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# Determinants of Number of Bankers by Listed Nigerian Firms

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***Abstract*** *This paper investigates the impact of firm-level attributes (cash flow from operating activities, sales revenue, profit after tax, firm size, and firm age) on the number of banks firms decide to have. The paper hypothesizes a significant positive relationship between the number of banks and firm attributes. We utilize data drawn from online annual reports and financial statements of 38 Nigerian non-financial quoted firms from 2011 to 2013. We model cross-sectional multiple regressions for the paper, and the test results are largely consistent with a priori expectations, except firm age. After controlling for industry membership, our findings suggest that operating cash flow, profit after tax, and firm size significantly increase the number of bankers. We find that firm age significantly reduces the number of bankers, contrary to prior findings. We find no evidence to suggest that sales revenue affects the number of bankers.*

***Key words*** Number of bankers, cash flow from operations, revenue, profit after tax, firm size, firm age, industry type

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## 1. Introduction

It is argued that there is no gain for companies to have multiple bankers (see, for example, Diamond, 1986 and Sharpe, 1990). In spite of this most companies have multiple bankers at the same time. This paper investigates the effect of firm-level characteristics on the number of bankers. [1] Specifically, the paper attempts to explain the relationship between number of bankers and cash flow from operating activities, sales revenue, profit after tax, company size and age. Marketing officers of banks make best efforts to attract companies to open account(s) with their banks. We argue that the actual opening of an account with a bank is driven by a company's resolve to do so based on the company's peculiar characteristics; aside from the probable intention to diversify their risk exposure.

This paper is not about firm-bank relationship but on the determinants of what makes companies to have multiple bankers, in the first place.

We utilize a unique data set drawn from *e*-annual reports and financial statements of 38 Nigerian non-financial quoted firms from 2011 to 2013. Our objective is to get a deeper understanding of firms' characteristics that influence the number of banks from a developing nation. By so doing, we hope to contribute to the empirical literature in the area. Our findings, hopefully, can be generalisable to other developing countries. To the best of our knowledge, our paper is one of the first comprehensive empirical studies from a developing country to examine this issue.

*The Nigerian context*

Statistics from the Central Bank of Nigeria (CBN) show that Nigeria has 21 commercial banks, otherwise called deposit money banks[2].The country has an estimated population of 160 million inhabitants, which is about 7.6 million inhabitants to one bank. This shows that the country is grossly under-banked. According to Asien (2015a, b), Nigeria has the biggest and fastest growing economy in Africa. The country has been identified as one of the Next Eleven countries projected to be among the world's largest

[1] We recognize that a bank may host difference bank accounts for the same customer. Nigerian companies do not normally disclose their number of bank accounts in public documents such as annual reports and financial statements; hence this paper investigates the number of bankers.

[2] http://www.cenbank.org/Supervision/Inst-DM.asp

economies in the 21st century, and the country has one of the largest pools of investment capital on the African continent, with (about) five million registered capital market investors[3]. These facts present a proper setting for our study,

### *1.1. Theoretical background*

Theoretical background of our paper is underscored by the theory of financial economics, which seeks to address the optimum number of banks a firm should have considering the cost of doing so. Although empirical evidence is inconclusive, we think that to have multiple banks is expensive because of the costs of doing so, for example operating, monitoring and coordinating costs. The aggregate operational charges imposed on firms by banks for maintaining an account can be high. Petersen and Rajan (1994) find that multiple banking is associated with higher interest payments and more credit constraints. Castelli *et al*. (2006 and 2012) show that financing cost increases as the number of banking relationships increases. García *et al.* (2003) argue that firms may choose not to relate with many banks because there are fixed costs in establishing and maintaining multiple banks. Machauer and Weber (2000) opine that the argument favouring fewer banking relationships is supported by the fact that transaction costs, and the costs of opening and coordinating many bank accounts play a role in the decision of how many banking relationships are desirable. Pagano *et al.* (1998) point out that it is common for firms issuing initial public offerings to have an average of 11 banks in Italy. In the U.S. listed firms can have up to 5 banks (see Houston and James, 1996). Thus, the importance of researching the factors that lead companies to have the number of banks that they have cannot be over-emphasized.

A number of factors motivate this paper. The first is our serendipitous discoveries that some Nigerian firms publish the identity of their bankers, ranging from one banker to several bankers. Our preliminary calculation revealed that the companies maintain an average of about six banks, which is a relatively high number by international standards (e.g. Bonfim *et al*., 2009; Ongena and Smith, 2000). Consequently, we wanted to know whether the number of bankers a company has are in anyway related to the firm's financial and non-financial characteristics. Consequent to the anecdotal discovery, we did an initial review of the literature in the area to follow up the trail. The initial review found prior empirical studies (e.g. Detragiache *et al*., 2000; Farinha and Santos, 2002; Ongena and Smith, 2000; Bonfim *et al*., 2009; Omar, 2007; Aregbeyen, 2011; and Fatoki and Chigamba, 2011) that have addressed the determinants of number of banking relationships. Omar (2007) and Aregbeyen (2011), and Fatoki and Chigamba (2011) used data from developing economies in Africa; Nigeria and South Africa, respectively. Our paper relates mainly to this empirical literature (although it is different in several respects), and contributes to the literature by finding a relationship between number of bankers and cash flow from operating activities, sales revenue, profit after tax, firm size and age. The majority of the studies on number of bankers are from the developed world; their findings may not be generalizable to a developing economy due to environmental differences.

Because our paper uses data from a developing economy, it is similar to Omar (2007), Aregbeyen (2011), and Fatoki and Chigamba (2011). Without argument, researches that examine the relationship between bank selection and customers in Nigeria are few, and they try to find bank-side or household attributes that determine the choice of bankers. For example, Omar (2007) used questionnaires to elicit the opinion of wage earners of 5 Nigerian banks out of about 25 banks when his study was conducted. Aregbeyen (2011) used a broader size than Omar (2007). He administered 1750 Likert-type questionnaires on respondents to find out bank selection criteria used by individual self-employed customers in Nigeria. Fatoki and Chigamba (2011) investigated the determinants of choice of commercial banks by South African university students.

In at least four respects, our paper is different from, and extends, prior papers. First, we examine the issue from firms' perspective instead of from the bankers' or individuals' perspective. Second, and related to the first is on theoretical grounds. While prior papers are premised under rational choice and competition theories (e.g. Aregbeyen, 2011) because they studied individual or household behaviour, our paper is built on the theory of financial economics by looking at the cost implication of having multiple bankers. Third, whereas prior papers used questionnaires to gather their data, our paper uses archival

[3] See http://www.nse.com.ng/OurMarkets/Pages/Introlisting.aspx

data. Fourth, apart from Machauer and Weber (2000) who specifies firms' characteristics as independent variables, most prior papers specify firms' characteristics as dependent variable. Our paper mimics Machauer and Weber (2000) in specifying firms' attributes as its independent variables.

## 2. Literature review

Recently, theoretical attempts have been made to find the determinants of bank selection by firms. [4] The contemporary literature on relationship banking has developed along two main lines, which are based on suppliers and demanders of capital. A strand of the attempts examines individual's criteria for electing to maintain relationships with banks. The attempts are based on attributes or properties researchers think banks should possess to attract customers, whether individuals or organizations. Another strand of the literature examines firm-side characteristics that determine the number of bankers.[5] Our paper aligns itself with this latter strand.

If a firm is unable to get satisfaction from one bank, it approaches other banks, although at a cost. Petersen and Rajan (1994) find that multiple banking relationships are associated with higher interest payments and more credit constraints. However, Pertersen and Rajan (1994), Bonfim *et al*. (2009) find that when a firm borrows from one additional bank, the interest rate on bank loans for the firm becomes 9 to 20 basis points lower, on average; except for micro and young firms. Castelli *et al*. (2009) show that financing costs increase as the number of banking relationships increases, consistent with a positive value of fewer bank relationships. Firms also incur hold-up costs (Sharpe, 1990; Rajan, 1992; and von Thadden, 2004) when they deal with one bank.

These prior papers argue that having a single relationship gives an informational monopoly to the only informed bank, which can impose hold-up costs on the firm. The hold-up problem is thus based on the bank's monopoly power by its ability to capture proprietary information about firms in the process of its relationship with a firm. The monopoly power allows the bank to charge firms higher interest rates. Thus, firms engage in multiple relationships to avoid being overcharged. This may be why some firms decide to have more than one bank relationship. Consistent with this view, Ongena and Smith (2000) show that multiple relationships reduce the hold-up problem; but it may be at the expense of credit availability. Rajan (1992) and Sharpe (1990) argue that banks are able to extract surplus from the firm through an information monopoly due to the process of monitoring the firm and controlling its investment decisions. This advantage for banks generates cost for firms. Weinstein and Yafeh (1998) show that Japanese banks extract rents by imposing relatively high interest rates on firms with which they have close ties. Degryse and van Cayseele (2000) also suggest that a firm with a longer financial relationship pays higher interest rates on its loans. Houston and James (1996) find that relying on single bank financing has a negative impact on firm's growth opportunities. However, some people argue in favour of a single banking relationship. Diamond (1986) illustrates that a single relationship can reduce both costly information frictions and problems related to renegotiation because firms delegate part of their monitoring responsibility to banks. As a result, Diamond (1986) concludes that there is no gain in having multiple relationships compared to a single one. Sharpe (1990) agrees with this argument, and shows that firms keep single relationships, although other banks want to contact with them. It is argued that a single bank avoids agency costs and free-riding problems by private investors. Using 1987 data from a sample of 1389 American small firms, Petersen and Rajan (1994) show that exclusive relationships reduce the cost of credit. In a another study, Petersen and Rajan (1995) find that small and young firms in the U.S. tend to face less credit constrain and seem to receive better lending rates when they borrow from exclusive bank.

The soft-budget constraint problem allows firms to more easily renegotiate the debt contract when having only a single banking relationship which consequently induces banks to continue financing firm's unprofitable projects without proper monitoring. Ongena and Smith (2000) find that in countries with inefficient judicial systems and poor enforcement of creditor's rights, firms have contacted to a higher number of bank relationships. The cost of strategic default is low and the incidence of soft-budget

[4] See Harhoff and Körting (1998) for a review

[5] We define a banking relationship as an ongoing contract between a firm and deposit money banks for purposes of providing financial services.

constraint problem might be greater in those countries. Hence, firms in countries with inefficient judicial systems and poor enforcement of creditor's rights engage in multiple bank relationships as a solution to the soft-budget problem.

Multiple relationships can be detrimental to a firm's success due to the leakage of proprietary information because when a firm seeks financing resources, it has to disclose some of its private information to banks in order to convince them of its credit quality and mitigate asymmetric information problems. The information can be easily transferred to the firm's competitors by either accident or during a bank's advising activity that can hurt the firm.

Conversely, revealing confidential information to banks because of non-exclusive banking relationships can also benefit the firm since it enhances better evaluation and introduce competition in the credit market that lowers the cost of credit for high quality borrowers. Von Rheinbaben and Ruckes (2004) argue that for highly rated companies, providing private information cannot significantly upgrade their ratings; so disclosing little private information and having a substantial number of banks to induce competition are good choices. By contrast, it is necessary for a firm with a low credit rating to communicate private information substantially to signal its quality at the expense of severe information leakage. As a result, it is optimal for such a firm to have a relatively small number of banks.

Detragiache *et al.* (2000) suggest that multiple bank relationships can diversify liquidity risk. Harhoff and Körting (1998) study the increase in limits to credit for firms borrowing from more than one bank. Their empirical results obtained from a model of the optimal number of bank relationships show that multiple bank relationships decrease the probability of an interruption of funding due to a lender's internal problems.

## 3. Hypotheses development

In this section, we motivate the choice of the explanatory variables and present the research hypotheses, which are stated in the alternative form.

*Cash flow from operating activities (CFO)*

Firms are likely to consider cash flow from operating activities as an important element in deciding to have a banking relationship. The cash flows generated by a firm are allocated among managers and investors through the banking system which may warrant having multiple banks. A firm's cash flow generated from operating activities can influence the firm to have multiple banks. Cash is subject to more severe agency cost, and therefore, prone to mismanagement or misappropriation. To avoid a situations in which abundant idle cash is misapplied or used to finance inefficient investments (see Jensen, 1986), a firm can put excess cash away in a bank. Only when a firm is satisfied with its current cash flow situation can it initiate a relationship with banks. Knowledge of a firm's cash flows is very important for banks because cash flows are inseparable parts of the business operations of all firms (see Pandy, 1991).

We expect a positive relationship between cash flow generated from operating activities and number of banks, and hypothesize that:

***H1***: *Cash flow from operation is positively related to the number of banks firms have*

*Sales revenue (REV)*

High sales revenue can be associated with demand for multiple banking relationships because of the need to control cash. To achieve an efficient working capital management, firms may need prompt lodgments of sales revenue into their bank accounts. Ongena and Smith (2000) observe that firms with more turnovers hold more bank relations. Therefore, we expect firms which are generating high sales revenue to have many banking relationships, and hypothesize that:

***H2****: Sales revenue is positively related to the number of banks firms have*

It is posited that profitability is an important factor affecting banking relationships (e.g. Degryse *et al*. (2009). Current after tax profits can limit the number of banks (Sterken and Tokutsu, 2003, p. 4). Moreover, loss-making firms are not likely to have the confidence to initiate relationships with many banks because

they do not have much to save. Indeed, it is argued that more profitable firms want more bank relations, which implies that most loss-making firms will tend to have fewer bank relations (Sterken and Tokutsu, 2003). Degryse *et al.* (2009) empirical study shows that profitability is an important factor affecting small firms' relationships with banks. Udell *et al.* (2011) find that more profitable firms are more likely to form new banking relationships. On the basis of this we hypothesize that:

***H3****: Profit after tax is positively related to the number of banks firms have*

*Firm size, Total Assets*

Prior studies (Agarwal and Elston, 2001; Machauer and Weber, 2000; Ongena and Smith, 2000; Harhoff and Körting, 1998; among others) find that the number of banking relationships grows with firm size. These studies argue that small firms tend to have fewer bank relationships than large firms. Memmel *et al.* (2007) demonstrate that the number of firms using the services of a single bank quickly diminishes as the size of the firm increases. Ongena and Smith (2000) argue that larger firms require more bank relationships, because as firms grow, their service and financing needs may exceed the capacity of any one bank. Machauer and Weber (2000) argue that large firms require a wide range of bank transactions which may be allotted to a variety of specialized banks. The authors opine that large firms have specialized financial departments that are able to handle transactions with many banks. We predict a positive relationship between firm size and number of banks, and hypothesize that:

***H4****: Firm size is positively related to the number of banks firms have*

Additional to financial characteristics, the data set also contains information on a range of non-financial characteristics of firms, including age since foundation and industry type.

*Age of firms (AGE)*

Research (Farinha and Santos, 2002; Detragiache *et al*., 2000; Bonfim *et al*., 2009) has shown that the number of banking relationship increases with firm age. Farinha and Santos (2002) find that the number of relationships is highly dependent on the firm's age. They find that as firms mature in age the average number of relationships increases and the number of firms that continue to have a single relationship decreases. Bonfim *et al.* (2009), show that the number of lending relationships increases steadily with firm age, and find that start-up firms have, on average, two or three lending relationships whereas older firms hold a more diversified creditor structure. We expect that as firms mature in age the number of banks they deal with increases. Hence we make the next hypothesis thus:

***H5****: Firm age is positively related to number of banks firms have*

## 4. Methodology of research

### *4.1. Sample, data and sources*

We downloaded three years' annual reports and financial statements from the websites of 85 firms. The data collection was driven by data availability on the number of banks as 37 of the 85 firms did not disclose the identity or number of their banks. This leaves us with 38 disclosing firms, which were eventually used for the analyses. All our research data are available from this public source. During the data collection, we exclude firms in the financial services industry including banks, insurance and assurance companies. We also exclude foreign banks which the firms have a banking relationship with.

Our sample size of 38 firms surpasses that used by Ongena and Degryse (2000) who use 27 firms in their investigation; howbeit, they admit that their sample size is unrepresentative.

The Nigerian setting and our data set in particular are well suited to explore the relation between corporate characteristics and number of banks because the majority of all commercial debts of publicly listed firms in Nigeria are bank financed. Because "firms quite often alter their set of bank relationships" (Ongena and Degryse, 2000) from year to year, we take the average number of banks for the three years, 2011-2013.

### *4.2. The model*

We use regression model to predict the cross-sectional variation in number of banks. We specify cross-sectional multiple regression models based on firm-side characteristics, which are our candidate variables that can likely impact the number of banks. Our estimation model follows Sterken and Tokutsu (2003) and Machauer and Weber (2000), who specify firms' characteristics as independent variables, and make number of banks their dependent variable. Our cross-sectional investigation with firm-level regressions of number of banks on firm-specific characteristics goes thus:

$$LN(NBANK) = \alpha + \beta_1 CFO/TA + \beta_2 REV/TA + \beta_3 PAT/TA + \beta_4 LN(TA) + \beta_5 AGE + \beta_6 IND + \epsilon \quad (1)$$

Where *LN(NBANK)* is the natural log of average number of banks. *CFO/TA* is average cash flow generated from operating activities to average total assets. *REV/TA* is average sales revenue to average total assets. *PAT/TA* is average profit after tax to average total assets. *LN(TA)* is natural logarithm of average total assets. *AGE* is number of years since a firm was founded. *IND* is industry membership a firm belongs. $\epsilon$ is an i.i.d. error term with mean zero. All averages are for 2011-2013.

We expect positive sign (+) for the coefficients $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$. We have no sign expectation for $\beta_6$.

*Dependent and independent*

*LN(NBANK)* is the dependent variable while *CFO/TA*, *REV/TA*, *PAT/TA*, *LN*(*TA)* and *AGE* are the hypothesised independent variables. Our primary goal in this paper is to investigate whether the independent variables explain or are associated with number of banks. Therefore, there is no causality intention for our model.

*Control variable*

To capture a potentially omitted variable, we introduce industry-specific control (*IND*), which is the industry membership a firm belongs. This is because different industries have need for different banking relationship. For instance, we would expect agricultural firms to have less banking relationships than, say, oil and gas firms or consumer goods firms. We are unable to predict a sign for industry membership. We adopt Nigerian Stock Exchange's industry classification to control for industry outcomes in capturing different needs for banks as in Table 1. Among eight industries sampled in Table 1, consumer goods sector has nine firms, representing about 23.70% of the 38 firms.

*Table 1.* Classification of Industry According to Type

| Industry Type | Code | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Agriculture | 1 | 3 | 7.9 | 7.9 |
| Conglomerate | 2 | 2 | 5.3 | 13.2 |
| Construct and Real Estate | 3 | 4 | 10.5 | 23.7 |
| Consumer Goods | 4 | 9 | 23.7 | 47.4 |
| Healthcare | 5 | 6 | 15.5 | 63.2 |
| Industrial goods | 6 | 3 | 7.9 | 71.1 |
| Oil& Gas | 7 | 5 | 13.2 | 84.2 |
| Services | 8 | 6 | 15.8 | 100.0 |
| Total | | 38 | 100.0 | |

All our paper's variables are motivated by prior literature (e.g. Bonfim *et al*., 2009; García *et al*., 2003; Agarwal and Elston, 2001; Degryse *et al*., 2009; Udell *et al*., 2011; Ongena and Smith, 2000; among others). We test the hypotheses at .01, 05, and .10 levels of significance, 2-tailed.

## 5. Empirical results

In this section, we present the empirical results of our paper. The descriptive statistics is presented in Table 2. The mean number of banks is *LN*(1.66), which is about 6. Minimum number of banks is *LN*(0) or 1 bank and the maximum is *LN*(3) or about18 banks. The median number of banks is *LN*(2) or 6 banks. The median is the 50th percentile.

*Table 2*. Descriptive Statistics

| | LN(NBANK) | CFO (N'm) | REV (N'm) | PAT (N'm) | TA (N'm) | AGE (Years) | IND |
|---|---|---|---|---|---|---|---|
| Mean | 1.66 | 10915.29 | 57650.95 | 6584.45 | 64596.34 | 37.97 | 4.03 |
| Median | 2.00 | 903.50 | 12500.00 | 478.00 | 21721.50 | 40.00 | 4 |
| Std. Dev. | .708 | 30238.590 | 106921.146 | 25648.725 | 135010.558 | 16.144 | - |
| Minimum | 0 | -1059 | 19 | -4508 | 401 | 8 | 1 |
| Maximum | 3 | 179526 | 562353 | 158182 | 681118 | 65 | 8 |

The mean cash flow from operating activities is about N10, 915.29 million, with a median of N903.50 million. Cash flow loss from operating activities is about N1, 059 million whereas maximum cash flows generated from operating activities is about N 179,526 million. Mean sales revenue is N 57,650.95 million. Minimum (maximum) sales revenue is about N 19 million (N 562,353 million) with a median sales revenue of N 12,500 million. Mean profit after tax is about N 6,584.45 million. Loss after tax is about N 4,508 million while maximum profit after tax is about N 158,182 million. The median profit after tax is about N 478 million. Average total assets is about N 64,596.34 million. Minimum (maximum) total assets is about N401 million (N 681,118 million), with median of about N 21,721.50 million. The average number of years since the firms were founded is about 38 years. The median number of years is about 40. The youngest (oldest) firm is about 8 (65) years. Industry membership (*IND*) is a categorical variable coded 1-8 (see Table 1). Data are available for eight industrial sectors, ranging from 1 for agriculture to 8 for services. Consumer goods sector, coded 4, appears to be the median industry with 9 firms.

### *5.1. Correlations analyses*

#### *5.1.1. Bivariate correlations*

The bivariate correlations among all the variables are shown in Table 3. Pearson (Spearman) correlations are to the right (left) diagonal of the table. The top cells in a row contain the correlations while the bottom cells in a row contain the Sig. *p*-values.It can be seen that except for *AGE* and industry membership (*IND*), there are positive correlations between the number of banks and the rest independent variables. It can be seen that among these variables firm size, *LN(TA)*, is the only independent variable that has a significant correlation (.606, Pearson) with number of banks.

*Table 3.* Bivariate Correlation Matrices (N = 38)

| | *LN(NBANK)* | *CFO/TA* (N'm) | *REV/TA* (N'm) | *PAT/TA* (N'm) | *LN(TA)* (N'm) | *AGE* (Years) | *IND* |
|---|---|---|---|---|---|---|---|
| *LN(NBANK)* | 1 | .152 | .186 | .222 | .606** | -.178 | -.042 |
| | | .363 | .264 | .180 | .000 | .285 | .800 |
| *CFO/TA* | .200 | 1 | .174 | .672** | .163 | -.060 | -.055 |
| | .229 | | .295 | .000 | .329 | .719 | .742 |
| *REV/TA* | .231 | .172 | 1 | .119 | .143 | .075 | .335* |
| | .162 | .302 | | .475 | .392 | .656 | .040 |
| *PAT/TA* | .149 | .710** | .044 | 1 | .100 | -.176 | -.349* |
| | .372 | .000 | .794 | | .552 | .291 | .032 |
| *LN(TA)* | .572** | .132 | .089 | .036 | 1 | -.120 | -.295 |
| | .000 | .430 | .594 | .831 | | .474 | .072 |
| *AGE* | -.180 | -.115 | -.077 | -.210 | -.079 | 1 | -.001 |
| | .279 | .491 | .645 | .205 | .636 | | .996 |
| *IND* | -.099 | -.039 | -.372* | -.320 | -380* | -.002 | 1 |
| | .554 | .818 | .022 | .050 | .019 | .992 | |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

*LN(NBANK) is the natural logarithm of average number of banks. CFO/TA is average cash generated from operating activities deflated by average total assets. REV/TA is average sales revenue deflated by average total assets. PAT/TA is average net profit or profit after tax deflated by average total assets. LN(TA) is the natural logarithm of average total assets. AGE is number of years since a firm was founded. IND is industry membership. All averages are for 2011-2013.*

The Spearman correlation (.572) for firm size is also significant. This is initial evidence that firm size significantly increases number of banks. Generally, the correlations between *CFO/TA*, *REV/TA* and *PAT/TA* and number of banks are very low.

Among the hypothesized independent variables, cash flow from operating activities which is deflated by total assets (*CFO/TA*) positively significantly correlates with profit after tax deflated by total assets (*PAT/TA*) at .672 (Pearson) and .710 (Spearman). Although cash flow from operating activities and profit after tax appears to be significantly correlated, it is a spurious correlation because they are not the same or directly related. Profits after tax require several adjustments to arrive at gross cash flow generated from operating activities. The adjustments to after tax profits include depreciation, amortization, provisions, loss/gains on disposal of non-current assets, changes in current assets/current liabilities etc. These adjustments make profits after tax to be different from cash flow from operating activities. For this reason, we leave the two variables in our OLS regression model. In the Pearson correlations, the control variable (*IND*) significantly correlates with *REV/TA* and *PAT/TA* at .335 and -.349, respectively. In the Spearman correlations, *IND* is negatively significantly correlated with sales revenues (*REV/TA*) at -.372 and firm size, *LN(TA)*, at -.380.

*5.1.2. Partial correlations*

We wanted to know whether industry membership affects the correlations reported in Table 3. Hence we control for industry membership (*IND*) in the partial correlations. The partial correlations can be seen in Table 4. The correlations are consistent with those reported in bivariate correlations (Table 3). This is an indication that industry type has no moderating effects on the correlations between/among the variables. After controlling for industry membership, except for *AGE*, all the independent variables have positive relationship with number of banks. Among the independent variables, only firm size, *LN(TA)*, is significantly correlated with number of banks. Also, Sales revenue and profit after tax (*PAT/TA*) continues to be positively significantly correlated (.697) with number of banks.

Table 4. Partial Correlations (*df* = 35)

| *Controlling for IND* | *CFO/TA* (N'm) | *REV/TA* (N'm) | *PAT/TA* (N'm) | *LN(TA)* (N'm) | *AGE* (Years) |
|---|---|---|---|---|---|
| *LN(NBANK)* | .150 | .213 | .222 | .622** | -.178 |
| | .376 | .207 | .188 | .000 | .291 |
| *CFO/TA* | | .205 | .697** | .154 | -.061 |
| | | .224 | .000 | .364 | .722 |
| *REV/TA* | | | .268 | .269 | -.079 |
| | | | .109 | .108 | .642 |
| *PAT/TA* | | | | -.004 | -.188 |
| | | | | .983 | .266 |
| *LN(TA)* | | | | | -.126 |
| | | | | | .459 |

**. Correlation is significant at the 0.01 level (2-tailed).

*LN(NBANK) is the natural logarithm of average number of banks. CFO/TA is average cash generated from operating activities deflated by average total assets. REV/TA is average sales revenue deflated by average total assets. PAT/TA is average net profit or profit after tax deflated by average total assets. LN(TA) is the natural logarithm of average total assets. AGE is number of years since a firm was founded. IND is industry membership. All averages are for 2011-2013.*

***5.2. Multicollinearity tests***

We use three methods to test for collinearity among the variables. The first method is the bivariate correlation matrix contained in Table 3. The Spearman correlation shows a high significant correlation (.710) between *CFO/TA* and *PAT/TA*. As explained elsewhere above, this is a spurious correlation because cash flow from operating activities and profits after tax is not directly related because of several adjustments to operating profits to arrive at cash flow generated from operating activities. The other high significant correlation (.606) in Table 3 is between the size variable, *LN(TA)*, and the dependent variable,

number of banks, *LN(NBANK*. This high correlation is expected since prior research documents firm size as explaining the majority of variance in bank relationship (Memmel *et al*., 2007; Petersen and Rajan, 1994; Sterken and Tokutsu, 2003; Ongena and Smith, 2000; Ongena and Degryse, 2000). The second method is the variance inflation factor (VIF), which, in Table 5, Model 1, ranges from 1.073 to 2.520. These do not exceed the theoretical threshold of 10. Hair *et al.* (2009) suggest that collinearity is present when VIFs are greater than 10. The condition index is the third method. It ranged from 1 to 8.842. An examination of the collinearity diagnostic (table not shown due to space constraint) indicates that we are within the acceptable threshold of between 15 and 30. Taken together, there is no collinearity among the variables. In the next section, we turn to multivariate analyses.

### *5.3. Multivariate analyses*

We run multiple regressions for our model by regressing cash flow from operating activities, sales revenue, profit after tax, firm size, firm age and industry membership on number of banks. The basic cross-sectional multiple regressions model containing these variables is shown in section 4.2. In other words, Model 1 is the full model containing all the variables of the research. Table 5 presents the results of the multivariate tests, which were implemented on SPSS using the backward method. We refer to the basic model as Model 1 in Table 5, and it is the outcome of the default "enter" method on SPSS. We chose the backward elimination regression model based on *a priori* expectation of the standard regression estimation. Our test result shows that profit after tax (*PAT/TA*) and firm size, *LN(TA*), significantly increases the number of banks in all the models, but for Model 5 where *PAT/TA* is not. *PAT/TA* is significant at the .10 level (2-tailed) in Models 1, 2, and 4, and significant at the .05 level (2-tailed) in Model 3. This confirms ***H3*** which states that profit after tax is positively related to the number of banks firms have. Firm size is positive and significant at the .01 level (2-tailed) in all the models, which is consistent with the hypothesis that firm size is positively related to the number of banks, confirming ***H4***. Drawing our inferences from the basic or full model (Model 1), we can conclude that an increase in profit after tax increases the number of banks by about 38.7 percent whereas an increase in firm size increases the number of banks by about 68.5 percent.

*Table 5.* Multivariate Analysis of Firms and Number of Bankers

$$LN(NBANK) = \alpha + \beta_1 CFO/TA + \beta_2 REV/TA + \beta_3 PAT/TA + \beta_4 LN(TA) + \beta_5 AGE + \beta_6 IND + \epsilon$$

*LN(NBANK) is the natural logarithm of average number of banks. CFO/TA is average cash generated from operating activities deflated by average total assets. REV/TA is average sales revenue deflated by average total assets. PAT/TA is average net profit or profit after tax deflated by average total assets. LN(TA) is the natural logarithm of average total assets. AGE is number of years since a firm was founded. IND is industry membership. All averages are for 2011-2013.*

| Model | | Coefficient | *t* | *p* | VIF |
|---|---|---|---|---|---|
| 1 | *(Constant)* | -3.226 | -2.845 | .008*** | |
| | *CFO/TA* | -.202 | -1.060 | .297 | 2.089 |
| | *REV/TA* | -.024 | -.158 | .875 | 1.319 |
| | *PAT/TA* | .387 | 1.849 | .074* | 2.520 |
| | *LN(TA)* | .685 | 4.599 | .000*** | 1.278 |
| | *AGE* | -.042 | -.306 | .761 | 1.073 |
| | *IND* | .291 | 1.672 | .105 | 1.750 |
| 2 | *(Constant)* | -3.186 | -2.928 | .006*** | |
| | *CFO/TA* | -.201 | -1.071 | .292 | 2.086 |
| | *PAT/TA* | .380 | 1.890 | .068* | 2.395 |
| | *LN(TA)* | .679 | 4.817 | .000*** | 1.178 |
| | *AGE* | -.042 | -.313 | .756 | 1.073 |
| | *IND* | .279 | 1.822 | .078* | 1.392 |
| 3 | *(Constant)* | -3.312 | -3.322 | .002*** | |
| | *CFO/TA* | -.209 | -1.138 | .263 | 2.050 |

| | | | | | |
|---|---|---|---|---|---|
| | *PAT/TA* | .394 | 2.041 | .049** | 2.272 |
| | *LN(TA)* | .685 | 4.994 | .000*** | 1.150 |
| | *IND* | .286 | 1.909 | .065* | 1.366 |
| | *(Constant)* | -3.092 | -3.148 | .003*** | |
| 4 | *PAT/TA* | .239 | 1.740 | .091* | 1.139 |
| | *LN(TA)* | .651 | 4.842 | .000*** | 1.095 |
| | *IND* | .233 | 1.630 | .112 | 1.235 |
| | *(Constant)* | 2.278 | -2.632 | .013** | |
| 5 | *PAT/TA* | .163 | 1.237 | .225 | 1.010 |
| | *LN(TA)* | .590 | 4.464 | .000*** | 1.010 |
| | *(Constant)* | -2.308 | -2.648 | .012** | |
| 6 | *LN(TA)* | .606 | 4.576 | .000*** | 1.000 |

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| # of Obs. | 38 | 38 | 38 | 38 | 38 | 38 |
| $R^2$ | .461 | .461 | .459 | .438 | .394 | .368 |
| Adj. $R^2$ | .357 | .377 | .394 | .389 | .360 | .350 |
| *F-Statistics* | 4.427 | 5.474 | 7.010 | 8.838 | 11.389 | 20.942 |

***. Significant at the 0.01 level (2-tailed).
**. Significant at the 0.05 level (2-tailed).
*. Significant at the 0.10 level (2-tailed).

*Model 1: $LN(NBANK) = \alpha + \beta_1 CFO/TA + \beta_2 REV/TA + \beta_3 PAT/TA + \beta_4 LN(TA) + \beta_5 AGE + \beta_6 IND + \epsilon$*
*Model 2: $LN(NBANK) = \alpha + \beta_1 CFO/TA + \beta_2 PAT/TA + \beta_3 LN(TA) + \beta_4 AGE + \beta_5 IND + \epsilon$*
*Model 3: $LN(NBANK) = \alpha + \beta_1 CFO/TA + \beta_2 PAT/TA + \beta_3 LN(TA) + \beta_4 IND + \epsilon$*
*Model 4: $LN(NBANK) = \alpha + \beta_1 PAT/TA + \beta_2 LN(TA) + \beta_3 IND + \epsilon$*
*Model 5: $LN(NBANK) = \alpha + \beta_1 PAT/TA + \beta_2 LN(TA) + \epsilon$*
*Model 6: $LN(NBANK) = \alpha + \beta_1 LN(TA) + \epsilon$*

Testing for *CFO/TA*, *REV/TA*, and *AGE*, the test results in Model 1 show they are no significantly related to number of banks. The control variable (*IND*) is also not significant in Model 1, although the sign is positive. According to the basic or full model, Model 1, the independent variables explain about 46.10% of the variation in the number of banks.

### *5.4. Robustness check*

In the results reported in the last section, cash flow from operating activities, sales revenue and profit after tax was deflated by total assets. Also, the natural log of total assets was taken. We wanted to know whether the results reported so far are sensitive to this procedure. To achieve this purpose, we run additional robustness tests where cash flow from operating activities, sales revenue, and profit after tax is *not* deflated by total assets, and total assets are *not* logarithm transformed. We build this latter model as:

$$LN(NBANK) = \alpha + \beta_1 CFO + \beta_2 REV + \beta_3 PAT + \beta_4 TA + \beta_5 AGE + \beta_6 IND + \epsilon \quad (2)$$

All variables are as previously defined, and the coefficient estimates as previously signed.

The result of the sensitivity checks is reported in Table 6. It can be seen from Model 1 of the table that this latter procedure improved our reported results as two more of the hypothesised independent variables (cash flow from operating activities (*CFO*), and firm age, *AGE*) become significant. In model 1 of Table 6 firm size (*TA*) and profit after tax (*PAT*) continues to be significant at .01 and .10, respectively, consistent with the reported results in Table 5.

Cash flow from operating activities is now significant in the four models in Table 6; as is firm age (*AGE*). Industry membership (*IND*) is now significant in Model 1 only. Models 1 of Tables 5 and 6 are equivalent because they contain all the variables of the paper.

*Table 6.* Multivariate Analysis of Firms and Number of Bankers

$LN(NBANK) = \alpha + \beta_1 CFO + \beta_2 REV + \beta_3 PAT + \beta_4 TA + \beta_5 AGE + \beta_6 IND + \epsilon$

*LN(NBANK) is the dependent variable and is the natural logarithm of average number of banks. CFO is average cash generated from operating activities. REV is average sales revenues. PAT is average net profit or profit after tax. TA is average total assets. AGE is number of years since a firm was founded. IND is industry membership. All averages are for 2011-2013.*

| | *Predicted* | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** | |
|---|---|---|---|---|---|---|---|---|---|
| | *Sign* | Coeff. | *t* | Coeff. | *t* | Coeff. | *t* | Coeff. | *t* |
| Intercept | ? | 1.481 | 4.141*** | 1.603 | 4.656*** | 1.567 | 4.673*** | 1.933 | 7.649*** |
| *p-value* | | | (*.000*) | | (*.000*) | | (*.000*) | | (*.000*) |
| ***Independent variables*** | | | | | | | | | |
| *CFO* | (+) | 2.643 | 1.769* | 2.884 | 1.937* | 2.072 | 3.801*** | 1.982 | 3.571*** |
| *p-value* | | | (*.087*) | | (*.062*) | | (*.001*) | | (*.001*) |
| *REV* | (-) | -.741 | -1.258 | -.241 | -.587 | | | | |
| *p-value* | | | (*.218*) | | (*.561*) | | | | |
| *PAT* | (+) | 2.613 | 2.014* | 2.372 | 1.840* | 1.689 | 3.066*** | 1.588 | 2.836*** |
| *p-value* | | | (*.053*) | | (*.075*) | | (*.004*) | | (*.008*) |
| *TA* | (+) | .685 | 4.599*** | .679 | 4.817*** | .685 | 4.994*** | .651 | 4.842*** |
| *p-value* | | | (*.000*) | | (*.000*) | | (*.000*) | | (*.000*) |
| *AGE* | (-) | -.290 | -1.944* | -.320 | -2.164** | -.296 | -2.103** | -.296 | -2.152** |
| *p-value* | | | (*.061*) | | (*.038*) | | (*.043*) | | (*.048*) |
| ***Control variable*** | | | | | | | | | |
| *IND* | (?) | .263 | 1.903 | .221 | 1.641 | .214 | 1.615 | | |
| *p-value* | | *(.000)* | (*.066*)* | | (*.110*) | | (*.116*) | | |
| No. of observations | | 38 | | 38 | | 38 | | 38 | |
| *F-Statistic* | | 7.891 | | 9.669 | | 12.205 | | 15.352 | |
| $R^2$ | | .536 | | .535 | | .532 | | .511 | |
| Adj. $R^2$ | | .468 | | .480 | | .488 | | .478 | |
| VIF | | 1.891 | | 1.839 | | 1.084 | | 1.084 | |

**Model 1:** $LN(NBANK) = \alpha + \beta_1 CFO + \beta_2 REV + \beta_3 PAT + \beta_4 TA + \beta_5 AGE + \beta_6 IND + \epsilon$
**Model 2:** $LN(NBANK) = \alpha + \beta_1 CFO + \beta_2 PAT + \beta_3 TA + \beta_4 AGE + \beta_5 IND + \epsilon$
**Model 3**: $LN(NBANK) = \alpha + \beta_1 PAT + \beta_2 TA + \beta_3 A) + \beta_4 IND + \epsilon$
**Model 4:** $LN(NBANK) = \alpha + \beta_1 PAT + \beta_2 TA + \beta_3 IND + \epsilon$

***. Correlation is significant at the 0.01 level (2-tailed).
**. Correlation is significant at the 0.05 level (2-tailed).
*. Correlation is significant at the 0.10 level (2-tailed).

*LN(NBANK) is the natural log of average number of banks. CFO is average cash generated from operating activities. REV is average sales revenue. PAT is average net profit. TA is average total assets. AGE is number of years since a firm was founded. IND is industry membership. Note that all averages are for 2011-2013.*

Specifically, when we compare Model 1 of Tables 5 and 6, we can see that cash flow from operating activities, firm age (*AGE)* and industry membership (*IND*) now become significant at the .10 level (2-tailed). This is consistent with hypothesis 1 (***H1***) which states that cash flow from operating activities is positively related to number of banks. As reported during the analysis of Table 5, profit after tax and firm size continues to be significant at the .10 and .01 levels, respectively. These findings further confirm ***H3*** that profit is positively related to number of banks; and ***H4***, which states that firm size is positively related to number of banks. Contrary to our signed expectation for firm age, although significant, it is negatively related to number of banks. This can be interpreted to mean that the older the firm, the fewer number of banks it has. This finding confounds prior researches that find a positive relationship between the number of banking relationships and firm age (see Farinha and Santos, 2002; Detragiache *et al*., 2000; Bonfim *et al*., 2009). In both procedures, sales revenue is consistently *not* significantly related to number of banks. From this robustness check, the explanatory variables explain about 53.6% (adj. $R^2$ = 46.8%) of the variation in number of banks, which is an improvement on the 46.1% (adj. $R^2$ = 35.7%) explanatory power reported using the first procedure.

## 6. Conclusions

This paper investigates the impact of cash flow from operating activities, sales revenue, profit after tax, firm size, and firm age on the number of banks firms decide to have. After controlling for industry membership, we document evidence that profit after tax and firm size increase the number of banks by about 38.7 percent and 68.5 percent, respectively. This finding is consistent with the hypotheses that the number of banks is positively related to profit after tax and firm size, ***H3*** and ***H4***, respectively. Additional robustness tests reported in Table 6 marginally improve the results of the paper. After controlling for industry membership, the additional tests suggest that cash flow from operating activities (*CFO*), firm age (*AGE*) is significantly related to number of banks. Specifically, in Model 1 of Tables 5 and 6, cash flow from operating activities significantly increases number of banks, which supports hypothesis 1, ***H1***. Our test on ***H5*** suggests that the number of banks significantly reduce as firms grow in age (*AGE)*. This is a surprising finding in view of prior research findings that indicate the contrary. Farinha and Santos (2002), Detragiache *et al.* (2000), and Bonfim *et al.* (2009) find a positive significant relationship between firm age and the number of banking relationships. We also find a significant relationship between the control variable, industry membership (*IND*), and number of banks. Our tests could not find a significant relationship between sales revenue and number of banks. Whereas the independent variables in Model 1 of Table 5 explain about 46.1% (adj. $R^2$= 35.7%) of the variation in the number of banking relationships, the independent variables used in the additional test of Model 1 in Table 6 explain about 53.6% (adj. $R^2$ = 46.8%) of the variation in number of banks.

The policy implication of the paper is that Chief Financial Officers of firms should consider the cost implications of having many banks because bank accounts and bank relationships can be expensive to operate, monitor and coordinate. Also, marketing officers of banks should look out for firms' performance indicators so they can reach out to them to open bank accounts with their banks.

The paper has a few caveats. First, although our sample size is higher than Ongena and Degryse (2000)'s 27 firms, we admit to the limitation of using data on 38 firms to generalise the results of this paper to a wider context. Second, conclusions on cash flow from operating activities and firm age should be taken with caution in view of their mixed results in the two procedures applied in determining them.

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