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PREDICTING DE NOVO BRANCH ENTRY INTO RURAL MARKETS

by Gary Whalen

Gary Whalen is an economic advisor at the Federal Reserve Bank of Cleveland.

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I. Introduction

Currently, there is a great deal of debate among industrial-organization economists about whether potential competition can be relied upon to be an effective disciplinary force in real-world markets. Contestable-market theorists argue that, in general, the answer is yes.[1] However, others have questioned the assumptions and/or predictions of contestable-market theory on a variety of grounds.[2] One of the primary reasons for the lack of consensus is the dearth of empirical studies on this issue, which is largely due to the difficulties involved in developing measures of potential competition for use in empirical work.[3]

Additional insight into potential competition would be of considerable value to bank regulators, who are charged with preventing bank mergers and acquisitions that "substantially lessen" competition. A large number of states have lowered long-standing geographic barriers to bank expansion in recent years. These developments, in turn, have stimulated a great deal of merger/acquisition activity. More frequently, proposed transactions imply substantial increases in local market concentration. To reliably determine the competitive impact of the concentration increases in individual cases, regulators must be able to evaluate the intensity of potential competition in the markets affected. The aim of the current study is to provide such information.

We estimate a logit model designed to explain the probability of de novo branch entry into rural banking markets in Ohio and Pennsylvania from 1980 to 1984.[4] The key assumption underlying this approach is that the intensity of potential competition in any local banking market is highly correlated with the threat or probability of de novo market entry.

The focus is on rural or non-MSA counties for several reasons. The number of actual competitors is generally small and concentration is high relative to urban counties. Further, the number of potential entrants, both bank and nonbank, is generally lower and de novo entry is less common. Thus, knowledge about the likelihood of entry and about potential competition in rural markets is particularly useful.

The findings presented in this study are noteworthy for several reasons. Unlike most previous studies, de novo branch entry is investigated. This appears to be the most appropriate entry measure if one is attempting to gain insight on potential competition. Further, entry is defined in two alternative ways: by commercial banks only, and by both banks and savings and loan associations (S&Ls). Consideration of S&L entry seems appropriate given the expansion of S&L asset and liability powers in 1980 and 1982.[5] Finally, explicit measures of the number of potential entrants are included as explanatory variables in the estimated model. This should provide valuable insight concerning the relationship between the number of potential entrants and the likelihood of entry.[6]

II. Previous Research

The existing body of previous empirical work on entry in banking has been summarized and reviewed recently in Amel (1988). His analysis demonstrates that surprisingly little work has been done in this area. However, he does find that most researchers have used the same basic set of variables to explain entry. The most common measures are market growth, market size, concentration, density of customers per bank office, profitability, and legal restrictions on branching. Other, less frequently used variables are measures of bank holding company presence in a market, previous entry, and the number of potential entrants.

Several conclusions can be drawn after reading Amel's review. First, many of the previous studies are now dated, and many have at least several important flaws. In particular, very few investigate **de novo** entry. Those that do typically examine the determinants or impacts of establishing **de novo** banks, rather than branches. **De novo** branch entry is much more common, particularly now that intrastate branching restrictions have been reduced in many states. Most studies, including the two most recent ones (Amel [1988] and Lawrence and Watkins [1986]) examine entry only by acquisition. While there are drawbacks associated with the use of both types of entry measure, the use of a **de novo** entry measure appears to be preferable on theoretical grounds.[7] Potential competition should be more closely related to the threat of **de novo** entry, which implies an additional competitor, than to a change in the identity of an existing one because of a merger.

S&Ls are generally ignored in these studies. They are not considered in the construction of the entry measures employed, presumably because they are not viewed as competitive equals of commercial banks. Most studies do not include any type of S&L market-presence variable as a possible determinant of the commercial bank entry decision. Many do not even consider S&L market deposits in the calculation of the measures of market growth and size that are typically used as explanatory variables in the entry equations estimated. Neglect of S&Ls may not have been important in studies done prior to 1980, but it seems inappropriate now given the substantial expansion of S&L powers that has occurred recently.

Finally, most studies do not include a measure of the number of potential entrants as an explanatory variable. The likelihood of market entry should depend in some fashion on the number of potential entrants, and insight into the nature of this relationship should be of value to bank regulators.

III. Model Specification

A logit model is the statistical technique employed in this study. This type of model is used because the primary aim of this research is to develop a reduced-form model that will produce relatively accurate estimates of the probability of future entry into local financial markets. A logit model of entry is particularly well-suited to this task.

The dependent variable used in the equations estimated is a binary dummy measure, defined to equal one if a rural county experienced **de novo** branch entry over the two-year period from June 1980 to June 1982. Otherwise, the variable is set equal to zero. The choice of this particular time period was not completely arbitrary. **De novo** branching laws were roughly the same in Ohio and Pennsylvania over this interval, so markets in both states could be used in the study. Furthermore, the substantial expansion of S&L powers authorized in the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) took effect at the beginning of 1980. The use of the two-year period also reflects uncertainty about the length of the lag between a decision to branch and the actual establishment of an office. Finally, since a relatively small number of markets are examined and since **de novo** entry is relatively rare in non-MSA markets, a period of this length was necessary to provide enough instances of entry to estimate the model.

In general, the explanatory variables used are the same set identified in Amel (1988) as the most useful predictors of market entry. Specifically, measures of market growth, market size, market income, concentration, market profitability, and customer density are used. Market growth (MGROWTH) is defined to be the percentage change in market deposits over the three years ending in June 1980. Market size (MSIZE) is total market deposits at the end of June 1980. Market income (MINC) is per capita personal income as of year-end 1979. Concentration (CR3) is the share of market deposits controlled by the three largest institutions in June 1980.[8] Customer density (POPTO) is population in the market at year-end 1979, divided by total offices in the market in June 1980. All of these variables are defined to include S&Ls operating in the market. The profitability of each market (MPROF) is proxied by the mean annual return on assets of all single-market commercial banks in the market, averaged over the 1977-1979 period.[9]

A potential entrant variable is also calculated for each market. This is relatively straightforward for banks because in both Ohio and Pennsylvania over the 1980-1982 time period, banks were permitted to branch de novo only within their home office county and into contiguous counties. The bank potential competition variable for any market (BPE) is simply the total number of banking organizations operating in counties contiguous to (but not in) the market that are legally able to branch de novo into it.

The S&L potential entrant variable is more difficult to define because S&Ls had more freedom to branch de novo over this interval. Consequently, we consider any S&L organization operating an office in a county contiguous to (but not in) a particular market to be a potential entrant into that market. An analysis of S&L branching patterns indicated that this approach is reasonable. The total number of potential entrants variable for each market (BSLPE) is the sum of these two measures. These potential entrant measures were calculated as of June 1980.

One additional explanatory variable is included in some versions of the equations estimated: a dummy variable with a value set equal to one for markets that had experienced de novo entry over the previous two-year period (PREVENT). This variable is included because of the realistic possibility that entry in the recent past could impact the probability of entry in the current period.

An important consideration is that entry over the June 1980 to June 1982 interval is presumed to depend solely on variables known prior to this time period. This is desirable for two reasons. First, this specification realistically reflects the lag between the decision to branch and the actual establishment of an office. Second, using the estimated model to predict the probability of future market entry does not require forecasts of any of the explanatory variables in it.

Markets that are larger, more rapidly growing, more profitable, with wealthier residents, or with more population per existing office are expected to be more attractive, ceteris paribus. This implies that the coefficients on the market growth, market size, market profitability, per capita personal income, and population per office variables should be positive.

The expected sign of the concentration variable is unclear. If concentrated markets are more profitable and/or less risky than less-concentrated ones, and if entrants can expect to share in these benefits, then the level of concentration should be positively associated with the probability of market entry. If, on the other hand, market concentration signals that the large players in a market possess some type of competitive advantage over smaller prospective entrants, a negative coefficient might be observed. Thus, the expected sign of the concentration variable is ambiguous.

There is also some uncertainty about the sign of the potential entrant variable. The conventional view is that the overall likelihood of market entry will be positively related to the number of potential entrants. Some writers, however, have demonstrated that mutual awareness among potential entrants could cause the relationship between the number of potential entrants and the overall likelihood of entry to be non-monotonic, perhaps even negative. Given this uncertainty, the sign of the coefficient on the number of potential competitors term is also viewed as indeterminate.

The sign of the previous entry variable is also unclear. Previous de **novo** entry could be a signal that expected market profitability is high and thus could be positively related to the probability of entry in the current period. On the other hand, previous de **novo** entry could imply downward profitability pressure on current and any future competitors in the market and could be negatively related to the probability of entry in the current period.

IV. Empirical Results

Various versions of the logit model described above were estimated using the complete or pooled sample of markets. These models were then used used to predict the probability of entry into rural markets in Ohio and Pennsylvania over the ensuing two-year period (1982-1984).

Before proceeding, several circumstances that could affect the forecasting accuracy of equations estimated using the pooled sample should be noted. Over the 1980-1982 period, geographic restrictions on bank expansion were similar but not identical in both states. The major difference was that multibank holding companies and statewide branching through merger were permitted in Ohio but not in Pennsylvania. The availability of these options could influence the relationship between de **novo** branch entry and its hypothesized determinants in each of the two states, and could therefore reduce the out-of-sample predictive accuracy of models estimated using the pooled sample. In addition, Pennsylvania enacted major changes in its bank expansion law, effective in 1982. **Multibank** holding companies were permitted for the first time and were allowed to acquire banks thoughout the state. Further, banks were allowed to branch de **novo** on a bicontiguous county basis. These changes could make it more difficult to forecast entry in Pennsylvania over the 1982-1984 period using the pooled model.

The models that performed best in terms of in-sample classification accuracy are presented in tables 1 and 2. The former contains results for models in which the dependent variable measures entry by commercial banks only. The latter contains equations in which the dependent variable measures entry by a bank or S&L. In general, the definition of entry does not have a major impact on the sign and statistical significance of the estimated coefficients or on the overall explanatory power of the equations.

Examination of the results reveals that the signs of the estimated coefficients on several of the variables are contrary to expectations and/or are insignificant. This is not surprising for several reasons. Similar results were obtained in many other previous studies, including Amel (1988), with much larger samples. The samples used to estimate the models in this study are quite small, and several of the explanatory variables are highly collinear. In any event, the model is viewed as a reduced-form model which we hope will produce accurate forecasts of market entry out-of-sample. Thus, the sign and statistical significance of the individual estimated coefficients are not a primary concern, and the discussion of these coefficients below is cursory.

Four variables were found to be statistically significant in the estimated models: market income, market concentration, the potential competition term, and the ratio of population to the number of financial offices in the market. The signs of these coefficients are reasonable. The probability of de novo entry is positively related to market income. De novo market entry is less likely in markets that are highly concentrated, Presumably because it is difficult to take market share away from large, established competitors. The probability of market entry is higher, the larger the number of potential entrants. The likelihood of entry is also greater, the higher the ratio of population to the number of bank and S&L offices in the market.

Tables 1 and 2 also present the in-sample classication results obtained using each model and a probability cutoff value approximately equal to the proportion of markets that experienced entry. The overall classification accuracy of the estimated models is generally in excess of 80 percent. More important, the Type I (incorrectly classifying a market that experienced entry) and Type II (incorrectly classifying a market that did not experience entry) error rates are roughly the same. This finding is encouraging because it implies that the estimated models allow both entered and nonentered markets to be identified with a reasonable degree of accuracy, at least in-sample.

To be useful for antitrust policy, however, the estimated models must produce relatively accurate estimates of the probability of market entry in the near future, that is, they must do a relatively good job of forecasting out-of-sample. Preliminary analysis indicated that the simplest models estimated (model 1 in each table) did the best job of identifying markets entered over the 1982-1984 period, so only the results obtained using these models are discussed.

The out-of-sample predictions of market entry by commercial banks obtained using model 1 and a prediction cutoff value of .10 (equal to the proportion of markets entered over the 1980-1982 interval) appear in table 3. The results are presented for the entire sample and also for Ohio and Pennsylvania separately.

The entry predictions generated by this relatively simple model are reasonably accurate, given the small sample size. For the whole sample, roughly two-thirds of the markets are classified correctly. More important, seven of the nine markets where entry occurred were correctly identified. The results for each individual state reveal that the overall classification accuracy of the model does not differ greatly for each of the two sub-samples. However, the two type I errors were both in Pennsylvania, where bank branching laws changed in 1982, rather than in Ohio, where they did not.

These results may actually understate the predictive accuracy of the estimated models somewhat. Further analysis disclosed that bank entry occurred dver the following two-year period (1984-1986) in six markets that the model predicted would be entered over the 1982-1984 period. Five of these were located in Ohio, and one was located in Pennsylvania.

The out-of-sample predictions of market entry by either a bank or an S&L generated by using equation 1 from table 2 also appear in table 3. Once again, a prediction cut-off value approximately equal to the sample proportion of markets entered over the 1980-1982 period is employed. This value is 0.2.

The results are similar to those obtained when only bank entry was considered. However, the model for bank/S&L entry produces somewhat less-accurate predictions than the bank-only model. This may be due to the unsustained surge in S&L branching activity, particularly in Ohio, that occurred during 1980-1982, the interval over which the forecasting equation was estimated. This branching activity was probably largely due to nonrecurring events (such as expanded powers authorized by the DIDMCA of 1980 and the Garn-St Germain Act of 1982) rather than to traditional economic factors. Thus, the model typically generates higher entry probabilities over the 1982-1984 period and so tends to have a Type II error rate and an overall error rate slightly above the bank entry model.

Roughly 60 percent of the complete sample of markets were correctly classified by the bank/S&L model. The overall error rate was slightly higher for the Ohio subsample, due to a higher Type II error rate. Eight of the eleven markets entered were correctly identified for the complete sample. As in the previous model, all of the Type I errors were concentrated in the Pennsylvania subsample.

Market entry in the 1984-1986 period should be considered in evaluating the predictive accuracy of this model, as well. As was the case for the bank entry model, six of the markets for which entry was incorrectly predicted over the 1982-1984 interval were subsequently entered during the next two-year period. Five of these were located in Ohio.

V. Summary and Conclusions

The results of the study suggest that it is possible to produce relatively accurate estimates of the probability of future de novo branch entry into rural markets using relatively simple models. The forecasting performance of the estimated models is viewed as surprisingly good given the relatively small sample size and the change in branching laws that occurred in Pennsylvania immediately prior to the forecast period.

If the key assumption made in this study is correct -- that the intensity of potential competition in any local market is directly related to the threat of de novo entry -- the results indicate that good estimates of potential competition can be generated at relatively low cost.

Footnotes

1. See, for example, Baumol, Panzar and Willig (1982).

2. For an opposing view, see Schwartz (1986).

3. Only two empirical examinations of the impact of potential competition in banking are known to the author: Hannan (1979) and Whalen (1988). Very few empirical studies of potential competition have been done for other industries.

4. Thus, local banking markets are assumed to be approximated by rural counties.

5. These powers were authorized in the Depository Institutions Deregulation and Monetary Control Act in 1980 and the Garn-St Germain Act in 1982.

6. Some researchers have suggested that the relationship between the number of potential entrants and the overall likelihood of market entry might not be a positive, linear one. See, for example, the discussion in Hannan (1981).

7. The main reason cited by Amel for choosing to analyze entry by acquisition rather than de novo entry is simply that it is easier to assemble data on the former.

8. A Herfindahl index of concentration was also employed. Use of this measure did not materially impact the reported results. Since the three-firm concentration ratio is much easier to compute, it was the concentration measure of choice in this study.

9. Single-market banks are those with all offices located within their home office county. Presumably the profitability of such banks reflects local market opportunities.

TABLE 1

LOGIT REGRESSION

DEPENDENT VARIABLE: Bank Entry

Variables	Model 1 Coef	Model 1 T-Stat	Model 2 Coef	Model 2 T-Stat	Model 3 Coef	Model 3 T-Stat
Constant	-10.80810	-1.56	-8.83336	-1.25	-10.09931	-1.46
MGROWTH	-0.15558	-1.12	-0.13608	-0.97	-0.14293	-0.98
MSIZE	-0.00425	-1.16	-0.00450	-1.20	-0.00393	-1.09
MINC	0.00117	1.81	0.00125	1.91	0.00113	1.77
CR3	-0.10504	-2.17	-0.12307	-2.09	-0.10887	-2.18
BPE	0.13020	2.03	0.12902	2.02	0.12115	1.89
POPTO	2.10460	2.48	2.29404	2.33	2.08918	2.49
MPROF	-------	----	-1.78405	-0.91	-------	----
PREVENT	-------	----	-------	----	-0.69627	-0.52
ADJ R SQ =	.382		.381		.357	
CHI - SQUARED =	19.93		20.79		20.23	

In-Sample Classification Results

Act	Pred NE	Pred E	Act	Pred NE	Pred E	Act	Pred NE	Pred E
NE	63	12	NE	61	14	NE	61	14
E	2	6	E	2	6	E	2	6

NE: Markets not entered.
E: Markets entered.

Source: Author.

TABLE 2

LOGIT REGRESSION

DEPENDENT VARIABLE: Bank/S&L Entry

	Model 1		Model 2		Model 3	
Variables	Coef	T-Stat	Coef	T-Stat	Coef	T-Stat
Constant	-7.76417	-1.67	-6.01392	-1.27	-8.33036	-1.76
MGROWTH	-0.06269	-0.70	-0.03938	-0.39	-0.03599	-0.37
MSIZE	-0.00353	-1.32	-0.00435	-1.43	-0.00349	-1.37
MINC	0.00084	1.89	0.00097	2.05	0.00089	1.97
CR3	-0.06119	-1.89	-0.07439	-2.04	-0.06211	-1.93
BSLPE	0.04950	2.20	0.04866	2.24	0.05065	2.32
POPTO	1.27440	2.46	1.53052	2.41	1.27148	2.45
MPROF	-------	----	-2.34456	-1.67	-------	----
PREVENT	-------	----	-------	----	-1.01016	-1.09
ADJ R SQ =	.219		.261		.204	
CHI - SQUARED =	20.39		23.40		21.74	

In-Sample Classification Results

	Pred			Pred			Pred	
Act	NE	E	Act	NE	E	Act	NE	E
NE	52	16	NE	52	16	NE	55	13
E	4	11	E	4	11	E	4	11

NE: Markets not entered.
E: Markets entered.

Source: Author.

TABLE 3

OUT-OF-SAMPLE BANK ENTRY PREDICTIONS
1982 - 1984

Entire Sample

	Pred	
Act	E	NE
E	48	26
NE	2	7

Ohio Subsample

	Pred	
Act	E	NE
E	27	18
NE	0	3

Pennsylvania Subsample

	Pred	
Act	E	NE
E	21	8
NE	2	4

NE: Markets not entered.
E: Markets entered.

Source: Author.

TABLE 4

OUT-OF-SAMPLE BANK/S&L ENTRY PREDICTIONS
1982 - 1984

Entire Sample

Act	Pred E	Pred NE
E	43	29
NE	3	8

Ohio Subsample

Act	Pred E	Pred NE
E	25	20
NE	0	3

Pennsylvania Subsample

Act	Pred E	Pred NE
E	20	9
NE	3	5

NE: Markets not entered.
E: Markets entered.

Source: Author.

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