Why Do Private Companies Demand Auditing? A Case for Organizational Loss of Control

A. Rashad Abdel-Khalik*

The objective of this paper is to explain the motivation for owners of private companies to voluntarily demand audit (positive) assurance. It is hypothesized that the owner/manager seeks audits as compensatory control systems for the organizational loss of control inherent in hierarchical organizations. Thus, the expected value of wealth at risk due to loss of control sets a lower limit on the amount owners would be willing to pay for audits to compensate for that loss. The hypothesized relationship was tested using information for 103 private companies demanding audit (positive) assurance.

The obtained relationships were basically unaltered by the introduction of lenders' requirement of audits (n = 40). Furthermore, the hypothesized compensatory aspect of audit assurance was absent for the demand for negative assurance (reviews) in a sample of 31 companies. This is consistent with the fact that negative assurance is not viewed as a way of providing confidence so as to compensate owners for loss of direct supervision and control.

1. Introduction

In this paper I propose that, in the absence of regulatory demand for audits, owners would voluntarily demand the assurance provided by external audits for one or both of the following reasons:

1. To compensate for the loss of control induced by organizational
design (Williamson, 1967 and 1971; Evans, 1975; and Calvo and Wellisz, 1978);
2. To comply with constraints placed on the organization by creditors.

Whereas the latter is a contractual constraint, the former is an outcome of the structure of organizations. Of particular interest is the effect of the number of hierarchies. With a longer chain of command and decreased observability of subordinates’ actions, there is more loss of control from the top for which external audits can be demanded as a compensatory device.

A test of the relationship between the cost of audits and the number of levels of hierarchy is carried out for a sample of private companies (fully owned by managers) that (1) voluntarily demand audits and (2) did not plan to go public (and hence no regulatory demand). While the loss-of-control phenomenon is common in all organizations, using private companies for empirical analysis eliminates the confounding effect of regulatory demand and provides more interpretable results since owners and managers are the same. In particular, demand for audits by private companies is essentially a discretionary choice. Organizational loss of control that is hypothesized as a motive for the discretionary demand of audit assurance is validated by:

1. Using cross-validation tests for the sample under study;
2. Showing that lenders’ demand for audits might, in fact, be related to the substantive concern about the existence of loss of control (results are unaltered for a subsample for which the lenders’ demands are known); and
3. Testing for the absence of the hypothesized relationships for the case of negative assurance provided by reviews.

The remainder of this paper consists of the following segments. The nature of the demand for assurance and the loss of control concept are discussed in the next two sections. An empirical model is then suggested and estimated for testing the relationship between loss of control and audit fees. A subsample for which the lenders’ demand for auditing was known is then analyzed. Relationships were tested next for a smaller sample of private companies that demand reviews (negative assurance) instead of audits. The last section offers concluding remarks and some limitations.

1. Public trading of securities is the mechanism that triggers mandatory audits. Private companies are not subject to such mandates unless they (1) have more than 500 partners, or (2) receive federal contracts. The firms used in this study consist of companies that are fully owned by managers, have no registered securities, and do not prepare financial statements for any regulatory agency. In these companies, ownership and control are not separated.
2. Demand for Assurance

2.1 Types of Assurance

External auditors provide "positive" assurance (PA) in connection with audits, and "negative" assurance (NA) in connection with reviews. Milburn defines audit assurance as "the degree of confidence to detect a specified material level of error" (1980, p. 123). The product of an audit is an opinion on financial statements providing the highest level of assurance an external auditor is allowed to offer. An audit opinion is an indication that certain audit procedures, with known attributes based on professional pronouncements and practice, have been performed and that the financial reports of the company are credible, subject to an acceptable level of error. Thus, other than audit fees, a client demanding external audit assurance has little, if any, flexibility in negotiating the process or the product of the audit.

Because we observe only reservation fees, a confusion between the demand side and the cost side arises, especially since (1) an "audit" of a given firm is largely indivisible and (2) the reservation price (contractual audit fee) is the only observable component of an audit's cost.

Instead of an opinion, the product of a "review" is a letter indicating that some limited examination and analytical review procedures have been conducted and that the CPA is not aware of any material modifications that should be made to the financial statements in order for them to be in conformity with generally accepted accounting standards. This negative assurance, therefore, provides a much lower degree of confidence than an audit. As a result, the cost associated with each type of product is expected to differ. Abdel-khalik (1989) provided evidence showing that for two samples of similar-size companies, reviews cost about one-third the cost of audits.

By construction, NA inspires a lower level of confidence, which is not likely to compensate for the loss of control internal to the client’s organization. The difference between NA and PA is brought out by an analysis of a sample demanding NA (reviews).

2.2 Assurance Demand Functions

In the absence of regulatory mandates, the choice of the type of assurance is the client's. Further, neither the product nor the process leading to assurance can be segmented into separate contracts. Consequently, the individual client's demand for assurance is, in effect, a disjointed function, with demand for assurance taking on three possible levels, as shown in Figure 1.
Although PA encompasses NA, each type of assurance is a distinct product and is indivisible. In other words, an audit is a contract for a full unit of PA, and a review is a contract for a full unit of NA.²

The market demand for auditing can be assessed by summing the individual demand functions. The price of an audit, however, differs from one client to another, as illustrated by points PA(X) and PA(Y) in Figure 2. Each of the two clients (X and Y) demands one unit of PA, but they pay different fees because of differences in the audit effort required.³

The relationship between the type of assurance and the amount of effort a CPA firm expends is not known. In general, audit firms set their fees at cost-plus, which is translated into billable hourly rates for different skills. Thus, for a given pricing regime, differences in fees paid by clients should reflect differences in audit effort.

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² In some cases, divisibility might exist. For example, audits of a car dealer may not include new car inventory since it can be part of the manufacturer’s own audit. I want to thank Doug Carmichael, Baruch College, for drawing my attention to this point.

³ Earlier findings have shown that audit fees increase at a decreasing rate of size. See, for example, Elliott and Korpi (1978), Simunic (1980), Dopuch and Simunic (1980, 1982), Francis (1984), Firth (1985), Maher et al. (1985), Palmrose (1986 and 1989), and Abdel-khalik (1990). The issue of client complexity was first studied by Elliott and Korpi (1978), but it is not clear how they aggregated the various complexity indicators used. Their indicators included degree of decentralization, internal control strength, locations, and several other indexes of organizational structure.
3. Aspects of Loss of Control

Although fully private firms do not have the risk of moral hazard emanating from separation of ownership and control, they are subject to problems of moral hazard "internal" to the operation of the firm. Moral hazard risk, or the risk of loss of control, occurs in organizations for many reasons, some of which are related to attributes of organizational design, such as the length of the chain of command. This is the primary focus in this section.

3.1 Hierarchy-Induced Loss of Control

In a small company with one level of hierarchy, the owner (manager) controls operations primarily by means of direct supervision and personal observation. As the company grows larger, its organizational structure begins to take a pyramidal shape: Delegation becomes necessary because bounded rationality and natural limits on attention span make firsthand knowledge of actions of all subordinates increasingly infeasible. Authority is then delegated down the chain of command and multilayered hierarchies evolve. The reduced observability in hierarchies gives rise to the risk of moral hazard and opportunism (Williamson, 1967 and 1975; Williamson and Ouchi, 1981), which is characterized by certain actions of employees such as shirking, cutting corners, consuming organization resources, or perpetrating fraud. Williamson and Ouchi (1981, p. 351) indicate that it is sufficient that only some employees behave in this fashion for this risk to become costly to the organization.

Given the observed ranges of five to ten subordinates for the span of control per supervisor (see Finley et al., 1976, chap. 10; Perrow, 1979, p. 37), the greater the number of employees, the more administrative layers an organization will have. However, as will be shown, the number of layers increases at a decreasing rate.

Multilayer hierarchy in an organization creates several problems that can cause loss of control. First, as indicated above, observability of subordinates' actions decreases as the chain of command gets longer. Second, the longer the chain of command (i.e., the more levels of hierarchy), the more likely that communication will get distorted, because of coding (Katz and Kahn, 1966, p. 229) and because "the boss is not likely to be given information by his subordinates which will lead to decisions affecting them adversely" (p. 246). Third, communication down the chain of command passes through several filters, which subject it to summarization, misinterpretation, and possible intentional manipulation (Williamson and Ouchi, 1981). Further, the owner/manager is also constrained in communicating
certain information down the chain, since it may be used by subordinates for shirking (Christensen, 1981).

The resulting slippage in the effectiveness of communication and control gives rise to loss of control at the top (owner/manager). Downs (1967, p. 143) is credited with formulating this concept:

Downs has since elaborated the argument and summarized it in his "Law of Diminishing Control": *the larger any organization becomes, the weaker is the control over its actions exercised by those at the top.* The cumulative loss of control as instructions and information are transmitted across successive hierarchical levels is responsible for this result (Williamson, 1967, p. 126; emphasis in original).

Evans (1975) also shows that compounded loss of control can be very large for an organization with three or more layers of hierarchy. Organizational loss of control is thus an inherent feature of hierarchical structures, and the number of layers in a hierarchy can be used as a measure of the distance between top management and the bottom layer. This distance is a proxy for the extent of control loss.

One possible remedy for the costly consequences of unobservability of subordinates' behavior is to enhance internal control mechanisms. A manifestation of this remedy is to "organize transactions in such a way as to economize on bounded rationality while simultaneously safeguarding those transactions against the hazards of opportunism" (Williamson and Ouchi, 1981, p. 351). This is the M-form for which empirical evidence is provided by analysis of historical cases in Chandler (1966), but the results of a more recent study (Armour and Teece, 1978) are mixed. The question is: Why can't organizational loss of control be remedied by internal control? Several observations can be made in this regard. First, the development of internal control systems (including internal auditing) has been slow and, in addition, corporate investment in internal auditing has been generally insignificant, especially prior to the enactment of the Foreign Corrupt Practices Act of 1977 (Mautz et al., 1980; and Maher, 1981). Furthermore, internal control systems vary greatly in adequacy, quality, and sophistication.  

4. In an extensive survey of internal control practices in U.S. corporations by Mautz et al. (1980), the Financial Executives Institute Report concludes as follows:

Great diversity exists among companies of all sizes in a number of characteristics that relate to the adequacy and effectiveness of internal control practices. . . . Opportunities for improvement of internal control exist in most companies; opportunities for substantial improvement exist in many companies. The identification of internal control risks, the careful assessment of the potential costs of such risks and of measures to reduce them, and a formal management decision whether to modify present control measures as a result of such assessment is anything but a common practice in American Industry. As a result of this and other pressures on management time and energy, internal control weaknesses do exist in many companies (pp. 7–8).
Second, internal control systems are not foolproof and their effectiveness in large organizations is debated (see, e.g., Williamson, 1975, p. 125; Williamson and Ouchi, 1981; and Perrow, 1981). This is consistent with the observation that almost all business enterprises (of any reasonable size) demand monitoring systems from outside their boundaries in the form of external audits. Finally, an internal control system is a component of the organization and is subject to the very same problems discussed above.

It is hypothesized that voluntarily imported monitoring systems are demanded for their ability to enhance the owners’ confidence in reducing the loss of control inherent in the structure of organizations. Indeed, a primary

5. Loss-of-control theory has been developed for the purpose of understanding bureaucratic organizational design. The role of demand for auditing in that theory has not been explored. The extent to which authors have explored these relationships is embodied in the following quote from Williamson (1975):

The difference in scope (between internal and external auditors) is partly explained by the fact that the internal auditor can be presumed to act in the interest of the firm. The external auditor is associated with the “other side” and his motives are regarded suspiciously. The degree of cooperation received by the auditor varies accordingly. The external auditor can expect to receive perfunctory cooperation (pp. 29–30).

Although internal organization is (potentially) better able than the market to distinguish between random events and meritorious performance, and in this respect is superior to the market as a mechanism for assigning rewards to deeds, the inference difficulties that internal auditing experiences as the firm grows in complexity eventually limit its power in this respect (p. 125, emphasis in original).

6. I collected qualitative responses to this effect in interviews with 20 owners/managers of private companies and the written responses received from more than 103 companies not included in the interviews. A sample of the written responses is presented below, but stronger views were expressed in the interviews. As indicated, the two main reasons for external audits cited by owners are (1) bank requirements and (2) augmentation of internal controls. The latter reason is considered somewhat more general since it spans the views expressed by most owners with whom I have communicated, including those not having debt.

The questions (in the second request) about why companies hire outside auditors and why “the company does not rely on internal control and internal auditing instead of hiring an outside auditor” have elicited the following:

(A) From GFV, Inc.:
   1. Requirement by banks.
   2. Reaffirms that internal controls and employees are performing up to acceptable standards for a company of GFV’s size.

(B) From Builders Redi-Mix, Inc.:
   Owners are not involved in day-to-day operations. It is good assurance for owners and management. It is helpful with the bank.

(C) From a private company in Jackson, Mississippi:
   1. Objective unbiased summary of year’s operations.
   2. Good critique of many phases of business.
   3. Keeps our accounting groups on their toes all year long.

(D) From a private company in Evansville, Indiana:
   1. No internal auditing department employed.
   2. Humans perform accounting function. No humans are error-free. The outside auditors help to make accounting systems more error-free.

(E) From Union Brass, Inc.:
   Assurance to Stockholders that our internal auditing and controls are correct.
function of external audits is to evaluate the quality and adequacy of internal control systems. Aside from relying on professional standards, managers also call on external auditors to provide independent evaluation because "if a person is within the system, he/she can see its operations differently than if he/she were on the outside looking in" (Katz and Kahn, 1966, p. 228). Importing external monitoring systems is particularly important for smaller companies, whose scale of operations does not facilitate making large investments in internal control systems.

3.2 The Number of Levels of Hierarchy

Studies on organizational structure used the longest chain of command as a measure of the number or levels of hierarchy (e.g., Blau, 1974; Blau and Schoenherr, 1971; Hage, 1980; and Grinyer and Yasai-Ardekani, 1981). In some cases, both average number of levels and longest chain of command were used (Hall et al., 1967). Recently, Abdel-khalik (1988) showed that the logarithm of the number of employees in an organization is the average number of levels of hierarchy in that organization (see a brief description of the proof in the Appendix). The proof follows Simon’s (1986) assumption of symmetric organization, but shows robust results for deviating from this assumption. Indeed, the empirical evidence over the past thirty years has shown a high association between the length of the chain of command and the log of the number of employees (e.g., Blau and Schoenherr, 1971; Dewar and Hage, 1978; Hage, 1980; Pugh and Hickson, 1976) and the paper by Abdel-Khalik (1988) is an explanation for the reason high correlations are observed.

3.3 Size Alternatives

Thus far, loss of control has been presented as an outcome of the design of organizations. The economic attributes of loss of control, however, extend beyond an abstract structure. The relative degree of labor versus capital intensity should give rise to the importance of tangible economic resources.

(F) From Macklanburg-Duncan Co.:
Outside auditors give credibility to the internal systems and controls; without it, they would be suspect to general management.

(G) From Zip Marts, Inc.:
1. Bank credit agreement requires external audit.
2. Forces internal auditors and financial management to do a better job. Makes them more conscientious knowing someone else will be reviewing their work.
3. Having ultimate responsibility for the financial integrity of the company, external auditors give me a higher comfort level that no material errors have gone undetected (They just make me feel better).
an owner subjects to the risk of being misused. The more wealth an owner places at the risk of opportunism and improper utilization by subordinates, the greater the consequences of losing control. Hence, the size of tangible assets (total assets) employed by the organization can be used as the maximum amount of \textit{wealth at risk}, which can be viewed as the economic weight of hierarchy-induced loss of control.

\textbf{4. Loss of Control and Audit Fees}

To develop the proposed relationships, let

\begin{align*}
L &= \text{ labor, or the number of employees in the auditee organization.} \\
H &= \text{ number of hierarchical levels of the auditee's organization.} \\
C &= \text{ loss of control induced by organizational hierarchies, an unobservable construct.} \\
K &= \text{ the tangible economic resources subject to the risks of moral hazard.} \\
q &= \text{ the expected value of \textit{wealth at risk} due to loss of control.} \\
F &= \text{ audit fees paid to external auditors.}
\end{align*}

The theory of bureaucracy discussed above suggests a parsimonious expression of the loss of control, $C$, as a function of organizational hierarchy, $H$. Let that function be described as

$$C = f(H) = \beta H,$$  \hspace{1cm} (R1)

where $\beta$ is the marginal effect of hierarchical levels on loss of control; the value of $\beta$ is non-negative. However, a simple geometric series summarized in the Appendix shows that, under plausible assumptions, the number of hierarchical levels in an organization is almost equal to the logarithmic transformation of the number of its employees, $\log L$ (see Eq. 6). Thus, the loss of control relation (R1) can be written as

$$C = \beta \log L,$$

or $C^* = L^\lambda$,  \hspace{1cm} (R1a)

where $C^* = \exp C$, which remains an abstract concept. Let the maximum amount of wealth the owners of a private firm can place at risk be denoted $K$. The hierarchy-induced loss of control can lead to losing only a small fraction of $K$. Let that fraction be denoted $K^\lambda$, where $\lambda$ is bounded: $0 < \lambda < 1$. Since different firms would have different degrees of loss of control, then the expected economic value of the firm-specific loss of control is the weighted average $q$, which can be represented as
The expected value of wealth at risk due to loss of control, \( q \), serves as the maximum amount owners would be willing to pay someone to offer assurance that compensates for the loss of control. That is, in principle, owners would expect to pay audit fees, \( F \), at least equal to \( q \), suggesting that

\[
q = L^\beta K^\lambda \quad \text{(R2)}
\]

where \( E \) is an expectations operator and \( F \) is for audit fees. Although \( q \) is unobservable, the values of \( L, K, \) and \( F \) are observable and the parameters \( \beta \) and \( \lambda \) can thus be estimated.\(^7\) By rearranging (R3) to include only the observables and taking the logarithm of both sides, (R3) becomes

\[
E(\log F) \geq \beta \log L + \lambda \log K. \quad \text{(R4)}
\]

Let \( u \) be the expected amount of audit fees payable for reasons other than compensating for the hierarchy-induced loss of control, where \( E(u) \geq 0 \), then (R4) can be written as

\[
E(\log F) - u = \beta \log L + \lambda \log K. \quad \text{(R5)}
\]

Rearranging (R5) and considering a realization form, this relationship becomes

\[
\log F = \alpha + \hat{\beta} \log L + \hat{\lambda} \log K + \epsilon, \quad \text{(R6)}
\]

where \( \hat{\beta} \) and \( \hat{\lambda} \) are estimated parameters, \( \alpha \) represents an estimate of audit fees that is attributable to other factors, and \( \epsilon \) is an error term with an expected value of zero and is uncorrelated with either \( \log L \) or \( \log K \), and \( u = \alpha + \epsilon \). If (R4) is a full specification of the demand for auditing, then the expected value of \( \alpha \) would not be greater than zero. However, placing wealth at risk occurs for more reasons other than hierarchy-induced loss of control, and since \( \alpha \) captures the effect of these omitted variables, the expected value of \( \alpha \) would be greater than zero.\(^8\)

Each determinant on loss of control (and hence on audit fees) is expected to be positive. That is, \( \hat{\beta} > 0 \) because increasing the number of hierarchical layers leads to a higher degree of unobservability and consequent loss of control. Additionally, the amount of wealth placed at risk due to loss of

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7. Equation (R3), and its linear form in (R6), is a cost function, although it is similar in form to the typical Cobb-Douglas production function. See D. J. Poirier (1975). Cost determinants in this model are the factors of the user (not those of the producer) of the service.

8. Since this paper is not concerned with the supply side of auditing, it is assumed that firms are competitive and that audit pricing is set at marginal cost. This assumption, however, is a simplification since audit technology is not standardized across firms, and the marginal cost of any audit firm is unknown to other firms.
WHY DO PRIVATE COMPANIES DEMAND AUDITING?

Control cannot capture the entire wealth (K) and, as a consequence, the coefficient \( \lambda \) must be less than unity. That is, the hypothesized coefficients are expected to be bounded as follows:

1. \( \alpha > 0 \),
2. \( 0 < \beta < 1 \),
3. \( 0 < \lambda < 1 \).

5. Empirical Analyses

Data used in this paper were collected in two phases. In phase one of the empirical analyses, data were collected from privately held companies without information on whether or not lenders demand auditing. Three years later, additional information was collected in the form of a second request to the responding private companies. The updated measures of earlier information were used to evaluate the temporal stability of the estimated model and to examine the effect of lenders’ requiring audits (explicitly adding the requirement as a dummy variable, \( D \)). The analysis of the second phase is presented separately.

5.1 Sample and Data—Initial Phase

Two samples consisting of 134 privately owned companies (had no registered securities) constitute the data set: 103 had audits and 31 had reviews. The sample companies are located in 83 communities in 36 states and are engaged in diverse manufacturing and merchandising activities. A post-survey inquiry also revealed that most companies in the sample hire local CPA firms, and none was a first-time audit.\(^9\) The geographical distribution of the sample provides a sufficient degree of diversity to partially mitigate problems resulting from either industry or localized factors. The sample consists of the usable responses from a study conducted for the Financial Accounting Standards Board.\(^10\) The data collected for this paper

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9. The reason for this restriction is to avoid including audit fees during the first period since many of these fees might be priced below cost (DeAngelo, 1981).

10. The survey was conducted for both the National Accountants Association and the Financial Accounting Standards Board. For this reason, owners of a reasonable sample of privately owned companies were willing to release confidential information. The objective of the survey was to examine the attitudes of owners of privately owned companies toward GAAP and GAAS. The information required for this project was collected by implanting questions in the survey that would collect information about audit fees, total assets, sales, and number of employees. The original sample consisted of 570 companies. With the assistance of the NAA and the FASB, we were able to obtain close to a 25 percent response rate. However, several respondents were preparing to go public, and others engaged external auditors only for “reviews” or “compilations.” A total of 103 respondents engaged external auditors for audits and had no missing data. This is the sample used in this study.
Descriptive statistics for the audit samples are presented in Table 1. In their original form, the variables are characterized by high skewness and kurtosis and are not symmetric (significant departures from normality at $p < 0.01$). By contrast, the log transformation of audit fees ($\log F$), the imputed measure of hierarchy $H$ ($\log L$), and the log transformation of each of total assets ($\log TA$) and sales revenues ($\log S$) were symmetrically distributed (failing to reject the null hypothesis of departure from normality for these distributions at $p = 0.15$). Using log-normal distribution of each of these four variables, therefore, reduces potential problems resulting from highly skewed distributions.\footnote{The models used here were replicated by using the square root of total assets (as in Simunic, 1980) with similar results, but adjusted $R$-squared for (Reg B) was 0.49, compared with 0.56 in Table 2.}

### Table 1

Descriptive Statistics of Relevant Data

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</thead>
<tbody>
<tr>
<td>$F = \text{Audit fees}$</td>
<td>35.6m</td>
<td>37.8m</td>
<td>3.1</td>
<td>12.7</td>
<td>0.21</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>$\log F = \text{Audit fees}$</td>
<td>10.1</td>
<td>0.87</td>
<td>0.118</td>
<td>-0.07</td>
<td>0.06</td>
<td>$&gt;0.15$ (N)</td>
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</table>

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<tbody>
<tr>
<td>$L = \text{No. of Employees}$</td>
<td>371</td>
<td>518</td>
<td>3.4</td>
<td>15.06</td>
<td>0.24</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>$H = \text{Hierarchical Levels*}$</td>
<td>5.24</td>
<td>1.21</td>
<td>-0.15</td>
<td>-0.04</td>
<td>0.06</td>
<td>$&gt;0.15$ (N)</td>
</tr>
<tr>
<td>$K = \text{TA (total assets)}$</td>
<td>24.0mm</td>
<td>48.8mm</td>
<td>6.8</td>
<td>57.88</td>
<td>0.32</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>$\log TA = \log \text{Total Assets}$</td>
<td>16.11</td>
<td>1.30</td>
<td>0.309</td>
<td>-0.51</td>
<td>0.07</td>
<td>$&gt;0.15$ (N)</td>
</tr>
<tr>
<td>$sqTA = \text{Square Root TA}$</td>
<td>3926</td>
<td>294</td>
<td>2.45</td>
<td>10.53</td>
<td>0.17</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>$K = \text{S (sales revenues)}$</td>
<td>41.9mm</td>
<td>47.2mm</td>
<td>2.01</td>
<td>5.57</td>
<td>0.203</td>
<td>$&lt;0.01$</td>
</tr>
<tr>
<td>$\log S = \log \text{Sales}$</td>
<td>16.91</td>
<td>1.22</td>
<td>0.51</td>
<td>0.017</td>
<td>0.06</td>
<td>$&gt;0.15$ (N)</td>
</tr>
</tbody>
</table>

*The measure of $H$ that would approximate the actual number of hierarchies should use a log base equal to average span of control. However, the natural log is used for simplifying exposition because any log base is a multiple of another by a scalar.

$m = \text{in thousand dollars}$

$mm = \text{in million dollars}$

$N = \text{fails to reject normality}$

$K = \text{wealth}$

$log = \text{natural logarithm}$

$D$-stat = Kolmogorov-Smirnov $D$-statistic for testing normality

$1^{11}$. The models used here were replicated by using the square root of total assets (as in Simunic, 1980) with similar results, but adjusted $R$-squared for (Reg B) was 0.49, compared with 0.56 in Table 2.
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TABLE 2

Estimation of the Proposed Model Using Alternative ER Measures

Model: \( \log(F) = \alpha + \beta H + \lambda \log K + \epsilon \)

<table>
<thead>
<tr>
<th>Model:</th>
<th>Coefficients</th>
<th>(t)</th>
<th>Adj ( R^2 )</th>
<th>( F - \text{Stat} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Reg A) Incomplete Model Estimate (H only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficients</td>
<td>7.15</td>
<td>0.47</td>
<td>—</td>
<td>0.42</td>
</tr>
<tr>
<td>(t)</td>
<td>(20.8)*</td>
<td>(8.74)*</td>
<td>—</td>
<td>(1;101)</td>
</tr>
<tr>
<td>(Reg B) Full Model with Total Assets for K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficients</td>
<td>2.83</td>
<td>0.145</td>
<td>0.40</td>
<td>0.56</td>
</tr>
<tr>
<td>(t)</td>
<td>(3.48)*</td>
<td>(1.96)*</td>
<td>(5.73)*</td>
<td>(2;100)</td>
</tr>
<tr>
<td>(Reg C) Full Model with Sales for K</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Coefficients</td>
<td>4.47</td>
<td>0.30</td>
<td>0.22</td>
<td>0.45</td>
</tr>
<tr>
<td>(t)</td>
<td>(4.2)*</td>
<td>(3.60)*</td>
<td>(2.00)*</td>
<td>(2;100)</td>
</tr>
</tbody>
</table>

*Statistically significant at \( p < 0.025 \) (one-tailed test)

\( \log = \text{natural log} \)

\( H = \) levels of hierarchy

\( K = \) total assets, or sales

\( F = \) audit fees

5.2 Estimation Results—Initial Phase

Total assets is used for operationalization of \( K \) (the maximum amount of economic resources subjected to the risk of opportunism), but sales dollars (S) are also used for comparison. In order to evaluate the relative contributions of each of \( H \) and \( K \) to the demand for auditing, Table 2 includes estimation results of linear regressions that use only \( H \), the number of hierarchical levels; the full model (R6) is estimated next (Reg B) using log total assets for \( K \), and with log sales as a surrogate for \( K \) (Reg C). The incremental contribution of either \( K \) or \( H \) can be examined\(^{12} \) by using the

\[ F = \frac{(R^2_H - R^2_A)/(k_a - k_H)}{(1 - R^2_A)/(n - k_a)}. \]

\(^{12} \) The reason for two different estimations (Reg A and Reg B) is the collinearity of \( \log(L) \) and \( \log(K) \). The correlation for this sample is about 0.77. Since multicollinearity increases regression variance, the statistical significance of the coefficients will be understated. But the collinearity of the two variables did not increase the variance sufficiently to render either variable insignificant. In addition, the incremental explanatory power of the second variable can be measured by
significance of the t-tests of each (the squared value of each variable’s t is the F-test for significance of incremental change in adjusted $R^2$).

As shown, each of the three functions is statistically significant at $p < 0.01$. Furthermore, the coefficients $\beta$ and $\lambda$ are statistically significant ($p < 0.01$) and are in the expected direction and range. The function (Reg B) estimated with $H$ and $\log TA$ (for $K$) explains about 56 percent of the variation in the dependent variable, whereas the function with $H$ and $\log S$ (for $K$) explains only about 45 percent. Furthermore, as shown below, the validation of the Reg B estimation is slightly better than that of the model using $\log S$. Finally, the Goldfield and Quandt test for heteroscedasticity (Johnston, 1972, p. 218) produced F-statistics not different from unity, which suggests the absence of heteroscedasticity. Accordingly, the additional analysis that follows focuses on Reg B, which has the following estimated function:

$$\log F = 2.83 + 0.145H + 0.40 \log TA + \epsilon,$$

(Reg B)

where $\epsilon$ is a residual error with an expected value of zero.

Consistent with the hypothesized relationships, both estimates of $\beta$ and $\lambda$ fall within the range of $[0-1]$, $\alpha$ is positive, and each is statistically significant (at $p < 0.025$, one-tailed test). In addition, Cook’s D-statistics for detecting outliers indicated no significant influence of any individual observation on the estimated model.

### 5.3 Cross-Validation and Consistency Checks

The relative stability across sample observations of the estimated function (Reg B) is examined by two approaches. In the first approach, five observations were held out at a time; the model was repeatedly estimated where $B$ and $A$ refer to (Reg B) using the two variables, and (Reg A) using only one variable, and where $k$ refers to the number of estimated parameters. (See Kmenta, 1971, pp. 370–71.) Using the data in Table 2, $F_a = 31.8$ which is statistically significant at $p < 0.001$ for 1 and 100 degrees of freedom. Note that 31.8 is about equal to the squared value of the t-statistic of $\beta$ ($t = 5.73$). A similar check in the incremental explanation of $H$ over $\log TA$ can be performed. The F-statistic ($df = 1; 100$) for this increment is also equal to the squared value of the t-statistic for $\beta$, which is about 3.84 (significant at $p < 0.05$). The comparison of 31.8 for increment of $\log TA$ against 3.84 for the increment of $\log L$ suggests that $\log TA$ captures much of the variation in $\log L$.

13. The sample was rank-ordered by the size of $\log TA$. The middle third was eliminated, and two separate regressions were run for the top (U) and the bottom (B) third of the sample. Since both regressions used the same number of observations ($n_1 = n_3 = 35$), the statistic

$$F = [SS(U) / SS(B)],$$

rendered a value of 1.015. Since $F$ with 3 and 32 degrees of freedom is equal to 1.80 at $p < 0.05$, the sample was judged to have no heteroscedasticity (Johnston, 1972, p. 219; Maddala, 1977, p. 294).

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TABLE 3
Cross-Validation (Prediction) Errors with Two Holdout Approaches

<table>
<thead>
<tr>
<th>Model Used for Prediction</th>
<th>Approach</th>
<th>Average Prediction Error</th>
<th>MSE (Variance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Reg A) logF = α + β H + ε</td>
<td>A</td>
<td>-0.001*</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0.01*</td>
<td>0.44</td>
</tr>
<tr>
<td>(Reg B) logF = α + β H + λ logTA + ε</td>
<td>A</td>
<td>-0.0017*</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0.0126*</td>
<td>0.34</td>
</tr>
<tr>
<td>(Reg C) logF = α + β H + λ logS + ε</td>
<td>A</td>
<td>-0.00021*</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0.006*</td>
<td>0.42</td>
</tr>
</tbody>
</table>

A = five observations held out
B = 50 percent of observations held out
* = not significantly different from zero.

with the full sample minus the five observations. The estimated parameters were then used to predict the values of the dependent variable for the five holdout observations. This process was repeated until all sample observations were predicted with the parameters estimated from sample observations that excluded those being predicted. In the second approach (the 50/50 approach), half of the sample was selected randomly and used in estimating the model. The parameters thus estimated were projected onto the other half of the sample for cross-validation and prediction. The two halves were then switched so that all the sample observations were predicted with parameter estimates based on other observations.

The difference between actual and predicted values for the sample observations provided metrics for validation errors. Two indices were used for evaluating the relative quality of prediction: (1) the average of the signed prediction errors (APE), and (2) MSE for average squared prediction errors (denoted "variance" for ease of reference). The first measure assumes that negative and positive errors cancel each other out, while the second index assumes an equal penalty for positive and negative errors.

Table 3 presents a summary of prediction errors. As shown, with the five-observations holdout approach, the average prediction error is quite small and not significantly different from zero (at \( p < 0.05 \)). However, when using MSE, Reg B performs slightly better than others. The variance (MSE)

---

15. This is essentially equivalent to the jackknife approach, except that in the latter case only one observation is held out at a time for cross validation or prediction.
of the prediction error for this model is 0.35, while the next lowest variance, for the model with HL and lnS, is 0.42. The results for the 50-percent-holdout approach are similar.

5.4 Analysis with Lenders' Demand Known

Owners of privately held companies would have less discretion over the demand for auditing if, in fact, this demand originated with lenders. In this event, lenders act as pseudo-regulators. Consequently, it is important to evaluate the extent to which such a requirement intervenes so as to dominate the loss-of-control phenomenon and explain the owner's motivation to hire external auditors. Information pertinent to this variable was collected in the second phase. The second request was made three years after the initial data collection and was intended to assist in examining: (1) the effect of lenders' external auditor requirements and (2) the extent to which the relationships discussed above exhibit stability.

Lenders' covenant restriction was obtained as a dichotomous information variable from the owners/managers of 40 privately owned companies, 18 of whom indicated either that their lenders do not require audited financial statements or that they do not have debt. In the meantime, information on the cost of audits, total assets, employment, and sales were updated for all 40 companies. This information pertained to a fiscal period three years after the one used in the initial phase.

Estimates of regression functions similar to those reported in Table 2 reveal stability of the relationships and of levels of significance. Inclusion of the lenders' demand resulted in the following relationship:

$$\log(F) = \alpha + \beta H + \lambda \log(K) + \gamma D + u,$$

where $D$ is an indicator variable for lenders' requirement of audited financial statements from their clients (1 if required; 0 otherwise), $u$ is an error term uncorrelated with either $H$ or $\log(K)$ and has an expectation of zero, and all other terms are as before.

The results of estimating (R7) are reported in Table 4 for the two cases where wealth is measured differently, $K = TA$ and $K = S$. These results indicate the following:

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16. Arnold and Diamond (1981, p. 66) report that bankers require clients to have audits for relatively large loans (for $100,000 or more), when there are potential cashflow problems, or when the client is unknown to the banker.
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TABLE 4

Estimating the Proposed Models with the Inclusion of Lenders’ Demand

Model: \( \log(F) = \alpha + \hat{\beta}H + \hat{\lambda}\log(K) + \hat{\gamma}D + u \)

<table>
<thead>
<tr>
<th>( \alpha )</th>
<th>( \hat{\beta} )</th>
<th>( \hat{\lambda} )</th>
<th>( \hat{\gamma} )</th>
<th>( \text{Adj } R^2 )</th>
<th>( F\text{-stat}^* )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using Total Assets for ( K ):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficients</td>
<td>2.69</td>
<td>0.297</td>
<td>0.33</td>
<td>0.475</td>
<td>0.67</td>
</tr>
<tr>
<td>( t )</td>
<td>(1.73)^b</td>
<td>(2.55)^a</td>
<td>(2.55)^a</td>
<td>(2.48)^a</td>
<td></td>
</tr>
<tr>
<td>Using Sales for ( K ):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficients</td>
<td>3.51</td>
<td>0.37</td>
<td>0.24</td>
<td>0.53</td>
<td>0.64</td>
</tr>
<tr>
<td>( t )</td>
<td>(1.88)^b</td>
<td>(2.99)^a</td>
<td>(1.67)^a</td>
<td>(2.64)^a</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- \( \log \) = natural log
- \( H \) = levels of hierarchy
- \( K \) = company's wealth, described by total assets or sales
- \( D \) = lenders' demand of auditing (1 = yes, 0 = no)
- \( a \) = significant at \( p < 0.01 \) (one-tailed test)
- \( b \) = significant at \( p < 0.05 \) (one-tailed test)
- \* The numerator and denominator degrees of freedom for the F-statistics are 3 and 36, respectively.

1. The coefficient \( \gamma \) for variable \( D \) is statistically significant at \( p < 0.01 \) in both functions.
2. Both regression estimates (where \( K = TA \) or \( K = S \)) indicate a significant increase in adjusted \( R^2 \) (up to 0.67) when \( D \) is included in the regression function.
3. As with the earlier estimation, the regression with \( K = TA \) provides estimates more consistent with the proposed model than when sales, \( S \), is used. A higher adjusted \( R^2 \) (0.67 versus 0.64) and a relatively more significant coefficient (\( p < 0.001 \) for \( \log(TA) \) versus \( p < 0.10 \) for \( \log(S) \)) indicate that the earlier findings about using \( TA \) for \( K \) are maintained.

While this analysis suffers from nonresponse bias, the above observations suggest that \( D \) is a significant determinant of audit fees for this sample of small, privately held companies. In addition, the inclusion of the lenders’ demand as an explicit variable did not alter the significance of the relationships posited earlier concerning the hierarchy-induced loss of control. The combined effect of lenders’ demand with loss of control is to increase the expected value of \textit{wealth at risk} and increase the amount that owners are willing to pay for audit assurance.
TABLE 5

Statistics Related to the Sample of Companies Demanding Reviews (Negative Assurance)

Panel A: Descriptive Statistics (n = 31)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Normality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Fees (a)</td>
<td>5.78</td>
<td>6.24</td>
<td>2.41</td>
<td>6.62</td>
<td>W = 0.73</td>
</tr>
<tr>
<td>Log Fees (logF)</td>
<td>8.51</td>
<td>0.78</td>
<td>0.20</td>
<td>-0.03</td>
<td>W = 0.97N</td>
</tr>
<tr>
<td>Total Assets (b)</td>
<td>3.0</td>
<td>2.53</td>
<td>1.75</td>
<td>2.89</td>
<td>W = 0.80</td>
</tr>
<tr>
<td>log Total Assets (log TA)</td>
<td>14.6</td>
<td>0.79</td>
<td>0.79</td>
<td>0.62</td>
<td>W* = 0.98N</td>
</tr>
<tr>
<td>H = Levels of Hier.</td>
<td>3.92</td>
<td>0.86</td>
<td>-0.53</td>
<td>1.44</td>
<td>W = 0.97N</td>
</tr>
<tr>
<td>Sales</td>
<td>15.5</td>
<td>23.54</td>
<td>2.73</td>
<td>7.22</td>
<td>W = 0.59</td>
</tr>
<tr>
<td>Log Sales (log S)</td>
<td>15.86</td>
<td>1.13</td>
<td>0.51</td>
<td>0.016</td>
<td>W = 0.96N</td>
</tr>
</tbody>
</table>

Panel B: Regression Results

\[
\log F = \alpha + \hat{\beta}_2 H + \hat{\lambda}_2 \log K + \epsilon
\]

<table>
<thead>
<tr>
<th>Model</th>
<th>Intercept</th>
<th>\hat{\beta}_2</th>
<th>\hat{\lambda}_2</th>
<th>Adj R^2</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced (H only)</td>
<td>7.44</td>
<td>0.21</td>
<td>-</td>
<td>0.02</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>(9.17)*</td>
<td>(1.33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With H and K = TA</td>
<td>1.37</td>
<td>-0.02</td>
<td>0.50</td>
<td>0.18</td>
<td>4.4*</td>
</tr>
<tr>
<td></td>
<td>(0.56)</td>
<td>(-0.15)</td>
<td>(2.61)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With H and K = S</td>
<td>3.12</td>
<td>0.123</td>
<td>0.30</td>
<td>0.19</td>
<td>4.4*</td>
</tr>
<tr>
<td></td>
<td>(1.71)</td>
<td>(0.81)</td>
<td>(2.60)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: * Statistically significant at p < 0.01

\( W = \) Kolmogorov-Smirnov test for small samples
\( N = \) Not different from normal distribution
\( TA = \) Total Assets
\( S = \) Sales
\( H = \) The number of hierarchical levels

6. Analysis for Negative Assurance

The purpose of this second type of validation is to show the extent to which the loss-of-control phenomenon is applicable to clients demanding negative assurance (NA) in comparison with those demanding audits (PA). It is assumed that NA does not compensate for loss of direct observation and control. As indicated earlier, a sample of 31 companies hiring external CPAs to provide reviews was collected in the first phase of this study and is used here for this purpose.

Some descriptive characteristics in the sample are reported in Panel A of Table 5. These companies are smaller than the audit sample and appear to be more labor intensive. Hiring, on average, 70 employees implies that the number of levels of hierarchy in this sample is, at most, three levels.
For example, assuming a span of control of ten, the number of hierarchical levels would be about two (using Eq. 6 from the Appendix), that is, a flat organization. Hence, owners in this sample are expected to have a smaller loss of direct control than is the case with the audit sample and a corresponding intensity of incentives to demand assurance. Accordingly, the empirical relationships between logL, logTA, and logF observed for the audit sample above are not obtained for negative assurance (reviews).

The results of estimating regressions equivalent to Reg A and Reg B (R6) for the NA (reviews) sample are presented in Panel B of Table 5. As shown, the coefficient of logL is insignificant with and without the inclusion of logTA. In addition, logTA explains only about 19 percent of the variation in logF.

7. Concluding Comments

This paper considers the client’s demand for both positive and negative assurance. It is hypothesized that the voluntary demand for audit (positive) assurance emanates from the needs of owner/managers of privately owned companies to compensate for the loss of control associated with increasing organizational complexity. The nature of individual and cross-sectional demand for assurance is examined, and the hierarchy-induced loss of control concept is summarized. Hierarchical structure and the wealth of the organization were used as determinants of the potential extent of the loss of control. The expected economic value of wealth at risk is the amount owners would be willing to pay for audit assurance to compensate for the hierarchy-induced loss of control. The empirical results are consistent with this operationalization.

The findings reported here are provided as a demand-side explanation for why we observe a particular form of nonlinear relationship between audit fees and size. Although the empirical relationships appear reasonable, there is no firsthand knowledge of the extent to which auditing does indeed reduce the cost of hierarchy-induced loss of control and moral hazard. In particular, improved controls might reduce theft of company assets, but may have no effect on employees’ shirking. This is a fundamental limitation for the use of loss of control as a generic concept for the internal problem of moral hazard. Several other limitations are pertinent. One limitation concerns the inability to obtain information about the quality of internal control systems of the companies participating in this study. Finally, understanding barriers to competition facing audit firms in different locales would have added to the quality of these results.
Appendix

A Model for Estimating Levels of Organizational Hierarchy

This appendix draws on Abdel-khalik (1988) to prove that the log of the number of employees is the average number of levels of hierarchy. Let \( L \) = the number of employees, \( s = \text{span of control} \), \( H = \text{number of hierarchical levels} \), and \( b = \text{the base of the logarithm} \). Assume, for simplicity, though not necessarily for generality, that the company has a symmetric structure in that all branches have the same number of \( H \) levels. Then the number of employees is generated by a process of expansion down the chain of command as follows:

\[
L = 1 + s + s^2 + s^3 \ldots + s^H, \quad \text{(Eq. 1)}
\]

where "1" stands for the chief executive officer. Substituting \( s^0 \) for "1", Eq. 1 is then shown as a finite geometric series having the following sum:

\[
L = \frac{s^{H+1} - 1}{s - 1} = \left(\frac{s^{H+1}}{s-1}\right). \quad \text{(Eq. 2)}
\]

By taking the log of both sides and rearranging, we obtain

\[
\log_b(L) = (H + 1) \log_b(s) - \log_b(s - 1).
\]

Then the number of levels of hierarchy, \( H \), is as follows:

\[
H = \left[\frac{\log_b(L)}{\log_b(s)}\right] + \left[\frac{\log_b(s - 1)}{\log_b(s)}\right] - 1. \quad \text{(Eq. 3)}
\]

For large \( s \),

\[
H \approx \left[\frac{\log_b(L)}{\log_b(s)}\right], \quad \text{(Eq. 4)}
\]

as \( b \) approaches \( s \), in the limit, \( H = \log_b(L) \). However, for a given \( b \) and \( s \), \( [\log_b(s)] \) is a constant (call it \( c \)), and Eq. 4 becomes

\[
H \approx c[\log_b(L)]. \quad \text{(Eq. 5)}
\]

Since \( c \) is a constant for a given \( s \) and \( b \), it shifts the level of \( H \) only in comparison with another combination of \( s \) and \( b \), but it does not change its correlations with other variables. The assumption of a common span of control is for simplification, as it has been used in studies like Simon (1986, pp. S220–S221). In the limit, when \( s = b \), \( c \) became unity and

\[
H \approx \log(L). \quad \text{(Eq. 6)}
\]

When \( b \) deviates from \( s \), the log transformation of \( L \) does not provide an exact, but instead a scaled, measure of the number of hierarchies in the
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organization. Even when s and b are not equal, the measure H is, in general, an indicator of the average number of levels of hierarchy. Average number of hierarchical levels and the longest chain of command would be identical when the organization is fully symmetric (i.e., no division has a longer chain of command than another).

REFERENCES


Belbey, D. A., E. Kuh, and R. E. Welsch, Regression Diagnostics Identifying Influential Date and Sources of Collinearity (New York: Wiley, 1982).


