THE EFFECTS OF FIRM SIZE ON PROFIT RATES IN THE FINANCIAL SERVICES

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ABSTRACT

The impact of firm size on firm profit rates has been of interest to economists for several decades. However, this extensive literature deals almost exclusively with manufacturing industries. Empirical consideration of the firm size-profits for firms outside manufacturing, including financial services, is almost non-existent. The purpose of this study is to empirically test the relationship between firm size and profitability for the financial services sector using a data set that covers a broad range of firm sizes. The topic is an important one because recent changes in the legal framework have facilitated a level of merger activity that is unprecedented in the history of the financial services sector. Questions related to the profitability of financial services firms operating at various sizes are integral to an analysis of financial service sector practices and ultimately to an evaluation of overall performance within this important sector. An important contribution of this paper is the testing of both linear and non-linear specifications for the firm size-profitability relationship.

INTRODUCTION

The impact of firm size on firm profit rates has been of interest to economists for several decades. Economies of scale provide one theoretical basis for arguing that firm size is related to profitability. The scale economy justification for a positive relationship between firm size and profitability is prominent in the works of Alexander (1949), Stekler (1964), Hall and Weiss (1967) and Scherer (1973). Scale economies may be related to profit by virtue of their propensity to serve as entry barriers and the implied cost disadvantages imposed on smaller firms operating at sub-optimal scale (Scherer, 1990). Doubts over this justification for a

relationship between firm size and profitability arise when one examines evidence regarding MES plant sizes relative to total market demand. Empirical studies suggest that most U.S. industries could support numerous firms operating at minimum efficient scale (Waldman and Jensen, 2001), raising questions as to why firms continue to operate at sub-optimal scale. The lack of satisfactory answers to these questions cast doubt on scale economies as a source of size related differences in profit.

Demsetz (1973) offers an alternative explanation for the relationship between firm size and profitability, arguing that the greater profits of large firms have little or nothing to do with conventional scale economies. Demsetz argues that some firms are inherently more efficient than others due to superior management. Over time, the more efficient firms are rewarded with both growth and elevated profit. Cross sectional studies that provide a mere snapshot of the firm size-profitability relationship suggest that profitability is a function of firm size, but in Demsetz' model, both increased firm size and higher profits are merely the consequences of the firm's superior efficiency. Using Internal Revenue Service data, Demsetz observes that large firms earn higher profits in highly concentrated markets while smaller firms earn a normal return. Demsetz interprets these findings as supporting evidence for his premise regarding the superior efficiency of large firms. However, Demsetz' findings are not supported by more rigorous empirical testing (Amato and Wilder, 1988).

Capital market imperfections provide yet another conceptual argument to support size related differences in profitability. The basis for this argument is that financial markets may overstate the risks associated with small firms and charge interest rates that more than compensate the lender for any actual risk differential. Reinganum and Smith (1983) found that lenders charge risk premiums of small firms that exceed what is justified by increased risk of default. Moreover, there is evidence that large firms borrow in a national credit market whereas the credit market faced by smaller borrowers is local or regional (Meyer, 1967). Meyer cites these differences in borrowing patterns between large and small borrowers as a source of increased borrowing cost for small firms.

The final theoretical justification relating firm size and profitability comes from the strategic groups concept developed by Caves and Porter (1977) and Porter (1979). Caves and Porter describe strategic groups as consisting of clusters of firms within each industry who confront similar operating conditions. Strategic groups are related to profitability because the firms in higher strategic groups have considerable market power, while firms in lower strategic groups have little or no

market power. Caves and Porter (1977) introduce the concept of mobility barriers to explain the inability of firms from lower strategic groups to move into the higher strategic groups that afford the greatest profit opportunities. Mobility barriers are similar to entry barriers, but refer to the ability to restrict intra-industry movements as well as to the more traditional restriction to new firms implied by entry barriers. Caves and Porter imply that differences in profitability for firms within the same industry are ultimately the result of the network of strategic groups. Because firm size is one factor that determines a firm's strategic group, there is an observed relationship between firm size and profitability (Porter, 1979).

The theoretical arguments presented above suggest a positive relationship between firm size and profitability. Empirical studies have frequently found a positive relationship, including studies by Shepherd (1972), Marcus (1969), Hall and Weiss (1967) and Smyth, Boyes and Peseau (1975). The main difficulty with the aforementioned studies is their focus exclusively on large firms. Amato and Wilder (1985) used IRS data that covers diverse firm sizes ranging from very small firms to the largest multinationals. The most important finding of Amato and Wilder is that once the sample is broadened beyond the very largest firms, the effect of firm size on profitability is small and perhaps negative. Schmalensee (1985) finds that profitability is not closely related to any attribute of the firm, concluding instead that profits are more closely tied to the market in which the firm operates. He summarizes his findings by stating that industry effects dominate firm effects in explaining cross sectional profit rate variation.

The biggest difficulty with the literature cited above is an almost exclusive focus on manufacturing industries. Empirical consideration of the firm size-profits for firms outside manufacturing, including financial services, is almost non-existent. The purpose of this study is to empirically test the relationship between firm size and profitability for the financial services sector using a data set that covers a broad range of firm sizes. The topic is an important one because recent changes in the legal framework have facilitated a level of merger activity that is unprecedented in the history of the financial services sector. Questions related to the profitability of financial services firms operating at various sizes are integral to an analysis of financial service sector practices and ultimately to an evaluation of overall performance within this important sector. An important contribution of this paper is the testing of both linear and non-linear specifications for the firm size-profitability relationship.

PREVIOUS LITERATURE AND CONCEPTUAL FRAMEWORK

No previous literature deals directly with the relationship between firm size and profitability for financial services. Much of the prior literature related to firm size within the financial services deals with the survival prospects and lending procedures for various size banks. Elyasiani and Mehdian (1995) express concern regarding the survival prospects for small banks. The issue of small bank survival is potentially important because small banks generally loan more to small businesses as compared to larger banks (Jayaratne and Wolken, 1999).

Small banks may have a comparative advantage in loaning to small business. Nakamura (1994) contends that small banks do a better job of processing information and assessing risks relative to small business loans. Some of this advantage may accrue as a result of the daily contacts that small banks have with their small business loan customers (Nakamura, 1993). Moreover, DeYoung, Hunter, and Udell (2004) maintain that much of the advantage that small banks possess in making small business loans relates to their ability to process "soft information" that is either not available or underutilized by larger lenders. Carter, McNulty, and Verbrugge (2004) examined the small business lending procedures of both small and large lenders. Their conclusion, that small lenders make better small business loan decisions as compared to large lenders, is consistent with the hypothesis that small lenders have a comparative advantage in dealing with small business.

The effect of firm size on competition is another prominent theme in the literature. Hanweck and Rhoades (1984) found that the presence of large banks reduces competition in local banking markets. Rhoades (1995) found a positive and statistically significant relationship between overall bank profitability and the presence of at least one large bank in the local market. Several researchers (Heggestad and Rhoades, 1978; Feinberg, 1984; Bernheim and Winston, 1990, and Scott, 1993) conclude that profits are increased when banks confront one another in multiple markets. Finally, Philloff (1999) found that overall profitability is higher in markets where there is at least one large bank as compared to markets without a large bank presence. The general consensus of this literature is that large banks have an impact on overall profitability that is disproportionate to the banks absolute size or size relative to the market.

Both of the existing strands of literature cited above have important public policy implications. The literature relating small business loans to the presence of small banks suggests that there may be social benefits from having small banks

operating in a market. Similarly, the literature dealing with profitability and the presence of at least one large bank in a market may indicate the propensity for reduced competition when large banks enter a market. While the prior literature undoubtedly contributes to our understanding of the role that large banks play in the financial services sector, questions related to the impact of firm size on profitability within the sector remain unanswered. Empirical work dealing with the effects of firm size in sectors other than financial services provides the theoretical framework for analyzing the financial services sector.

Michael Porter (1985 and 1998) offers arguments to suggest that the relationship between firm size and profitability may be non-linear. Porter's argument focuses on his "stuck in the middle" hypothesis, which suggests that profitable niches are available to both very small and very large firms, but mid sized firms may find it difficult to develop an effective and profitable strategy. According to Porter's hypothesis, there are profitable opportunities available to small firms serving localized niche markets and profitable opportunities available to large firms following a market wide strategy. Medium size firms, on the other hand, are too large to pursue niche markets but too small to compete against national or international companies whose focus is on serving the entire market. The stuck in the middle hypothesis suggests that the relationship between firm size and profitability is a non-linear cubic function. Moreover, the cubic function could be expected to exhibit a positive, negative, positive sign pattern as the profits for both small and large firms are higher than those of medium sized firms. There have been few empirical tests for Porter's stuck in the middle hypothesis. Amato and Amato (2004) found that a cubic model with a positive, negative, positive sign pattern best describes the relationship between profitability and firm size in the U.S. retailing sector.

DATA AND METHODOLOGY

The data for this study are drawn from the Internal Revenue Service: Sourcebook for Corporation Income Tax returns. The IRS data do not include data for individual firms, but rather contain data grouped into twelve asset size classes. The asset size classes range from firm with zero assets up to the largest firms in the world, an open ended size class of firms with $250 million or more in assets. By convention, the smallest size class is omitted from the analysis to avoid difficulties regarding profit rates for firm with no assets. The industry classification is based on the NAICS system with the level of aggregation at the six digit NAICS industry.

For readers more familiar with the SIC industrial classification, six digit NAICS are slightly less aggregated than four digit SIC industries.

These data are widely familiar to industrial organization economists, having been used for previous research by Stigler (1963), Demsetz (1973), and Porter (1979). The aforementioned empirical studies using the same IRS data source used for this research are considered seminal works in the field of empirical industrial organization. Moreover, all of these authors used the grouped IRS data to test firm level hypotheses. Our data were gathered from the IRS Corporate Sourcebook for financial services sector and covers the years 2000 and 2001. The specific industries covered by the data set are listed in appendix A, along with the IRS asset size classes.

The basic model relating return on assets to firm size and a set of control variables is found in equation 1.

$$ROA_{ij} = \beta_0 + \beta_1 FSIZ_{ij} + \beta_2 ADIN_{ij} + \beta_3 CLASSSHAR_{ij} + \beta_4 CYCLE_t + \sum_{j=1}^{M-1} \beta_{5+j} IND_j + \mu$$

Where:

ROA_{ij} is the return on assets for firms in the ith size class of the jth industry. Return on assets is measured as net income plus interest paid divided by total assets.

$FSIZ_{ij}$ is the average firm size for firms in the ith size class of the jth industry. Firm size is measured by dividing the total assets for the size class by the number of firms (returns) for the size class.

$ADIN_{ij}$ is the average advertising intensity for firms in the ith size class of the jth industry. Advertising intensity is computed by dividing the total advertising expenditure for the size class by the total receipts for the size class.

$CLASSSHAR_{ij}$ is the size class market share or proportion of total receipts by the industry contributed by the size class. Class share

is computed by dividing the total receipts for the size class by the total receipts for the industry.

$CYCLE_t$ is a dummy variable denoting the year for each observation (2000 or 2001). The yearly dummy variable is included to capture the business cycle with 2001 as the deleted category.

IND_j is a set of M-1 industry dummy variables where M is the number of industries. The dummy variable takes on a value of 1 if the observation falls within a particular industry and 0 otherwise. The omitted category for the dummy variable grouping is industry 522300, Activities Related to Credit Intermediation.

Benston (1985) and Fisher and McGowan (1983) offer strong criticism regarding the use of accounting profit rates to measure profitability. However, the criticism levied by Benston and Fisher and McGowan is based upon extreme scenarios and analysis of worst case outcomes. Moreover, much of their criticism refers to weakness in the ability of accounting return to measure economic profit for an individual investment project, whereas accounting return used in this study is for the entire firm. We agree with Martin (1993) who argues that while there are weaknesses in accounting profit measures, there are few alternatives. Ending the use of accounting return would thus likely imply the end of much empirical research in economics and business, an outcome whose consequences are most likely greater than the costs associated with using measures that are slightly flawed.

The model is estimated in both linear and cubic form (to conserve space, only the linear model is presented in equation form). The structure performance relationship from industrial economics provides the theoretical basis for the variables included on the right hand side of equation 1. Firm size is included based upon the arguments presented above. For the linear model, the hypothesized sign is positive due to economies of scale and other efficiencies that accompany large size. Porter's stuck in the middle hypothesis predicts a positive, negative, positive sign pattern for the linear, squared and cubed terms respectively. That sign pattern suggests that profits are positively related to firm size for small and large firms but negatively related to firm size in the middle. As indicated above, the basis for Porter's argument is that small firms serve niche markets, while large firms fill a market wide strategy. Medium sized firms are too large to serve niche markets, but

too small to realize the scale economies required for a market wide strategy. The arguments presented above regarding small business lending by small banks would be consistent with the opportunity for small financial service firms to fill niche markets. While the cubic function does not directly test whether small banks have advantages in loaning to small business, a finding that the underlying firm size function is a cubic is consistent with such an hypothesis.

Advertising intensity is included based upon the works of Schmalensee (1978), Spence (1980) and others. Based upon theoretical arguments and prior empirical work, a positive sign is hypothesized for advertising intensity. Relative market share is included to the capture the proportion of total industry sales contributed by firms in each size class. George Stigler's (1958) survivor theory provides a justification for including class share as a regressor. The size classes that provide relatively large proportions of total sales could be expected to be the most efficient. Relative market share thus serves as a proxy for scale economies. The expected sign is positive. Cycle is a dummy variable for the business cycle, with 2001 as the omitted category. Given that the recession began in 2001, we would expect a positive coefficient for the cycle dummy. Finally, the industry dummy variables are included based on the works of Schmalensee (1985) and numerous subsequent works which found that industry effects dominate firm effects in explaining cross sectional profit rate variation.

EMPIRICAL RESULTS

The estimated coefficients for the model represented by equation 1 are found in Table 1. Four models are presented in Table 1. The columns of Table 1 contain various iterations of the model estimated with firm size entered in both linear and cubic forms and with industry fixed effects both excluded and included. White's test revealed heteroskedasticity for the two models that deleted the industry fixed effects. Accordingly, the t-statistics for these two models were computed using White's robust standard errors. There was no evidence of heteroskedasticity in the models that included industry fixed effects as regressors.

The first column of Table 1 contains the model estimated with the linear specification and industry fixed effects deleted. The R^2 for the model is 0.52, a reasonably good fit for a model estimated using pooled cross sectional-time series data. The only statistically significant coefficient among the regressors is advertising, whose coefficient is negative and significant. A negative and statistically significant coefficient for advertising is contrary to our *a priori* hypothesis regarding the effects of advertising on profitability. Coefficients for none of the other regressors are statistically different from zero.

The second column of Table 2 contains the model that is cubic in firm size, but with the industry fixed effects excluded. Comparing the estimated coefficients between the linear and cubic models, there is little change. R^2 remains 0.52 (the only change is in the third decimal place). As in the case of the linear model with industry fixed effects excluded, the only statistically significant coefficient in the cubic model is the negative and significant coefficient for advertising intensity.

The estimated coefficients for the linear model with industry effects included are found in column 3 of Table 1. Comparing the R^2 from the linear model with industry effects excluded to the linear fixed effects model, we see that R^2 increases from 0.52 to 0.62. The increase in R^2 indicates that industry fixed effects explain ten percent of the total variation in return on assets. While ten percent explained variation from industry fixed effects does not rise to the eighteen percent variation explained by industry effects in Schmalensee's original model, ten percent of variation explained by the fixed effects is nevertheless an important result. Strong industry fixed effects indicate that there are sufficient similarities between firms operating in the same industry to cause their profit rates to be similar.

Finding strong industry effects in the financial services is an important finding. Since the early 1980s, the financial services sector has undergone periods of de-regulation. An important focus of this de-regulation movement has been to relax rules that limit financial services firms to operating within a particular market. In short, current law allows firms from the financial services to compete across markets more easily than at any time. One would expect this de-regulatory trend to equalize profit rates across industries as firms seek to operate in those markets that offer the greatest profit opportunities. Although present data do not allow us to analyze what has happened to industry profit rate differences over time, the industry fixed effects reported in this study suggest that industry level profit rate differences continued to persist through 2001. The continued existence of profit rate differences would suggest that, at least to some degree, profit opportunities are greater in some financial services industries as compared to others. We recognize that these differences could reflect nothing more than risk premiums and that risk adjusted rates of return may be more equal across the various financial services industries. The greatest contribution of our findings regarding industry effects is, therefore, to point to the need for ongoing research using risk adjusted profit rates.

Examining the coefficients for the continuously measured variables from the linear/fixed effects model, advertising intensity is the only continuous regressor whose coefficient is statistically different from zero. As in the previous cases, the coefficient for advertising intensity is negative and statistically significant. The coefficients for three of the dummy variables were statistically significant, all negative. The industries in question are: commercial banks; savings institutions and credit unions; and international secondary financing. All three of these industries

are devoted to broad depository activities, in contrast to the omitted category that includes firms dealing in credit intermediation. The negative profit rate for depository institutions as compared to credit intermediation is an interesting result worthy of additional research using firm level data.

The estimated coefficients for the cubic model with industry effects included are found in column 3 of Table 1. The most interesting result from the cubic model is the positive, negative, positive sign pattern for the linear, squared and cubed terms from the cubic specification. Moreover, the coefficients for each of these terms (linear, squared, cubed) are all statistically different from zero. A positive, negative, positive sign pattern indicates that profits are elevated for small firms and for firms at the upper end of the size distribution, but profit rates are lower for mid size firms. The cubic model with industry effects thus provides support for Porter's (1985, 1998) stuck in the middle hypothesis. While the data and models presented here cannot directly test the hypothesis that small banks fill a niche making loans to small business presented by Carter, McNulty, and Verbrugge (2004) and others, the results do suggest that there are likely niche markets available to small financial service firms. Our results are thus consistent with arguments regarding the advantages that small banks have in dealing with small business firms.

As in previous cases, the coefficient for advertising intensity is negative and significant in the cubic/fixed effects specification. Our finding that the advertising intensity coefficient is negative and significant is thus robust to variations in the specification including the inclusion or exclusion of industry fixed effects, as well as to changes in the specification of the firm size variable as either linear or cubic in form. We can offer no explanation for the consistently negative and significant coefficient for advertising intensity other than to suggest that it is an interesting finding worthy of additional research. The same dummy variable coefficients that were negative and significant in the linear model are negative and significant in the cubic model. As stated above, detailed investigation of this finding requires firm level data that is beyond the scope of these data.

CONCLUSION

The purpose of this paper was to examine the relationship between profitability, measured as return on assets, and firm size. There are two important findings. First, there is evidence of a cubic relationship between return on assets and firm size. Moreover, the cubic function displays a positive, negative, positive sign pattern that indicates greater profit opportunities for small and large firms as compared to medium sized companies. This finding is consistent with Porter's (1985 and 1998) stuck in the middle hypothesis that suggests that there are profit opportunities for both small and large firms, but that medium sized firms are stuck

in the middle. The basis for Porter's view is that small firms serve niche markets, large firms follow a market wide strategy, but medium sized firms are not well positioned for either approach. Medium sized firms are too large for niche markets but too small to pursue a market wide strategy. Moreover, the cubic function is consistent with the arguments of Carter, McNulty, and Verbrugge (2004) and others suggesting that among the profit opportunities available to small banks are superior performance servicing small business customers.

The second major finding relates to the importance of industry effects in explaining cross sectional variation in financial services profit rates. We find that industry effects explain approximately ten percent of the total variation in profit rate. While ten percent is less than the industry effects observed by Schmalensee (1985) and others, industry effects that explain ten percent of total variation document the importance of industry. This result suggests that although deregulation during the 1980s and 1990s may have allowed financial service firms to operate across markets, these changes may not have completely eliminated the importance of industry.

Table 1: Estimated Regression Coefficients Return On Assets-Dependent Variable

Variable	Linear, industry effects excluded	Cubic, industry effects excluded	Linear, industry effects included	Cubic, industry effects included
Intercept	9.35 (1.99)*	9.31 (2.01)*	18.20 (5.85)*	19.05 (6.15)*
$FSIZ_{ij}$	-.0000017 (-1.25)	.0000072 (0.59)	-.0000019 (-1.54)	.000022 (2.06)*
$FSIZ_{ij}^2$	--	-1.69 E-12 (-0.75)	--	-4.31 E-1 (-2.39)*
$FSIZ_{ij}^3$	--	8.64 E-20 (0.80)	--	2.14 E-19 (2.42)*
$ADIN_{ij}$	-529.09 (-2.01)*	-532.37 (-10.95)*	-579.57 (-12.70)*	-591.50 (-13.11)*
$CLASSSHAR_{ij}$	15.52 (1.08)	2.55 (0.14)	15.28 (1.49)	-22.16 (-1.04)
$CYCLE_t$	-1.44 (-0.81)	-1.50 (-.84)	-1.51 (-0.71)	-1.61 (-0.77)
IND_j	Excluded	Excluded	Included	Included
R^2	0.52	0.52	0.62	0.64
	30.67*	20.37*	20.27	17.70*

t-statistics in parentheses
* significant at the 0.05 level

The results reported here provide interesting insight regarding the sources of profit rate variation within the financial services sector. One benefit to our use of IRS data is the extremely broad range of firm sizes covered by our sample. The next logical step in the research sequence is to test our findings using similarly broad data gathered at the firm level. That research project will undoubtedly involve the use of survey data.

APPENDIX A

Size Classes

Size Classes	Asset Range (in Thousands)
1	0
2	$1 - 100
3	$100 -250
4	$250 - 500
5	$500 - 1,000
6	$1,000 - 5,000
7	$5,000 - 10,000
8	$10,000 - 25,000
9	$25,000 - 50,000
10	$50,000 - 100,000
11	$100,000 - 250,000
12	$250,000 or more

Industries

Industry Code	Description
522110	Commercial Banking
522125	Savings Institutions, Credit Unions and Other Depository Institutions
522215	Credit Card Issuing
522292	Real Estate Credit
522295	International Secondary Financing and Other Depository Credit Intermediation
522300	Activities Related to Credit Intermediation

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