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The Effect of Auditor Quality on Financing Decisions

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ABSTRACT: We present a model and provide empirical evidence showing that auditor quality affects the financing decisions of companies, and that higher audit quality reduces the impact of market conditions on client financial decisions and capital structure. Consistent with our analytical predictions, we find that companies audited by Big 6 firms are more likely to issue equity as opposed to debt than are those audited by small audit firms. We also find that companies audited by Big 6 auditors are able to make larger equity issues than are those audited by small auditors, but the difference narrows when market conditions improve. Additional results show that the debt ratios of companies decrease less in response to favorable market conditions when auditor quality is high, at least over the medium term.

Keywords: *auditor quality; financial decisions; adverse selection; capital structure.*

Data Availability: *All analyses are based on publicly available data.*

I. INTRODUCTION

The theoretical literature has long recognized that the asymmetry of available information between companies and outside investors can affect companies' financing choices. For example, Myers and Majluf (1984) explain how adverse selection can

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lead companies to refuse to issue equity and forgo profitable projects. A company's financial statements play a critical role in reducing this asymmetry, and their integrity is essential to well-functioning capital markets. In turn, auditors play a key role in assuring the integrity of information. Yet, all auditors may not offer the same level of service. While the services of larger auditors (the Big 6 firms, in particular) are more expensive (as shown, for example, by Ireland and Lennox [2002]), these firms are usually thought to offer a higher level of audit quality.[1] For example, Willenborg (1999) states that it is widely perceived that larger, more prestigious firms have greater incentives not to perform a low-quality audit at a high-quality price. This higher quality should reduce the information asymmetry between informed managers and uninformed suppliers of capital and thus affect a company's financing decisions.

We investigate how differences in auditor quality can affect the timing and the choice of security issuance. We develop a model that is based on the idea that the quality of the auditor can reduce the information asymmetry about future earnings of the company. Our framework is based on time-varying adverse selection. This adverse selection implies that companies audited by a poor-quality auditor will rely more on debt as opposed to equity when compared to companies that are audited by higher quality auditors. Moreover, we show that the average size of equity issuance by companies audited by low-quality auditors will also be smaller than that of companies audited by high-quality auditors. The model also suggests that, irrespective of its auditor's quality, a company relies more on equity issuance when the market is optimistic about the its prospects. This result stems from the fact that the degree of adverse selection is lower in good economic periods. However, because the average degree of adverse selection is higher for companies that are audited by low-quality auditors, the equity issuance decisions of such companies will be more sensitive to market conditions. Specifically, the difference in the size of equity issues between companies audited by high- and low-quality auditors will narrow when the market is optimistic about the prospects of companies.

Our empirical results are consistent with these predictions. First, we find that companies audited by Big 6 firms are more likely to issue equity as opposed to debt than are those audited by non-Big 6 firms. Second, the size of equity offerings is smaller for companies that are not audited by Big 6 firms. While the size of equity offerings increases for all companies when stock returns in the recent past are higher, the effect is stronger for those that do not hire Big 6 auditors. These results are both economically and statistically significant. We explore the consequences of our main findings on the company's capital structure For example, we find that the debt ratios of companies increase less over a five-year window when stock returns improve. However, the effect of stock returns is again stronger for companies that do not hire Big 6 auditors. We also find that companies audited by Big 6 firms have less debt in their capital structures.

One concern is that the auditor quality may be endogenous and company characteristics, company size in particular, may drive observed effect of the auditor size. We perform numerous empirical tests to establish the robustness of our empirical results in relation to these potential problems. First, we address the possibility that company size may drive our results. To do so, we replicate our results in a sample matched on company size and two-digit SIC industry codes. Our results hold. Second, we replicate our Ordinary Least-Squares (OLS) tests using different econometric specifications specifically designed to control for

[1] We follow the convention of calling the main firms the Big 6. The actual number of main firms has varied over time from eight in 1980s to four currently due to several mergers and the dissolution of Arthur Andersen.

the endogeneity in the auditor choice. A traditional approach is to use the Two-Stage Least-Squares (2SLS) procedure. However, our endogenous variable is binary, which precludes the standard approach. Instead, we employ two alternative strategies. In the first strategy, we predict the likelihood of the company to select a Big 6 auditor in the first stage and then we use this predicted value in the second stage. We bootstrap the system 500 times to obtain consistent standard errors. In the second strategy, we follow Wooldridge (2002) and use the predicted value of the auditor quality as an instrument in the instrumental regressions. All results hold. Third, we consider a sample of firms for which auditors have long tenure. Given that the size of the auditor has been established for many years for these firms, the possibility that auditor quality is endogenous with respect to the current financial decisions of the firm is greatly reduced. All our results hold. Fourth, we consider different panel specifications and a sample of firms that switch the size of their auditors. Results from these specifications indicate that the effect of external conditions on issuances or the company's capital structure is mitigated for companies audited by Big 6 auditors. The fact that our results are robust to company fixed effects indicates that they are not driven by time-invariant omitted variables.

While the theoretical literature has suggested that Big 6 auditors serve a valuable function, there is a paucity of empirical evidence on the importance of auditor quality to companies' financing decisions. Our empirical results show that auditor quality is relevant for companies' financing decisions; furthermore, the tests exploit the fact that the extent of adverse selection can vary with the market conditions that a company is facing and therefore the importance of auditor quality is also likely to vary with these market conditions. Our finding that companies with Big 6 auditors rely more on equity financing relative to debt financing and have lower debt ratios compared with companies not audited by a Big 6 firm relate to recent findings that auditor quality affects both the cost of equity in Initial Public Offerings (e.g., Willenborg 1999; Copley and Douhett 2002) and the cost of debt (e.g., Mansi et al. 2004; Pittman and Fortin 2004). Looking at debt-equity choices essentially allows us to consider the cost of equity relative to the cost of debt instead of trying to evaluate the absolute cost of equity. Therefore, showing that auditor quality has a first-order effect on the debt-equity choice extends the prior results outside the IPO setting. Finally, our results are generally stronger for smaller companies. For these companies, auditors are likely to play a key role since there are no additional outside informational intermediaries between managers and investors. This stands in contrast to Chang et al. (2006), who examined the effect of variations in analyst coverage on financial decisions. In their study, most of the variation occurs among companies that are large enough to attract some coverage. In our study, most of the variation occurs among small companies.

Section II describes our hypotheses and methodology. The sample and variables are discussed in Section III. Section IV discusses our empirical results. Section V provides an investigation of the causes and the consequence of these results. Section VI reports different robustness checks. Section VII concludes.

II. HYPOTHESES DEVELOPMENT AND EMPIRICAL SPECIFICATIONS

To motivate our main testable hypotheses, we outline a model based on the idea that current earnings serve as estimates of future earnings and that the quality of the audit of current earnings affects information asymmetry about future earnings. The basic intuition behind the model is that companies sell equity instead of debt when they face low adverse-selection costs. Both good economic prospects and a high-quality auditor can mitigate this adverse selection and facilitate the issuance of equity. The model is similar in spirit to the time-varying adverse-selection model of Choe et al. (1993).

Model Outline

Cash Flows, Projects, and Information Structure

We consider a one-period model with two dates, $t = 0$ and $t = 1$. Earnings are reported at $t = 0$. Let X_0 denote the reported earnings. We assume that there are two possible states of nature at $t = 0$, denoted by *Low* (L) and *High* (H). These states of nature determine true earnings (X) in a non-shock state of the world at $t = 1$. Namely, if there is no shock to the economy at $t = 1$, then the true earnings will be X_L and X_H in the *Low* and *High* states, respectively ($X_L < X_H$). The *ex ante* probability that $X = X_H$ is p, where $0 < p < 1$. The state of nature is privately known to the company's managers at $t = 0$. We assume that reported earnings X_0 can be either X_L or X_H. With exogenous probability δ, the non-shock state of the world prevails at $t = 1$ and earnings are X. With the complementary probability $1 - \delta$, a shock occurs and earnings are 0.[2]

We assume that there are two possible projects at $t = 0$. The projects require an initial investment of $I = I_1$ or $I = I_2$, where $I_1 < I_2$, at $t = 0$. Only one of the projects is available at $t = 0$ to a particular company, and availability is determined randomly with an exogenous probability q. The type of project that is available is public information. The projects have identical earnings. The earnings from the project are realized at $t = 1$. In what follows, the earnings from the project are distinguished from the earnings from *existing assets*, which can be either X or 0 at $t = 1$, as discussed above. We refer to the earnings from existing assets as "other earnings." For the new project, there are also two possible outcomes (shock and non-shock) at $t = 1$. The project earnings are $I + V$ if the non-shock state of the world prevails at $t = 1$ (and the other earnings are X), and 0 if the shock state occurs (the other earnings are then also 0). The net present value (NPV) of the additional project is therefore $\delta(V + I) - I$. The assumption that the NPV, $\delta(V + I) - I$, of the project is decreasing in project scale I captures the notion of diminishing returns to scale.

Earnings Manipulation, Auditor Quality, and Managerial Objectives

True earnings X in the non-shock state of the world need not be the same as reported earnings X_0. Companies can boost the market's perception of actual earnings through accounts manipulation. By assumption, this is only possible if the true earnings are X_L. If the company is successful in such manipulation, then its reported earnings are X_H. A good-quality auditor will always detect any misreporting, so its client's announced earnings are the same as its true earnings. A poor-quality auditor, however, detects manipulation with only a probability of 0.5.[3] Auditor quality is assumed to be public information. We assume that managers act in the interest of existing shareholders in deciding the type of security to issue. The company finances the new investment either through the issuance of debt or

[2] Put differently, there are four possible states of the world at $t = 1$: *High* and *Non-Shock* (*HN*), *Low* and *Non-Shock* (*LN*), *High* and *Shock* (*HS*), and *Low* and *Shock* (*LS*). The manager knows whether the state is *High* or *Low*, but does not know whether it is *Shock* or *Non-Shock*. In addition, $X_{HN} = X_H$, $X_{LN} = X_L$, and $X_{HS} = X_{LS} = 0$.

[3] The assumptions that the good-quality auditor detects manipulation with a probability of 1 and the poor-quality auditor with a probability of 0.5 are without any loss of generality, and are made for simplicity of exposition. All of our results hold when good- (poor-) quality auditors detect misreporting with a probability of m (n), as long as $m > n$, but these extra parameters are not needed.

equity. We assume that the cost of financial distress (if the company issues debt and is in default) is $c > 0$.[4]

Debt-Equity Choices

By assumption, when auditor quality is good, earnings manipulation is not successful, and the reported earnings X_0 at $t = 0$ must equal X. Hence, by construction, there is no adverse selection associated with equity issuance. However, debt issuance is always associated with the expected cost of financial distress of $(1 - \delta)c$. Therefore, managers acting in the interest of existing shareholders will issue equity when auditor quality is good, irrespective of the scale of the project (i.e., whether I_1 or I_2).

Now suppose that auditor quality is poor. If reported earnings at $t = 0$ are $X_0 = X_L$, then this must be the true state of earnings. Consequently, again, there is no adverse selection with respect to equity issuance, and the company will issue equity to finance its projects.

If, however, auditor quality is poor but reported earnings are $X_0 = X_H$, then the market does not know whether the true earnings are X_H, or that the true earnings are X_L but earnings manipulation is successful. The market, therefore, takes into account that a poor-quality auditor detects manipulation with probability of 0.5 and that the *ex ante* probability of true earnings being high is p to form a (Bayesian) estimate of the expected true earnings. Denote by $E(X,p)$ the expected earnings in the non-shock state when auditor quality is poor but the company reports $X_0 = X_H$. It is straightforward to show that:

$$\begin{aligned} E(X, p) &= \text{Prob.}(X = X_H | X_H \text{ is reported})X_H + \text{Prob.}(X = X_L | X_H \text{ is reported})X_L \\ &= \frac{2p}{1 + p} X_H + \frac{1 - p}{1 + p} X_L. \end{aligned} \quad (1)$$

Note that $E(X,p) < X_H$, which implies that equity is underpriced for companies with $X = X_H$. Namely, if the true earnings are $X = X_H$, then the equity will be undervalued if other companies with $X = X_L$ also issue equity when reported earnings are X_H (because of successful manipulation). This is true in any equilibrium because for $X = X_L$, the equity is, at worst, correctly priced and therefore equity issuance dominates debt issuance because of the expected financial distress cost associated with debt financing. In addition, the mispricing cost associated with equity issuance for $X = X_H$ will be higher the larger is the amount of external financing needed, i.e., the larger is the scale of the project. Thus, there exist parameter values for which the smaller scale project I_1 is financed with equity because the mispricing loss is not larger than the financial distress cost associated with debt financing, but the larger scale project I_2 is financed with debt because of the larger mispricing cost. A formal statement of the equilibrium is given below.

Proposition 1: (i) Companies with good-quality auditors will finance both I_1 and I_2 with equity.

[4] If the company uses its internal funds as part of the financing for the project, then it needs to raise less than I. This, however, raises the possibility that the amount raised will reveal the true cash flow. To avoid this possibility, we can assume that either (1) the difference between X_H and X_L mainly comes from accruals, or (2) the actual scale of investment is a random draw from two possible distributions, one with a mean I_1 and the other with a mean I_2. The former assumption requires that no change be made in our analysis except for a redefinition of the funds raised as amounts net of X, whereas the latter requires that very minor changes be made in the analysis.

(ii) For companies with poor-quality auditors and true earnings of $X = X_L$:
   a. those reporting $X_0 = X_H$ because accounting manipulation is successful will issue equity to finance both I_1 and I_2; and
   b. those reporting $X_0 = X_L$ (because accounting manipulation is unsuccessful) will issue equity to finance both I_1 and I_2.

(iii) For companies with poor-quality auditors and true earnings of $X = X_H$, the conditions for issuance can be stated as follows:

Fix $p = p^*$. Suppose that I_1 satisfies[5]

$$(1 - \delta)c > \frac{X_H + I_1 + V}{E(X, p^*) + I_1 + V} I_1 - I_1. \tag{2}$$

We then have the following results:

a. The company issues equity for $I = I_1$. Further, there exists a value $I_2(p^*)$, where $I_2(p^*) > I_1$, such that for $I = I_2 \geq I_2(p^*)$, the company issues debt.
b. Fix I_2 at the value $I_2(p^*)$. Then, there exists $p' > p^*$ such that the company prefers equity to debt issuance for both $I = I_1$ and $I = I_2$.

Part (i) follows from the fact that for companies with good-quality auditors, there is no mispricing of equity. Thus, by issuing equity, the company can avoid the financial distress costs associated with debt. Part (ii) follows because companies with low reported earnings (and poor auditor quality) must have low actual earnings. As equity is correctly priced for such companies, they will not issue debt either. Finally, part (iii) considers issuance decisions when true earnings X (in the non-shock state) are high for a company with poor auditor quality. Appendix A provides a formal proof of part (iii). Reported earnings X_0 are high in this case; however, as the market does not know whether reported earnings are high because true earnings are high or because the poor-quality auditor has failed to detect misreporting, equity will be mispriced. If the issue size is large, then the mispricing cost of equity issuance will exceed the financial distress costs associated with debt. However, if economic conditions are good (i.e., p is high), then mispricing is smaller and firms may issue equity to avoid financial distress costs.

Endogeneity of Auditor Choice

So far, we have not discussed how companies and auditors are matched. We now show why some companies might prefer low-quality auditors while others might prefer high-quality ones. We will assume that high-quality auditors are more expensive than low-quality ones: without any loss of generality, assume that the fee for a high-quality auditor is f while that for a low-quality auditor is 0.

In terms of our model, a high-quality auditor adds value only when the scale of investment is $I = I_2$, when true earnings are $X = X_H$, and when p is not too high (as in part (iii)a of Proposition 1). This is because, under these conditions, the cost associated with equity mispricing is sufficiently high that companies with low-quality auditors have to issue debt and experience the expected financial distress costs, which amount to $(1 - \delta)c$. Thus,

[5] Note that for a sufficiently small I_1, this condition holds.

the benefit of a high-quality auditor is positively related to the probability $1 - q$ of the state $I = I_2$ occurring, and is given by $(1 - q)(1 - \delta)c$. Therefore, it is optimal to choose a high-quality auditor if and only if:

$$(1 - q)(1 - \delta)c > f.$$

Companies with sufficiently low q will therefore choose high-quality auditors, while those with higher q will choose low-quality auditors. Importantly, note that q is not a parameter that enters Proposition 1 and, therefore, does not affect the main results.

Empirical Implications

To interpret our results, it is useful to fix the exogenous probability of $I = I_1$ as q_i, where $0 < q_i < 1$, and $i = G, B$ denotes the auditor quality (*Good* or *Bad*). We assume that $q_B \geq q_G$.[6] The first empirical implication of Proposition 1 is as follows.

Empirical Implication 1: (i) Companies with poor-quality auditors will issue equity (as opposed to debt) less frequently than will those with good-quality auditors.
(ii) The average size of equity issues will be smaller for companies with poor-quality auditors than for those with good-quality auditors.

When I_1 satisfies condition (2) and $I_2 \geq I_2(p^*)$, we have companies with good-quality auditors always issuing equity but companies with poor-quality auditors issuing debt for $I = I_2$ (part (iii)a of Proposition 1) when $X = X_H$. Thus, the probability of equity issuance for companies with poor-quality auditors is $(1 - p) + pq_B < 1$, which corresponds to part (i) of Empirical Implication 1. The average size of equity issues for the companies with poor-quality auditors, conditional on equity issuance, is $(pq_BI_1 + (1 - p)(q_BI_1 + (1 - q_B)I_2))/(pq_B + (1 - p))$; this can be shown to be less than that for companies with good-quality auditors, given by $q_GI_1 + (1 - q_G)I_2$. Thus, the second part of the implication follows.[7]

Our model also has the following implications of the impact of market conditions on financing decisions.

Empirical Implication 2: (i) The probability of debt (as opposed to equity) issuance (for all companies combined) will decrease after good stock market performance.
(ii) The average size of equity issues (for all companies combined) will increase after good stock price performance.
(iii) The gap in the average size of equity issues between companies that have good-quality auditors and those that have poor-quality auditors will narrow after good stock price performance.

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6 As the discussion above on auditor choice suggests, firms with lower q benefit more from the choice of a higher quality auditor.

7 Notice that we can write: $(pq_BI_1 + (1 - p)(q_BI_1 + (1 - q_B)I_2))/(pq_B + (1 - p)) = (q_BI_1 + (1 - p)(1 - q_B)I_2)/(q_B + (1 - p)(1 - q_B))$. Since $q_B \geq q_G$, we have $1 - q_G \geq 1 - q_B > ((1 - p)(1 - (q_B))/(q_B + (1 - p)(1 - q_B))$. Because $I_2 > I_1$, we have $q_GI_1 + (1 - q_G)I_2 > (q_BI_1 + (1 - p)(1 - q_B)I_2)/(q_B + (1 - p)(1 - q_B))$.

To understand how these implications are derived, we can examine the effect of p. Part (iii)b of Proposition 1 shows two things. First, it shows that when times are good (i.e., p is high), companies with poor-quality auditors issue equity more often than when times are bad (with a probability of 1 when times are good compared with a probability $(1 - p) + pq_B$ when times are bad). The underlying intuition is that when market conditions are good, high-type companies are less undervalued because of the reduced information asymmetry. This corresponds to part (i) of Empirical Implication 2 and is consistent with the idea that the probability of debt issuance is negatively related to run-ups in stock prices (which would be associated with increases in p). Second, when p is sufficiently high, the average size of an issuance by companies with poor-quality auditors is larger compared with a situation in which p is not so high. This occurs because the mispricing faced by companies with high earnings but poor auditor quality is less when market conditions are good, which allows these companies to finance bigger projects with equity as well (and avoid potential financial distress costs from issuing debt). The average size of equity issues when p is high by companies with poor-quality auditors is $q_BI_1 + (1 - q_B)I_2$; this exceeds the average size of $\frac{pq_BI_1 + (1 - p)(q_BI_1 + (1 - q_B)I_2)}{pq_B + (1 - p)}$ when p is low. This result corresponds to part (ii) of Empirical Implication 2. Finally, it also follows that the *difference* in the average size of equity issuance between companies with good-quality auditors and those with poor-quality auditors will be less during good times compared with bad times, consistent with the third part of the implication.[8]

Relation to Prior Studies

The basic intuition behind our model is similar to that behind the model of Choe et al. (1993); that is, during good times, adverse-selection costs will be lower. This occurs because the cash flows from a company's assets in place have a publicly observable component that is related to general economic conditions and to a component that is private information to the company's insiders, as noted in Myers and Majluf (1984). This publicly available component is relatively more important during good times, thereby reducing the adverse-selection costs of equity issuance. A similar effect is present in our context: if the probability of the *High* state is higher during good times, then the *High*-type company with $X = X_H$ is less underpriced even when the market is unable to distinguish company types and equity issuance is less costly. However, our model also differs from that of Choe et al. (1993). Whereas their study derives implications for the aggregate volume of equity issues and the market reaction to equity issuance announcements as a function of economic conditions, we derive implications for the size of equity issuance (in addition to the probability of equity issuance) as a function of market conditions. These implications are new to the literature. Moreover, we show how auditor quality interacts with market conditions to affect the probability and size of equity issues across companies.

We articulate the main arguments in terms of a model of time-varying adverse selection. In this approach, investors are fully rational and there is no price bubble. There are also numerous models based on irrational investor exuberance in which companies have incentives to take advantage of temporary mispricing of equity. For example, a well-known body of work links the long-term underperformance of companies engaged in seasoned equity

[8] To see this, notice that companies with good-quality auditors issue equity in both states at all times and hence the average size of equity issuance is $q_GI_1 + (1 - q_G)I_2$ irrespective of p.

issues or initial public offerings to earnings manipulation.[9] If better-quality auditors limit the potential for companies to manipulate earnings, then there is greater potential for favorable misvaluation for companies with poor-quality auditors when stock prices are high. If this is true, then these companies may engage in equity financing more actively when prices are high. However, our tests are not designed to distinguish between such models and those based on time-varying adverse selection.

Testable Hypotheses

The empirical implications of our model generate several testable hypotheses. We discuss these here and outline our estimation methodology.

Audit Quality and the Debt-Equity Choice

Empirical Implication 1 leads to our first hypothesis, as follows.

Testable Hypothesis 1: Companies with Big 6 auditors are more likely to issue equity as opposed to debt than are companies with non-Big 6 auditors.

To test H1, we estimate the following probit model, which is similar in spirit to that of Hovakimian et al. (2001):

$$P[Dissue_{i,t} = 1] = F(a_0 + a_1 BigSix_{i,t-1} + a_2 DevTgt_{i,t-1} + \gamma C_{i,t-1}) \tag{3}$$

where P stands for the probability of debt being issued, F denotes the normal cumulative distribution function, and $Dissue_{i,t}$ takes a value of 1 if the net debt issued by company i in fiscal year t constitutes more than 5 percent of its total assets, and 0 if the net equity issued exceeds 5 percent of its total assets. Only issue years in which the company issues net debt or equity exceeding 5 percent of its book value of assets are considered; years in which both are issued or neither is above the 5 percent cutoff are not included in the model. *BigSix* is an indicator variable that takes a value of 1 if the company is audited by a Big 6 firm, and 0 otherwise.[10] The coefficient on *BigSix*, a_1, is expected to be negative. C denotes a set of predetermined (one-period lagged) control variables that have been shown in the prior literature to influence a company's debt-equity choice (e.g., Frank and Goyal 2003). The interpretations of the control variables are presented in Section III, and the definitions of these variables are provided in Appendix B. In addition, we control for the deviation from the target leverage ratio (*DevTgt*) in the estimation because trade-off theory suggests that the change in the debt ratio will also be related to whether the company is above or below the target. The deviation from the target leverage ratio is measured as the difference between the leverage ratio (lagged one year) and the target debt ratio. We report the target leverage ratio estimation in Appendix C, where we regress the leverage ratio on the control variables, C. The target leverage ratio is the predicted value from this cross-sectional leverage regression.

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[9] See Teoh et al. (1998a, 1998b) for evidence of aggressive earnings management prior to equity issuance and subsequent return underperformance, and Jain and Kini (1994) and Loughran and Ritter (1997) for evidence that earnings deteriorate after equity issuance.

[10] *BigSix* takes a value of 1 if the audit code (Compustat item 149) is between 1 and 8, and 0 otherwise.

Audit Quality and the Size of Equity Issuance

The first and second empirical implications lead to the following testable hypothesis concerning the size of equity issues:

Testable Hypothesis 2: (i) The size of equity issues will be larger for companies with Big 6 auditors;
(ii) the size of equity issues will be larger following good recent stock price performance; and
(iii) the gap in the average equity issue size between companies with and those without Big 6 auditors will be smaller subsequent to good recent stock price performance.

To test H2, we regress the size of equity issue on past stock returns (*PRTN*), controlling for different company characteristics. We expect *BigSix* to be associated with larger issuances. Consistent with the prior literature, we also expect that past returns will have a positive effect on issuance size. We then introduce an interaction between past returns and the Big 6 dummy. We expect that the interaction will have a negative effect (i.e., the effect will not be as strong for companies audited by Big 6 firms). Specifically, we estimate the following model for companies issuing equity:

$$\begin{aligned} Esize_{i,t} = {} & b_0 + b_1 PRTN_{i,t-1} + b_2 BigSix_{i,t-1} + b_3 PRTN_{i,t-1} \times BigSix_{i,t-1} \\ & + b_4 DevTgt_{i,t-1} + \gamma C_{i,t-1} + \varepsilon_{i,t} \end{aligned} \tag{4}$$

where $Esize_{i,t}$ denotes the size of the net equity issue of company i in fiscal year t, scaled by the book value of assets at the beginning of the fiscal year; *PRTN* denotes the cumulative monthly stock return for the fiscal year; and C is the set of control variables used in Equation (1), which are expected to influence the size of the equity issuance as well. The deviation of the actual debt ratio from an estimated target (*DevTgt*) is included to capture a company's motive to choose the size of its equity issuance to adjust the leverage ratio toward its target. We expect coefficients b_1 and b_2 to be positive and, more importantly, coefficient b_3 to be negative.

As the company's decision to issue equity is an endogenous choice, and Equation (4) is estimated only over the company-years in which an equity issuance decision is observed, the OLS estimates could be biased. To address this selection issue, we re-estimate Equation (4) as part of a Heckman selection model. We posit that companies will issue equity if:

$$\rho Z_{i,t-1} + u_{i,t} > 0 \tag{5}$$

where Z is a vector of predetermined company-specific variables, and u is a standard normally distributed error term. We allow for the possibility that u and ε in Equation (4) are correlated; if the correlation coefficient is nonzero, then standard regression techniques applied to Equation (4) will result in biased estimates. Heckman's maximum likelihood estimation provides consistent, asymptotically efficient parameter estimates. The vector Z includes variables that are likely to affect the company's requirement for external funds, as well as those that affect the choice of equity *vis-à-vis* debt financing. These variables include proxies for the company's investment needs (in the current period and in the next year), proxies for internally available funds, variables that are relevant for the determination of the company's cash-holding targets, and variables that are relevant for the determination of its debt capacity. Appendix B gives a complete list of all of the variables that vector Z includes.

III. DATA, VARIABLES, AND SUMMARY STATISTICS

Data

Our main sample consists of companies listed in the Compustat Industrial Annual files at any point between 1985 and 2005. We start our sample in 1985 because we control for the marginal tax rate, analyst coverage, and debt rating in all multivariate analysis, and 1985 is the first year that all of these variables are commonly available. As a robustness check, we extend our sampling period to 1974 (when data on auditor size became available) and exclude the control variables for which we cannot obtain data. Our results (untabulated) are qualitatively similar. The data on stock prices and returns are retrieved from the Center for Research in Security Prices (CRSP) files. Following the practice of earlier studies, we exclude financial, insurance, and real estate companies (i.e., SIC codes 6000–6900) because their capital structures are likely to be significantly different from the industrial companies in our sample. We also exclude regulated utilities (SIC codes 4900–4999) because their financial policies are governed by regulatory requirements. To ensure that our results are not driven by extremely small companies, we also exclude observations if the company's assets are less than $10 million. Companies with missing book values of assets or those that have fewer than five consecutive years of data are not included because several key variables of interest are measured over a five-year period. We define equity and debt issues using cash flow statement data (see Appendix B).[11] All variables have been winsorized at the top and bottom 0.5 percent of their distributions. Dollar values are adjusted to the 2000 dollar value using a GDP deflator.

Control Variables

As mentioned in Section II, we control for a set of variables that have been shown in the prior literature to influence a company's capital structure.

We include the log of the book value of assets as a proxy for company size. We also control for company maturity by including the log of the company's age plus 1. We expect that the incentive to take on debt increases with the company's marginal tax rate because of the tax deductibility of interest expenses. Thus, we include the simulated corporate marginal tax rate based on the operating income after interest expenses (Graham 1996). We also control for liquidity by including share turnover. Finally, companies having more tangible assets are expected to support more debt as these assets can be pledged as collateral. The net PPE-to-asset ratio measures the tangibility of the firm's assets. Research and development (*R&D*) expenses scaled by sales can proxy for a variety of company characteristics, such as the uniqueness of the product (Titman 1984), information asymmetry, or growth potential. We also include an *R&D* indicator variable that equals 1 if *R&D* expenses are missing, and 0 otherwise. To control for the risk and financial constraints faced by companies, we include Altman's (1968) unleveraged Z-score, stock return volatility, and earnings volatility.

Chang et al. (2006) find that companies with greater analyst coverage have lower leverage and weaker incentives to take advantage of favorable conditions in the equity

[11] Our definition of debt issues does not include the increase in accounts payable, the increase in income taxes payable, and the increase in other current liabilities. As a robustness check, we follow Baker and Wurgler (2002) and define equity and debt issues using balance sheet data where debt issues are defined as the change in total liability plus the change in preferred stock minus the change in deferred taxes and the change in convertible bonds. Our main results remain the same under this alternative definition.

market. Thus, for each year, we set the number of analysts following a company as the maximum number of analysts who make annual earnings forecasts in any month over a 12-month period. Faulkender and Petersen (2006) document that companies that have access to public bond markets, as measured by having a debt rating, take on more debt. To capture a company's access to bond markets, we include a debt-rating indicator variable that equals 1 if a company has a debt rating assigned by Standard & Poor's, and 0 otherwise.

Various capital structure theories suggest that leverage is related to profitability. For example, it could be argued that profitability is a proxy for debt capacity, and there should therefore be a positive association between profitability and leverage. We use return on assets (ROA) as a proxy for profitability. We expect that companies will be more likely to issue equity when their stock performance has been good. This is consistent with both the equity market timing and adverse-selection arguments, as companies are less likely to be undervalued during such periods. To measure a company's past stock performance, we use, in alternative specifications, two cumulative stock returns, which are obtained by compounding monthly stock returns from year $t-2$ to $t-1$ and from year $t-5$ to t, respectively. We employ the market-to-book ratio as a control for growth opportunities. Most studies document a negative relation between the market-to-book ratio and leverage ratio, possibly because growth companies have greater incentives to avoid debt overhang problems. We control for the corporate payout policy because it may be related to capital structure decisions. If current profits are positively correlated with future profits, then companies expecting higher future profits may pay more dividends and have lower debt ratios by retiring debt. However, to the extent that higher future profits reflect higher debt capacities, companies that pay more dividends may choose higher debt ratios.

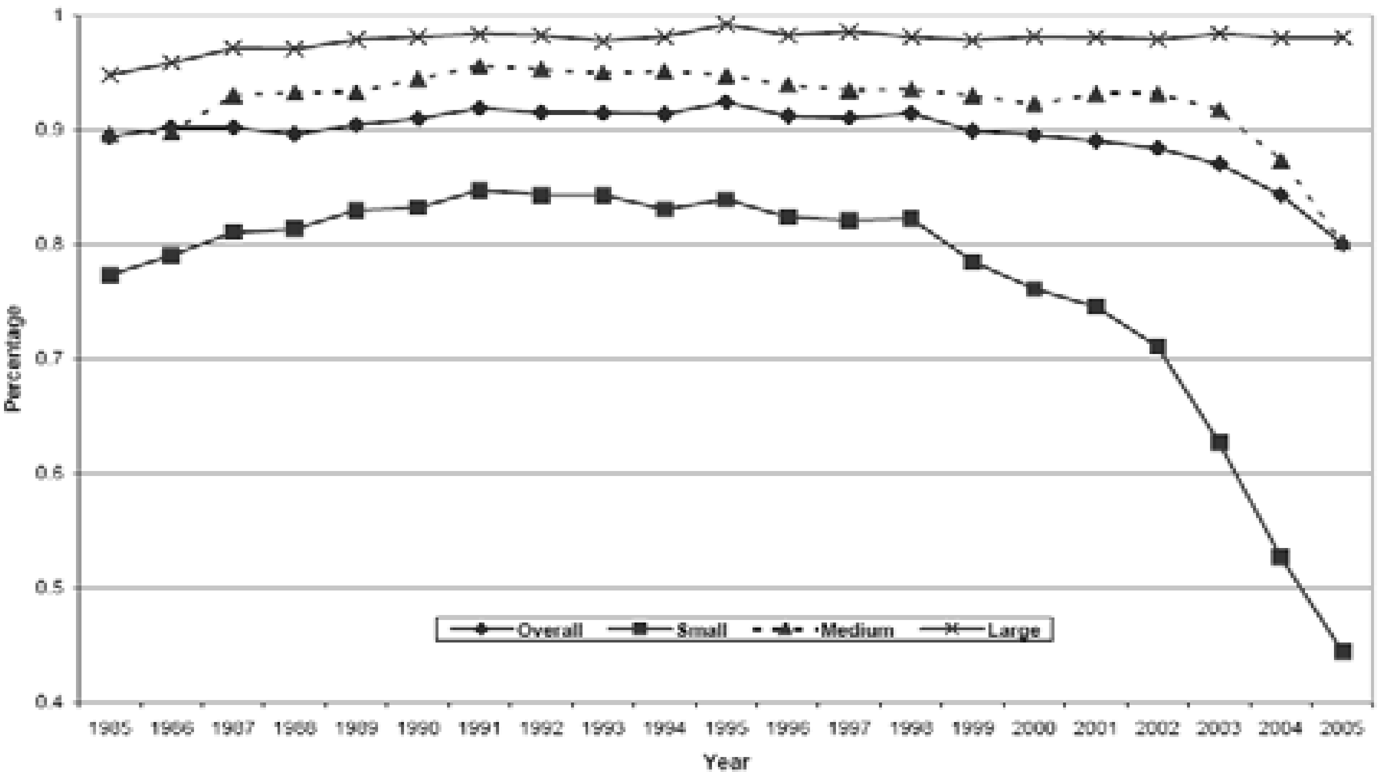
Summary Statistics

Figure 1 reports the evolution of the percentage of companies audited by Big 6 firms. We split the sample evenly into three groups according to the book value of assets at the beginning of the fiscal year. Group 1 consists of the smallest companies and group 3 includes the largest ones.

Table 1 shows that, in the overall sample, 89.7 percent of the companies are audited by Big 6 auditors. Noticeably, large companies are more likely to be audited by Big 6 firms; the percentage of companies audited by Big 6 firms increases across the three subgroups based on size (from 78.6 percent for small companies to 97.9 percent for large ones). Overall, the market share of the Big 6 varies over time, ranging from a low of 80.1 percent of companies in 2005 to a high of 92.4 percent in 1995. Interestingly, we observe a decline in recent years in the percentage of small and medium companies audited by Big 6 firms.

Table 1 reports the descriptive statistics for the overall sample, two groups of companies sorted on the basis of auditor quality, and three groups sorted on the basis of company size. When we compare companies audited by Big 6 firms with those audited by smaller firms, we observe that companies audited by Big 6 firms are larger, more profitable, and less leveraged. They also have more tangible assets and a greater likelihood of having analyst coverage and credit ratings. However, differences in analyst coverage and bond ratings are also driven to a large extent by differences in company size. For the group of small companies, the median number of analysts (not tabulated) is 0 compared with 10 for the group of large companies, and only 0.6 percent of small companies have their debt rated by Standard & Poor's. In these companies, auditors are likely to play a key role as there are no additional outside informational intermediaries between managers and investors. This finding contrasts with that of Chang et al. (2006), who investigated the effect of variation

FIGURE 1
Percentage of Companies Audited by Big 6 Firms



The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. Financial, insurance, and real estate companies, regulated utilities, and companies with assets less than $10 million are excluded. Also excluded are companies with missing book values of assets. The overall sample is evenly partitioned into three groups based on the book value of assets at the beginning of the fiscal year. The figure reports the time trend of the percentage of firms audited by Big 6 auditors. Firms are defined as audited by Big 6 firms if their Compustat auditor code (Compustat data item 149) is between 1 and 8.

TABLE 1
Summary Statistics

Panel A: Mean Values Of Firm-Specific Variables

	Overall Sample	Audit Quality Grouping: Big 6	Audit Quality Grouping: Non-Big 6	Audit Quality Grouping: t-statistic	Company Size Grouping: Small	Company Size Grouping: Medium	Company Size Grouping: Large
Age	21.8	22.2	18.4	18.7***	16.5	20.2	28.8
Book Value of Assets	2,425	2,650	444	14.4***	46.5	292	6,938
Tangibility	0.31	0.32	0.28	12.8***	0.26	0.31	0.38
Leverage ratio (*Lev*)	0.19	0.19	0.21	−5.7***	0.18	0.20	0.20
Return on Assets	9.6%	10.4%	3.0%	−8.4***	2.2%	12.2%	14.4%
Market-to-Book Ratio	1.77	1.79	1.62	4.7***	1.84	1.68	1.79

Panel B: Summary Statistics of Debt/Equity Issues

	Overall Sample	Audit Quality Grouping: Big 6	Audit Quality Grouping: Non-Big 6	Audit Quality Grouping: t-statistic	Company Size Grouping: Small	Company Size Grouping: Medium	Company Size Grouping: Large
Percentage of companies issuing debt	23.3%	23.3%	23.4%	−0.4	20.2%	23.3%	26.4%
Percentage of companies issuing equity	7.4%	7.1%	8.5%	3.1***	10.6%	7.5%	4.2%
Average size of debt issues	0.19	0.18	0.21	−4.8***	0.20	0.20	0.16
Average size of equity issues	0.31	0.30	0.32	−1.1	0.37	0.30	0.14
Percentage of companies having rated debt	29.1%	31.8%	5.0%	36.3***	0.6%	15.4%	71.3%
Percentage of companies covered by analysts	60.4%	63.5%	33.5%	37.8***	37.3%	70.1%	74.0%
Percentage of companies audited by Big 6 firms	89.7%	100%	0%		78.6%	92.7%	97.9%
Number of company-years	39,837	35,757	4,080		13,279	13,279	13,279

(*continued on next page*)

TABLE 1 (continued)

The two-tailed significance levels of the t-statistics are marked with *, **, and *** for differences significant at the 10 percent, 5 percent, and 1 percent levels, respectively. Dollar figures are in millions.

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The overall sample is evenly partitioned into three groups based on the book value of assets at the beginning of the fiscal year.

Net equity and debt issued are computed using Compustat's cash flow statement data. Equity issues equal the sale of common and preferred stock minus the purchase of common and preferred stock. Debt issues equal long-term debt issuance minus long-term debt reduction plus changes in current debt. Companies are defined as issuing debt (equity) when the net debt (equity) issued divided by total assets exceeds 5 percent. Cases where companies issue both debt and equity in a given fiscal year are not counted. The size of debt and equity issues is scaled by total assets at the beginning of the fiscal year. A firm has rated debt if either senior or subordinated debt is rated by Standard & Poor's. A firm is covered by analysts if the number of analysts is greater than zero. The number of analysts is the maximum number of analysts making annual earnings forecasts any month over a 12-month period.

The t-statistic tests the difference in the mean (average) levels of the variables between companies audited by Big 6 and those audited by non-Big 6 firms.

Variable Definitions:

Age = number of years since the firm entered Compustat;
Book Value of Assets = Compustat item #6;
Tangibility = net PPE-to-asset ratio;
Leverage Ratio (*Lev*) = total debt divided by the sum of total debt and the product of the number of the shares outstanding and the closing stock price at the end of the fiscal year;
Market-to-Book Ratio = (market value of equity + book value of debt)/book value of assets; and
Return on Assets = income before depreciation and amortization divided by the book value of assets.

in analyst coverage on financial decisions. In their setting, most of the variation occurs among companies that are large enough to attract some coverage. In our setting, most of the variation occurs among small companies. Table 1 also shows that companies audited by Big 6 firms have less debt in their capital structure than do those audited by small auditors.

Table 2 reports a correlation table. Univariate correlations also indicate that companies audited by Big 6 auditors tend to have less debt in their capital structure. In addition, Table 2 indicates significant positive relations among company size, being audited by a Big 6 firm, analyst coverage, and debt rating. Other correlations are generally low, which suggests that multicollinearity is not a major problem in our setting.[12]

Determinants of Auditor Quality

Table 3 reports the results of a probit regression in which the dependent variable is *BigSix*. This analysis provides the basis for our control for the possible endogeneity of auditor quality discussed in Section IV. In selecting control variables, we start by introducing different company characteristics proposed by previous studies: size, age, stock price, asset turnover, asset growth (Willenborg 1999), the Herfindahl index, current ratio (Weber and Willenborg 2003), and whether the company discloses any R&D. We also control for ROA (Chaney et al. 2004). We include several measures for risk: a dummy variable for companies working in industrial sectors in which litigation risk is high (Hogan 1997), return and earnings volatility, the industry's median debt ratio, and bankruptcy risk (Z-score). We also control for different measures of the complexity of the auditing assignment: the number of segments, R&D intensity, and asset tangibility. The results indicate that larger companies with higher asset turnover, higher stock price, higher ROA, lower litigation risk, lower earnings volatility, lower growth, and higher tangibility are more likely to be audited by Big 6 firms. Note, however, that our main objective here is not to identify a demand or supply function for auditor quality, but rather to identify mere correlates with auditor quality to obtain a basis for our procedures that control for the endogeneity discussed in Section IV.

IV. MAIN EMPIRICAL TESTS AND RESULTS

Here, we present the empirical results for our two main hypotheses.

Auditor Quality and Debt-Equity Choice

Our first hypothesis predicts that companies with Big 6 auditors are more likely to issue equity as opposed to debt than are those with non-Big 6 auditors. To test this hypothesis, we examine whether auditor size affect the debt-equity choices of companies in a given year. Following Hovakimian et al. (2001), we estimate a regression Equation (3) using three empirical approaches. We start with a simple maximum likelihood approach. We allow for clustering of observations of a company to adjust the standard errors for serial correlation and correct the standard errors for heteroscedasticity. However, these approaches may lead to biased coefficients endogeneity in the selection of the auditor. We cannot address this problem using the traditional 2SLS procedure because the dependent variable in the second stage is a binary variable. Instead, we use two additional approaches as follows.

[12] We calculate the variance inflation factors for our OLS regressions in 5 and 6. The average VIF is below 2 and no individual factor is greater than 10, a conventional level for significant multicollinearity.

TABLE 2
Correlation Coefficients among Key Variables

	BigSix	*Lev*	*Log (Assets)*	*Tangibility*	*Return on Assets*	*Past Stock Return*	*Market-to-Book*	*Z-Score*	*Marginal Tax Rate*	*Analyst Following*
Leverage Ratio (Lev)	−0.03***									
Log (Assets)	0.27***	0.04***								
Tangibility	0.06***	0.25***	0.23***							
Return on Assets	0.04***	−0.02***	0.11***	0.04***						
Past Stock Return	−0.00	−0.16***	0.00	−0.02***	0.05***					
Market-to-Book Ratio	0.02***	−0.24***	−0.02***	−0.10***	−0.03***	0.19***				
Unleveraged Z-Score	0.03***	−0.03***	0.10***	−0.01**	0.63***	0.04***	−0.57***			
Marginal Tax Rate	0.09***	−0.02***	0.35***	0.10***	0.19***	0.06***	−0.08***	0.19***		
Analyst Following	0.16***	−0.14***	0.58***	0.12***	0.07***	0.00	0.11***	0.04***	0.21***	
Debt Rating	0.18***	0.18***	0.66***	0.20***	0.05***	−0.01**	−0.02***	0.02***	0.18***	0.43***

Correlation coefficients that are significant at the 1 percent, 5 percent, and 10 percent level are marked with ***, **, and *, respectively.
The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The pairwise Pearson correlation coefficients among variables are reported.

Variable Definitions:
BigSix = 1 if a company chose a Big 6 Auditor, and 0 otherwise;
Leverage Ratio (Lev) = total debt divided by the sum of total debt and the product of the number of the shares outstanding and the closing stock price at the end of the fiscal year;
Log (Assets) = log value of the total book value of assets;
Tangibility = net PPE-to-asset ratio;
Past Stock Return = compounded annual stock return over a 12-month period;
Return on Assets = income before depreciation and amortization divided by the book value of assets;
Market-to-Book Ratio = (market value of equity + book value of debt)/book value of assets;
Unleveraged Z-score = (3.3 × pretax income + sales + 1.4 × retained earnings + 1.2 × [current assets – current liabilities]/book value of assets);
Marginal Tax Rate = simulated marginal tax rate after interest expenses obtained from John Graham's website;
Analyst Following = maximum number of analysts making annual earnings forecasts any month over a 12-month period; and
Debt Rating = dummy equal to 1 if either senior or subordinated debt is rated by Standard & Poor's, and 0 otherwise.

TABLE 3
Determinants of Auditor Quality (Probit Model)

Auditor Quality (*BigSix*)	**Coef.**	**z-stat.**
Log (Assets)	0.339***	(14.4)
Log (Age)	−0.125**	(−2.5)
Log (Stock Price)	0.116***	(3.8)
Asset Turnover	0.092**	(2.4)
Return on Assets	0.270*	(1.7)
Industry Median Leverage Ratio	−0.302	(−1.4)
Unleveraged Z-Score	−0.035**	(−2.2)
Stock Return Volatility	0.729	(1.0)
Earning Volatility	−0.001***	(−4.9)
Litigation Risk Dummy	−0.221*	(−1.9)
Herfindahl Index	−0.106	(−0.7)
Market-to-Book Ratio	0.024*	(1.8)
Asset Growth	−0.188***	(−5.0)
Number of Industrial Segments	−0.037***	(−2.7)
R&D-to-Sales Ratio	0.132***	(3.4)
R&D Dummy	−0.106**	(−2.1)
Tangibility	0.435***	(2.6)
Current Ratio	0.298**	(2.0)
Pseudo-R^2/Firm-years	0.15/39,837	

Coefficients that are significant at the 10 percent, 5 percent, and 1 percent level are marked with *, **, and ***, respectively.

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The dependent variable is the Big 6 dummy (*BigSix*), which equals 1 if a firm chose a Big 6 Auditor, and 0 otherwise.

All explanatory variables are measured one year before a firm's auditor quality is observed. Constant terms and year dummies are included in the regressions but not reported. The z-statistics in parentheses are calculated from the Huber/White/sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm.

Variable Definitions:

Age = number of years since a firm entered the data set;
Industry Median Leverage Ratio = computed by the three-digit SIC code and by year;
Asset Growth = change in the log of total assets;
Litigation Risk Dummy = 1 if the firm is in a high litigation risk industry, and 0 otherwise;
Herfindahl Index = computed by summing the squared market shares within each three-digit SIC industry;
Market-to-Book Ratio = (market value of equity + book value of debt)/book value of assets;
Stock Price = median monthly closing prices over a 12-month period;
Number of Industrial Segments = number of business segments obtained from Compustat segment data;
R&D to Sales ratio = R&D expenses divided by net sales;
R&D Dummy = 1 if R&D expenses are missing;
Return on Assets = income before depreciation and amortization divided by total assets;
Tangibility = net PPE-to-asset ratio;
Asset Turnover = sales divided by total assets;
Current Ratio = current assets divided by total assets;
Stock Return Volatility = standard deviation of daily stock returns calculated for each firm each year; and
Earning Volatility = standard deviation of the EBIT-to-asset ratios over a firm's entire life in Compustat.

First, we predict the likelihood of the company selecting a Big 6 auditor in the first stage using the specification in Table 3, and use this predicted value in the second stage. To further mitigate the effect of endogeneity, auditor choice is lagged one period and is first predicted based on company-specific variables that are lagged two periods. We bootstrap the system 500 times to obtain the 95 percent confidence intervals. In addition, we follow a technique suggested in the prior econometric literature (for example, Wooldridge 2002), which involves using the predicted value of auditor quality as an instrument in the instrumental regressions. This approach has three steps. In the first step, we predict auditor quality as in Table 3. In steps 2 and 3, we use a standard instrumental approach, with the predicted value obtained from step 1 as an instrument. In our subsequent analysis we interact *BigSix* with past stock returns, we follow Wooldridge (2002) and used the demeaned value of past returns.[13] Wooldridge (2002) indicates that, under fairly general conditions, this procedure provides efficient estimations. In addition, we are using the fitted probability of auditor quality as an instrument, the effect of misspecification in auditor quality model is mitigated. We also correct the standard errors for heteroscedasticity and serial correlation.

The results in Table 4 from the three estimation procedures are very similar. They all indicate that *BigSix* is significantly associated with a lower likelihood of issuing debt as opposed to equity. The z-statistic equals −2.5 in Column I and −4.7 in Column III of Table 4. The bootstrapped 95 percent confidence interval, reported in Column II, indicates that the coefficient of auditor quality is significantly different from zero.[14] The economic magnitude is such that the likelihood of issuing equity the average company in the sample would be 3.5 percent higher if it were audited by a Big 6 rather than a small auditing firm.[15] By comparison, increasing the company's size by one standard deviation changes the probability of issuing equity by 2.6 percent. By assuming that a company chooses to issue debt (equity) if the estimated probability is greater (lower) than 50 percent, our model correctly predicts the debt-equity choice 80 percent of the time. The control variables generally have signs consistent with prior literature (e.g., Titman and Wessels 1988; Frank and Goyal 2003). For example, companies that are more mature, more profitable, less risky or have a higher marginal tax rate are more likely to issue debt. It is important to note that the auditor effect exists above and beyond the effect of other financial intermediaries such financial analysts or debt-rating agencies.

Auditor Quality, Size of Issuance, and Market Conditions

Our second hypothesis is that all companies will issue more equity when market conditions are good and those audited by non-Big 6 auditors are more likely to take advantage of favorable market conditions. Put differently, the impact of auditor quality on the size of equity issuance will be smaller when market conditions improve. To test this hypothesis, we estimate Equation (4). Specifically, we regress the size of equity issues scaled by the book value of assets on the control variables and the compounded monthly stock returns over the previous fiscal year, as well as the latter's interaction with the Big 6 dummy.

Table 5 presents the results obtained from the estimation of Equation (4). We first estimate this model in Column I of Table 5 using the standard OLS approach and correcting the standard errors for heteroscedasticity and serial correlation. However, endogeneity is

[13] See Wooldridge (2002, Section 18.5.2).

[14] Untabulated results show that our results hold when we use a bivariate probit procedure specification to simultaneously model the debt-equity choice and the decision to choose a Big 6 auditor.

[15] To estimate this difference, we set the value of all control variables to their means in the sample. We estimate the likelihood of the company issuing equity, assuming that *BigSix* equals 0. We then estimate the same probability if *BigSix* equals 1. The difference of the two probabilities is equal to 3.5 percent.

TABLE 4
Debt-Equity Choices and Audit Size (Probit Model)

	(I) Probit		(II) Two-Stage Bootstrap		(III) Two-Stage Wooldridge	
Dissue	**Coef.**	**z-stat.**	**Coef.**	**95% Interval**	**Coef.**	**z-stat.**
BigSix	−0.127**	(−2.5)	−0.164	[−0.305, −0.023]	−1.318***	(−4.7)
Size of Total Financing	0.173***	(4.1)	0.181	[0.084, 0.277]	0.191***	(4.9)
Deviation from Target	0.371***	(3.1)	0.407	[0.166, 0.648]	0.279***	(2.6)
Log (Assets)	0.089***	(5.8)	0.117	[0.020, 0.214]	0.147***	(7.4)
Log (Age)	0.170***	(5.2)	0.165	[0.090, 0.240]	0.141***	(4.6)
Tangibility	0.057	(0.7)	0.380	[0.198, 0.561]	0.094	(1.3)
Return on Assets	0.668***	(3.9)	0.482	[0.157, 0.807]	0.688***	(4.7)
Share Turnover	−101.4***	(−5.4)	−96.7	[−131.9, −61.4]	−107.4***	(−7.9)
Past Stock Return	−0.214***	(−10.5)	−0.164	[−0.205, −0.123]	−0.221***	(−11.6)
Market-to-Book Ratio	−0.087***	(−4.9)	−0.082	[−0.118, −0.044]	−0.078***	(−7.6)
R&D-to-Sales Ratio	−0.112***	(−3.3)	−0.103	[−0.185, −0.022]	−0.067**	(−2.3)
R&D Dummy	0.099***	(2.9)	0.057	[−0.025, 0.140]	0.058*	(1.7)
Unleveraged Z-Score	0.064***	(4.6)	0.075	[0.045, 0.104]	0.070***	(6.7)
Dividend-to-Assets Ratio	6.466**	(2.5)	6.722	[0.636, 12.80]	6.453***	(6.1)
Stock Return Volatility	0.798	(1.0)	1.069	[−0.678, 2.82]	−0.181	(−0.2)
Earning Volatility	−0.000	(−0.1)	−0.001	[−0.002, 0.001]	−0.002*	(−1.7)
Marginal Tax Rate	0.695***	(4.2)	0.751	[0.408, 1.095]	0.658***	(4.4)
Analyst Following	−0.012***	(−4.6)	−0.012	[−0.018, −0.007]	−0.012***	(−4.5)
Debt Rating	0.094**	(2.0)	0.086	[−0.007, 0.179]	0.109**	(2.5)
Pseudo-R^2/Firm-years	0.20/12,232		0.20/500 replications		0.16/12,232	

Coefficients that are significant at the 10 percent, 5 percent, and 1 percent level are marked with *, **, and ***, respectively.

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The dependent variable, *Dissue*, equals 1 if debt is issued, and 0 if equity is issued. Companies are defined as issuing debt (equity) when the net debt (equity) issued divided by total assets exceeds 5 percent. Cases where companies issue both debt and equity in a given fiscal year are omitted. The explanatory variables are predetermined and defined in Appendix B. Constant terms are also included in the regressions but not reported. The z-statistics in parentheses are calculated from the Huber/White/sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm. Column II reports the regression using a two-stage procedure. In the first stage, the likelihood of the firm selecting a Big 6 auditor is predicted based on firm-specific variables using the probit model in Table 3. In the second stage, debt-equity choice is regressed on the predicted auditor quality and other control variables. The 95 percent confidence intervals in brackets are calculated from 500 bootstrap replications of the two-step estimation based on resampling from the data set with replacement of clusters. The average pseudo-R^2 of 500 replications is reported. Column III reports the results from an instrumental variable approach, which is described in Wooldridge (2002).

again a source of concern for two reasons. The first is the auditor choice, which may not be random as we have already noted. The second is that we limit our sample in this test to companies that issue equity and this issuance is also endogenous. To address the first type of endogeneity, we employ the same two approaches as those used in Table 4. The results are presented in Columns II and III of Table 5. To address the second type, we estimate a Heckman (1979) selection model in which the issuance decision is endogenized in the first step. Variables included in the first stage are those that are likely to affect the

TABLE 5
Size of Equity Issue, Price Run-Ups, and Auditor Quality

	(I) OLS		(II) Two-Stage Bootstrap (Auditor Quality Endogenized)		(III) Two-Stage Wooldridge		(IV) Heckman (Equity Issuance Decision Endogenized)	
Size of Equity Issue (*Esize*)	**Coef.**	**t-stat.**	**Coef.**	**95% interval**	**Coef.**	**t-stat.**	**Coef.**	**z-stat.**
Past Stock Return (*PRTN*)	0.056***	(4.3)	0.074	[0.065, 0.083]	0.142***	(3.6)	0.024***	(2.6)
BigSix	0.084***	(4.0)	0.124	[0.096, 0.154]	0.501***	(3.7)	0.041**	(2.1)
BigSix × *PRTN*	−0.029**	(−2.3)	−0.038	[−0.043, −0.032]	−0.139***	(−3.7)	−0.017**	(−2.2)
Log (*Assets*)	−0.072***	(−12.0)	−0.099	[−0.110, −0.089]	−0.084***	(−9.4)	−0.028***	(−5.4)
Log (*Age*)	−0.001	(−0.1)	−0.002	[−0.010, 0.007]	0.001	(0.1)	0.069***	(5.7)
Tangibility	0.078***	(3.1)	0.072	[0.052, 0.094]	0.059**	(2.5)	−0.046	(−1.6)
Return on Assets	−0.391***	(−6.4)	−0.349	[−0.390, −0.308]	−0.258***	(−4.9)	−0.218***	(−3.7)
Market-to-Book Ratio	0.013***	(3.7)	0.021	[0.018, 0.024]	0.015***	(4.3)	0.003	(0.6)
Share Turnover	48.62***	(10.2)	43.91	[39.49, 48.31]	42.16***	(7.7)	28.38***	(5.2)
Unleveraged Z-Score	−0.008**	(−2.0)	−0.003	[−0.008, −0.002]	−0.009**	(−2.6)	0.019***	(3.7)
Dividend-to-Assets Ratio	−0.104	(−0.4)	−0.197	[−0.662, 0.268]	0.354	(0.9)	0.619	(1.4)
Stock Return Volatility	−2.010***	(−6.5)	−1.747	[−2.123, −1.371]	−0.982***	(−2.9)	−0.489	(−1.6)
Earning Volatility	0.075***	(3.3)	0.080	[0.063, 0.096]	0.083***	(2.8)	−0.014	(−0.1)
Deviation from Target Debt Ratio	0.051***	(3.4)	0.009	[−0.019, 0.038]	0.006	(0.1)	0.159***	(3.7)
Marginal Tax Rate	0.039	(0.6)	0.048	[0.011, 0.086]	0.018	(0.3)	0.178***	(3.6)
Analyst Following	−0.001*	(−1.7)	−0.002	[−0.003, −0.000]	−0.002**	(−2.4)	−0.006	(−0.4)
Debt Rating	0.023*	(1.8)	0.031	[0.012, 0.051]	0.051***	(3.7)	0.024***	(3.1)
[Log pseudo-likelihood] R^2/Firm-years	0.31/2,939		0.30/500 replications		0.16/2,939		[−8570.1]/39,837	

(*continued on next page*)

TABLE 5 (continued)

Coefficients that are significant at the 10 percent, 5 percent, and 1 percent level are marked with *, ** and ***, respectively.

The t (z)-statistics in parentheses are calculated from the Huber/White/sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm.

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The dependent variable (*Esize*) is the size of net equity issue scaled by the book value of assets at the beginning of the fiscal year. Only equity issues exceeding 5 percent of total assets are included in Columns I–III. The Heckman equation in Column V is estimated using the entire sample. Net equity issued is the sale of common stock minus the purchase of common stock. *Past Stock Return* (*PRTN*) is the compounded monthly stock return over the previous fiscal year. The control variables and variables in the selection equation (Column IV) are defined in Appendix B. Constant terms and year dummies are included in both the regression equation and the selection equation, but not reported. Column I presents the OLS estimates. Column II reports the results when auditor quality is endogenized using the Two-Stage bootstrap approach. The average R^2 of 500 replications is reported. Column III reports the results from an instrumental variable approach, which is described in Wooldridge (2002). Column IV endogenizes the issuance decision.

company's requirement for external funds, as well as the choice of equity *vis-à-vis* debt financing. Appendix B gives a complete list of all the variables included in the first stage. We use the full sample to estimate this specification, and the results are reported in Column IV of Table 5.

The results in Table 5 are consistent across all specifications. As predicted in Empirical Implication 2(ii), the size of the issuance increases with past returns (*PRTN*). The t-statistics 4.3, 3.6, and 2.6 in Columns I, III, and IV, respectively, of Table 5.[16] The bootstrapped results also indicate that this effect is significant at less than the 5 percent level. In other words, companies tend to issue larger amounts of equity when market conditions are good. However, this effect is less important for companies that are audited by large firms (as predicted by Empirical Implication 2(iii)). The interaction of past return with *BigSix* is negative in all specifications. The t-statistics are −2.3, −3.7, and −2.2 in the different specifications.[17] The result also holds in our bootstrapped specification (Column II, Table 5). The effect is also economically significant; being audited by a large firm reduces the sensitivity to past returns by more than half.[18] Finally, we find that companies audited by large firms tend to issue larger amounts of equity when they do issue (consistent with Empirical Implication 1(ii)). The t-statistics are 4.0, 3.7, and 2.1 in Column IV of Table 5. The coefficient is significant at the 5 percent level in our bootstrapped specification. Untabulated results show that when we run our tests separately for different size groups, the interaction effect is statistically stronger for smaller companies.

V. FURTHER ANALYSIS

The previous section established the effect of auditor quality on the issuance of debt and equity. We now explore the causes and consequences of this effect empirically.

The Consequences of Auditor Quality on Capital Structure

Both our theoretical developments and the results in Tables 4 and 5 relate to the effects of market conditions and auditor quality on debt and equity issuance. The recent literature looks at a company's debt ratio to investigate the implications for issuance activity in response to market conditions (see Baker and Wurgler [2002], Leary and Roberts [2005], Kayhan and Titman [2007] for examples of papers using this approach). The essential idea is that if companies do not follow very closely a target capital structure (either because of adjustment costs such as underwriting fees or because they really have no debt ratio targets), then issuance activity will have persistent effects on debt ratios, at least in the medium term. Baker and Wurgler (2002) and Kayhan and Titman (2007) examine whether the sensitivity of past equity issues to market conditions has a negative impact on subsequent debt ratios or changes in debt ratios, while Leary and Roberts (2005) examine whether the effect of the pattern of issuance is more persistent when firms are likely to face higher adjustment costs (related to issue costs of debt and equity).

Our main findings are that companies are likely to make larger size equity issues (and issue equity more often) when market conditions are good and that these effects are likely

[16] The λ coefficient, a statistic for the selectivity effect, in our Heckman estimation (Column IV) is −0.36 and is significant at less than the 5 percent level (the 95 percent confidence interval is [−0.39, −0.33]), suggesting that self-selection is indeed a concern.

[17] Our model assumes that the motive behind equity issuance is to finance new investments. Our sample contains 373 (out of 2,939) instances where companies issue equity to repurchase debt. Excluding these observations leads to slightly more significant results (the coefficient associated with the interaction term becomes −0.033 with a t-statistic equal to −2.7).

[18] For example, the ratio of the coefficients is 0.029/0.056 in the OLS specification.

to be stronger for companies audited by non-Big 6 auditors. Based on the studies we have discussed, it seems natural to investigate whether our main findings affect debt ratios. To do so, we follow a strategy similar to that employed by Kayhan and Titman (2007). We regress the change in the leverage ratio over a five-year period on stock returns over the same period, a Big 6 indicator variable, and the interaction between the two. Specifically, we estimate the following model:

$$Lev_{i,t} - Lev_{i,t-5} = c_0 + c_1 ASR_{i,t} + c_2 BigSix_{i,t-5} + c_3 ASR_{i,t} \times BigSix_{i,t-5} + c_4 DevTgt_{t-5} + \gamma \Delta C_{i,t} + \varepsilon_{i,t} \quad (6)$$

where the dependent variable is the change in the leverage ratio (*Lev*) for company i between year $t-5$ and t. *BigSix* is our previously defined dummy variable. *Accumulated Stock Return* (*ASR*) is obtained by compounding monthly stock returns from year $t-5$ to t. *ASR* $\times$ *BigSix* represents an interaction between *ASR* and *BigSix.* ΔC represents the change in the control variables over the same period. These control variables are essentially those used in Equations (3) and (4) but we make the following changes. We drop the control variables related to the change in *R&D* and earnings volatility (measured over the entire life of the firm in Compustat) from this test as they are essentially fixed firm characteristics. In addition, we control for the deviation in the debt ratio at $t-5$ from an estimated target (*DevTgt*). If the effect of market conditions has long-lasting implications for a company's capital structure, then we expect that debt ratios will decrease more (as more equity is issued) if stock returns are high during this period (and therefore c_1 should be negative). More importantly, for our purpose, we expect c_2 to be negative and c_3 to be positive if auditor quality has long-lasting effects on a company's capital structure.

We report the results of estimating Equation (6) (with *Accumulated Stock Return*) in Table 6. We use our usual three approaches to estimate the model (OLS in Column I, the two-stage bootstrap procedure in Column II, and the instrumental variable approach in Column III). The results are consistent with our prior specifications. In all cases, the coefficient of *ASR* is negative (t-statistics of -10.0 and -4.3 in Columns I and III, respectively). This is consistent with the idea that adverse selection is time varying and less likely to be important when market conditions are good. However, as expected, the interaction between *BigSix* and *ASR* is positive in all specifications (t-statistics of 4.0 and 3.7 in Columns I and III, respectively). Our bootstrapped specification in Column II generates similar results. These results are consistent with the hypothesis that companies audited by Big 6 firms have less incentive to issue equity when market conditions are favorable. We obtain similar results (untabulated) when we consider changes in a company's capital structure over a ten- (instead of a five-) year period, or if we exclude observations for which *BigSix* changes in value over the five-year period (untabulated results). We also obtain similar results if we use only the years when companies issue securities (debt or equity) to estimate the market leverage ratio. Our results are also similar if we use the book-leverage rather than the market-leverage ratio. The effect is economically significant, and switching to a Big 6 auditor reduces the sensitivity to market conditions by approximately 50 percent.[19] When we partition the sample based on company size, the results (untabulated) indicate that the effect is stronger for the smallest companies but insignificant for the largest ones. Table 6 also indicates that the increase in the debt ratio is less for companies audited by

[19] The ratio of coefficients is 0.006/0.012 in the OLS specification.

TABLE 6
Auditor Quality, Accumulated Stock Return, and Capital Structure

Change in Leverage Ratio from t−5 to t ($Lev_t - Lev_{t-5}$)	**(I) OLS** Coef.	t-stat.	**(II) Two-Stage Bootstrap** Coef.	95% Interval	**(III) Two-Stage Wooldridge** Coef.	t-stat.
Accumulated Stock Return (*ASR*)	−0.012***	(−10.0)	−0.015	[−0.019, −0.011]	−0.028***	(−4.3)
BigSix	−0.029***	(−6.8)	−0.040	[−0.047, −0.033]	−0.304***	(−12.5)
ASR × *BigSix*	0.006***	(4.0)	0.005	[0.003, 0.007]	0.026***	(3.7)
Δ*Total Assets*	0.064***	(25.7)	0.064	[0.057, 0.071]	0.053***	(20.4)
Δ*Market-to-Book Ratio*	−0.006***	(−4.7)	−0.007	[−0.009, −0.004]	−0.006***	(−4.8)
Δ*Return on Assets*	−0.110***	(−10.7)	0.011	[−0.076, 0.098]	−0.106***	(−9.6)
Δ*Tangibility*	0.168***	(15.6)	0.172	[0.150, 0.194]	0.165***	(13.7)
Δ*Unleveraged Z-Score*	−0.002**	(−2.3)	−0.003	[−0.008, 0.002]	−0.002**	(−2.3)
Δ*Dividend-to-Assets Ratio*	0.016	(0.9)	0.011	[−0.026, 0.049]	0.009	(0.5)
Δ*Stock Return Volatility*	1.507***	(17.8)	1.473	[1.285, 1.661]	1.460***	(16.9)
Δ*Share Turnover*	−9.323***	(−2.8)	−9.346	[−16.049, −2.644]	−8.609***	(−2.8)
Deviation from Target Debt Ratio	−0.328***	(−35.8)	−0.349	[−0.371, −0.328]	−0.350***	(−30.1)
Δ*Analyst Following*	−0.002***	(−9.7)	−0.002	[−0.023, −0.017]	−0.002***	(−9.0)
Δ*Marginal Tax Rate*	−0.112***	(−11.2)	−0.151	[−0.188, −0.114]	−0.087***	(−7.6)
Debt Rating	0.027***	(10.9)	0.055	[0.047, 0.063]	0.055***	(14.6)
R^2/Firm-years	0.33/39,837		0.33/500 replications		0.09/39,837	

Coefficients that are significant at the 10 percent, 5 percent, and 1 percent level are marked with *, **, and ***, respectively.

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The dependent variable is *Change in Leverage Ratio from t−5 to t*. *Accumulated Stock Return* (*ASR*) is obtained by compounding monthly stock returns from $t-5$ to t. Constant terms and year dummies are included in the regressions, but not reported. The control variables are defined in Appendix B. Column I presents the OLS specification. The t-statistics in parentheses are calculated from the Huber/White/sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations of a given firm. Column II reports the regression using a two-stage procedure. In the first stage, the likelihood of the firm selecting a Big 6 auditor is predicted based on firm-specific variables using the probit model in Table 3. In the second stage, *Change in Leverage Ratio* is regressed on predicted auditor quality, *ASR*, the interaction term between predicted auditor quality and *ASR*, and the changes in other control variables. We bootstrap the system 500 times to obtain consistent standard errors. The 95 percent confidence intervals in square brackets are calculated from 500 bootstrap replications resampled from the data set with replacement of clusters. The average R^2 of 500 replications is reported. Column III reports the results from an instrumental variable approach, which is described in Wooldridge (2002).

Variable Definitions:

BigSix = dummy equal to 1 if a firm chose a Big 6 auditor at t–5, and 0 otherwise; and
Deviation from Target Debt Ratio = difference between a firm's leverage ratio at $t-5$ and the target debt ratio estimated in Appendix C.

Big 6 firms. The control variables have signs essentially consistent with those documented by Kayhan and Titman (2007).

As an additional robustness check, similar to Fama and French (2002) and Flannery and Rangan (2006), we estimate a target adjustment model to investigate whether auditor quality also has a direct effect on a company's capital structure by regressing the leverage ratio at time *t* on its lagged value, *BigSix*, and the different control variables described in Appendix B.[20] Untabulated results indicate that *BigSix* significantly reduces the target leverage ratio (t-statistic = −2.7). This is true for our overall sample and across all size groups, and the effect is stronger for small companies.

These additional results are consistent with the idea that auditor quality has a long-lasting effect on the financial structures of companies.

The Causes of the Effect of Auditor Quality on Financial Decisions

Having explored some of the consequences of our main findings in the previous section, we investigate the causes of the different auditor effects that we document in our empirical tests. We consider two possibilities. The first is the insurance role played by auditors, and the second is the reduction in information asymmetry through an improvement of a firm's disclosure policy, and especially its accounting reporting.

The idea behind the insurance effect is that Big 6 firms have deeper pockets than do smaller auditors in cases of litigation and thus offer more valuable insurance in case the initial value of the firm had been inflated. If this insurance effect is the primary driver of our results, then the effect of being audited by a Big 6 firm should be stronger when the expected liability is greater. We interact either an indicator variable for industries with high litigation risk (Hogan 1997) or the Z-score (Dye 1993, which indicates that the greatest liability of auditors derives from auditing clients that subsequently experience financial distress) with *BigSix* in the debt-equity probit regression (described in Equation (3)) and in our capital structure regression (reported in Table 6). The interactions are insignificant, which suggests that the insurance effect does not drive our results.

To investigate the second possibility, we regress the probability of informed trading (*PIN*) (Easley et al. 2002), a measure of accrual quality (Francis et al. 2005), and a measure of discretionary accruals (Teoh et al. 1998a) on *BigSix*, controlling for firm-specific variables used in Equation (3). The results (untabulated) indicate that the probability of informed trading and the amount of discretionary accruals are significantly lower among companies that are audited by a large firm, whereas the accounting quality is greater. This finding holds both in the OLS specification and the specifications designed to address the endogeneity of auditor quality (bootstrapped procedure and 2SLS approach). These additional results are consistent with those of previous studies, including Becker et al. (1998), Teoh and Wong (1993), and Krishnan (2003). These prior results and our new findings collectively support the idea that large auditors reduce information asymmetry through an improvement of the disclosure policy of firms, and especially their accounting reporting.

VI. ROBUSTNESS CHECKS

We now explore different empirical issues to check the robustness of our results.

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[20] More specifically, we start with the following model: $Lev_{i,t} - Lev_{i,t-1} = \alpha_1 + \lambda[Lev^*_{i,t} - Lev_{i,t-1}] + \varepsilon_{i,t}$, where $Lev_{i,t}$ is the leverage ratio of company *i* in year *t*, $Lev_{i,t-1}$ is the leverage ratio lagged one period, and λ is the speed of adjustment. $Lev^*_{i,t}$ denotes the target leverage ratio, which can be expressed as a function of auditor quality and a set of predetermined variables (C): $Lev^*_{i,t} = \alpha_2 + \beta C_{i,t-1} + \delta BigSix_{i,t-1}$. By combining two equations, we have the following reduced form: $Lev_{i,t} = \alpha_3 + (1 - \lambda)Lev_{i,t-1} + \mu BigSix_{i,t-1} + \gamma C_{i,t-1} + \varepsilon_{i,t}$, where $\gamma = \lambda\beta$ and $\mu = \lambda\delta$. Thus, the impact of *BigSix* on the target leverage ratio is then equal to μ/λ.

The Effects of Endogeneity, Causality, and Omitted Variables

Differentiating between correlation and causality is probably the most difficult problem in empirical economics, and it is doubtful that any analysis can fully address it. Nevertheless, we consider several tests that speak to this issue. First, as noted above, we use different econometric techniques to deal with the endogeneity of auditor selection. For example, we employ the instrumental approach described by Wooldridge (2002). Consistent with a directional relation, our results hold when we use these different procedures. In addition, company size is the largest driver of auditor choice. To ensure that our results are not driven by company size, we form a matched sample based on two-digit SIC industry codes and size. For each company audited by a small auditor, we identify a match that is in the same two-digit SIC industry, has total assets as close as possible, and is audited by a Big 6 firm. We then re-estimate our different models using this new sample. Our results (untabulated) are qualitatively similar.[21]

Second, we exploit the fact that auditor quality is sticky. It seems reasonable to argue that if auditor quality has been the same for years, then it is unlikely to be a by-product of current financial choices. Therefore, we rerun all of our tests using only firms with auditor tenures longer than seven years. The degree of endogeneity is likely to be less in this sample. All of our results (untabulated) hold. However, a problem with this approach is that the endogeneity may be driven by time-invariant characteristics.

As a third test, we re-estimate our models using company-level fixed effects to rule out this possibility. The statistical significance of our most important results improves when we include a company-level fixed effect (compared with the cross-sectional OLS results). To obtain more variation in our auditor quality variable, we use a fourth approach and replicate the interaction tests on a subsample of companies that switched auditors. This sample is small compared with our full sample. It contains 2,385 observations and covers 147 small-to-big auditor-switching events and 128 big-to-small auditor-switching events. Not surprisingly, the t-statistics of our interaction variables are reduced compared to our OLS cross-sectional tests (-2.1 for the equivalent in Table 5 and 1.9 for the equivalent in Table 6 versus -2.3 and 4.0, respectively, in our main sample), but the signs are not affected. Our results also hold in the Heckman specification in Table 5 (t-statistic $= -2.0$). These additional results support the argument that there is a causal relation between an increase in auditor quality and lower sensitivity to adverse selection in the issuance decisions made by companies.

The Effect of National Auditors

Our main tests consider the effect of Big 6 firms on financing decisions. We further refine our auditor classification by partitioning the non-Big 6 firms into national auditors (BDO Seidman, Grant Thornton, McGladrey and Pullen, and Richard A. Eisner) and small ones.[22] We replicate our main tests for companies that are not audited by Big 6 firms and substitute an indicator variable that is equal to 1 for companies audited by a national auditor, and 0 otherwise. We have to restrict our sample to the post-1987 period because information on national auditors is not available before that time. The results (untabulated) indicate that national auditors have a significant impact on financing decisions: the variable is significant

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[21] The one exception is in the matched sample for Equation (6). The coefficient of the interaction term between *ASR* and *BigSix* becomes insignificant but remains positive in the three-step procedure described by Wooldridge (2002). The results of the OLS and bootstrapped procedures hold.

[22] Specifically, a firm is considered to be audited by a national auditor if the audit code (Compustat item 149) equals 11, 17, 21, or 26.

in the debt/equity probit model (t-statistic = −2.0). In our tests of the effect of market conditions on capital structure, the interaction between the new dummy and past stock returns is significantly positive (t-statistic = 1.9). However, the new dummy is insignificant in our size of equity issuance (*Esize*) regression, perhaps because of the significantly reduced sample size and much smaller number of equity issues. Taken together, these results suggest that compared with smaller auditors, national auditors also mitigate information asymmetry, but not as well as Big 6 firms do. However, this weaker significance has to be qualified because the drastic reduction in the sample size reduces the power of our tests.

VII. CONCLUSION

We find evidence that the difference in information asymmetry associated with high-quality auditors affects the financing choices of companies. First, companies audited by large auditors are more likely to issue equity as opposed to debt and to have more equity in their capital structures. Second, companies tend to issue larger amounts of equity when market conditions are favorable. This association is significantly weaker for companies with Big 6 auditors. Third, the debt ratios of companies audited by Big 6 firms are less affected by market conditions. These results hold in different specifications that are designed to minimize the risk of bias due to the endogeneity between auditor quality and financing decisions. They also hold both cross-sectionally and in panel settings, and in a sample of companies that switch between small and large auditors.

APPENDIX A
PROOF OF PROPOSITION 1 PART (iii)

Fix I, and suppose the equilibrium is one in which type $X = X_H$ with a poor-quality auditor issues equity. If, instead, it issues debt, and assuming without loss of generality that the debt holders' required rate of return is zero, then the face value of the debt is given by $F = I/\delta$, and hence the payoff to the company is:

$$\Pi_D = \delta(I + V + X_H - F) - (1 - \delta)c = \delta(X_H + V) + (\delta - 1)I - (1 - \delta)c. \quad \text{(A1)}$$

Hence:

$$\frac{d\Pi_D}{dI} = \delta - 1 < 0. \quad \text{(A2)}$$

Suppose instead that the company issues equity. Let α be the fraction of equity offered to outside investors. Then we have:

$$\alpha\delta[\text{Prob.}(X = X_H|X_H \text{ is reported})X_H + \text{Prob.}(X = X_L|X_H \text{ is reported})X_L + I + V] \\ = I. \quad \text{(A3)}$$

Denote:

$$E(X, p) = \text{Prob.}(X = X_H|X_H \text{ is reported})X_H + \text{Prob.}(X = X_L|X_H \text{ is reported})X_L \\ = \frac{2p}{1 + p} X_H + \frac{1 - p}{1 + p} X_L.$$

where the last equality follows from Bayes' Rule.

The payoff to the company's existing equity holders is:[23]

$$\Pi_E = (1 - \alpha)\delta(X_H + I + V) = \delta(X_H + I + V) - \frac{I}{E(X, p) + I + V}(X_H + I + V). \tag{A4}$$

It is easily checked that $E(X, p)$ is increasing in p. Also:

$$\begin{aligned}\frac{d\Pi_E}{dI} &= \left(\delta - \frac{X_H + I + V}{E(x, p) + I + V}\right) + \frac{I(X_H - E(x, p))}{(E(X, p) + I + V)^2} \\ &= (\delta - 1) + \frac{X_H - E(X, p)}{E(X, p) + I + V}\left(\frac{I}{E(X, p) + I + V} - 1\right) < \delta - 1 < 0.\end{aligned} \tag{A5}$$

Notice that, for a given p and sufficiently small I—in particular, I satisfying condition (2)—the expression in (A4) exceeds that in (A1). Hence, the company will issue equity, and the proposed beliefs that the market has are supported.

However, by virtue of (A5) and (A2), for a sufficiently high I, the expression in (A4) will be less than that in (A1). Hence, the company will issue debt, and the belief must be that a company issuing debt is type X_H. Notice, however, that type X_L with a low-quality auditor, (whether it succeeds in misreporting), has no incentive to mimic this type by issuing debt. At worst, the equity is correctly priced for such a type, and while there is no mispricing gain from debt issuance, there is a potential financial distress cost. Therefore, if a company with a low-quality auditor issues equity, then the market must believe that the true earnings are $X = X_L$. It is easy to check that these beliefs support the equilibrium issuance decision of type $X = X_H$.

Finally, notice that for any I and for p sufficiently close to 1, the expression in (A4) exceeds that in (A1) (and is positive as the project is assumed to have a positive net present value). Hence, a set of beliefs for which type X_H with a poor-quality auditor issues equity for both I_1 and I_2 can be supported.

APPENDIX B
VARIABLE DEFINITIONS

Variable	Definition
Esize	Net equity issue equals the sale of common and preferred stock minus the purchase of common and preferred stock. Net debt issue equals long-term debt issuance minus long-term debt reduction plus changes in current debt. *Esize* is equal to the amount of net equity issue deflated by the book value of assets at the beginning of the fiscal year.
BigSix	Dummy variable equal to 1 if the audit code (Compustat item 149) is between 1 and 8, and 0 otherwise.
Leverage Ratio (*Lev*)	Total debt/(total assets + market value of equity − book value of equity).

(*continued on next page*)

[23] We assume that V is sufficiently large so that the expression below is positive at $I = I_1$.

Size of Total Financing	Total financing needs/total assets = (net debt issued + net equity issued)/total assets.
Log (Assets)	Log of total assets.
Age	Number of years since the firm entered Compustat.
Tangibility	Net PPE-to-assets ratio.
Return on Assets	Ratio of operating income before depreciation and amortization to total assets.
Share Turnover	Median value of monthly shares traded (volume) divided by shares outstanding over a 12-month period.
Past Stock Return	Compounded annual stock return over a 12-month period.
Market-to-Book Ratio	(Total assets + market value of equity – book value of equity)/ total assets.
R&D to Sales Ratio	Research and development expenses scaled by total sales.
R&D Dummy	Dummy variable equal to 1 if research and development expenses are missing, and 0 otherwise.
Dividend-to-Assets Ratio	Ratio of dividends to total assets.
Unleveraged Z-Score	(3.3 × pretax income + sales + 1.4 × retained earnings + 1.2 × [current assets – current liabilities])/total assets.
Stock Return Volatility	Standard deviation of the daily stock return calculated for each firm for each year.
Earning Volatility	Historical standard deviation (using available data during the previous ten years) of the ratio of EBITDA to total assets.
Marginal Tax Rate	Simulated marginal tax rate after interest expenses obtained from John Graham's website.
Debt Rating	Dummy variable equal to 1 if the firm has a debt rating assigned by Standard & Poor's, and 0 otherwise.
Analyst Following	The maximum number of analysts making annual earnings forecasts any month over a 12-month period. We assume that companies not covered by I/B/E/S have no analyst coverage.

Variables in the selection equation of Table 5, Column IV

(Apart from the variables listed below, we also include in the selection equation *Unleveraged Z-Score*, *R&D Expenses*, *Market-to-Book Ratio*, *Tangibility*, *Marginal Tax Rate*, *Analyst Following*, and *Debt Rating Dummy*, which are defined above.)

Projected Current Investment	Average investment growth rate over the previous three years multiplied by the previous year's investment.
Cash Balance	Sum of cash and marketable securities divided by total assets.
Projected Current Cash Flow	Average cash flow growth rate over the previous three years multiplied by the previous year's cash flow.
Industry Equity Issue	Proportion of firms issuing equity in the industry (two-digit SIC code).
Anticipated Future Investment	Actual investment to total assets ratio over the next year.
Anticipated Future Cash Flow	Actual cash flow to total assets ratio over the next year.
Dividend Payer Dummy	Dummy variable equal to 1 if a company paid dividends, and 0 otherwise.
New Working Capital	(Other current assets – [total current liabilities – short term debt])/total assets

APPENDIX C
ESTIMATION OF THE TARGET LEVERAGE RATIOS

The sample includes all Compustat industrial companies with complete data for five or more consecutive years from 1985–2005. The dependent variable, *Leverage Ratio* (*Lev*), is total debt divided by (total assets – book equity + market capitalization). The control variables are defined in Appendix B and lagged one period relative to the dependent variable (*Lev*). The median industry leverage ratio is defined as the median of the ratio of total debt to the market value of assets by the three-digit SIC code and by year. Coefficients that are significant at the 10 percent, 5 percent, and 1 percent level are marked with *, **, and ***, respectively. The constant terms are included in the regression but not reported. The t-statistics in parentheses are calculated from the Huber/White/sandwich heteroscedastic consistent errors, which are also corrected for correlation across observations for a given firm.

	OLS	
***Leverage Ratio* (*Lev*)**	**Coef.**	**t-stat.**
Log (*Assets*)	0.009***	(5.6)
Log (*Age*)	−0.016***	(−5.0)
Tangibility	0.069***	(7.1)
Industry Median Leverage Ratio	0.438***	(24.5)
Return on Assets	−0.025	(−1.6)
Share Turnover	−7.515***	(−6.3)
Past Stock Return	−0.014***	(−13.3)
Market-to-Book Ratio	−0.017***	(−11.1)
R&D-to-Sales Ratio	−0.018***	(−6.6)
R&D Dummy	0.021***	(5.6)
Unleveraged Z-Score	−0.010***	(−7.3)
Dividend-to-Assets Ratio	−0.181***	(−2.9)
Stock Return Volatility	1.306***	(11.1)
Earning Volatility	−0.001***	(−6.4)
Marginal Tax Rate	0.095***	(7.0)
Analyst Following	−0.003***	(−14.4)
Debt Rating	0.072***	(16.3)
R^2/Firm-years	0.30/39,837	

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