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Bala G. Dharan  
*Rice University*

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# Auditing As A Signal in Small Business Lending

Bala G. Dharan

This paper models the borrowing decision of a small firm seeking a bank loan when it can optionally hire, at a cost, an independent external auditor to convey its risk characteristics to lenders. The analysis shows that a necessary condition for a potential borrower to prefer having an audit to not having an audit is that the borrower's debt to equity ratio must be above a certain minimum cut-off value. For observed audit cost functions, this cut-off debt-equity ratio is higher for smaller initial size firms. Such firms will forego an audit even if they are of low risk, and potentially face loan denial and higher interest rate. Additionally, the cut-off debt-equity ratio is an increasing function of audit cost. Hence smaller audit costs may allow more high quality small firms to reveal their types to the banks, thus leading to a more partially separating equilibrium. The model suggests a number of interesting empirical questions for further study.

## I. INTRODUCTION

Borrowers of capital in financial markets face the problem of credibly informing potential lenders about their projects' quality since such messages are subject to moral hazard. This paper models the borrowing decision of a small firm seeking a bank loan when it can optionally hire, at a cost, an independent external auditor to validate its cash flow projections. In other words the auditor's opinion is assumed to convey the risk characteristics of the firm to the lenders without error. Of course, firms which are publicly traded are required by securities laws to have a periodic audit of their financial statements. Thus a decision to seek an audit of financial statements is not a choice variable for these firms and hence cannot act as a signal of firm quality. However, such a signalling option exists for small firms which are typically closely held. This paper examines the nature of this decision.

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Bala G. Dharan • Jesse H. Jones Distinguished Associate Professor of Accounting, Jones Graduate School of Administration, Rice University, P.O. Box 1892, Houston, TX 77251.

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Signalling models of financial decisions such as dividend policy, equity financing and debt financing have been examined in the past by numerous papers including Leland and Pyle [12], Ross [15], Bhattacharya [4, 5], Miller and Rock [13], Titman and Trueman [19], and others. Titman and Trueman specifically examine the audit decision and show that the perceived "quality" of a firm's choice of auditor (or investment banker) prior to an initial public offering would be a signal of the firm's riskiness. Unlike Titman and Trueman, this paper examines the more basic question of whether or not the decision to have an audit prior to seeking a loan (say from a bank) can serve as a signal of the firm's riskiness. Note that the cost of the audit is always paid by the borrowing firm, regardless of whether the firm volunteers to have an audit before requesting the loan or whether the lender requests the audit. In addition, since the audit can reveal the borrower's true risk characteristics to the lender, an audit may actually reduce a borrower's chance of getting a loan. Thus the decision to have an audit is a "costly signal" which can credibly be used to signal the firm's risk characteristics.

The analysis here shows that a necessary condition for a potential borrower to prefer having an audit to not having an audit is that the borrower's debt to equity ratio must be above a certain minimum cut-off value. This minimum debt-equity ratio depends on the borrower's initial wealth, the borrower's risk preferences, the investment return distribution, and the audit cost. In particular, the analysis shows that the minimum debt-equity ratio is an increasing function of the audit cost and a decreasing function of the initial wealth. In other words, the cut-off debt-equity ratio is higher for smaller initial size firms.

In the next section, the institutional characteristics of small business lending are described. In Section 3, the basic model of the firm, the bank, the audit and the project is set up. Section 4 analyzes the audit decision. Section 5 examines the effect of firm size and audit cost on the audit decision. In the concluding section, empirical implications are discussed and some propositions for empirical testing are outlined.

## **2. SMALL FIRMS, BANKS AND AUDITING**

The role of auditing in small business lending decisions has received some attention in recent years from U.S. regulators such as the Financial Accounting Standards Board (FASB). In addition, there has been much interest in recent years in the capital formation problems of small business firms generally and in the regulatory costs incurred by small businesses in raising capital. One such cost is the cost of audit. Currently all U.S. businesses, regardless of size, must follow the same generally accepted

accounting principles (GAAP) to prepare their audited financial reports, and their CPAs must follow the same generally accepted auditing standards (GAAS) to audit them. It is known that accounting and auditing costs show positive economies of scale, with auditing costs in particular increasing with the square root of sales rather than linearly with sales (Simunic [16]; Dopuch and Simunic [6]). Hence small businesses are likely to find audit costs more burdensome than larger firms. This has raised suggestions that less costly reporting requirements (dubbed “little GAAP” and “little GAAS”) should be developed for use by small businesses (FASB [8]).

In a research study sponsored by the FASB to address these issues, Abdelkhalik [1] surveyed end-users such as bank lending officers and found support for less complex and less expensive small business reporting requirements. A survey of practicing CPAs by Knutson and Wichmann [11] also found strong support for such an approach. Anderson et al. [3] note that small firms have differing characteristics than large firms, such as weaker internal controls and dominance of an owner-manager, that create unique audit problems. Similarly, a special committee report of the American Institute of CPAs examining the issue of “standards overload” for small businesses recommended the elimination of certain burdensome auditing and accounting standards and adoption of a different set of measurement and disclosure standards for small businesses (AICPA [2]).

A small number of studies have empirically examined whether the presence or absence of audit (or types of audit) makes a difference in small business lending decisions. Houghton [9] reports on an Australian experiment involving 247 lending officers evaluating a hypothetical loan application for A\$60,000 from a small business company with a net worth of about A\$180,000. A third of the subjects received the firm’s financial statements together with a “clean” opinion from the firm’s auditors. For another third, the statements were accompanied by a “qualified” auditor’s opinion. The remaining officers did not get an auditor’s opinion with the financial statements. Houghton found that the lending outcome “was not significantly influenced by either the presence or the content of audit reports.” He notes that his result may have been driven by the small size of the loan even though the implied debt-equity ratio was large. Somewhat conflicting results have been reported by studies examining American lending officers [10] and British lenders [7, 17].

Despite the above studies, many aspects of small business lending remain in need of further study. For example, we do not know whether the banks charge differential interest rates for audited and non-audited firms, or the sensitivity of the audit decision to the banks’ interest rate policies. It is also not known what decision variables (e.g., availability of collateral; loan size; firm’s life) are emphasized by banks in the absence of an audited statement.

Informal discussions with officers of some small and large U.S. banks reveal that a large percentage of small business borrowers whose loan requests were approved by the banks were not asked to submit audited financial statements. However, many borrowers did volunteer audited statements. This paper examines whether such an action is consistent with a signalling model in which low risk borrowers elect to use a costly signal to distinguish themselves from high risk borrowers. The next section provides the model of the firm and its cost structure.

### 3. MODEL OF THE FIRM

#### The Firm

The potential borrower firm has an initial "wealth" or investible assets,  $W$ , and an increasing, strictly concave continuous utility function,  $U$ , defined on the firm's end-of-period asset level.<sup>1</sup> The firm has the opportunity to invest in a project requiring an investment,  $I$ , which is greater than its investible assets. While the firm can alternatively invest just  $W$  in the project, the optimum investment level for the project is greater than  $W$ , motivating the firm to seek external financing.

Firms differ from one another according to their "risk type,"  $\theta$ , with higher values of  $\theta$  corresponding to riskier borrowers. A firm's true risk type is not observable, unless the firm voluntarily elects to undergo an audit conducted by an external auditing firm which will provide perfect information about the firm's risk type.<sup>2</sup>

#### The Project

The project's end-of-period cash outflow,  $X$ , from an initial investment of  $I$  is given by  $X = (1 + r)g(I)$ , where  $g(I)$  is assumed increasing strictly concave in  $I$ .<sup>3</sup> The project's rate of return,  $r$ , is stochastic, defined over the range  $[-1, R]$  where  $R$  is some large value, with a distribution function given by  $F(r)$ . The project is considered successful if its rate of return,  $r$ , turns out, ex post, to be greater than a break-even value  $r_m$ , at which the project cash flows would be sufficient to repay the loan and the accrued interest to the bank. If the loan interest rate is  $\alpha$ , then  $r_m$  is solved from

$$(1 + r_m)g(I) = (1 + \alpha)B. \quad (1)$$

If the actual return is less than  $r_m$ , then the firm defaults on the loan.<sup>4</sup> Note that  $r_m$  depends on the audit decision since the loan amount,  $B$ , would be

larger if an audit is sought (due to the non-zero cost of the audit). In addition,  $r_m$  depends on the firm size, the audit cost, and the interest rate (discussed below), all of which are firm-specific. Hence the break-even return is firm-specific.

### The Bank

Modeling the decision-making process of the bank can be complex, since banks can optimize on any one of a number of loan variables such as interest rate, loan size and mix, quality and amount of collateral offered, firm's credit history, etc. In addition, as noted earlier, at present we have very little empirical data on many of these decision variables, such as the relationship between the interest rate charged and loan size, risk type, audit decision etc. In this paper, it is assumed that the bank's policy is to approve all loans if the bank can observe the firm's risk type from the firm's audit report and if the risk type is below a cut-off level,  $\theta^*$ . The interest rate charged,  $\alpha$ , is an increasing function of the observed risk type.<sup>5</sup> However, if the firm's observed risk type exceeds the bank's cut-off value, then the loan is denied. This form of loan approval policy can be due to either regulatory or economic factors and is commonly observed in banks. As Stiglitz and Weiss [18] and others have observed, it is in the interest of a bank to turn down credit requests from high-risk borrowers rather than make loans at higher and higher interest rates, since very high interest rates will only increase the borrower's default risk. Moreover, bank regulations in most countries (and many states in the U.S.) apply caps on lending rates to protect customers from "usury" practices. The bank-specific values of the cut-off risk level,  $\theta^*$ , and the interest rate function (including the cut-off interest rate,  $\alpha^* = \alpha(\theta^*)$ ) are assumed known to potential borrowers.

If the borrower does not submit to an audit, then the bank does not observe the borrower's risk type and hence cannot use it to make the loan decision. In such cases, the bank is assumed to make the loan decision based on the size of the loan.<sup>6</sup> If the borrower requests a trivially small loan, the bank assigns a much smaller default risk than if the borrower requests a "very large" loan without an audit. Specifically, given an unaudited loan request of size  $B$ , the bank would approve the loan with a probability  $\pi(B)$ , where  $\pi(B) = 1$  for  $B = 0$  and  $d\pi(B)/dB < 0$ . In addition, the interest rate charged on approved loans is  $\alpha^*$ , which is the highest rate charged by the bank to firms which submit audited statements (i.e.,  $\alpha(\theta^*)$ ). This follows from the bank's assumption that if the firm does not submit to an audit it must be of "high risk type," though, as will shown below, some firms with risk below  $\theta^*$  may also choose to forego an audit because their requested loan size is very small. In such cases, the firms would win loan approval with a high

probability, although at the high interest rate of  $\alpha^*$ . Thus, the combined policy of charging the highest interest rate and making the loan approval uncertain provides an incentive to large borrowers to seek an audit and potentially get a lower-interest rate loan, while permitting small borrowers to trade off the cost of audit for the higher interest cost.

#### 4. THE AUDIT DECISION

If the borrowing firm decides to present the bank with audited financial statements, it will have to pay its auditor an up-front fee of  $C(W)$ , which is assumed to be increasing concave with respect to the firm's size. As noted earlier, this assumption is consistent with the findings in the audit-fee literature, including Simunic [16] who reports that  $C(W)$  is a linear function of the square root of  $W$ . For the firm, the fee is small and affordable with respect to initial investible assets, i.e.,  $C(W) < W$ .

Affordability does not, of course, mean that the audit would be sought. In particular, if the firm is riskier than  $\theta^*$ , it will clearly not volunteer for an audit as part of its loan request, since the audit will perfectly reveal the firm's type to the bank. But even for a firm whose risk type is less than  $\theta^*$ , an audit is not always preferred unless the desired loan size is "large" relative to the firm's asset size. The logic is essentially based on the information "economies of scale" argument of Wilson [20], *viz*, the amount borrowed must be of a certain minimum size relative to the firm's initial size in order to "justify" the audit costs, and is similar to that used by Ohlson [14] to show that it does not pay for a portfolio manager to acquire information unless the investment level is substantial.

Consider the case where the firm seeks a loan without an audit. The firm's expected utility, *if the loan is approved*, is given by:

$$T^N(I) = \int_{r_m}^R U[(1+r)g(I) - (1+\alpha^*)(I - W)]dF(r) \quad (2)$$

where the superscript  $N$  stands for the "no-audit case. If the loan is not approved, the borrower can always invest his initial wealth in the project (though, as noted, this is not the optimal level), giving the firm an expected utility of  $T^N(W)$ . Hence the ex-ante expected utility of the no-audit decision is given by:

$$EU^N(I) = \pi T^N(I) + (1 - \pi)T^N(W). \quad (3)$$

where  $\pi = \pi(I - W)$  is the probability of loan approval.

The firm's ex-ante expected utility given an audit decision can be defined similarly. This means, of course, that the firm's  $\theta \leq \theta^*$ , since the firm's loan request would be definitely denied otherwise. Thus we need to consider only the case of loan being approved. Hence we get

$$EU^A(I) = \int_{r_m}^R U [(1+r)g(I) - (1+\alpha(\theta)\{I - W + C(W)\})]dF(r). \quad (4)$$

where the superscript A stands for the "audit" case.<sup>7</sup> Note that though the lower bound,  $r_m$ , in equations (4) and (2) are both computed using equation (1), the value of  $r_m$  is different in (4) and (2) since the loan amounts are different.

From the forms of the two ex-ante utility functions, it is clear that the optimum level of investment would differ for the two decisions. Let  $I^N$  be the potential borrower's optimal investment level given his decision to seek a loan without an audit (the no-audit case), and  $I^A$  be the optimal investment level given his decision to apply for a loan with a perfect information audit. Then the audit decision can be stated as follows: Select audit if  $EU^A(I^A) > EU^N(I^N)$ , i.e., the expected utility from audit-investment should exceed the no-audit-investment case.<sup>8</sup>

## 5. EFFECT OF AUDIT COST AND FIRM SIZE ON AUDIT DECISION

In the U.S. and most other countries, the auditing profession is prohibited against contingent audit fees. As a result, the audit cost,  $C(W)$ , is a function of the firm's initial size but not the loan amount sought. Therefore it is clear that there will be investment levels extremely close to  $W$  (i.e., as the loan amount  $B$  approaches zero), where it will not pay to have the audit. Moreover, if a company would find it preferable to have an audit at the optimal investment level  $I = I^A$  and would not need an audit at  $I = W$  (i.e., no loan sought), then there must be a cut-off investment level,  $I^c$ , between the initial wealth level,  $W$ , and the optimal investment level,  $I^A$ , where the transition from no-audit to audit would occur. That is, at  $I = I^c$ , the two expected utility curves,  $EU^A$  and  $EU^N$ , will *intersect*, such that  $I^A$  is greater than  $I^c$  for the case where an audit is preferred to no-audit.

The nature of the audit cost function, therefore, leads to a "firm size effect" in the audit decision, *viz*, the desired investment level with an audit must be "large" relative to initial wealth. Specifically, firms will seek an audit only if their targeted debt-equity ratio,  $I^A/W$ , is greater than a cut-off debt-equity ratio,  $I^c/W$ .<sup>9</sup>

This result, which is derived from a simple cost-benefit analysis, raises an important question: is the cut-off debt-equity ratio a function of firm size?

More specifically, is the cut-off debt-equity ratio larger for a small business? This question has public policy implications since more “burdensome values of the minimal debt-equity ratio for small business firms may be considered as undesirable for economic objectives such as job creation and venture capitalism.

To analyze the effect of the firm size on the cut-off debt-equity ratio, this section will assume that the project production function,  $X$ , is homogeneous of degree one, so that it can be written in the form of the debt-equity ratio as follows:

$$X = (1 + r)g(I) = (1 + r)Wg(I/W).$$

Consider a firm that prefers an “audit and seek loan” decision to a “no-audit and no-loan” decision. Under the latter case, the initial asset can still be invested in the project, and thus we get

$$(1 + r)Wg(I/W) - (1 + \alpha)(I - W + C(W)) > (1 + r)Wg(W/W). \quad (5)$$

Inequality (5) can be rewritten by dividing both sides by  $W$  as

$$(1 + r)g(I/W) - (1 + \alpha)(I/W - 1 + C(W)/W) > (1 + r)g(1). \quad (6)$$

One way to interpret (6) is that when the stated inequality is satisfied, firms would seek an audit with their loans. Obviously, when  $I = W$ , the inequality is not satisfied and audit will never be preferred, consistent with the cost-benefit argument stated earlier.

The term  $C(W)/W$  in equation (6) represents the per-unit audit cost. As noted, it is known from past studies that  $C(W)$  is increasing concave and in particular,  $C(W)$  is a square root function of  $W$ , e.g.,  $C(W) = kW^{0.5}$ , where  $k$  is some normalizing factor. For such known audit cost functions,  $C(W)/W$  decreases as  $W$  increases.<sup>10</sup> For smaller firms, the audit cost per dollar of asset is much larger than the cost per asset dollar for larger firms. Thus, from (6), as  $W$  becomes greater, the left hand side gets larger and thus the inequality is more likely to be met. In other words, given the known structure of audit cost functions, larger firms are more likely to seek an audit with loans. The audit cost is more “burdensome” to smaller firms in the sense of  $C(W)/W$  being larger, which leads smaller firms to forego the audit.<sup>11</sup>

The above discussion suggests that it is a priori less likely that a small initial size firm would prefer an audit, given what we know about the shape of the audit cost function. This raises an interesting signalling aspect of the audit decision problem. If a small firm signals “loan with no audit,” the bank can interpret this signal in two different ways: 1) the firm is very risky

(i.e., has  $\theta > \theta^*$ ), or 2) the firm is low-risk ( $\theta < \theta^*$ ) but perceives the audit to be too costly. Of course, the bank knows that it is unlikely that a smaller initial size firm would want an audit, even if the firm is “low risk”. On the other hand, the bank would be much more skeptical of a larger firm that claims an audit is too costly. For a given debt/equity ratio, it is much more likely that the true reason a larger firm does not want an audit is that the firm is high risk. Hence the bank is much more likely to extend a loan with no audit to a small firm than to a larger firm, for similarly targeted debt-equity ratios.

Another interesting signalling aspect of the audit decision problem relates to the effect of the cost of the signalling on the existence of a separating equilibrium where banks can identify high-risk firms from low-risk firms from their audit signals. If audit costs are prohibitively high, neither good nor poor quality small firms would choose to signal their quality with an audit. Thus a bank receiving unaudited financial statements from a small firm applicant cannot infer that the applicant is necessarily of high risk (poor quality). This would lead to a pooling equilibrium where all applicants are treated equally (as risky) by the bank.<sup>12</sup> If the audit costs are less burdensome, (i.e., with  $C(W)/W$  becoming smaller for a given level of  $W$ ), at least some of the high-quality small firms would seek a loan with audit, but low-quality firms would still not attempt to have an audit. Thus lower audit costs can lead to a partially separating equilibrium where at least some of the high-quality small firms are distinguishable from the low quality firms.

## 6. CONCLUSION

The analysis in the paper shows that small business firms seeking loans face a size hurdle when deciding whether to voluntarily seek an audit. A size-based audit cost function, such as the square root function observed in practice, leads small firms below a cut-off size to forego an audit even if they are of high quality (low risk) from the point of view of the banks. Such firms then face a non-zero probability that their loans will be denied even when they are of high quality. The analysis shows that the minimal or cut-off debt-equity ratio is an increasing function of audit cost. Hence smaller audit costs may allow more high quality small firms to reveal their types to the banks, thus leading to a more partially separating equilibrium.

The analysis suggests a number of interesting empirical questions for study. The proposition that the minimal debt-equity ratio of audit-seeking companies is an increasing function of audit costs could be empirically tested provided data on audit costs and loan files are made available by banks. Banks would want to know whether there are risk differences between companies

which seek loans with and without audit (or services such as review or compilation). They would also be interested in the relationship between their interest rate policy (i.e., the shape of the  $\alpha(\theta)$  function) and the nature of small firm audit decision. Small firms would want to know whether the probability of loan approval is a function of the audit decision. More data and research on these and related issues are needed to increase our understanding of the financial markets for small firms.

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## NOTES

1. Due to limited liability, the utility is assumed zero for all asset levels less than zero.
2. Such an assumption is consistent with the observed widespread use of audited financial statements in lending decisions.
3. The concavity of  $g(I)$  is assumed so that the optimum investment size and hence the required size of bank loan are finite. The results in the paper do not, for the most part, depend on the shape of  $g(I)$ —for example, linear functions would also suffice. In section 5, however, it is assumed that  $g(I)$  is a homogeneous function of degree one.
4. Due to limited liability, the firm's utility is lower-bounded at zero in the case of default.
5. The loan decision and the interest rate may also depend, in practice, on loan size, since a bank's resource constraints would usually limit its lending potential. Here we assume that the loan request is within the bank's lending range.
6. As noted earlier, the loan size is assumed to be within the bank's normal lending range.
7. It can be seen that the two ex-ante utility functions given in (3) and (4) are continuous in  $I$ .
8. The basic assumption that the firm's desired investment level,  $I$ , is greater than its initial wealth,  $W$ , implies that either  $EU^A(I^A)$  or  $EU^N(I^N)$  is greater than  $T^N(W)$ .
9. Because of the one-to-one relationship between the investment-equity ratio,  $I/W$ , and the corresponding debt-equity ratio,  $(I - W)/W$ , the two terms are used interchangeably in this paper.
10. The assumption that  $C(W)$  is increasing concave does not, by itself, always imply that  $C(W)/W$  is a decreasing function of  $W$ . For example if  $C(W) = \ln W$ , then  $C(W)/W$  increases as  $W$  increases for values of  $W$  in the open interval  $(0, e)$ . However, for observed and known functions of audit cost such as the square root function,  $C(W)/W$  is indeed a decreasing function of  $W$ .
11. An exception to this statement would be if  $g(I/W)$  is sufficiently large so that the inequality in (5) is still satisfied even though  $C(W)/W$  is high. However, the investment-equity ratio  $I/W$  and consequently the debt equity ratio  $(I - W)/W$  may be so large in such cases that the bank may not grant the loan despite the firm's risk being below the bank's cut-off risk.
12. At the other extreme, a truly separating equilibrium will exist only if the audit cost is zero. Then all high-quality firms (regardless of firm size or loan size) will choose to have an audit and all low-quality firms will not seek audit.

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