank concentration in local markets, as hypothesized. A positive impact of local market bank concentration on bank business loan rates has previously been documented by Edwards [2], Meyer [8], and Phillips [9], and a positive impact of bank concentration on bank auto loan rates has been documented by Greer and Nagata [5]. However, a positive impact of limited branching, *per se*, on bank consumer loan rates has not been documented by other investigators.⁶ This finding is particularly interesting because statewide branching was not found to have a similar effect on bank loan rates. However, there was evidence of inter-correlation between the limited branching dummy variable and geographic regions--as the standard error of the branching dummy doubled when the regional dummies were added to the equations.
- (iv) As is true with bank loan returns in general, bank auto loan rates increased with bank size. In May, the increase was monotonic. In September, while the smallest banks still charged the lowest rates and the largest banks the highest rates, rates charged by banks in size category 2 insignificantly exceeded those charged by banks in the next largest size category.
- (v) Urban banks charged significantly lower rates than banks in rural areas. This supports the hypothesis that banks with less intensive local market competition tend to charge higher rates.
- (vi) In each month the geographic region variables explained a significant amount of variance in bank loan rates that was not explained by other variables. However, in some cases the magnitudes, and/or the signs, associated with individual geographic variable coefficients changed substantially from May to September.

⁴ Alternatively, creditor remedy restrictions also might reduce credit availability to riskier classes of customers, but that possibility was not investigated in this study.

⁵ Restrictive rate ceilings might also have reduced bank credit availability to riskier customers or caused other terms of credit transactions (such as sales prices or down payments) to be modified to increase creditors' expected yields. Such effects possibly could reduce the observed rate effect. However, because they are difficult to quantify, they were not investigated in this study.

⁶ Edwards [2] failed to find similar results because he used only one dummy variable for both limited and statewide branching. Greer and Nagata's results ([5], p. 197) of no systematic branching effect are not comparable because (i) they used only statewide aggregate data and, thus, were not able to control for differences in bank size, bank location, etc., as carefully as we could by using micro-data, (ii) they did not control for the influence of state loan rate ceilings, and (iii) they only considered average bank direct loan rates in 43 states.

Table 1
Factors Affecting Bank 36-Month, "Most Common" Direct New Auto Loan Rates

Month	May (1)	Sept. (2)	May (3)	Sept. (4)
R ² /Std.Dev.	.16	.15	.27	.23
	101.65	106.76	96.36	102.85
Constant	1063.64	1077.96	1070-86	1060.58
	(28.53)*	(30.18)*	(42.73)*	(45.92)*
CR	43.92	47.89	35.37	47.24
	(16.44) *	(17.31)*	(18.49)*	(19.74)*
IC	57.05	50.61	64.31	54.22
	(19.72) *	(20.55)*	(21.25)*	(22.53)*
BRI	42.14	45.55	20.27	19.69
	(14.05) *	(14.89)*	(27.47)	(29.32)
BR2	-.74	19.28	-4.53	29.28
	(17.04)	(17.67)	(21.78)	(22.23)
S2	20.49	35.47	18.14	33.81
	(16.27)	(16.73)*	(15.62)	(16.31)*
S3	43.89	32.04	31.30	22.65
	(17.20) *	(17.64)*	(16.57)*	(17.15)
S4	68.85	65.47	53.58	58.07
	(17.78) *	(18.45)*	(17.19)*	(18.05)*
UR	-38-08	-59.35	-36.85	-56.09
	(21.81) *	(22.85)*	(20.86)*	(22.21)*
G2			51.64	59.67
			(26.62)*	(28.93)*
G3			-32.17	-35.04
			(29.61)	(32.42)
G4			-1.65	17.47
			(29.92)	(32.51)
G5			-20.73	58.10
			(32.32)	(35.17)*
G6			5.65	31.49
			(30.42)	(33.33)
G7			-65.90	-29.20
			(31.43)*	(33.27)
G8			44.41	54.60
			(34.33)	(37.10)
G9			35.07	63.60
			(29.58)	(32.22)*
Mean Rate	1140.02	1134.74	1140.02	1134.74

Where * denotes variables significant at the 90% level for two-tailed tests, standard deviations are presented in parentheses, and variables are defined as follows:

- CR = 1 for banks located in states with the most highly restricted creditors' remedies available on automobile credit,+
- IC = an "ineffective ceiling" dummy variable which equals 1 for banks located in states with rate ceilings on 36-month \$3000 auto loans which exceed the average loan rate charged by all banks in the sample,++
- BRI = 1 for banks located in states which permit limited branching,+++
- BR2 = 1 for banks located in states which permit statewide branching,+++
- S2 = 1 for banks with between 75 and 300 million dollars in deposits,
- S3 = 1 for banks with between 300 and 750 million dollars in deposits,
- S4 = 1 for banks with 750 million dollars or more in deposits,
- UR = an "urban" dummy variable which equals 1 for banks located in SMSA's
- G2 to G9 = dummy variables which take the value of 1 for banks in geographic regions 2 to 9, respectively (see below).

Geographic regions, rate ceilings, creditors' remedy restrictions, and state branching law dummies were assigned as indicated on the following list of states. Blanks refer to omitted categories.

State	G	BR	IC	CR	State	G	BR	IC	CR
Maine	1	2	1		Indiana	6	1	1	
New Hampshire	1	1	1		Illinois	7		1	
Massachusetts	1	1	1	1	Missouri	7		1	
Rhode Island	1	2	1		Iowa	7		1	
Connecticut	1	2	1		Wisconsin	7	1	1	1
Vermont	1	2	1		Minnesota	7			
New York	2	1	1	1	N. Dakota	7	1		
New Jersey	2	1			S. Dakota	7	2	1	
Pennsylvania	2	1	1		Nebraska	7		1	
Delaware	2	2	1		Kansas	7		1	
Maryland	3	2	1		Oklahoma	8		1	
D.C.	3	2	1		Texas	8		1	
Virginia	3	2	1		New Mexico	8	1	1	
W. Virginia	3	1	1		Colorado	9		1	
N. Carolina	4	2	1		Wyoming	9		1	
S. Carolina	4	2	1		Montana	9		1	
Georgia	4	1			Idaho	9	2	1	
Florida	4				Utah	9	2	1	
Alabama	5	1	1		Arizona	9	2	1	
Mississippi	5	1			Nevada	9	2	1	
Louisiana	5	1	1	1	California	9	2	1	
Arkansas	5				Hawaii	9	2	1	
Tennessee	5	1	1		Oregon	9	2		
Kentucky	5	1	1		Washington	9	2	1	1
Ohio	6	1	1		Alaska	9	2	1	
Michigan	6	1	1						

+ As indicated by executives of major automobile finance companies.

++ Rate ceilings on \$3000, 36-month auto loans were determined from Gushee [6] and other sources to be less than the mean most-common rate.

+++As determined by Goldberg [4].

Note: Regions were obtained by clustering contiguous states with similar economies, subject to the proviso that each region includes at least three states and twenty banks.

IV. Additional Analysis of Geographic Rate Differences

To determine whether the coefficients associated with the geographic dummy variables changed significantly from May to September, we hypothesized a condition of no change and tested to see if that hypothesis could be accepted. Construction of such a test requires that the (degrees of freedom) weighted average mean square error obtained from separate regressions for each time period (equations (3) and (4) in Table 1) be compared with the mean square error obtained from an additional regression. In the additional regression, data for both months are pooled and coefficients on the set of geographic variables are constrained to be the same in both periods, while all other coefficients are allowed to take different values in each period. If the

geographic variable coefficients have not changed significantly over time, an F-test will show that the residual sum of squares is not increased significantly by the constraints imposed on the geographic variable coefficients in the pooled regression.⁷

Such a test is conditional, however, in the sense that the test is robust only if the null hypothesis is rejected. If not, to be conservative, one must pool the data and conduct individual F-tests to determine if a significant reduction in explanatory power results when each individual dummy variable coefficient is restricted in turn. In such tests, the change in the error sum of squares that results when an individual dummy variable is constrained to be equal in both periods is compared to the initial weighted average mean square error applicable to the two unconstrained regressions (equations (3) and (4)). The F-statistic thus generated is then tested for statistical significance.⁸

When such tests were conducted, the results of the F-tests showed that the explanatory power of the pooled equation was reduced significantly when regional dummy variable 5 (mid-South) was constrained to be equal in both periods. Thus the hypothesis that no change had occurred in the geographic dummy variable coefficients over time was rejected.

Further analysis of the data showed that no changes occurred in sample bank reporters in region 5 from May to September. Thus the change that occurred in the relative magnitude of region 5 bank auto loan rates over time was ascribed to changes in the behavior of individual banks, rather than to interperiod changes in the composition of the sample.

The finding that geographic consumer loan rate differentials can change between periods is interesting because it may help explain the disparate geographic rate differentials observed by other investigators.

To investigate the geographic rate differentials that existed in May and September 1975 in more detail, the residuals obtained from equations (1) and (2) in Table 1 were used as dependent variables in equations that used geographic regions as independent variables. This allowed us to identify geographic differences in loan rates once differences in respondent bank size, rural-urban location, and various attributes of the regulatory milieu had been taken into account. Table 2 presents data on regional variations in loan rates generated by this procedure. For purposes of comparison, unadjusted regional differences are also presented.

The data presented in Table 2 indicate that, in addition to region 7 (the largely agricultural Midwest), banks in the lower Mid-Atlantic area (region 3) tended to charge below-average loan rates in both surveys. Furthermore, banks in the West and Southwest (regions 8 and 9), charged consistently higher loan rates than would otherwise be expected--given differences in bank size, state regulation, etc. Before adjustment, banks in the Northeast (regions 1 and 2) and in the Mid-South and Industrial Midwest (regions 5 and 6) also exhibited high loan rates--but those differences are largely explained by the bank size, urban location and regulation variables.

The high rate results for the Western regions (8 and 9) are consistent with the findings of Shay [10] and Phillips [9]. The low-rate results for the largely agricultural Midwest have not previously been documented. Based on casual observations, one might speculate that recent bumper harvests increased capital availability and/or decreased auto loan demand in that region relative to the rest of the country during 1975.

⁷ Basic tests of the hypothesis that two sets of data are not significantly different (and, thus, can be legitimately pooled) are described by Bass and Wittink [1].

⁸ This paragraph has benefited from discussions with Frank M. Bass.

Table 2
Regional Deviations of Loan Rates from the Low Rate Region (7)

	Region								
	1	2	3	4	5	6	7	8	9
After adjustment for other variables									
May	50	90	31	59	25	51	0	112	97
Sept.	-3	62	3	42	63	35	0	84	97
Before adjustment									
May	98	151	42	55	67	98	0	114	111
Sept.	75	121	26	45	106	79	0	80	114

*Numbers in each row were computed by subtracting coefficients applicable to regional dummy variable 7 from corresponding coefficients applicable, in turn, to each other regional variable.

V. Conclusions

Our analysis of May and September 1975 sample data on commercial bank auto loan rates indicates that, other things being equal: (i) auto loan rates were generally higher at larger banks, (ii) banks in rural locations charged higher rates than banks in, presumably more competitive, urban locations (SMSA's), (iii) rates charged by banks located in states with restrictive ceilings were significantly lower than rates charged by other banks, (iv) banks located in states with restrictive remedies available to creditors in the event of customer default on auto loans charged higher rates than banks in other states, and (v) banks located in states that permitted only limited bank branching, charged higher rates than banks in unit banking states, while rates charged by banks in statewide branching and unit banking states were not significantly different. This is consistent with the hypothesis that limited branching laws tend to reduce bank competition in local markets significantly relative to what one would expect in unit banking states while statewide branching laws do not. However, there was some intercorrelation between geographic location and restrictions on branching, which slightly weakened the last conclusion. Finally, (vi), we found that there were significant geographic differences in bank loan rates that could not be explained by any of the previously mentioned considerations, and that such differences may change over time.

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