The Role of Advertising in Commercial Banking [†]

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Abstract

I use a new data item that became available in 2001-2002 Call Reports to examine the role of advertising in commercial banking. I revisit the 1960s and 1970s evidence on bank non-price competition and estimate profitability–advertising and advertising–market structure relationships to test old and new hypotheses while controlling for alternative hypotheses. Results suggest that advertising plays a pro-competitive role in banking. An increase in advertising appears to lead to an increase in profitability. I find evidence that there are size advantages to advertising. Advertising is also higher for *de novo* and consumer-oriented banks, but lower for efficient, older, and minority-owned banks.

Non-Price Competition in Commercial Banking

1. Introduction

What role, if any, does non-price competition, in the form of advertising and marketing efforts play in the profitability of commercial banks? What is the link, if any, between advertising expenditures and the degree of market competition? Can banks use advertising to signal their quality? Are branching and advertising, two different forms of non-price competition, substitutes or complements? Is there a link between the bank product mix and the level of advertising? How do banks respond to competitors' advertising expenditures? In this paper I try to answer these questions using year-end 2001-2002 data on U.S. commercial banks operating in a single market.

In 1999, U.S. depository institutions spent an estimated $5.8 billion on advertising and marketing, of which an estimated $5.1 billion was spent by commercial banks and Bank Holding Companies (BHCs).[1] Advertising expenses were an estimated 8.8% of net income before taxes for the industry, 8.9% for commercial banks and BHCs, and 4.7% for small banks and BHCs with less than $250 million in Total Assets (TA). Given the important sums spent on advertising, we know, surprisingly, little on its effects on commercial bank performance.

In the U.S., banks operate in a significantly more competitive environment than they did a quarter of a century ago. The number of U.S. commercial banks, defined as those with total assets less than one billion in year-2001 dollars, almost halved during the past 25 years, dropping from over 14,400 in 1977 to roughly 8,000 in 2001. Over this time period, many banks became larger through acquisitions, and entered new markets as geographic market entry restrictions were gradually removed, first at the state, and then at the federal level. This not only allowed banks to capitalize on economies of scale but also to spread their operations over the geographic space to diversify the local economy risk during 1980s and 1990s. Competition from credit unions, which are exempt from income taxes, and non-bank financial services, such as money market mutual funds and finance companies, which are exempt from banking

regulations, also stiffened during this period. Banks tried to counter non-bank competition by offering a wider range of products and services, ranging from insurance to investment banking, betting on the economies of scope. No studies have examined the role of advertising as a form of non-price competition among U.S. banks since the beginning of market deregulation. The dramatic changes in the banking sector suggest that the role of advertising in commercial bank production and performance may have increased in the new competitive environment. It is this potential role that I examine in this article.

An extended update of the role of advertising in banking appears to be warranted for a number of reasons. First, as stated above, the existing evidence on the role of non-price competition in U.S. banking dates back to 1960s and 1970s. It is not clear that the results of these studies can be extrapolated to today's much more competitive banking markets. Second, theoretical and empirical literature on the economics of advertising has grown significantly during the past two decades, generating new testable hypotheses. Finally, the earlier literature on bank non-price competition relies on either survey data for commercial banks or limited samples for savings institutions. None of these studies correct for selection biases that might have affected their results. I use the new income statement item on "advertising and marketing expenses" introduced with the March 2001 Reports of Income and Condition (Call Reports) to revisit the role of advertising in banking. To properly link advertising expenditures with specific market characteristics, I focus here on commercial banks operating in a single market.

The literature on the role of advertising on firm performance and market structure is very extensive, covering the fields of economics, marketing, management science, and more recently financial economics. An informal treatise in economics dates back to Marshall (1890, 1919) who contrasts advertising's potential *constructive role* (informing customers) versus its *combative role* (stealing customers from competitors without necessarily providing information).[2] In modern economics the *constructive role* has lead to *the informative view* according to which advertising creates a *more* elastic demand by providing information to customers (for example, Ozga, 1960; Stigler, 1961; Demsetz, 1973; and Nelson, 1974, 1975). This pro-competitive interpretation associates increased advertising with increased market entry and lower prices. In contrast, *the persuasive view*, along the lines of Marshall's

combative role, suggests that advertising is primarily conducted to change consumers' tastes to advertiser's advantage (for example, Braithwaite, 1928; Robinson, 1933; Kaldor, 1950; Bain, 1956; and Comanor and Wilson, 1967). In this case, advertising generates a *less* elastic demand for the product/service by increasing brand loyalty, eventually leading to higher prices. Importantly, under *the persuasive view*, advertising is anti-competitive and can be used to create entry barriers. Potential entrants may also renege if the initial sunk-advertising costs are important enough to increase entry's risk. A recent alternative to these theories is *the complementary view* (for example, Stigler and Becker, 1977; Fisher and McGowan, 1979; Nichols, 1985; Hochman and Luski, 1988; and Becker and Murphy, 1989). According to this view, advertising, an argument of the utility function, does not change or shift consumer tastes, but is 'consumed' jointly with the good/service being advertised, and may affect demand even when it has no explicit information content. A consequence of this last view is that managers may under-advertise, rather than over-advertise, if they believe they cannot fully internalize its benefits.

These alternative views of advertising have been examined under various static and dynamic frameworks, such as the neoclassical, game-theoretical, and dynamic optimization models. For example, advertising can be linked to money-burning models, in which high-efficiency, high-quality, and presumably low-cost producers can signal product quality which the low-efficiency, high-cost producers cannot mimic in a separating equilibrium (Milgrom and Roberts, 1986; and Bagwell and Ramey, 1988). Despite significant advances on the theoretical front, however, the empirical evidence on advertisings' role is far from being conclusive (Bagwell, 2001). Extensive inter- and intra-industry studies suggest that advertising-market structure and advertising-profitability links vary considerably across industries and product categories. Consequently, results, old and new, from other industries may not necessarily apply to commercial banking.

Evidence on the role of advertising in banking comes from studies that have examined relationship between banks' profitability or market structure and their advertising intensity which is defined as the ratio of advertising to deposits or interest on deposits.[3] Results based on commercial bank, savings bank, or savings and loan (S&L) data are not conclusive. Regressing profitability variables on

advertising intensity, Edwards (1973) and Kohers and Simpson (1981) find a negative but insignificant association. Regressing advertising intensity on market structure variables, Rhoades (1980) finds a negative but insignificant association; Kohers and Simpson (1981) observe a significant negative relationship; Scott (1978) finds a non-linear relationship that first increases and then decreases; but Wolken and Derrick (1986) fail to find support for this non-linear relationship. Finally, regressing market concentration on advertising intensity Edwards (1973, 1976) finds a positive but insignificant relationship; Lapp (1976) observe a positive and significant one; whereas Kohers and Simpson (1981) find a negative and significant one. These contradictory results may be due to, at least in part, the selection biases inherent in the restricted samples or survey data used in these studies.

In this paper, I contribute to the bank non-price competition literature in a number of ways. First, the newly introduced RIAD0497 "Advertising and Marketing Expenses" item in the Call Reports allows me to examine non-price competition in banking with the largest sample to date. Second, I revisit the earlier bank advertising literature by estimating profitability-advertising intensity and advertising intensity-market concentration models with year-end 2001 data. Third, compared to the existing evidence on bank advertising, I test a larger set of hypotheses. These hypotheses question whether there is a relationship between advertising and bank (i) efficiency, (ii) *de novo* entry, (iii) organizational structure, (iv) capital structure, and (v) bank's clientele. Fourth, I attempt to correct for the potential effects of selection bias inherent in my sample. Fifth, given that profitability and advertising expenditures may be jointly determined, I further explore these relationships within the framework of a simultaneous equations model. Finally, with the limited quarterly time-series data that are available, I provide, however incomplete, tests of Granger causality between bank profitability and advertising, in order to shed some light on the problem of simultaneity between advertising and bank profits.

Results indicate that advertising plays a special role in banking. Advertising positively affects profitability with some lag, and profitability appears to affect advertising budgets. However additional tests using longer time-series data are needed to assure the robustness of these results. Advertising intensity is lower for banks that are X-efficient, minority-owned, and is higher for banks that are retail-

oriented and *de novo* entrants. Importantly, I only find weak evidence for the hypothesis that advertising intensity is low in highly competitive and highly concentrated markets, whereas it is higher in markets where competition falls in-between (*the 'inverted-U' hypothesis* to be explained below).

The paper proceeds as follows. A brief review of the theoretical and empirical literature on the role of advertising for firms in general and banks in particular is provided in Section 2. The hypotheses are also formulated in this section. The data and the econometric problems of selection bias and endogeneity are discussed in Section 3. Section 4 contains the empirical analysis, which consists of four parts: (sub-section 4.1) profitability-advertising intensity regressions, (4.2) Granger causality tests, (4.3) advertising intensity-market structure regressions, and finally, (4.4) a simultaneous-equation model of advertising intensity, profitability, and market concentration. Section 5 concludes the paper and makes suggestions for future research.

2. Literature Review and Hypotheses [4]

A strict interpretation of the classical economic theory suggests that in pure competition advertising is a frivolous expenditure: the price-taker faces a fixed-demand curve and can sell all that it produces at the market price (Pigou, 1924, p. 196; and Braithwaite, 1928, p.28). In contrast, the modern economic theory provides three alternative views as to why advertising can play an important role in firm's production and consumer's consumption. According to *the persuasive view,* advertising can be used to create product differentiation and brand loyalty (for example, Braithwaite, 1928; Robinson, 1933; Kaldor, 1950; Bain, 1956; Comanor and Wilson, 1967, among others). Firms advertise to compete more aggressively with other incumbents by potentially increasing their market power. Higher market concentration would eventually lead to higher profits through higher prices, to the detriment of consumers.

A number of hypotheses have been suggested to test *the persuasive view*. For example, based on the advertising economies of scale argument, Kaldor (1950) suggests that advertising leads to higher market concentration. Exploring the possible role of advertising in promoting competition, Telser (1964)

hypothesizes that if advertising can help increase monopolistic power, then market concentration and advertising intensity should be positively related. Regressing market concentration on advertising intensity, he finds only weak support for this argument, which he interprets as suggesting that the persuasive view may not hold in the data. Unfortunately, I cannot test Kaldor and Telser hypotheses by estimating a market concentration–advertising intensity relationship. I only have bank-level (rather than market-level) advertising data, and because I want to properly link market characteristics with advertising expenditures, I limit my sample to banks operating in a single market. This has the unfortunate consequence of restricting urban banks in my sample to marginal players in these markets. Hence, regressing market concentration on advertising intensity, as Telser (1964) does, would lead to highly biased tests. Instead, I use the Dorfman-Steiner framework to test for the persuasive view. Dorfman and Steiner (1954) model the firm's optimal advertising level as a function of market demand and structure. Under *the Dorfman-Steiner hypothesis*, higher advertising intensity is associated with higher market power, when the former is regressed on the latter.

The persuasive view also suggests that advertising may deter entry if there are advertising economies of scale (for example, Kaldor, 1950, p.13; Comanor and Wilson, 1974, pp. 48-49; Spence, 1980). Advertising economies of scale may exist, because higher sales levels may lead to lower marginal advertising costs per unit of output.[5] Second, advertising may need to be above a threshold to have any impact on consumers. Finally, higher advertising scales may also increase the quality of the hired personnel or outside advertising agencies which prefer larger accounts, and as a result, the marginal return on advertising. *The diminishing advertising costs hypothesis* suggests that advertising costs decrease as bank size increases.[6] These arguments suggest that advertising should be treated as an input in firm's production.[7] Maybe due to the difficulty of gauging the optimal level of advertising or due to the combative role of advertising, most of the inter-industry evidence suggests that advertising is typically over-supplied and that there are decreasing returns to advertising (for example, Simon, 1970; Lambin, 1976, pp.95-98; Boyer and Lancaster, 1986, p.515; Thomas, 1989; and Seldon, Jewell, and O'Brien, 2000).

Alternatively, advertising economies of scale may help create entry barriers (for example, Comanor and Wilson, 1974; Spence, 1980): incumbents may deter entry by further increasing their ad campaigns in order to force the entrant to incur significantly higher sunk advertising costs on top of the initial capital investment outlays. Small entrants facing higher initial advertising expenses per unit output than the larger incumbents may decide against entry. In banking, *de novo* entry could potentially be deterred by increased advertising by the incumbents, which increases the size of initial advertising outlays for the entrant. This effect may be insignificant when entrants are large banks and BHC-member banks that already enjoy advertising economies of scale due to the larger size and established brand recognition of their organization. *The de novo entry hypothesis* suggests that advertising intensities of newly created banks would be much higher than that of established banks.[8]

In contrast, *the informative view* of advertising suggests that advertising has a pro-competitive role. According to Brozen (1974), higher advertising increases competition as new firms can increase their market share at incumbents' expense through advertising. *Brozen's hypothesis* suggests a negative relationship between advertising expenditures and market share, as firms with smaller market shares spend more on advertising to increase their customer base compared to larger firms that have little customer base left to extend. Comanor and Wilson (1967, 1974) provide alternative tests of *the informative view* by regressing profitability on advertising intensity and other variables. Under *the Comanor-Wilson hypothesis* advertising causes profitability. However, finding a positive link between firm profits and advertising is also compatible with *the structure-conduct-performance* or *efficient-structure hypotheses. The structure-conduct-performance hypothesis* states that higher concentration leads to higher prices (in the case of banking, to lower deposit and higher loan interest rates) resulting in higher profits.[9] *The efficient-structure hypothesis* suggests that higher profitability follows from higher managerial and technical efficiencies (Berger, 1996a). I test *the Comanor-Wilson hypothesis* together with the alternative *structure-conduct-performance* and *efficient-structure hypotheses*. Further, the testing of *the Comanor-Wilson hypothesis* is complicated by the endogenous nature of advertising expenditures: if managers allocate advertising budgets based on current sales or profitability, then empirical evidence may

suggest that advertising causes profitability, whereas, in fact, the opposite is true. A spurious relationship would also result if more efficient firms generate higher revenues and invest more in advertising. To account for these possibilities I jointly estimate the profitability–advertising expenditure relationship together with the advertising–market structure relationship after accounting for firm efficiency.

The informative view of advertising is also supported by the recent evidence which shows that higher advertising levels lead to significantly higher number of individual and institutional investors holding company's stock leading to significantly higher levels of stock market liquidity (Grullon, Kanatas, and Weston, 2002). In banking, explicit and implicit interest rates, as well as available product, service, and branch location information that appears in ads clearly suggests an *informative* role.[10] Unfortunately, one cannot directly test for *the informative view* without matching banks' advertising expenses with price information, such as changes in explicit and implicit deposit and loan interest rates, as these are not disclosed in the Call Reports.[11]

The *informative view* also holds that advertising can be used to signal efficiency and/or product or service quality (for example, Nelson, 1974; Schmalensee, 1978).[12] If advertising can be used to signal quality, then cost efficient firms can separate themselves by advertising aggressively, something which the high-cost producers cannot afford to replicate. Similarly, profit efficient firms, that produce higher quality products/services (even if at higher costs) that are sold at higher prices to customers who value quality, could separate themselves by increasing their advertising expenditures, a move that low-profit firms could not follow.[13] *The quality signaling hypothesis* suggests that cost efficient and/or profit efficient banks would signal their quality to consumers through higher advertising intensities.

In line with the signaling interpretation of *the informative* view, Jain and Wu (2000) hypothesize that mutual funds may be using ads that include past return information as a signal of superior managerial skills. Instead, they find that mutual fund performance deteriorates, and yet the cash inflows increase in the post-advertising period. Jain and Wu (2000) finding is more in line with *the combative role* or *the persuasive view* of advertising. If bank and mutual fund managers reason similarly, then banks may be increasing their advertising expenditures to attract new customers to increase their profitability, most

likely at the expense of their competitors. I provide a test for the combative role of advertising by including the changes in the advertising expenditures of competitors (for example, Horsky, 1977; Erikson, 1985, 1992).[14]

Finally, the third major view of advertising, *the complementary view*, suggests that advertising is consumed together with the product or service it is associated with, and should be treated as an argument in consumer's utility function (Becker and Murphy, 1993). Here, advertising is a complement to the product/service in the sense that higher advertising increases the marginal utility of the product/service even if it does not contain any explicit information. This view is in contrast to both the *persuasive view* where advertising shifts consumer preferences, as well as the *informative view* where advertising is of value only if it contains information. One implication of *the complementary view* is that, if advertising complements the consumption of the good being advertised, then advertising has a role to play even in the purely competitive markets.

It is more likely that advertising's role in banking will be explained not by a single view at the exclusion of others, but a combination of these theories. For example, *the 'inverted-U' hypothesis*, a commonly tested hypothesis with depository institution data, follows from alternative views of advertising. According to this hypothesis, advertising intensity should increase as the market structure changes from pure competition to monopolistic competition, and then should decrease as the market structure shifts towards an oligopoly and then a monopoly. On one end, advertising should play no role in highly competitive markets where the price-taker firm can sell all it produces at market prices (Pigou, 1924; Braithwaite, 1928). On the other end, under *the persuasive view* returns to advertising should diminish for the monopolist (Kaldor, 1950, p.13), whereas under *the complementary view* the monopolist would under-advertise if higher prices would not follow from higher advertising (Nichols, 1985; Becker and Murphy, 1993). However, counter-arguments also exist. For example, it could also be argued that, with the increasing role of internet as a distribution channel to sell financial products, true monopolies no longer exist in banking. As a result, the monopolist defined by the physical market may still spend significant amounts on advertising. Similarly, casual observation suggests that firms operating in highly

competitive markets do spend significant amounts on advertising, implying that, as suggested by *the complementary view*, the role of advertising under pure competition can be important.

Recent research shows that firm's non-price competition is also linked to its capital structure. Grullon, Kanatas, and Kumar (2002) find that, after controlling for other factors, firms that decrease their leverage through new financing follow more aggressive advertising-based competition than those whose leverage has increased. Further, competitors of capital-raising firms respond with higher (lower) advertising expenditures if their own capital structure is less (more) levered. As a result, under *the capital structure hypothesis*, one would expect banks that have increased their equity levels (lowered their leverage) to have higher advertising expenditures than those that have not. Following Fazzari, Hubbard, and Petersen (1988) it could also be argued that investment in the intangible advertising capital will be significantly lower for financially constrained banks. *The financing constraints hypothesis* suggests a positive relationship between increases in dividend payouts and advertising spending. Alternatively, depleted capital can give bank managers incentives to increase their bank's liquidity at all costs, by increasing deposit rates and decreasing loan rates and heavily advertising the changes, in order to stay in business and remain in office.[15] A last question is whether the advertising intensities of minority- or women-owned banks differ statistically from other banks. *The minority clientele hypothesis* suggests that minority banks would have lower advertising expenses, holding everything else constant, as they would rely more on the spillover effect of community identity and word-of-mouth, serving a captured clientele.[16]

A number of studies have examined the role of advertising as a form of non-price competition among depository institutions. These studies focus on three relationships: (i) the profitability–advertising intensity relationship to test *the Comanor-Wilson hypothesis*; (ii) the advertising intensity–market concentration relationship to test *the Dorfman-Steiner hypothesis*; (iii) the advertising intensity–market share relationship to test *the Brozen hypothesis*; and (iv) the market concentration–advertising intensity relationship to test *the Telser hypothesis*. Edwards (1973, 1976) tests *the Telser* (1964) and *the Comanor-Wilson* (1967) *hypotheses* using data from 36 commercial banks among the 50 largest in the U.S. that responded to a survey of the Federal Reserve (the Fed). Edwards fails to find a significant relationship

when market concentration is regressed on advertising intensity. In contrast, Lapp (1976) finds that market structure affects advertising expenses, in support of the Dorfman-Steiner (1954) hypothesis. His study avoids the problem of simultaneity between advertising and market structure, as during 1962-1964 S&L market entry was strictly controlled by regulators and market structure could be considered exogenous. Regressing scaled-advertising expenses on market structure variables in a log-linear specification, Lapp (1976) finds that advertising is less relevant for perfectly competitive markets, and becomes increasingly more important as the market moves towards monopolistic competition. His evidence also suggests that advertising may have an informative role as it is positively correlated with branching. Advertising intensity increases faster where branching is allowed and competition becomes less than perfect.

Kohers and Simpson (1981) use the S&L data to test (i) *the Telser hypothesis* by regressing market concentration on advertising intensity, S&L size, and market growth; (ii) *the Comanor-Wilson hypothesis* by regressing ROE on market concentration and growth, S&L advertising intensity and size; (iii) *the Dorfman-Steiner hypothesis* by regressing advertising intensity on market concentration, population growth, and assets per branch; and (iv) *the Brozen hypothesis* by regressing advertising intensity on S&L's market share, gross revenue, and market deposit growth. They find support for *the Brozen hypothesis* that advertising increases with competition, but they find no support for *the Telser*, *Comanor-Wilson*, or *Dorfman-Steiner hypotheses*. All of these studies use linear or log-linear specifications for advertising intensity-market concentration relationship, whereas other evidence suggests that the relationship may be nonlinear.

Scott (1978) and Wolken and Derrick (1986) test *the 'inverted-U' hypothesis*. Scott (1978) uses a non-linear specification which includes the number of new branches, level and square of market concentration (Herfindahl Index and 3-firm concentration ratio), market share, total deposits variables, as well as interactive terms among these variables. He finds support not only for *the 'inverted-U' hypothesis*, but also for a non-linear relationship between advertising intensity and total deposits. In contrast, Wolken and Derrick (1986), the most recent study on advertising intensity and bank market concentration, fail to

find support for *the 'inverted-U' hypothesis*.[17] These authors expand the non-linear Scott (1978) model by including market entry (increase in the number of banks and branches) and market size variables. Wolken and Derrick (1986) find that (i) market power has no bearing on advertising intensity (none of the market concentration and market share coefficients are significant, individually or altogether); (ii) there is no relationship between branching and advertising (that is these are neither complements nor substitutes); but that (iii) advertising intensity increases as deposit market grows, deposit market size increases, and the bank has a retail rather than wholesale focus; and importantly (iv) provide the only evidence that advertising expenditures and bank market entry are positively related.

Unfortunately, it is not clear from these conflicting results what role, if any, advertising may play in commercial banking today. First, these past studies rely on data from 1960s and 1970s, when banking markets were largely protected from entry, whereas today's community banks operate in significantly more competitive environments. The role of advertising may have change through the course of this transformation.[18] For example, prior to 1980 Regulation Q put a ceiling on explicit interest that banking institutions can pay on deposits. When Regulation Q ceiling became binding, banks tended to compete through advertised promotions, such as toasters for opening deposit accounts. Another example is state usury interest rate ceilings imposed by the states on mortgage and other loans. Banks shied away from advertising their mortgage rates when market forces pushed interest rates above the imposed limits in states with low usury ceilings. Today banks operate in significantly more competitive markets. Restrictions on interest rates, such as Regulation Q, were phased out during early 1980s. Equally importantly, the gradual deregulation of geographic entry barriers that started during the 1980s at the state level, culminated in the removal of all market entry restrictions at the federal level by the introduction of Riegle-Neal Act of 1994, opening once protected banking markets to out-of-market competition.

Second, earlier studies rely on limited samples that potentially suffered from selection biases. For example, Scott's (1978) 1972 sample includes 125 savings banks operating in 11 Massachusetts markets only; Lapp (1976) uses 1962-1964 S&L data from 35 MSAs; whereas Kohers and Simpson's (1981) samples include 200 S&Ls from 1972, 1974, and 1976. Studies on the role of advertising in commercial

banking also suffer from self-selection bias. Edwards (1973, 1976) uses data from 36 respondents to a 1965 survey of largest 50 commercial banks. Rhoades (1980) and, Wolken and Derrick (1986) use larger samples from a voluntary cost accounting survey of the Fed, the Functional Cost Analysis (FCA) Program. Rhoades (1980) uses a sample of 524 out of the 894 FCA participants in 1976, whereas Wolken and Derrick (1986) use a sample of 550 out of the 751 participants in 1978. Bank managers participating in the FCA program may be more cost conscious, hence these banks advertising expenditures may not be representative of the larger population. Ors (forthcoming) shows that FCA banks were not representative of the population of U.S. banks. In fact, none of these studies correct for the selection bias inherent in their samples.

Finally, it is not clear whether savings banks and S&Ls can be readily compared with commercial banks. During 1960s and 1970s the majority of thrifts were mutually owned, whereas most commercial banks involved stock ownership. Esty (1997) finds that stock-type thrifts are more risky and exhibit higher income variability than mutual-type thrifts during the 1980s. One can presume that advertising policies across stock and mutual type organizations would differ given differences in managerial incentives.[19]

One issue that needs to be acknowledged before proceeding further, is the simultaneity of advertising expenditures, market concentration, and bank profitability.[20] The endogenous nature of advertising expenditures has been recognized in the literature (starting with Bain, 1956, pp. 191, 299; more recently Greer, 1971; and Martin, 1979). Limited empirical evidence suggests that causality may run from advertising to profitability. For example, Chan, Lakonishok, and Sougiannis (1999) find that, after controlling for size and book-to-market, mixed-industry stock portfolios based on high-advertising intensity quintile (where advertising intensity is scaled by the market value of equity) outperform those based on low-advertising intensity quintile (23.63% versus 18.95%, respectively), over the three years following portfolio formation. This, despite the fact that, prior to the portfolio formation date, high-advertising intensity portfolio underperforms the low-advertising intensity portfolio (14.02% versus 19.81%, respectively). However, one could also make the counter-argument that the causality runs in the

opposite direction as it is the more profitable firms that can afford bigger advertising budgets. There is some anecdotal evidence that supports this counter-argument: bank managers acknowledge that their advertising expenditures are conditioned on the available funding that flows from profitability.[21] There is also some evidence indicating that for the broadly defined financial sector (which includes banks, other credit institutions, and broker dealers), industry advertising demand increases with sales and, not surprisingly, decreases with the cost of advertising (Ehrlich and Fisher, 1982)

It is clear that any attempt to establish a link between bank profitability and advertising expenditures has to take into account the possibility that performance (profitability) is driven by other firm characteristics (for example, higher X-efficiency, higher product quality, and higher risk which is rewarded with higher returns) or market characteristics (for example, higher market concentration). One could attempt to solve the endogeneity problem by estimating simultaneous regression models. However, empirical evidence suggests that simultaneous regression models fail to significantly improve OLS estimates (for example, Rao, 1972; Strickland and Weiss, 1976). It should be noted that these empirical results may be industry- or sample-specific, and may not apply to banking. In any case, it appears that it would be difficult to improve estimation results with simultaneous regression models without understanding the causality between firm advertising and performance (Bagwell, 2002). With the limited time-series data that are available to date (commercial bank advertising expenses are only available for six quarters at this point), I conduct initial Granger-causality tests to establish the direction of the relationship between advertising and profitability. Due to the limited time-series data, the results should be taken with a grain of salt.

I summarize the testable hypotheses, the related theories, and the expected signs for the coefficient estimates in Table 1. The next section details the data sources and the econometric issues faced when testing these hypotheses for community banks.

3. The Data and the Sample

I use data from three different sources to examine the role of advertising in banking. Since March

2001, federal regulators require commercial banks to report their advertising and marketing expenses as a new item in the Call Reports.[22] Unfortunately, banks are only required to report their advertising and marketing expenses if these exceed one percent of their operating income (sum of total interest income and total non-interest income), a restriction that creates a selection bias. It is also unfortunate that no detail is provided as to the specific nature of advertising costs beyond total of advertising and marketing expenditures.[23] Despite these shortcomings, the newly added item has the benefit of providing information on advertising and marketing expenses for a very large number of commercial banks on a uniform basis. Bank characteristics and financial ratios come from the year-end 2001 Call Reports. Quarterly Call Reports between March, 2001 and June 2002 Reports are used for conducting Granger causality tests. Year-end 2000, 1998, and 1996 Call Reports are used to calculate one-, three-, and five-year bank total deposit and total asset growth rates ($BNKGR^{TD}$ and $BNKGR^{TA}$, respectively).

Federal Deposit Insurance Corporation (FDIC) 2001 Summary of Deposits datasets are used to construct market deposit-share and -concentration variables.[24] Banking markets are defined as the largest of the county, Metropolitan Statistical Area (*MSA*), and Consolidated Metropolitan Statistical Area (*CMSA*).[25] Year 2000, 1998, and 1996 Summary of Deposits datasets are also used to calculate one-, three- and five-year deposit market growth rates ($MKTGR^{DEPS}$). Market-level personal income growth (*PIG*) for years 2000 and 1999 are taken from the Bureau of Economic Analysis (BEA) website.[26]

I place the following restrictions on the sample. First, I limit the sample to commercial banks in order to eliminate differences in production processes that may exist with thrifts. However, the market shares and concentration ratios take into account the presence of thrift competitors in community banks' markets, to the extent these institutions are presented in the Summary of Deposits datasets. Second, I exclude banks with (i) zero deposits (credit card banks), (ii) zero loans, or (iii) zero assets. Table 2 provides summary statistics for the sample as well as the population of banks. Out of the 8,003 commercial banks that filed December 2001 Call Reports, 7,954 remain in my sample after deleting 49 commercial banks with negative total assets, equity, deposits, or loans. Third, in order to be able to establish a link between advertising expenditures and a specific market, I restrict my sample to 4,969

banks that operate in a single market. It should be noted that this last restriction eliminates many banks that operate in more than one market. One consequence is that urban banks that remain in my sample tend to be marginal players in their markets. Unfortunately, despite the consequences, such a restriction is necessary in order to be able to properly link advertising expenditures with the structure of the market in which the bank operates, as I only have bank-level, rather than bank-market level, advertising expenditures.

My final sample contains 2,670 banks. However, I use the data on the observable bank population of 7,954 banks and use Heckman's sample selection correction model (1976, 1979) to account for the potential effects of the selection bias. The empirical results are presented in the next section.

4. Empirical Estimates of Advertising Relations

4.1. Sample Selection Model

My sample is censored along two dimensions. First, banks are only required to report their advertising and marketing expenses if these are higher than one percent of their operating income. Of the 7,954 banks in the Call Reports, 4,170 report item RIAD0497 on advertising and marketing expenses. I should note that 1,801 banks report their advertising expenditures even though these are less one percent of their operating income. Second, I require banks to operate in a single market, that is, all of their deposits must be generated from a single county, MSA or CMSA. This allows me to properly link a single market's characteristics with those of the banks fully operating in that market. Unfortunately, this last restriction excludes many multi-market banks from my sample. In 2001, 4,969 commercial banks had 100% of their deposits from a single county, MSA or CMSA market. The joint-set of these two subsamples is my final sample of 2,670 banks.

I estimate a probit selection model that is later used, when estimated as part of Heckman's (1976, 1979) model, to correct for the selection biases created during the reporting of advertising expenses and the restriction of the sample to banks operating in a single market. The model links the probability of being included in the sample to bank and market characteristics and is admittedly *ad hoc*:

$$\Phi^{-1}\left(\Pr[SAMPLE_{i,m,s}=1]\right)=\delta_0+\delta_1\ln AGE_i+\delta_2 BHC_i+\delta_3 MLBHC_i+\delta_4 MIN_i+\delta_5 FRGN_i+\delta_6 WEB_i$$
$$+\delta_7 FTE_i+\delta_8\ln TA_i+\delta_9 INC_i^{INT}+\delta_{10} INC_i^{NON-INT}+\delta_{11} EXP_i^{INT}+\delta_{12} EXP_i^{NON-INT}+\delta_{13} SECS_i+\delta_{14} LNS_i \quad (1)$$
$$+\delta_{15} FXD_i+\delta_{16} MMDA_i+\delta_{17} DEPS_i^{TIME}+\delta_{18} DEPS_i^{SMALL}+\delta_{19} BMONEY_i+\delta_{20} RWATA_i+\delta_{21} NPL_i$$
$$+\delta_{22} MSA_m+\delta_{23} CMSA_m+\delta_{24} HERF_m+\delta_{25} BNKBR_m^{TOT}+\delta_{26} BNKS_m^{NEW}+\sum_{j=2}^{51}\gamma_j STATE_s$$

where, Φ^{-1} is the inverse-cumulative Normal distribution. The probability of being included in the sample is associated with the logarithm of bank's age ($lnAGE_i$), whether the bank is a member of a Bank Holding Company (BHC_m) where all banks are structured under a single BHC or a Multi-Layered Bank Holding Company ($MLBHC_m$), whether it is a minority-owned bank (MIN_i), the percentage of foreign ownership ($FRGN_i$), whether the bank has a web-banking portal (WEB_i), the number of full time-equivalent employees (FTE_i), the logarithm of the book value of bank's total assets ($lnTA_i$). The following ratios, all scaled by TA, are also included: interest income (INC_i^{INT}), non-interest income ($INC_i^{NON\text{-}INT}$), interest expense (EXP_i^{INT}), non-interest expense ($EXP_i^{NON\text{-}INT}$), securities ($SECS_i$), loans and leases (LNS_i), fixed assets (FXD_i), money market deposit accounts ($MMDA_i$), small time deposits ($DEPS_i^{TIME}$), other small deposits ($DEPS_i^{OSMALL}$), borrowed money (including negotiable -wholesale- certificates of deposit, $BMONEY_i$). Additionally, I incorporate the risk-weighted assets to TA ratio ($RWATA_i$), non-performing loans to total loans ratio (NPL_i), whether bank is operating in an MSA or CMSA market, Herfindahl Index of market concentration based on bank deposits ($HERF_m$), the total number of bank branches in the market ($BNKBR_m^{TOT}$), the number of new banks entering the market within the last year ($BNKS_m^{NEW}$), and indicator variables for each of the 49 states plus the District of Columbia.[27]

Model estimates are presented in Table 3.[28] The probability of being included in the sample is positively linked to the percentage of foreign ownership, presence of a web portal, the number of full-time employees, non-interest expenses, securities, higher MMDA and other small deposits, operating in a

MSA or CMSA market, and negatively associated with bank's age, BHC affiliation, interest and non-interest income, interest expenses, non-interest revenue from deposit accounts, and the number of branches for the bank. The pseudo-R^2 is 11.68%, suggesting that the model only partially explains the differentiating characteristics of banks included in the sample. I also examine the model's explanatory power by checking Type-I and Type-II errors when classifying observations based on the predicted probabilities. The simple probability of being included in the sample (Pr[SAMPLE=1]) out of 7,025 observations is 36.90%.[29] Using this threshold probability as the benchmark Type I error is 32.29% (827 observations out of 2,592 are predicted as non-sample, when in fact they are) and Type II error is 36.95% (1,638 observations out of 4,433 are predicted as sample, when in fact they are not). These statistics suggest that Heckman's model may not be fully successful in correcting the sample selection bias. In the following sections, I provide both OLS and Heckman model estimates, but I exclude estimates of the selection model that is part of the Heckman method for the sake of brevity.

4.2. Bank Profitability–Advertising Intensity Relationship

Following the existing literature, I first examine the possible relationship between commercial bank profitability and advertising intensity to test *the Comanor-Wilson hypothesis*: advertising can be used for product differentiation and to create entry barriers, suggesting a positive relationship between profits and advertising. It should be noted that bank profitability can also be explained by the alternative s*tructure-conduct-performance* and *efficient-structure hypotheses*. The first suggests that a higher concentration leads to higher prices for consumers (for example, higher loan and lower deposit interest rates) leading to higher profitability. The second suggests that higher profits are a result of best-practices adopted by the X-efficient firm. I test the *Comanor-Wilson hypothesis* by adding advertising intensity (ADV_i) to the reduced-form equations used by Berger (1995a) to test the *structure-conduct-performance* and *efficient structure hypotheses*:

$$\pi_{i,m,s} = \alpha_0 + \alpha_1 HERF_m + \alpha_2 SHARE_i + \alpha_3 XEFF_i^{COST} + \alpha_4 MSA_m + \alpha_5 CMSA_m + \alpha_6 MKTGR_m^{DEPS} \quad (2)$$
$$+ \alpha_7 ADV_i + \sigma\hat{\lambda}_i + \sum_{j=2}^{51} \gamma_j STATE_s + \varepsilon_{i,m,s}^{\pi}$$

where, profitability π_i is measured by ROE_i or ROA_i, $HERF_i$ is the Herfindahl Index of market concentration, $SHARE_i$ is bank's share based on deposits, $XEFF_i^{COST}$ is the cost X-efficiency estimate obtained from a stochastic frontier[30], MSA_i and $CMSA_i$ are metropolitan market indicators, and $MKTGR_i^{DEPS}$ is the one-year market growth rate of market deposits. This structural equation is jointly estimated with the selection model (1) and the potential sample selection bias is corrected by inserting λ_i, estimate of the inverse of Mill's ratio, into the reduced-form equation (2). λ_i is defined as $\phi(\boldsymbol{\delta}\mathbf{X_i})/\Phi(\boldsymbol{\delta}\mathbf{X_i})$, where ϕ (Φ) is the normal (cumulative normal) probability function, $\boldsymbol{\delta}$ is the vector of coefficient estimates for model (1), and $\mathbf{X_i}$ is the vector for observation *i*. The model also includes indicator variables for each of the 49 states (excluded state is Alabama) and the District of Columbia. The results are presented in Table 4.

The odd-numbered columns in Table 4 present the results with Ordinary Least Squares (OLS) estimation, and the even-numbered columns the results with Heckman's sample selection correction. First two columns replicate Berger's (1995a) regressions in his Tables 4 and 5, with the exclusion of scale-efficiency variables.[31] Columns three and four report results with the advertising intensity added to the specification. The last two columns re-estimate OLS and Heckman models for small community banks with TA less than $100 million. The results are generally in line with Berger (1995a). Cost X-efficiency is positive and significant in all specifications for both ROA and ROE, supporting the *efficient structure hypothesis*. Market share is positive and significant for both ROA and ROE specifications with OLS, but not with significant when corrected for the selection bias. Market concentration coefficients are negative under OLS (as in Berger, 1995a), positive under Heckman method, though none of them are significant: higher concentration does not impact profitability.

Advertising intensity coefficient is negative but insignificant for the whole sample, an exception being the ROE regression with OLS for the whole sample, but there again the coefficient is not

significant. These results are similar to those found by Edwards (1973) and Kohers and Simpson (1981) without controlling for cost X-efficiency. Interestingly, advertising expenditures are a significant drag on profitability for the small community banks with TA under $100 million, with or without sample selection bias correction.

It may be argued that these specifications, and hence the results, are questionable because they do not adequately address the question of simultaneity of profitability and advertising expenditures. In the next section, with the limited data that are available, I attempt to determine the causality between the two.

4.3. Granger-Causality Tests for Advertising Intensity and Bank Profitability

In this section I conduct Granger-causality tests with the limited time-series data that are available to date. I use six quarters of data that are available since the introduction of item RIAD0497 on advertising expenses in the March 2001 Call Reports, to run the following regressions separately:

$$\pi_{i,s,t} = \theta_0 + \theta_1\pi_{i,t-1} + \theta_2\pi_{i,t-2} + \theta_3\pi_{i,t-3} + \theta_4 ADV_{i,t-1} + \theta_5 ADV_{i,t-2} + \theta_6 ADV_{i,t-3} + \sum_{j=2}^{51}\gamma_j STATE_s + \varepsilon_{i,s,t}^{GRANGER} \qquad (3)$$

$$ADV_{i,s,t} = \theta_0 + \theta_1\pi_{i,t-1} + \theta_2\pi_{i,t-2} + \theta_3\pi_{i,t-3} + \theta_4 ADV_{i,t-1} + \theta_5 ADV_{i,t-2} + \theta_6 ADV_{i,t-3} + \sum_{j=2}^{51}\gamma_j STATE_s + \varepsilon_{i,s,t}^{GRANGER} \qquad (4)$$

where, profitability $\pi_{i,t}$ is measured by $ROE_{i,t}$ or $ROA_{i,t}$. Ideally, one would like to control for market characteristics that may explain profitability, such as $HERF_m$, $MKTSHR_m$, $MKTGR_m$, MSA_m, $CMSA_m$.[32] I cannot include such controls here, as market concentration and share variables are obtained from the Summary of Deposits datasets which are only reported once a year in June. Also note that regressions (3) and (4) are estimated with OLS without bank- or quarter-effects.

Given the restricted time-series dimension, the results provided in Table 5 should be taken with a grain of salt. The results suggest that the availability of free cash flow allows for higher advertising budgets: advertising intensity increases significantly for two or three quarters following increases in ROA

and ROE, respectively. This finding is consistent with bank managers acknowledging reductions in advertising budgets following poor profitability. There is also weak evidence that suggests that advertising may have an intangible-asset quality: increases in advertising reduce ROA and ROE in the first quarter but then are associated with increases in profitability in the second and third consecutive quarters. This may not be surprising as under the current accounting standard advertising is treated as a current expense, rather than investment in an intangible asset as suggested in the economics literature (for example, Demsetz, 1979, and Ayanian, 1983). Though, this effect is only significant for ROA, and for that, only in the first and third quarters. When more data become available, additional tests will help clarify the intangible nature of bank advertising. In the next section, I examine how market structure potentially affects advertising intensity.

4.4. Advertising Intensity – Market Structure Relationship

In this section, I, first, re-estimate Wolken and Derrick's (1986) specification, which is itself an extension of Scott's (1978) model, to explore the relationship between advertising intensity and market structure. I, then, go on to expand their model and test alternative hypotheses based on bank's efficiency, risk, asymmetric information, maturity, organizational structure, product diversification, minority, and foreign ownership status. The following specification replicates Wolken and Derrick's 1986 model:

$$\begin{aligned} ADV_i = {} & \beta_0 + \beta_1 BNKGR_i^{DEPS} + \beta_2 MKTGR_m^{DEPS} + \beta_3 \ln TD_i + \beta_4 MKTSZ_m^{DEPS} + \beta_5 LNS_i^{CONS} + \beta_6 MSA_m \\ & + \beta_7 CMSA_m + \beta_8 HERF_m + \beta_9 HERF_m^2 + \beta_{10} SHARE_i + \beta_{11} SHARE_i^2 + \beta_{12} HERF_m \times SHARE_i \\ & + \beta_{13} BNKBR_i^{TOT} + \beta_{14} MKTBR_m^{TOT} + \beta_{15} BNKBR_i^{NEW} + \beta_{16} MKTBR_m^{NEW} + \beta_{17} BNKS_m^{NEW} + \sigma\lambda_i + \varepsilon_i^{CONC} \end{aligned} \quad (5)$$

where, $BNKGR_i^{DEPS}$ is the one-year growth in bank's deposits, $MKTGR_m^{DEPS}$ is the one-year growth in deposits at the market level, $lnTD_i$ is the logarithm of bank's total deposits, $MKTSZ_m^{DEPS}$ is the size of the market as a percentage of total U.S. commercial banking deposits, LNS_i^{CONS} is the percentage of consumer

loans to total assets, $HERF_m$ is the Herfindahl Index based on market deposits, $SHARE_i$ is bank's share of the deposit market, $BNKBR_i^{TOT}$ is the total number of bank's branches, $BNKBR_i^{NEW}$ is the number of new branches over the past year, $MKTBR_m^{TOT}$ is the total number of branches in the market, $MKTBR_m^{NEW}$ is new branches introduced in the market over the past year, $BNKS_m^{NEW}$ is the number of banks entering or exiting the market over the past year.[33] As in Wolken and Derrick (1986), market concentration and market share enter the specification as linear, squared and interactive terms. λ_i is the estimate of the inverse-Mill's ratio.

I re-estimate an extended version of the Wolken and Derrick (1986) by adding to the specification the minority and website dummies (MIN_i and WEB_i, respectively), the percentage foreign ownership ($FRGN_i$), cost and profit X-efficiency estimates ($XEFF_i^{COST}$ and $XEFF_i^{PROF}$, respectively), logarithm of bank's age ($lnAGE_i$), an indicator variable that equals one if bank is a *de novo* bank, zero otherwise ($DENOVO_i$), change in the equity to TA ratio between year-end 2000 and year-end 2001 (ΔEQ_i), change in dividend paid by the bank year-end 2000 and year-end 2001 (ΔDIV_i), ratio of risk-weighted assets to total assets ($RWATA_i$), percentage of officers, managers, and directors who borrowed from the bank with respect to the total number of employees ($INSIDE_i$), indicator variables that equal one if the bank sells proprietary or third-party mutual funds, and zero otherwise (MF_i^{PROP} and MF_i^{THIRD}, respectively), an indicator variable that equals one if the bank sells insurance products, and zero otherwise (INS_i), the increase in advertising intensity of all of the other competitors operating in the same market ($COMBAT_i$), and the personal income growth in the market (PIG_m):

$$
\begin{aligned}
ADV_i = {} & \beta_0 + \beta_1 BNKGR_i^{DEPS} + \beta_2 MKTGR_m^{DEPS} + \beta_3 \ln TD_i + \beta_4 MKTSZ_m^{DEPS} + \beta_5 LNS_i^{CONS} + \beta_6 MSA_m \\
& + \beta_7 CMSA_m + \beta_8 HERF_m + \beta_9 HERF_m^2 + \beta_{10} SHARE_i + \beta_{11} SHARE_i^2 + \beta_{12} HERF_m \times SHARE_i \\
& + \beta_{13} BNKBR_i^{TOT} + \beta_{14} MKTBR_m^{TOT} + \beta_{15} BNKBR_i^{NEW} + \beta_{16} MKTBR_m^{NEW} + \beta_{17} BNKS_m^{NEW} \\
& + \beta_{18} MIN_i + \beta_{19} FRGN_i + \beta_{20} WEB_i + \beta_{21} XEFF_i^{COST} + \beta_{22} XEFF_i^{PROF} + \beta_{23} \ln AGE_i \\
& + \beta_{24} DENOVO_i + \beta_{25} \Delta EQ_i + \beta_{26} \Delta DIV_i + \beta_{27} RWATA_i + \beta_{28} INSIDE_i \\
& + \beta_{29} MF_i^{PROP} + \beta_{30} MF_i^{THIRD} + \beta_{31} INS_i + \beta_{32} COMBAT_i + \beta_{33} PIG_m + \sigma\lambda_i + \varepsilon_i^{CONC}
\end{aligned}
\tag{6}
$$

The estimates of models (5) and (6) are presented in Table 6: first two columns report the coefficient estimates for (5) first with OLS, and then with Heckman correction; columns three and four report the coefficient estimates for (6) first with OLS, and then with Heckman correction; last two columns report the coefficient estimates for (6) for small community banks with TA less than $100 million. Comparing the results of column one with those of Wolken and Derrick (1986) in their Table III column 1 (their Model 1), one can note that the coefficient estimates for $MKTGR_m^{DEPS}$, $lnTD_i$, $MKTSZ_m^{DEPS}$, LNS_i^{CONS}, $BNKBR_i^{TOT}$, and $BNKS_m^{NEW}$ are of the same sign and significance (insignificance). Market concentration and share variables, on the other hand, have the opposite signs, even though they are all insignificant both here and in Wolken and Derrick's (1986) estimation. Even though, in Table 6, column 1, the coefficients for $HERF_m$ and $HERF_m^2$ have the signs predicted by *the 'inverted-U' hypothesis*, they are not supportive of the hypothesis as they are not jointly significant in any of the specifications. Further, in contradiction to Wolken and Derrick (1986), $SHARE_i$ is negative, $SHARE_i^2$ is positive, and $HERF_m \times SHARE_i$ is negative, none being significant. It should be noted that correcting for the sample selection bias has an impact on model (5) results. In column two, the coefficient for $lnTD_i$ becomes negative and significant, indicating support for *the diminishing unit advertising costs hypothesis*. However, this is a weak support, as this result does not hold in the expanded model (5) – columns three and four – or becomes insignificant for the smaller banks – columns five and six. There is some evidence that suggests that the two alternative

non-price competition methods, namely advertising and branching, may be substitutes: in all specifications, when corrected for selection bias, the coefficient for $BNKBR_i^{TOT}$ remains negative but becomes significant. Additional new branches for the bank leads to decreases in its advertising, a surprising result, as one would expect the bank to increase its advertising to inform customers of the new facility. Similarly, increase in the number of total branches in the market leads to a lower advertising intensity, a result that is hard to reconcile with the competitive role of advertising. This latter is supported however, as in Wolken and Derrick (1986) by the positive and significant coefficient estimate on $BNKS_m^{NEW}$ which suggests that as new banks enter the market advertising intensity increases. Thus, it would appear that Wolken and Derrick (1986) results are, for the most part, supported by a larger dataset 24 years later.

Columns three and four of Table 6 report the OLS and Heckman results of the extended model (6). Interestingly enough, even though Heckman's correction matters for model (5), it makes no significant improvement in the estimation of the expanded model (6), as coefficient estimates across columns three and four have the same signs and significances. First, it should be noted that *the minority clientele hypothesis* is weakly supported, the coefficient on MIN_i is negative and marginally significant, indicating that minority owned banks advertise less, holding everything else constant. The results for the whole sample and the sub-sample of small banks reject *the quality signaling hypothesis*. The coefficient estimates for $XEFF_i^{COST}$ and $XEFF_i^{PROF}$ are negative and significant, suggesting that more efficient banks advertise less, rather than advertising more to separate themselves from the less efficient banks. Even though the coefficient on $DENOVO_i$ dummy variable is negative but insignificant, it still appears that banks spend less on advertising as they age: the coefficient of *lnAGE* is negative and significant. *The capital structure hypothesis* is not supported: an increase in bank's equity capital does not lead to a significant increase in advertising expenditures. But there is some support for *the financing constraints hypothesis*: banks that can increase their dividend payouts, hence that are not liquidity constrained also spend higher amounts on advertising. Banks with higher risk appear to spend more on advertising: the coefficients on risk-weighted assets to TA ratio ($RWATA_i$) and the ratio of number of managers, officers,

and directors borrowing from the bank to the number of full-time-equivalent employees ($INSIDE_i$) are both positive, though only the first one is significant. Interestingly, banks that are selling a variety of products, such as proprietary or third party mutual funds, or insurance products, do not advertise more: coefficients estimates on MF_i^{PROP}, MF_i^{THIRD}, INS_i are negative but insignificant. I also fail to find support for the combative role of advertising: an increase in competitors advertising expenses does not lead to an increase in bank's advertising response, as $COMBAT_m$ coefficients are negative and insignificant. However, a possible explanation is that $COMBAT_m$ is calculated over three quarters at most, and that banks may be reacting with shorter or longer lags to changes in competitors' advertising policies. Columns five and six of Table 6 report the estimates of model (6) for small community banks. In contrast to the full sample, *de novo entry hypothesis* holds for small banks: the coefficient on $DENOVO_i$ dummy is positive and significant, stating that banks that have five years or less spend more on advertising than the older small banks, holding everything else equal.

A natural extension of this work is test whether advertising creates market power, by estimating, for example, market concentration–advertising intensity relationships. I choose not to estimate concentration–advertising intensity models because the two-way censoring inherent in my sample would lead to biased and irrelevant tests. First, because the federal regulators require that only banks whose advertising expenses are at least one percent of their operating income to report them in the Call Reports. If there are advertising economies of scale in banking, then those banks that enjoy its benefits, and potentially use it to create entry barriers, would be excluded from my sample. More importantly, the second restriction requires that banks obtain all of their deposits from a single county, MSA, or CMSA market, which rules out the largest banks from my sample. It is specifically these banks that are most likely to have *deep-pockets* and potentially spend significant amounts to make create advertising entry barriers when needed.

Another important point is that if advertising expenditures and profitability are jointly determined, then a natural extension would be to estimate models (2) and (5) or (6) within a simultaneous equations framework. I estimate such models in the next section.

4.5. A Simultaneous Equations Model of Advertising Intensity and Profitability

The endogenous nature of advertising affects both profitability–advertising intensity and advertising intensity–market structure relations. For example, a change induced in the market structure due to an entry, acquisition, or failure will possibly lead to incumbents to reconsider their advertising strategies. At the same time, this change in the market structure is also likely to affect the profitability of all of its participants. If profitability and advertising are jointly determined, then their simultaneous nature should be accounted for during the estimation. I re-estimate models (2) and (5), and models (2) and (6) jointly within the framework of simultaneous equations estimation.[34]

The results in Table 7 show that it is important to account for the endogeneity of advertising. In Table 4, the estimates of the advertising intensity coefficient are all negative, though only significant for the smallest banks. This suggested that advertising reduces contemporaneous profitability. When model (2) is estimated jointly with more restricted version of the advertising intensity–market structure model (5), advertising has a positive and significant effect on profits. Compared to column three of Table 4, all of the other coefficient estimates retain their signs, and with the exception of $HERF_i$ variable, they are now all statistically significant. The results still support *the efficient-structure hypothesis*, and market share still appears to be an important factor in profitability as well. Deposit market growth leads to a significant decrease in profitability, possibly suggesting a role of advertising as the market expands. Comanor and Wilson (1974) observe a similar improvement in the estimate of advertising's effect on profitability when moving from single equation estimation to simultaneous equation estimation.

When models (2) and (6) are estimated simultaneously, advertising has still a positive, but now insignificant, impact on profitability. There are no major changes in the estimated relationship, as the coefficient estimates for $XEFF_i$, $SHARE_i$, and $MKTGR_m^{DEPS}$ are still of the same sign and significant. Examining the estimates of the advertising intensity–market structure relationship, one can observe that almost all of the coefficient estimates keep their sign, order of magnitude, and significance, suggesting that the conclusions drawn in section 4.4 still hold when allowing for the endogeneity of advertising. The

difficulty of interpreting the simultaneous equation model estimates is that, the estimation does not address the specification errors involved when estimating, what are in effect, ad hoc models due to lack of strong theoretical models. More exploratory work appears warranted in this area.

5. Conclusion and Suggestions for Future Research

I examine the potential role advertising in community banking using data that recently became available for a large sample of U.S. banks. Before undertaking the study, my prior was that the results obtained by studies that rely on 1960s and 1970s data, which were also subjected to important selection biases, would not apply to today's community banks. Interestingly, my results are generally in line with the research using 1960s and 1970s data. For example, I find weak evidence for *the 'inverted-U' hypothesis*: as in Kohers and Simpson (1981), I find a negative but insignificant relationship between profitability and advertising intensity, though my results become statistically significant for the smallest bank subsample. The estimates obtained from Granger causality regressions and the simultaneous equations estimates suggest the opposite, though additional work is needed to confirm the positive effect of advertising on profitability. It appears that advertising can have a pro-competitive effect in banking. Importantly, I test a new series of hypotheses. For example, I find that minority-owned banks advertise less, possibly because they have a captive clientele. I also reject *the quality signaling hypothesis*: X-efficient banks advertise less. This suggests that, there may be an optimal advertising level that is required as an input to the bank's production.

In evaluating these results, the limitations of the present study should be kept in mind. First, the sample selection biases may not have been fully corrected for, given the low explanatory power of the selection model. A non-parametric selection model may provide a better fit, and enhance the correction against selection biases. And second, the very limited Granger causality tests between advertising intensity and profitability provided here are far from being conclusive. The direction of the causality should be revisited as additional Call Report data become available.

The collection of item RIAD0497 "Advertising and Marketing Expenses" starting with the March

2001 Call Reports for a large number of U.S. banks creates a new opportunity for examining the role of advertising in commercial banking. Despite its lack of detail, the newly introduced Call Report item provides a promising venue for future research. Here are few suggestions for testing of old and new advertising-economics hypotheses using banking data. First, a number of theoretical models address firm's co-ordination of price and non-price competition (for example, Milgrom and Roberts, 1986; Chintagunta, Rao, and Vilcassim, 1993; Hertzendorf and Overgaard, 2000). Hannan and Berger (1991) find that deposit interest rates have higher 'rigidity' for small banks and banks operating in concentrated markets, whereas Kahn, Pennacchi, and Sopranzetti (1999) find that deposit interest rates are also 'sticky' in the sense that they are clustered around integers and even fractions. Given these findings, an interesting question is the joint price (interest rate) and non-price competition decisions of banks. Second, the argument about the advertising economies of scale suggests that advertising may play an important role among firm's production inputs. To the best of my knowledge, no one has formally examined the role of advertising in bank production economies, as reflected in a cost- or profit-function or frontier. Third, as more quarterly Call reports become available, one could formally test Telser's (1964) market share stability hypothesis: if advertising can be used to create entry barriers, then market share stability should increase with higher advertising intensity (for example, Mueller and Rogers, 1980). Finally, the collection of item BHCK0497 "Advertising and Marketing Expenses" starting with March 2002 Y-9 Reports, allows extending advertising economics research to BHCs.

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Table 1
Advertising Theories and Hypotheses

HERF is Herfindahl Index of market concentration in market m based on deposit shares. *SHARE* is the bank i's share in market m, $XEFF^{COST}$, $XEFF^{PROF}$ are cost and standard profit X-efficiency estimates obtained by applying a stochastic frontier to all banks in 2001. *ADV* is the advertising intensity measured as advertising expenses over total deposits. *lnAGE* is the logarithm of bank's age. *DENOVO* is an indicator variable equal to 1 if bank i's age is less than 6 years, 0 otherwise. *MLBHC* is an indicator variable equal to 1 if bank is a member of a Multi-Layered BHC (as opposed to a One BHC), and 0 otherwise. *lnTA* is the logarithm of bank's total assets in 2001 in millions of dollars. *ΔDEPS* is the change in bank's deposits between year-end 2001 and year-end 2000. *MIN* is an indicator variable equal to 1 if bank i is a minority bank. *ΔEQ* is the change in the ratio of book value of equity to book value of total assets between 2001 and 2000. *ΔDIVS* is the change in ratio of dividend payments on preferred and common stock to the book value of equity between years 2001 and 2000. *RBC* is risk-based capital ratio as reported in the Call Reports. *NPL* is the ratio of non-performing loans to total loans. *RWATA* is the ratio of risk-weighted assets to the book value of total assets. *INSIDE* is the percentage of bank officers and directors who have borrowed from the bank to the number of full-time equivalent employees.

Profitability – Advertising Intensity Regressions

Hypothesis	**Related Theories**	**Expected Sign of the Coefficient Estimate**
Structure-Conduct-Structure Hypothesis		(+) *HERF*, (+) *SHARE*
Efficient-Structure Hypothesis		(+) $XEFF^{COST}$, (+) $XEFF^{PROF}$
Comanor-Wilson (1967) Hypothesis	The Persuasive View	(+) *ADV*

Advertising Intensity – Market Structure Regressions

Hypothesis	**Related Theories**	**Expected Sign of the Coefficient Estimate**
Dorfman-Steiner Hypothesis	The Persuasive View	(+) HERF
Brozen Hypothesis	The Informative View	(–) SHARE
Inverted-U Hypothesis	The Persuasive View, The Complementary View	(+) HERF, (–) $HERF^2$ (+) SHARE, (–) $SHARE^2$
De Novo Entry Hypothesis	The Persuasive View	(+) *DENOVO*, (–) *lnAGE*
Diminishing Unit Advertising Costs Hypothesis	Production Economies	(–) *lnTA*
Quality signaling Hypothesis	The Informative View	(–) $XEFF^{COST}$, (–) $XEFF^{PROF}$
Minority Clientele Hypothesis	The Persuasive View	(–) *MIN*
Capital Structure Hypothesis	Capital Structure Theory	(+) *ΔEQ*
Financing Constraints Hypothesis	Liquidity Sensitivity of Investments	(+) *ΔDIVS*

Table 2
Comparative Statistics

where $HERF_i$ is the Herfindahl Index of market concentration based on bank deposits; $SHARE_i$ is the bank's i share of the market; $XEFF_i^{COST}$ is the cost X-efficiency estimate obtained from a stochastic minimum-cost frontier with semi-parametric Fourier terms fitted to all commercial banks in the U.S.; MSA_m and $CMSA_m$ are dummy variables for large metropolitan markets; $MKTGR_m^{DEPS}$ is the one-year market growth based on market deposits; ADV_i is advertising intensity defined as advertising expenses divided by total deposits of the bank; $BNKGR_i^{DEPS}$ is the one-year growth rate of bank deposits; $lnTD_i$ is the logarithm of bank's total deposits; $MKTSZ_m$ is the size of market m compared to US banking market; LNS_i^{CONS} is consumer loans to TA ratio; MSA_m and $CMSA_m$ are metropolitan area dummy variables; $HERF_m$ is the Herfindahl Index for market m; $SHARE_i$ is bank i's deposit share of the market; $BNKBR_i^{TOT}$ and $BNKBR_i^{NEW}$ are the bank's total number of branches and new branches, over the last year, respectively; $MKTBR_m^{TOT}$ and $MKTBR_i^{NEW}$ are the market's total number of branches and new branches over the last year, respectively; $BNKS^{NEW}$ is the number of new banks entering the market during the last year; MIN_i indicates whether the bank minority-owned; $FRGN_i$ is the percentage of foreign ownership in the bank; WEB_i indicates whether the bank has web presence; $XEFF_i^{COST}$ and $XEFF_i^{PROF}$ are cost and profit X-efficiency estimates; $lnAGE_i$ is the logarithm of bank's age; ΔEQ_i and ΔDIV_i is the change in bank's equity and dividend payouts over the past year; $RWATA_i$ is the ratio of risk-weighted assets to TA; $INSIDE_i$ is the ratio of the number of managers, owners, and directors who have borrowed from the bank to the number of full-time equivalent employees; MF_i^{PROP} and MF_i^{THIRD} are dummy variables indicating whether the banks sells proprietary or third party mutual funds; INS_i indicates whether the bank sells insurance products; $COMBAT_i$ is the change in competitors' advertising intensity in the market as a whole; PIG_m is percentage change in personal income at the market level between 1999 and 2000 (2001 were not available as of November 2002).

	Commercial Bank Population			Sample		
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**
TA	7,954	710.31	8,546.17	2,592	128.96	415.34
lnTA	7,954	4.61	1.29	2,592	4.20	1.00
TD	7,247	441.00	5,143.73	2,592	93.53	216.62
lnTD	7,247	4.33	1.30	2,592	3.95	1.00
AGE	7,837	64.73	40.63	2,592	56.97	41.97
lnAGE	7,837	3.72	1.23	2,592	3.39	1.49
DENOVO	7,954	0.11	0.31	2,592	0.20	0.40
BHC	7,954	0.80	0.40	2,592	0.74	0.44
OBHC	7,954	0.69	0.46	2,592	0.64	0.48
MLBHC	7,954	0.12	0.32	2,592	0.11	0.31
MIN	7,954	0.01	0.11	2,592	0.01	0.11
FRGN	7,954	1.04	9.79	2,592	1.18	10.72
MSA	7,954	0.29	0.45	2,592	0.32	0.47
CMSA	7,954	0.16	0.37	2,592	0.19	0.39
WEB	7,954	0.59	0.49	2,592	0.56	0.50
FTE	7,954	210	2,576	2,592	46	210
ADV	4,170	0.17	1.21	2,592	0.18	1.47
ADVtd†	4,120	3.98	6.75	2,577	3.63	5.10
ADVoi	4,169	1.53	3.59	2,592	1.26	1.36
ADVnie	4,174	2.93	2.69	2,592	2.87	2.37
ROA	7,954	1.19	1.08	2,592	1.02	1.10

ROE	7,819	12.66	9.95	2,592	10.82	10.39
INC^{INT}	7,954	6.75	1.05	2,592	6.68	0.93
INC$^{NON-INT}$	7,954	0.84	0.87	2,592	0.78	0.81
EXP^{INT}	7,954	3.08	0.74	2,592	3.02	0.71
EXP$^{NON-INT}$	7,954	3.10	1.16	2,592	3.18	1.16
AC		6.17	1.19	2,592	6.20	1.17
SECS	7,819	28.78	14.71	2,592	29.36	15.03
LNS	7,819	60.56	14.56	2,592	59.93	14.77
NPL	7,819	1.06	1.27	2,592	1.01	1.32
PLL	7,819	0.46	0.62	2,592	0.46	0.61
FXD	7,819	1.82	1.28	2,592	1.86	1.40
DEPS	7,954	83.31	8.86	2,592	84.39	7.24
MMDA	7,954	11.33	9.60	2,592	11.41	9.74
DEPS^{OSMALL}	7,954	8.24	6.81	2,592	8.24	7.03
DEPS^{STIME}	7,954	27.56	10.76	2,592	27.44	10.80
BMONEY	7,819	4.72	6.46	2,592	3.95	5.90
EQ	7,819	10.55	4.09	2,592	10.73	3.84
RBC	7,819	17.10	8.76	2,592	17.50	8.19
RWATA	7,819	0.67	0.14	2,592	0.67	0.14
INSIDE	7,815	4.88	9.51	2,592	6.23	11.10
COMBAT	6,496	0.01	0.11	2,370	0.01	0.10
PIG	7,734	5.84	3.25	2,526	5.83	3.13
XEFF^{COST}	7,710	78.44	8.36	2,553	78.14	8.77
XEFF^{APROF}	7,710	42.18	18.20	2,553	47.44	16.57
XEFF^{PROF}	7,710	41.58	18.91	2,553	47.37	17.20
MKTSZ	7,876	0.76	2.09	2,592	0.87	2.16
HERF	7,876	1,282	1,470	2,592	1,175	1,440
HERF^{2}	7,876	3,802,331	10,600,000	2,592	3,453,588	10,800,000
SHARE^{HQ-MKT}	7,247	89.65	20.07	2,592	100.00	0.00
SHARE	7,876	13.73	16.39	2,592	11.76	15.46
SHARE^{2}	7,876	457.28	1,155.37	2,592	377.08	1,118.67
MKTGR^{DEPS}	7,843	5.52	6.19	2,592	6.58	17.94
BNKGR^{DEPS}	6,922	17.93	39.66	2,476	52.68	1,061.08
BNKS^{NEW}	7,843	-0.53	2.94	2,592	-0.39	3.16
BNKBR^{TOT}	7,247	8.46	69.58	2,592	2.43	3.12
BNKBR^{NEW}	6,922	0.32	1.23	2,476	0.13	0.52
MKTBR^{TOT}	7,247	8.46	69.58	2,592	2.43	3.12
MKTBR ^{NEW}	7,843	5.03	16.06	2,592	7.19	18.21
ΔEQ	7,819	2.19	13.89	2,592	0.91	5.65
ΔDIV	7,676	-0.17	6.17	2,589	-0.14	5.56
MF^{THIRD}	7,819	0.22	0.41	2,592	0.17	0.38
MF^{PROP}	7,954	0.02	0.14	2,592	0.02	0.12
INS	7,954	0.50	0.50	2,592	0.43	0.49

Table 3
Profitability–Advertising Intensity Models

This table presents the results of profitability – advertising intensity models:

$$\pi_{i,m,s} = \alpha_0 + \alpha_1 HERF_m + \alpha_2 SHARE_i + \alpha_3 XEFF_i^{COST} + \alpha_4 MSA_m + \alpha_5 CMSA_m + \alpha_6 MKTGR_m^{DEPS} + \alpha_7 ADV_i + \sigma\hat{\lambda}_i + \sum_{j=2}^{51} \gamma_j STATE_s + \varepsilon_{i,m,s}^{\pi} \qquad (2)$$

where, $\pi_{i,t}$ is measured by ROA_i or ROE_i, return on assets or equity, respectively; $HERF_i$ is the Herfindahl Index of market concentration based on bank deposits; $SHARE_i$ is the bank's i share of the market; $XEFF_i^{COST}$ is the cost X-efficiency estimate obtained from a stochastic minimum-cost frontier with semi-parametric Fourier terms fitted to all commercial banks in the U.S.; MSA_m and $CMSA_m$ are dummy variables for large metropolitan markets; $MKTGR_m^{DEPS}$ is the one-year market growth based on market deposits; ADV_i is advertising intensity defined as advertising expenses divided by total deposits of the bank; λ_i is the estimate of inverse-Mill's ratio based on selection model when Heckman model is estimated to correct for the selection bias; and $STATE_m$ are dummies for 49 states and DC. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

	Sample OLS			Population Heckman Method			Sample OLS			Population Heckman Method			TA<100 million OLS			TA<100 million Heckman Method		
ROA	**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**	
α_0	-0.9058	0.2481	***	-1.4927	0.2379	***	-0.9054	0.2524	***	-1.448696	0.2411	***	0.1241	0.2888		-1.5889	0.4153	***
HERF	-1.20E-05	3.20E-05		2.73E-05	2.26E-05		-1.20E-05	3.20E-05		2.72E-05	2.26E-05		-2.24E-05	3.49E-05		-3.26E-06	3.99E-05	
SHARE	0.0073	0.0035	**	-0.0003	0.0024		0.0073	0.0035	**	-0.0003	0.0024		0.0075	0.0037	**	0.0040	0.0042	
XEFF ^{COST}	0.0221	0.0025	***	0.0154	0.0022	***	0.0221	0.0025	***	0.0149	0.0023	***	0.0132	0.0029	***	0.0149	0.0039	***
MSA	-0.0721	0.0625		0.0816	0.0582		-0.0721	0.0626		0.0840	0.0583		-0.1600	0.0702	**	-0.0222	0.0962	
CMSA	-0.1093	0.0834		0.2233	0.0812	***	-0.1093	0.0835		0.2257	0.0813	***	-0.5202	0.1053	***	-0.1883	0.1542	
MKTGR ^{DEPS}	-0.0047	0.0039		-0.0007	0.0028		-0.0047	0.0039		-0.0006	0.0028		-0.0029	0.0042		-0.0030	0.0047	
ADV							-0.0006	0.0804		-0.0732	0.0717		-4.0850	0.3256	***	-2.5674	0.4222	***
λ				1.2473	0.0247	***				1.2473	0.0247	***				1.7278	0.1321	***
Observations	2,553			6,989			2,553			6,989			1,756			3,937		
Censored				4,436						4,436						2,181		
Uncensored				2,553						2,553						1,756		
F-test	7.35	***					7.35	***					13.58	***				
Wald- χ^2				264.81	***					265.17	***					255.66	***	
Adj.- R^2	11.84%						11.81%						28.28%					

Table 3
Profitability–Advertising Intensity Models (continued)

	Sample OLS			Population Heckman Method			Sample OLS			Population Heckman Method			TA<100 million OLS			TA<100 million Heckman Method		
ROE	**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**		**Coef.**	**Std. Err**	
α	-8.0693	2.3734	***	-13.2699	2.2885	***	-8.0782	2.4147	***	-12.7411	2.3207	***	1.1526	2.6199		-15.0830	3.9367	***
HERF	-0.0003	0.0003		0.0001	0.0002		-0.0003	0.0003		0.0001	0.0002		-0.0004	0.0003		-0.0003	0.0004	
SHARE	0.0859	0.0331	***	0.0188	0.0242		0.0859	0.0331	***	0.0185	0.0242		0.0950	0.0339	***	0.0615	0.0398	
XEFF ^{COST}	0.1940	0.0235	***	0.1237	0.0215	***	0.1941	0.0240	***	0.1177	0.0219	***	0.0972	0.0263	***	0.1129	0.0367	***
MSA	1.0065	0.5978	*	2.3952	0.5661	***	1.0061	0.5984	*	2.4208	0.5665	***	-0.3062	0.6365		0.9997	0.9118	
CMSA	1.6617	0.7982	**	4.4107	0.7874	***	1.6610	0.7990	**	4.4348	0.7877	***	-3.4008	0.9552	***	-0.2549	1.4618	
MKTGR ^{DEPS}	-0.0422	0.0370		-0.0008	0.0275		-0.0422	0.0370		0.0002	0.0274		-0.0202	0.0384		-0.0214	0.0449	
ADV							0.0155	0.7686		-0.8234	0.6443		-30.7608	2.9537	***	-16.3767	4.0016	***
λ				12.0166	0.2436	***				12.0206	0.2436	***				16.3768	1.2524	***
Observations	2,553			6,989			2,553			6,989			1,756			3,937		
Censored				4,436						4,436						2,181		
Uncensored				2,553						2,553						1,756		
F-test	6.53	***					6.41	***					11.46	***				
Wald- χ^2				270.39	***					271.37	***					214.61	***	
Adj.- R^2	10.47%						10.43%						24.68%					

Table 4
Advertising Intensity–Market Concentration Models

This table presents the results of advertising intensity – market concentration models:

$$ADV_i = f(BNKGR_i^{DEPS}, MKTGR_m^{DEPS}, \ln TD_i, MKTSZ_m^{DEPS}, LNS_i^{CONS}, MSA_m, CMSA_m, HERF_m, SHARE_i, BNKBR_i^{TOT}, MKTBR_m^{TOT}, BNKBR_i^{NEW}, MKTBR_m^{NEW}, BNKS_m^{NEW},$$
$$MIN_i, FRGN_i, WEB_i, XEFF_i^{COST}, XEFF_i^{PROF}, \ln AGE_i, DENOVO_i, \Delta EQ_i, \Delta DIV_i, RWATA_i, INSIDE_i, MF_i^{PROP}, MF_i^{THIRD}, INS_i, COMBAT_i, PIG_m, \lambda_i) + \varepsilon_i^{ADV}$$

where, subscript i denotes bank, subscript m denotes market, BNK- prefix denotes bank, MKT- prefix denotes market, -BR suffix denotes branch, TOT superscipt denotes total, DEPS superscipt deposits, NEW superscipt denotes new bank, or branches, XEFF denotes X-efficiencies, MF denotes mutual funds. Estimations are conducted using simple OLS or Heckman's model where advertising intensity – market concentration model, the structural model, is jointly (in the case of MLE estimation) or consequently (in the case of 'two-step' estimation) estimated with the selection model (2) in Table 3. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

	Sample OLS			Population Heckman Method			Sample OLS			Population Heckman Method			TA<100 million OLS			TA<100 million Heckman Method		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
β_0	-0.2289	0.1439		-0.5677	0.1647	***	0.7089	0.1071	***	0.7068	0.1067	***	0.2374	0.0318	***	0.2559	0.0329	***
$BNKGR^{DEPS}$	0.0024	0.0005	***	0.0032	0.0006	***	0.0003	0.0002	**	0.0003	0.0002	**	0.0002	0.0000	***	0.0002	0.0000	***
$MKTGR^{DEPS}$	0.0110	0.0045	***	0.0122	0.0045	***	0.0029	0.0011	***	0.0029	0.0011	***	-0.0002	0.0003		-0.0002	0.0003	
$lnTD$	0.0152	0.0345		-0.0953	0.0427	**	0.0539	0.0134	***	0.0525	0.0146	***	-0.0075	0.0044	*	-0.0064	0.0046	
$MKTSZ$	-0.2074	0.0866	**	-0.1575	0.0889	*	-0.0192	0.0212		-0.0184	0.0213		0.0125	0.0079		0.0126	0.0083	
LNS^{CONS}	0.0280	0.0043	***	0.0261	0.0043	***	0.0058	0.0011	***	0.0057	0.0011	***	-0.0003	0.0003		-0.0002	0.0003	
MSA	0.0157	0.0957		0.1947	0.1044	*	-0.0508	0.0259	**	-0.0490	0.0269	*	0.0107	0.0073		0.0044	0.0076	
$CMSA$	0.0803	0.1573		0.4099	0.1747	**	-0.1392	0.0406	***	-0.1355	0.0435	***	0.0226	0.0131	*	0.0092	0.0140	
$HERF$	6.73E-05	6.77E-05		6.20E-05	6.78E-05		2.50E-05	1.77E-05		2.54E-05	1.77E-05		2.91E-06	5.28E-06		2.30E-06	5.33E-06	
$HERF^2$	-7.91E-09	1.65E-08		-8.00E-09	1.67E-08		-6.92E-09	4.12E-09	*	-7.02E-09	4.11E-09	*	-1.32E-09	1.11E-09		-1.64E-09	1.18E-09	
$SHARE$	-0.0069	0.0087		-0.0084	0.0088		-0.0053	0.0032	*	-0.0053	0.0032	*	-0.0006	0.0009		-0.0005	0.0009	
$SHARE^2$	5.59E-05	2.03E-04		4.83E-05	2.02E-04		5.11E-05	8.66E-05		5.16E-05	8.60E-05		7.59E-06	2.58E-05		5.10E-06	2.56E-05	
$HERF \times SHARE$	1.56E-07	2.75E-06		4.19E-07	2.76E-06		4.93E-07	8.34E-07		5.03E-07	8.29E-07		1.29E-07	2.46E-07		1.96E-07	2.48E-07	
$BNKBR^{TOT}$	-0.0114	0.0103		-0.0470	0.0129	***	-0.0112	0.0024	***	-0.0115	0.0028	***	0.0026	0.0025		0.0146	0.0037	***
$MKTBR^{TOT}$	0.0006	0.0002	***	0.0005	0.0002	**	0.0001	0.0001		0.0001	0.0001		-1.8E-05	2.04E-05		-1.9E-05	2.14E-05	
$BNKBR^{NEW}$	-0.0540	0.0522		-0.0412	0.0514		-0.0091	0.0120		-0.0090	0.0119		0.0007	0.0064		-0.0005	0.0063	
$MKTBR^{NEW}$	-0.0083	0.0026	***	-0.0078	0.0026	***	0.0002	0.0006		0.0003	0.0006		-0.0007	0.0002	***	-0.0007	0.0002	***
$BNKS^{NEW}$	0.0533	0.0122	***	0.0640	0.0129	***	0.0002	0.0028		0.0003	0.0028		0.0022	0.0010	**	0.0021	0.0010	**

Table 4
Advertising Intensity–Market Concentration Models (continued)

	Sample			Population			Sample			Population			TA<100 million			TA<100 million		
	OLS			Heckman Method			OLS			Heckman Method			OLS			Heckman Method		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
MIN							-0.0946	0.0550	*	-0.0962	0.0550	*	-0.0266	0.0159	*	-0.0267	0.0173	
FOREIGN							0.0005	0.0006		0.0005	0.0006		-0.0001	0.0004		0.0001	0.0004	
WEB							0.0060	0.0136		0.0070	0.0142		0.0224	0.0039	***	0.0156	0.0044	***
XEFF^{COST}							-0.0094	0.0008	***	-0.0094	0.0008	***	-0.0019	0.0002	***	-0.0018	0.0003	***
XEFF^{PROF}							-0.0015	0.0006	***	-0.0015	0.0006	***	-0.0004	0.0002	**	-0.0005	0.0002	***
DENOVO							-0.0138	0.0312		-0.0134	0.0310		0.0218	0.0104	**	0.0204	0.0104	**
lnAGE							-0.0194	0.0094	**	-0.0197	0.0094	**	-0.0011	0.0030		0.0004	0.0031	
ΔEQ							-0.0012	0.0012		-0.0012	0.0011		0.0000	0.0003		-0.0001	0.0003	
ΔDIV							0.0030	0.0011	***	0.0030	0.0011	***	0.0002	0.0003		0.0003	0.0003	
RWATA							0.1430	0.0500	***	0.1404	0.0510	***	0.0654	0.0147	***	0.0693	0.0157	***
INSIDE							0.0002	0.0006		0.0002	0.0006		0.0000	0.0001		0.0000	0.0001	
MF^{PROP}							-0.0216	0.0481		-0.0221	0.0478		-0.0154	0.0175		-0.0124	0.0172	
MF^{THIRD}							-0.0216	0.0170		-0.0214	0.0169		0.0031	0.0058		0.0013	0.0057	
INS							-0.0175	0.0129		-0.0177	0.0128		0.0009	0.0038		0.0011	0.0037	
COMBAT							-0.0721	0.0606		-0.0722	0.0601		-0.0153	0.0171		-0.0142	0.0172	
PIG							0.0005	0.0022		0.0004	0.0022		0.0003	0.0006		0.0005	0.0006	
λ				0.8194	0.1669	***				0.0093	0.0408					-0.0541	0.0118	***
Observations	2,476			6,912			2,167			6,603			1,470			3,651		
Censored				4,436						4,436						2,181		
Uncensored				2,476						2,167						1,470		
F-test	6.48	***					9.80	***					12.88	***				
Wald-χ^2				283.03	***					585.55	***					476.66	***	
Adj.-R^2	3.63%						11.82%						21.06%					

Table 5
Simultaneous Equation Models

This table presents the results of the simultaneous equations estimation for models (2) and (5) or (6):

$$\pi_{i,m,s} = \alpha_0 + \alpha_1 HERF_m + \alpha_2 SHARE_i + \alpha_3 XEFF_i^{COST} + \alpha_4 MSA_m + \alpha_5 CMSA_m + \alpha_6 MKTGR_m^{DEPS} + \alpha_7 ADV_i + \varepsilon_{i,m,s}^{\pi} \quad (2)$$

$$ADV_i = f(BNKGR_i^{DEPS}, MKTGR_m^{DEPS}, \ln TD_i, MKTSZ_m^{DEPS}, LNS_i^{CONS}, MSA_m, CMSA_m, HERF_m, SHARE_i, BNKBR_i^{TOT}, MKTBR_m^{TOT}, BNKBR_i^{NEW}, MKTBR_m^{NEW}, BNKS_m^{NEW}) + \varepsilon_i^{ADV} \quad (5)$$

$$ADV_i = f(BNKGR_i^{DEPS}, MKTGR_m^{DEPS}, \ln TD_i, MKTSZ_m^{DEPS}, LNS_i^{CONS}, MSA_m, CMSA_m, HERF_m, SHARE_i, BNKBR_i^{TOT}, MKTBR_m^{TOT}, BNKBR_i^{NEW}, MKTBR_m^{NEW}, BNKS_m^{NEW}, MIN_i, FRGN_i, WEB_i, XEFF_i^{COST}, XEFF_i^{PROF}, \ln AGE_i, DENOVO_i, \Delta EQ_i, \Delta DIV_i, RWATA_i, INSIDE_i, MF_i^{PROP}, MF_i^{THIRD}, INS_i, COMBAT_i, PIG_m) + \varepsilon_i^{ADV} \quad (6)$$

where $HERF_i$ is the Herfindahl Index of market concentration based on bank deposits; $SHARE_i$ is the bank's i share of the market; $XEFF_i^{COST}$ is the cost X-efficiency estimate obtained from a stochastic minimum-cost frontier with semi-parametric Fourier terms fitted to all commercial banks in the U.S.; MSA_m and $CMSA_m$ are dummy variables for large metropolitan markets; $MKTGR_m^{DEPS}$ is the one-year market growth based on market deposits; ADV_i is advertising intensity defined as advertising expenses divided by total deposits of the bank; $BNKGR_i^{DEPS}$ is the one-year growth rate of bank deposits; $lnTD_i$ is the logarithm of bank's total deposits; $MKTSZ_m$ is the size of market m compared to US banking market; LNS_i^{CONS} is consumer loans to TA ratio; MSA_m and $CMSA_m$ are metropolitan area dummy variables; $HERF_m$ is the Herfindahl Index for market m; $SHARE_i$ is bank i's deposit share of the market; $BNKBR_i^{TOT}$ and $BNKBR_i^{NEW}$ are the bank's total number of branches and new branches, over the last year, respectively; $MKTBR_m^{TOT}$ and $MKTBR_i^{NEW}$ are the market's total number of branches and new branches over the last year, respectively; $BNKS^{NEW}$ is the number of new banks entering the market during the last year; MIN_i indicates whether the bank minority-owned; $FRGN_i$ is the percentage of foreign ownership in the bank; WEB_i indicates whether the bank has web presence; $XEFF_i^{COST}$ and $XEFF_i^{PROF}$ are cost and profit X-efficiency estimates; $lnAGE_i$ is the logarithm of bank's age; ΔEQ_i and ΔDIV_i is the change in bank's equity and dividend payouts over the past year; $RWATA_i$ is the ratio of risk-weighted assets to TA; $INSIDE_i$ is the ratio of the number of managers, owners, and directors who have borrowed from the bank to the number of full-time equivalent employees; MF_i^{PROP} and MF_i^{THIRD} are dummy variables indicating whether the banks sells proprietary or third party mutual funds; INS_i indicates whether the bank sells insurance products; $COMBAT_i$ is the change in competitors' advertising intensity in the market as a whole; PIG_m is percentage change in personal income at the market level between 1999 and 2000 (2001 were not available as of November 2002). ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

	Coeff.	Std. Err.		Coeff.	Std. Err.	
ROA						
α_0	-0.5070	0.2674	*	-0.5727	0.2667	**
HERF	-5.03E-06	2.89E-05		1.43E-06	3.41E-05	
SHARE	0.0072	0.0031	**	0.0087	0.0044	**
$XEFF^{COST}$	0.0196	0.0031	***	0.0207	0.0031	***
MSA	-0.1039	0.0589	*	-0.0550	0.0681	
CMSA	-0.1363	0.0677	**	-0.0924	0.0778	
$MKTGR^{DEPS}$	-0.0065	0.0036	*	-0.0069	0.0039	*
ADV	0.6653	0.3264	**	0.2688	0.2730	

Table 5
Simultaneous Equation Models (continued)

	Coeff.	Std. Err.		Coeff.	Std. Err.	
ADV						
β_0	-0.1102	0.0323	***	0.6821	0.1019	***
$BNKGR^{DEPS}$	9.85E-05	0.0001		0.0002	0.0002	
$MKTGR^{DEPS}$	0.0029	0.0010	***	0.0030	0.0011	***
lnTD	0.0454	0.0078	***	0.0589	0.0131	***
MKTSZ	-0.0338	0.0186	*	-0.0170	0.0210	
LNS^{CONS}	0.0076	0.0010	***	0.0058	0.0011	***
MSA	8.83E-05	0.0207		-0.0490	0.0257	*
CMSA	-0.0468	0.0340		-0.1342	0.0402	***
HERF	9.08E-06	1.46E-05		2.32E-05	1.75E-05	
$HERF^2$	-6.49E-10	3.54E-09		-6.45E-09	4.07E-09	
SHARE	-0.0026	0.0019		-0.0053	0.0031	*
$SHARE^2$	1.96E-05	4.35E-05		5.12E-05	8.57E-05	
HERF×SHARE	-3.47E-09	5.89E-07		4.65E-07	8.25E-07	
$BNKBR^{TOT}$	-0.0076	0.0022	***	-0.0116	0.0024	***
$MKTBR^{TOT}$	9.71E-05	4.76E-05	**	4.98E-05	5.41E-05	
$BNKBR^{NEW}$	-0.0064	0.0112		-0.0093	0.0118	
$MKTBR^{NEW}$	-0.0005	0.0006		0.0003	0.0006	
$BNKS^{NEW}$	0.0013	0.0026		-5.3E-05	0.00275	
MIN				-0.0943	0.0544	*
FRGN				0.0005	0.0006	
WEB				0.0062	0.0135	
$XEFF^{COST}$				-0.0096	0.0008	***
$XEFF^{PROF}$				-0.0016	0.0006	***
lnAGE				-0.0133	0.0063	**
ΔEQ				-0.0015	0.0011	
ΔDIV				0.0033	0.0011	***
RWATA				0.1437	0.0495	***
INSIDE				0.0002	0.0006	
MF^{PROP}				-0.0173	0.0476	
MF^{THIRD}				-0.0233	0.0169	
INS				-0.0166	0.0127	
COMBAT				-0.0734	0.0599	
PIG				0.0008	0.0022	
Observations	2,439			2,167		
R^2 (ROA)	0.0165			0.0409		
R^2 (ADV)	0.0465			0.1304		
χ^2 (ROA)	100.49	***		102.75	***	
χ^2 (ADV)	133.37	***		331.41	***	
RMSE (ROA)	0.9947			0.9847		
RMSE (ADV)	0.2668			0.2695		

Table 1A
The Selection Model

This table presents the results of the following probit sample selection model:

$$\begin{aligned}\Phi^{-1}\left(\Pr[SAMPLE_{i,m,s}=1]\right) &= \delta_0+\delta_1\ln AGE_i+\delta_2 OBHC_i+\delta_3 MLBHC_i+\delta_4 MIN_i+\delta_5 FRGN_i+\delta_6 WEB_i\\ &+\delta_7 FTE_i+\delta_8\ln TA_i+\delta_9 INC_i^{INT}+\delta_{10} INC_i^{NON-INT}+\delta_{11} EXP_i^{INT}+\delta_{12} EXP_i^{NON-INT}+\delta_{13} SECS_i+\delta_{14} LNS_i\\ &+\delta_{15} FXD_i+\delta_{16} MMDA_i+\delta_{17} DEPS_i^{TIME}+\delta_{18} DEPS_i^{SMALL}+\delta_{19} BMONEY_i+\delta_{20} RWATA_i+\delta_{21} NPL_i\\ &+\delta_{22} MSA_m+\delta_{23} CMSA_m+\delta_{24} HERF_m+\delta_{25} BNKBR_m^{TOT}+\delta_{26} BNKS_m^{NEW}+\sum_{j=2}^{51}\gamma_j STATE_s\end{aligned} \quad (1)$$

where, the dependent variable is equal to 1 if the bank is included in the sample, 0 otherwise; *lnAGE* represents the logarithm of bank's age; WIN_i is an indicator variable equal to 1 if bank i is a minority-owned bank. $FRGN_i$ is the foreign ownership percentage, WEB_i is a dummy variable for the presence of a web portal; FTE_i is the number of full-time equivalent employees; $lnTA_i$ is the log of total assets; INC and EXP with the appropriate superscripts are interest and non-interest income and expenses; $SECS_i$, LNS_i, FXD_i denote securities, loans, fixed assets as a percentage of TA, respectively; $MMDA_i$ and $DEPS_i$ are various deposits to TA ratios; $BMONEY_i$ is borrowed money; $RWATA_i$ is risk-weighted assets rattio; NPL_i non-performing loans ratio; $HERF_i$ is Herfindahl Index of market concentration in market m based on deposit shares; $BNKBR_i$ is the number of bank branches; $BNKS_i$ is the number of banks; and $STATE_m$ are dummies for 49 states and DC. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

	Coef.	Std. Err	
δ_0	0.9140	0.3525	***
lnAGE	-0.0936	0.0184	***
OBHC	-0.0992	0.0445	**
MLBHC	-0.1229	0.0675	*
MIN	-0.2439	0.1531	
FRGN	0.0048	0.0022	**
WEB	0.1482	0.0377	***
FTE	0.0003	0.0001	**
lnTA	-0.2007	0.0308	***
INC^{INT}	-0.1094	0.0322	***
$INC^{NON-INT}$	-0.1349	0.0353	***
EXP^{INT}	-0.0327	0.0459	
$EXP^{NON-INT}$	0.1473	0.0288	***
SECS	0.0058	0.0032	*
LNS	0.0028	0.0034	
FXD	0.0155	0.0151	
MMDA	0.0074	0.0024	***
$DEPS^{OSMALL}$	0.0159	0.0031	***
$DEPS^{STIME}$	0.0015	0.0027	
BMONEY	0.0044	0.0033	
RWATA	0.1614	0.1784	
$DEPS^{CHARG}$	-0.1584	0.0721	**
NPL	-0.0138	0.0132	
MSA	0.2708	0.0433	***
CMSA	0.5143	0.0669	***
$BNKBR^{TOT}$	-0.0617	0.0068	***
$BNKS^{NEW}$	0.0147	0.0071	**
Observations	7,025		
Likelihood Ratio-χ^2	1,080.45	***	
Pseudo-R^2	11.68%		

Table 2A. Granger-Causality Tests

This table represents Granger causality tests conducted with the six quarters of data between March 2001 and December 2002 that were available as of May 2003:

$$\pi_{i,s,t} = \theta_0 + \theta_1\pi_{i,t-1} + \theta_2\pi_{i,t-2} + \theta_3\pi_{i,t-3} + \theta_4 ADV_{i,t-1} + \theta_5 ADV_{i,t-2} + \theta_6 ADV_{i,t-3} + \sum_{j=2}^{51}\gamma_j STATE_s + \varepsilon_{i,s,t}^{GRANGER} \quad (3)$$

$$ADV_{i,s,t} = \theta_0 + \theta_1\pi_{i,t-1} + \theta_2\pi_{i,t-2} + \theta_3\pi_{i,t-3} + \theta_4 ADV_{i,t-1} + \theta_5 ADV_{i,t-2} + \theta_6 ADV_{i,t-3} + \sum_{j=2}^{51}\gamma_j STATE_s + \varepsilon_{i,s,t}^{GRANGER} \quad (4)$$

where $\pi_{i,t}$ is measured by $ROA_{i,t}$ or $ROE_{i,t}$, return on assets or equity, respectively; $ADV_{i,t}$ is advertising intensity defined as advertising expenses divided by total deposits of the bank; and $STATE_m$ are dummies for 49 states and the District of Columbia (coefficient estimates not shown). Models estimated with OLS. ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

ADV	Coef.	Std. Err.	
θ_0	0.00962	0.00138	***
ADV_{t-1}	0.43488	0.01046	***
ADV_{t-2}	0.23012	0.01043	***
ADV_{t-3}	0.16352	0.00917	***
ADV_{t-3}	0.16352	0.00917	***
ROE_{t-1}	0.00014	0.00008	*
ROE_{t-2}	0.00019	0.00008	**
ROE_{t-3}	0.00010	0.00009	
ROE_{t-3}	0.00010	0.00009	
Observations	8,308	R^2	

ADV	Coef.	Std. Err.	
θ_0	0.00842	0.00132	***
ADV_{t-1}	0.44018	0.01042	***
ADV_{t-2}	0.23302	0.01041	***
ADV_{t-3}	0.16881	0.00918	***
ADV_{t-3}	0.16881	0.00918	***
ROA_{t-1}	0.00122	0.00072	*
ROA_{t-2}	0.00158	0.00073	**
ROA_{t-3}	0.00165	0.00076	**
ROA_{t-3}	0.00165	0.00076	**
Observations	8,383	R^2	

ROE	Coef.	Std. Err.	
θ_0	3.20770	0.19022	***
ADV_{t-1}	-1.55897	1.42047	
ADV_{t-2}	0.11741	1.43934	
ADV_{t-3}	0.94917	1.25357	
ADV_{t-3}	0.94917	1.25357	
ROE_{t-1}	0.34446	0.01054	***
ROE_{t-2}	0.24917	0.01116	***
ROE_{t-3}	0.21401	0.01179	***
ROE_{t-3}	0.00010	0.00009	
Observations	8,308	R^2	

ROA	Coef.	Std. Err.	
θ_0	0.3611	0.0194	***
ADV_{t-1}	-0.3313	0.1504	**
ADV_{t-2}	0.0763	0.1526	
ADV_{t-3}	0.3236	0.1333	**
ADV_{t-3}	0.3236	0.1333	**
ROA_{t-1}	0.3168	0.0105	***
ROA_{t-2}	0.2242	0.0107	***
ROA_{t-3}	0.2057	0.0111	***
ROA_{t-3}	0.00165	0.00076	**
Observations	8,383	R^2	

Footnotes

[1] The numbers are estimates based on a sample of tax returns. Source: Internal Revenue Service, Corporate Income Statistics 1999. For 2001, the total advertising expenses for 4,191 commercial banks that reported them in the Call Reports was $5.9 billion or 13.95% of these banks' net income before taxes and extraordinary items. As of year-end 2001, there were 8,003 commercial banks in the 50 states and Washington, DC.

[2] Bagwell (2001, 2002) provides excellent surveys of advertising economics. Next two paragraphs borrow from Bagwell (2001).

[3] Note that this definition presumes that banks only advertise deposit prices and services. Although, this assumption is highly questionable, this is the most common definition of advertising intensity in the banking literature. In the more general advertising economics literature, advertising intensity is defined as the ratio of advertising to sales.

[4] Given extensive theoretical and empirical research on advertising and firm behavior, which spans the fields of economics, financial economics, management science, and marketing, a comprehensive review is beyond the scope of this article. In this section, relying on Bagwell (2002) I cover the major theories as they relate to the testable hypotheses of the paper. The empirical research reviewed later in this section is biased towards the evidence obtained from the financial services sector. Bagwell (2001, 2002) provides outstanding reviews of the extensive literature on advertising from the economics point of view.

[5] Note that this is separate from the *production* economies of scale. Also note that advertising diseconomies of scale may exist if the target groups are already covered by the ad campaign, or if significantly larger increases in advertising are needed to enlarge the consumer pool.

[6] Note that this not a test for advertising economies of scale, since input prices and output levels are not properly controlled in the specification, as would be the case in a cost function or frontier (Arndt and Simon, 1983).

[7] Advertising's input character has been ignored in studies of bank production economies. I leave the examination of advertising economies of scale within the framework of bank production economies to future research.

[8] However, these tests suffer from selection bias because cases of thwarted market entry are not observed.

[9] If profitability–advertising relationship is only observed for firms with large market shares, then this would be compatible with the *relative-market-power hypothesis* (Shephard, 1982).

[10] The risk of legal liability is likely to determine the amount of detail provided in the ads. Too little information may be construed as deceptive and can increase the legal liability risk by customers or competitors (for example, American Banker, September 9, 2000). On the other hand, bank managers worry that too much detail can also increase the legal liability risk (American Banker, May 1, 2001).

[11] This requires matching of advertising expenses with terms of deposit and lending surveys conducted by the Fed. An examination of explicit-price and non-price competition is left for future research.

[12] This would be especially true in the case of *experience goods*. According to Nelson (1970) an *experience good's* quality can be only be ascertained during or following consumption, whereas a *search good's* quality can be assessed prior to consumption. Banking services appear to have both *search* and *experience good* qualities. Depositors and borrowers certainly shop around to learn about alternative explicit and implicit interest rates offered by various banks and non-banks. But it is difficult to fully assess the quality of banking services before the customer establishes a relationship with the bank. Even though it could be argued that *experience good* nature of banking services dominate their *search good* character, it is not clear to what extent, if any, this may hold true.

[13] Note that this signaling story is also compatible with the *efficient-structure hypothesis* which suggests that more efficient firms with endowed with better managers and technologies should earn higher profits. Berger (1995a) provides exclusive tests of *structure-conduct-performance* versus *efficient-structure hypotheses* in banking.

[14] Note that this is a weak test at best. Because bank regulators only require banks with advertising and marketing expenditures higher than one percent of operating income to report them, changes in competitors advertising intensities, is an incomplete measure that does not account for all banking market participants. The test is further weakened because the test sample is limited banks that only operate in a single market. In urban areas my sample would only include banks with relatively small market shares.

[15] Another interesting conjecture is *the financial distress hypothesis* under which high-risk banks with depleted capital would maintain higher advertising intensities to attract new deposits (at higher explicit and/or implicit interest rates) and make new loans (at lower higher explicit and/or implicit interest rates). However, given the higher regulatory scrutiny placed on banks' capitalization and the small number of bank failures in recent years, it is difficult to provide a clear test of this hypothesis.

[16] For example, Hasan and Hunter (1996) find that minority- and women-owned banks are significantly more cost X-inefficient than other banks. Thus, bank X-efficiency should be controlled for when testing the *minority clientele hypothesis.*

[17] To the best of my knowledge, Wolken and Derrick (1986) working paper has not been published.

[18] I thank Alton Gilbert for bringing this point and the following examples to my attention. White (1976) makes the same observation in examining branching as a form of non-price competition.

[19] I cannot test for this hypothesis because I focus on commercial banks, and all the 8,003 commercial banks that are included in the 2001 Call reports are of stock type.

[20] Santos (1995) conducts Granger causality tests between for Massachusetts S&Ls using 1960-1989 data. He rejects all causality, except that market structure may Granger cause S&L profitability. However, his results are weak, and market structure variable (number of S&Ls in the market) does not account for other competitors and for the survivorship bias.

[21] I would like thank Bob DeYoung for bringing this point to my attention.

[22] Bank Call Report (FFIEC 031 and 041) item RIAD0497 "Advertising and Marketing Expenses". Note that the Office of Thrift Supervision (OTS) also requires savings institutions to report "Marketing and Other Professional Service" expenses under Thrift Financial Report (TFR) item SO540. Although thrift deposits are included in the calculation of market concentration and share variables, we exclude thrifts from our analysis due to significant differences in reporting and regulatory requirements that may affect

the production processes. For example, the Qualified Thrift Lender Test requires thrifts to hold at least 65% of thrift assets in mortgage and mortgage back securities, significantly restricting thrift managers' product and portfolio choices.

[23] A separate item, subject to the same reporting requirements and hence bias, covers postage expenses. It is not included in my analysis because it may not include non-marketing related postage expenses, such as monthly customer statements.

[24] Banks are required to file Summary of Deposit Reports based on end of June deposits.

[25] The U.S. Office of Management and Budget defines the geographic metropolitan areas based on defined criteria. For example, MSAs must include at least one city with 50,000 inhabitants, a U.S. Census Bureau defined urban area and a total metropolitan population of at least 100,000 (75,000 in the New England region). An area that has one million or more inhabitants may redefined as a CMSA.

[26] Year 2001 Local Area Personal Income data were not available as of November 2002.

[27] Alabama is the state that is excluded to avoid perfect colinearity.

[28] Note that the model estimates included here are rather suggestive, as the Maximum Likelihood procedure applied of the Heckman model fully incorporates the information available for both the structural and the selection model during the estimation. As a result, coefficient estimates in these models may differ from the one reported in Table 3. However, the differences are small and are not materially important.

[29] Some 929 observations out of 7,954 are excluded due to the availability of variables used in the selection model.

[30] Cost X-efficiencies are obtained by estimating a stochastic translog cost frontier with non-parametric Fourier transform terms for the population of commercial banks in 2001. The minimum cost frontier specification, which is defined in terms of input prices, and output and netput levels, has three inputs (small deposits, purchased funds, and labor), two outputs (loans and securities), and two netputs (physical and financial capital). The frontier estimates are not included for the sake of brevity, but are available from the author upon request.

[31] Berger (1995a) does not find support for the scale-efficiency version of the *efficient structure hypothesis.*

[32] For example, Berger (1995b) includes them when testing Granger-causality between profitability and capital in banking. He uses annual data spanning 1983-1989.

[33] The specification here differs from that of Wolken and Derrick (1986) in one minor way. Wolken and Derrick (1986) use the total market deposits to control for the size of the market, whereas I use market size as a percentage of industry for that particular year.

[34] I do not correct for selection bias when estimating the simultaneous equations models.