IS AUDITOR INDEPENDENCE ENDOGENOUS? EVIDENCE AND IMPLICATIONS FOR PUBLIC POLICY

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Abstract

This paper examines the extent to which firm-specific levels of auditor-independence are codetermined with alternative inputs to governance production. We identify a number of governance-producing mechanisms that are causally or simultaneously related to auditor independence. These results are shown to be robust to omitted variable bias. Consequently, prescriptive regulation of auditor independence will be at least partly offset by firm adjustments on alternative governance-producing margins.

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1. Introduction

A coincidence of high profile accounting indiscretions and the coupling of audit and consulting services has heightened public concern regarding auditor independence. In response, US legislators recently passed the Sarbanes-Oxley Act. A central feature of this legislation prohibits firms from purchasing non-audit services from their independent financial statement auditors.[1] Such a policy can be expected to improve corporate governance to the extent that the various mechanisms for governance production are chosen independently of one another. Corporate governance need not be improved, however, if alternative mechanisms of governance production serve as substitutes to auditor independence. In the event, prescriptive regulation holds limited potential to improve corporate governance as firms adjust on substitute margins.

Recent research into the relationship between governance and firm performance suggests various determinants of corporate governance may be determined simultaneously. However, critics suggest these findings may be a result of omitted variable bias. The purpose of this article is to provide empirical estimates of the relationship between auditor-independence and alternative inputs to governance production, with particular attention to bias attributable to omitted variables. Auditor independence is estimated as a function of other governance-producing mechanisms and exogenous variables. Significant parameter estimates are screened for omitted variable bias following Altonji et al. (2002).

Our results suggest auditor independence is codetermined with several alternative governance-producing organizational features. Firms with higher levels of auditor

[1] See "Title II – Auditor Independence" of the Sarbanes-Oxley Act of 2002 (HR 3763).

independence have lower fractional CEO shareholdings, combine the positions of Chairman of the Board and CEO, and structure audit committees with a lower proportion of independent members. Evaluated in this light, the capacity for regulations like Sarbanes-Oxley to increase an economy's aggregate production of governance services appears limited at best.

These results resolve an empirical question in corporate governance with important implications for an ongoing policy debate. While high profile accounting indiscretions encouraged an increased scrutiny of financial markets' integrity, scholars disagree on what these indiscretions say about how (or even if) public regulation should respond. Kane (2003, p. 24), for example, interprets this spate of irregularities as evidence of "blatant market failure," calling for a strengthening of corporate governance regulation beyond that promulgated in Sarbanes-Oxley.[2] Looking at broader performance indicators (e.g., productivity gains, equity market performance), on the other hand, Holmstrom and Kaplan (2003, p. 2) conclude that the US governance system works relatively well, and may even be at risk of "over-regulation."

Results from related empirical studies also appear mixed. Frankel et al. (2002), for example, find evidence that audit quality *increases* with auditor independence, and less robust evidence that capital markets price this information.[3] Taken on its face, this evidence supports Kane's (2003) downbeat assessment of the state of corporate governance.

To generate this evidence, however, Frankel et al. (2002) implicitly assume that auditor independence is exogenous. Inference they make can thus be biased if firms

[2] Bebchuk and Bar-Gill (2002) offer similar prescriptions grounded more formally.
[3] We adopt Frankel et al.'s (2002) measure auditor independence; namely, the fractional contribution of audit services to total services supplied to a client.

substitute organizational features for auditor independence in producing governance services. Carefully investigating the potential for such bias appears important in light of Watts' (1977) and Chow's (1982) early evidence that endogenous selection of auditor independence may be considerable.[4] In addition, Agrawal and Chadha (2002) find evidence that audit quality and auditor independence are *unrelated*. Antle et al. (2002) similarly find evidence that would reject the view that the various inputs to governance production are determined independently of one another.

This evidence counters that of Frankel et al. (2002) and questions the potential efficacy of legislation like Sarbanes-Oxley. Even here, however, the potential for endogeneity bias can be considerable. For example, the integrity of Agrawal and Chadha's (2002) evidence rests on their matching estimator's validity. This validity, in turn, requires that sampled firms for which financials were restated differ from those that did not recognize a restatement *only* on the firms' observable characteristics. Financial and organizational theories, nevertheless, encounter difficulty when attempting to establish confidence that selection of matched pairs occurs only on observables.

Agrawal and Knoeber (1996) address this difficulty by estimating parameters from a system of governance-input equations. In doing so, they produce evidence that mechanisms for controlling manager-shareholder agencies are interdependent. Extended to the present application, this evidence suggests that clients choose auditor independence in a manner that trades the benefits of "dependent" auditors (e.g., economies of scope)[5] against the costs that might emerge from how capital markets perceive financial statement quality.

[4] Holthausen and Leftwich (1983) review this early literature.
[5] Simunic (1984) and Arruñada (1999) detail these benefits.

This evidence also questions the potential efficacy of Sarbanes-Oxley to enhance governance. However, such an inference is also tenuous in that the potential for endogeneity bias continues to be considerable. Indeed, the diversity of theories about how organizational factors produce governance services undermines confidence that Agrawal and Knoeber (1996) satisfy the exclusion restrictions necessary to identify relationships through their systems approach.[6]

We depart from the existing literature that attempts to establish a link, or lack thereof, between firm performance and inputs to governance production. Instead, we identify the relationship between auditor independence and other organizational features firms may employ to produce governance services. This allows us to explicitly test the exogeneity assumptions implicit in reduced form estimates from firm performance versus governance regressions. We first check for omitted variable bias by adding an extensive set of variables to our base case regression. We also present a more formal test for omitted variable bias following Altonji et al.'s (2002) methodological innovation for measuring selection on observables versus that on unobservables. This method is especially productive in aiding identification in settings like the present one where rigorously defensible exclusion restrictions are unavailable.

We also depart from scholars like Frankel et al. (2002) and Agrawal and Chadha (2002) by ignoring the incidence of restatements or earnings management. This feature of our research design lets us concentrate on an arguably more fundamental policy concern – i.e., the potential endogeneity of auditor independence. Here, understanding whether firms' organizational choices are interdependent can help gauge the potential

[6] Antle et al. (2002) also estimate parameters from a system of equations, but do not formally treat the potential bias from simultaneously determined regressors.

efficacy of relevant policies by letting us consider how likely it is that such policies will be redundant. To be sure, *if interdependencies are sufficiently strong, then guiding policy via reduced form evidence on how restatements or earnings management relate to auditor independence is unlikely to produce its "intended consequence."* Doing so may even leave an economy at an inferior level of welfare, where governance levels are unchanged but associated production costs are increased.[7]

It is important to note that the contribution of the present results rests firmly on our research design rather than on the consistency of the results with those of the existing empirical literature. Quite simply, the theoretical requirements necessary for identification in our design are considerably weaker than are those on which received evidence rests. In addition, while our application is specific to Sarbanes-Oxley, our results have important implications for *any* policy that aims to strengthen corporate governance by regulating a *particular* organizational feature. Here, our results offer insight into how decentralized systems react to the public production of governance services, and do so in a manner that is less susceptible to endogeneity problems than are related results in the literature.

We develop this insight more carefully in our article's remainder. In the following section, we motivate our empirical investigation by developing the observable implication that, to produce corporate governance services, profit-maximizing firms will substitute between governance-producing factors, including auditor independence. In Section 3, we empirically evaluate the extent to which firms indeed substitute along this

[7] Watts (1977) offers an early criticism of public regulation in this spirit. Antle et al. (2002) separately take issue with endeavors such as Agrawal and Chada's (2002) and Frankel et al.'s (2002) on the ground that observed financial statement irregularities and the denominator of audit independence measures (i.e., compensation for non-audit service) are jointly determined.

margin. Finally, we conclude in Section 4 by summarizing our results' policy implications and highlighting questions that our article leaves open for future research.

2. Theoretical Motivation

We begin our analysis by noting that, evaluated within a simple model of how firms produce governance services, *legislation like the auditor independence provision of Sarbanes-Oxley need not increase an economy's level of governance services*. Our premise is that numerous organizational features are employed by firms to produce the credibility with which they disclose financial performance. Frequently cited features in this regard include the composition, experience, and compensation of management teams, boards, and committees. A corollary to the premise is that firms may diminish any increase in governance services that might otherwise emerge from a regulatory narrowing of client-auditor relationships.

It is well known that even egoistic demanders of financial capital can benefit from supplying *independently* audited financial statements. Indeed, absent such verification, firms can face an increased (or even prohibitive) cost of capital.[8] But while auditor independence can create significant benefits in this regard, it can also limit the realization of scope economies. For example, the marginal cost of producing consulting services may fall when supplied in conjunction with a financial statement audit. Hence, while commingling the provision of such services may compromise financial statement integrity, doing so can also increase shareholder wealth.[9]

In this context, the profit maximizing firm's problem is to optimally trade the integrity-benefits of auditor independence against the associated costs. Firms might

[8] See Jensen and Meckling (1976) and Watts (1977).
[9] See Simunic (1984) and Arruñada (1999).

pursue this objective by structuring salient organizational features so as to reduce the integrity-costs of relaxing their auditors' independence. In other words, firms might "make" rather than "buy" financial market credibility. For example, executive managers who face low powered incentives (e.g., predominately salary-based compensation schemes) may be less likely to strategically manipulate the reporting of their firm's financial performance. The marginal benefit of auditor-independence is, as a consequence, relatively low for such firms. Ceteris paribus, the extent to which these firms exploit the audit-relationship's potential for economies of scope should be relatively high.

Firms that efficiently produce governance services will thus, on the margin, substitute auditor independence for alternative organizational factors. To see this implication, suppose that, when choosing the level of auditor independence, a firm ignores internal organizational features that contribute to the production of governance services. In this case, benefits associated with each feature's marginal contribution to governance-production will almost never equal the cost of employing marginal units of such features. A firm that ignores its salient organizational features when choosing auditor-independence will thus almost always forego feasible organizational alternatives that could have produced the same level of governance at a lower cost.

3. Empirical Analysis

A. Reduced Form Model

This theoretical implication motivates our empirical research design. It suggests that profit-maximizing choices of auditor independence share a negative relationship with other governance producing organizational features. The idea here is quite simple – i.e.,

to produce a given level of governance services, firms must heighten their auditors' independence as they decrease the employment of organizational features that might have otherwise been productive in this regard. We illustrate this relationship in Figure 1.

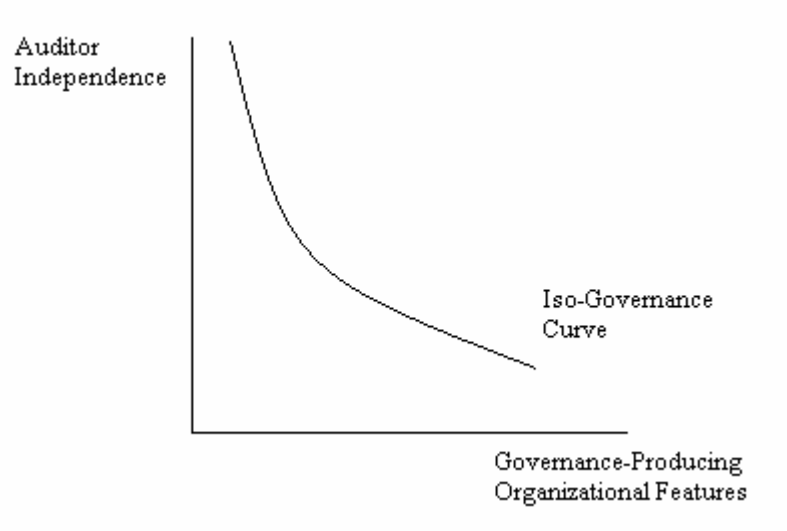

Figure 1

To formally evaluate whether this hypothesized relationship enjoys empirical support, we employ a cross-sectional dataset of firm characteristics to estimate parameters from the following equation.

Auditor Independence = f (Governance-Producing Organizational Features)

A recently implemented Securities and Exchange Commission (SEC) requirement lets us measure *Auditor Independence*. Filing companies must now distinguish between fees paid to auditors for audit services and those paid for other services (e.g., management consulting).[10] To the extent that firms forego potential scope economies between audit and consulting services, the share of fees that a client pays its accountant for audit services approaches one. If market participants can observe the auditor-client

[10] The SEC's "Final Rule S7-13-00, Revision of the Commission's Auditor Independence Requirements," demands that companies disclose, via proxy statements filed after February 5, 2001, information regarding fees that the auditor billed to it during the previous year (Frankel et al. 2002, p. 4).

relationship, then profit-maximizing firms that capture these economies must employ substitute organizational features to signal credibility. We thus formally examine how the proportion of fees paid to auditors for audit services varies with such features.

B. The Data

The analysis uses data constructed for a cross-section of 592 firms for fiscal year 2001. This fiscal year was selected to coincide with the SEC's ruling requiring firms to explicitly report expenditures to financial statement auditors for non-audit services. The sample size is limited by firms that could be matched across several sources of data used in the analysis.

The Investor Responsibility Research Center (IRRC) publication *Board Practices/Board Pay 2002: The Structure and Compensation of Boards of Directors at S&P Super 1,500 Companies* provides information on auditor-related expenses, board organization and compensation, and board committee structure. Firm expenditures on audit and non-audit services are obtained from IRRC publication *Audit Versus Non-Audit Fees: What U.S. and U.K. Companies Pay Their Auditors*.

The Corporate Library (CL) Director Data and Company Data sets are also used to construct governance variables for the analysis. Overlap between CL and IRRC data on auditor related fees and board and committee structure allows verification of data quality. The CL data also provides board member and CEO level data on compensation and ownership, allowing construction of committee and managerial ownership shares.

Institutional shareholdings are obtained from Standard and Poor's COMPUSTAT database. Finally, COMPUSTAT is also the source of other firm-specific control variables used in the analysis, including financial variables and industry classifications.

Table 1 – Summary of Data

Variable	Median	Mean	Std Dev
AuditFees	572000.000	1383254.413	2630834.966
AuditFeesTotal	1574486.000	4673787.427	9976585.835
f_audind_cl	0.399	0.430	0.205
SALE	1462197998.0	5753472769.5	15212774343
EMP	6279.000	21952.591	61467.274
fcata	0.408	0.419	0.218
fdtv	0.186	0.198	0.160
	Auditor Structure		
d_audnew_i	0.000	0.164	0.371
	Board Structure		
n_dirs_cl	9.000	9.622	2.923
n_boardmtg_i	6.000	7.145	3.009
f_boardind_cl	0.727	0.704	0.155
d_dirtenlmt_i	0.000	0.016	0.124
d_boardleaddir_i	0.000	0.033	0.179
d_chneceo_i	0.000	0.270	0.444
f_direxpgt15yrs_cl	0.111	0.157	0.171
f_dironlt4boards_cl	1.000	0.939	0.097
d_corpgovcom_i	0.000	0.422	0.494
n_naudcommem_cl	4.000	3.831	1.140
f_audcomind_i	1.000	0.904	0.169
f_nomcomind_i	0.900	0.797	0.251
f_comcomind_i	1.000	0.901	0.186
	Ownership Structure		
f_dirwshhldgs_cl	1.000	0.882	0.165
f_ceoshheld_cl	0.003	0.027	0.079
f_shhldbyinsider_cl	0.003	0.003	0.002
f_shhldbyinstitu_cl	0.006	0.006	0.002
	Compensation Structure		
n_dirbasepay_cl	20000.000	22338.775	16535.763
f_ceolopocomp_cl	0.477	0.476	0.275
	Other descriptive statistics		
PE_COMPOSITE	17.021	13.489	209.987
froa	0.028	0.020	0.115
q	0.872	1.338	1.393
BETA_Y01	0.795	0.883	0.600
vol	0.145	0.374	0.639

N = 592

Auditor Independence is defined as the ratio of fiscal year 2001 fees paid for audit services to fees paid for all accounting services. We limit our analysis to the first full year following the SEC's requirement for which a full set of proxy disclosures is

available. Data in subsequent proxies are not included in the analysis since they may be relatively noisy as firms learn to 'game' this reporting requirement.[11]

Table 1 summarizes sample statistics for audit fees, fees paid to auditors for non-audit services, and our constructed *Auditor Independence* variable. The table also summarizes a number of control variables included in the analysis as well as measures of alternative inputs to governance production introduced in the base-case analysis and expanded identification strategy discussed below.

C. Empirical Specification and Identification Strategy

Our base specification receives guidance from early contributions to the literature (e.g., see Jensen and Meckling (1976), Watts (1977), Chow (1982), and Jensen (1986)). *Auditor Independence* is regressed against a number of potentially governance-producing organizational features, including *Firm Size* (i.e. sales, employment), *Current-to-Total Asset ratio*, *Debt-to-Value ratio*, and *CEO Ownership share*, as well as auditor, exchange, and industry fixed effects.

To begin, managers might face an increased incentive to play morally hazardous actions, or enjoy a greater ability to hide those actions, as *Firm Size* increases. Here, relatively large firms might tempt potentially opportunistic agents with attractive levels of rents or the capacity to hide rent seeking behavior behind a relatively complex set of operations. As a result, larger firms are expected to require higher levels of *Auditor Independence*. Similarly, the more fixed are a firms assets, the greater is management's discretion in reporting profits (e.g., see Watts (1977)). We include *Current-to-Total*

[11] While beneficial in this regard, this feature of our research design precludes our using popular methods with which to address endogeneity bias (e.g., controlling for fixed effects). We address this issue below by employing Altonji et al.'s (2002) method for evaluating causation from non-experimental data when neither good instruments nor meaningful time series variation are available.

Asset ratio in the regressions. Governance services complementary to *Auditor Independence* may come from a firm's capital structure, measured here via the variable *Debt-to-Value ratio*. For example, interest payments may diminish the free cash flows with which managers may fund morally hazardous actions (e.g., see Jensen (1986)). Finally, to the extent that increased *CEO Ownership* aligns managerial incentives with those of relevant stakeholders, higher shares should act as an organizational substitute for *Auditor Independence* in the production of corporate governance services (e.g., see Jensen and Meckling (1976) and Watts (1977)). We expect *Auditor Independence* to be negatively related to *Current-to-Total Asset ratio*, *Debt-to-Value ratio*, and *CEO Ownership share*, and positively related to *Firm Size*.

Financial exchange and two-digit SIC dummies are included in the base-case regression to control for institutional and industry-specific variation in the costs and benefits of governance. Return-on-assets, share price volatility, and total fees paid to auditor are also included as controls.

We formally evaluate the base-case relationship using ordinary least squares. The validity of inference available from this evaluation, of course, depends on the regressors being exogenous. Here, the most important source of potential bias for our present objective is that which emerges from omitted variables. To be sure, bias that might emerge from measuring our variables with error would simply attenuate coefficient estimates and thus work against our finding evidence that auditor independence is codetermined. Bias that might emerge from reverse causality would not invalidate available inference that auditor independence is codetermined.

To address the potential for omitted variables bias, we begin by simply expanding the set of variables included in the vector of *Governance-Producing Organizational Features*. Here, we receive guidance from more recent contributions to the literature – i.e., Agrwal and Knoeber (1996), Agrawal and Chadha (2002), Antle et al. (2002), and Frankel et al. (2002).

Our first set of supplemental independent variables falls under the heading of *Auditor Structure*. We include a dummy to control for whether a firm's auditor is new to the firm in the fiscal year under observation. We would like to control for a range of auditor-specific features, such as partnership compensation schemes and organizational structures that may result in auditor-specific variation in governance production. Absent availability of such data, we employ indicator variables to control for audit firm "fixed effects".

Our second set of independent variables falls under the heading of *Board Structure*. To evaluate the extent to which a firm's board structure substitutes for auditor independence, we treat as regressors the board's size, number of meetings, and proportion of outsiders. We also control for whether directors face term limits and whether a board employs a lead director or separates the positions of Chair and CEO. We additionally control for committee structure via and indicator for whether a firm employs a corporate governance committee and covariates that measures the size of the audit committee and the independence of the audit, nomination, and compensation committees. Finally, we control for board members' characteristics via variables that measure their experience (i.e., fraction of directors w/ less than 15 years experience) and interlocking relationships (i.e., fraction of directors on less than 3 other boards).

Ownership Structure variables include measures of institutional, board, and insider shareholdings, including the fraction of directors with shareholdings and the fraction of shares held by the CEO, insiders, and institutions. To the extent that these measures reflect shareholder's capacity to monitor earnings quality or align agent interests with those of shareholders, firms can employ less independent auditors without significantly degrading earnings quality.[12]

Finally, *Compensation Structure* variables include director base pay. In addition, we include a measure of the share of CEO total compensation that is salary, a relatively low-powered form of compensation.

While this set of covariates appears extensive in light of related research, one may still be concerned that significant coefficients are a reflective of some variable that remains omitted. However, we cannot possibly evaluate our results' robustness to *every* potentially influential covariate. Moreover, we are not interested in identifying *every* organizational factor that might substitute for auditor independence, but rather in drawing inference about whether *some* organizational factors act as substitutes in this regard. Hence, instead of adding still more to this set of covariates, we employ Altonji et al.'s (2002) methodological innovation to address the question of how much variation of interest would unobservables have to explain to render the present results artifactual.

This method is particularly well suited to aiding identification in the present application. Received identification strategies tend to ignore established theory's frequent inability to, a priori, exclude potential instruments from sets of regressors. In other words, these strategies encounter considerable difficulty when attempting to show

[12] Notice that more concentrated shareholders not only have an increased monitoring capacity, however, they also have an increased capacity to opportunistically misrepresent earnings. We plan to address this concern by evaluating the potential for any salient relationships to exhibit non-monotonicities.

that instruments relate to the dependent variable of interest *only* through their relationships with potentially endogenous regressors. Moreover, because exclusion restrictions are inherently untestable, empirical methods cannot mitigate this difficulty when the relationship of interest is just identified.[13]

At least two directions exist in which one might remedy this difficulty. First, one could develop a theoretical innovation with which to more convincingly establish an instrument's excludability. Going forward with a more credible IV approach could then check the potential for endogenous regressors to bias inference of interest. Second, one could employ empirical methods that address the potential for endogeneity bias without having to rely on theoretical exclusion restrictions.

Altonji et al.'s (2002) method allows us to move in this second direction. This method lets us measure how much of the relationship between *Auditor Independence* and regressors of interest would have to be attributable to unobservables for omitted variables to completely rationalize those relationships. To the extent that unobservables have to explain "a lot" in this regard, one can gain confidence that channels do not exist through which a regressor of interest is endogenous.

The manner in which Altonji et al.'s (2002) method develops this confidence is similar to that of the fixed-effects estimator, but Altonji et al.'s method is available to those for who cross sectional data is otherwise attractive. To see this similarity, consider the following figure.

[13] Over-identification tests can offer statistical insight to whether an instrument satisfies the exclusion restriction. However, one might be skeptical of such tests in the present setting. For example, in light of the difficulty with which we can confidently dismiss instruments as redundant regressors in the structural equation (i.e., "second stage" regression), any observed stability of coefficient estimates across just- and over-identified cases could very well reflect the condition that *both* instruments violate the exclusion restriction.

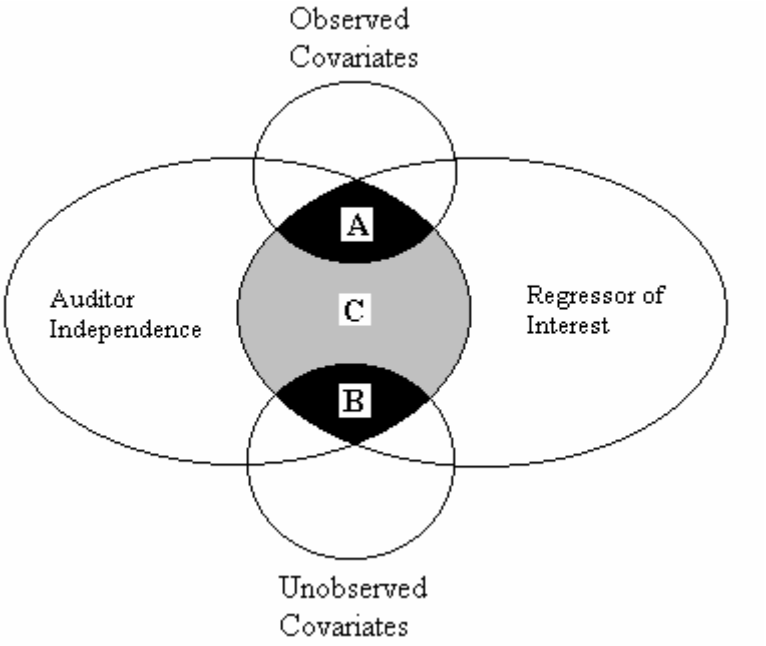

Figure 2

Altonji et al.'s (2002) method evaluates the potential for omitted variables to bias a relationship of interest by providing an index of observables (represented here by the *A* sub-area of *C*) that can give guidance to the relationship between unobservables and the regressor of interest (represented here by the *B* sub-area of *C*). If the measured relationship of interest (represented here by the area *C*) is an artifact of endogenous selection, then the specification from which that measure emerged is likely to be arbitrary. Assuming observables are selected randomly from the set of all potentially observable variables, observables and unobservables should exhibit the same capacity to rationalize the relationship of interest (i.e., $\frac{A}{B} \to 1$). Under this assumption, if observables suggest only a small fraction of the relationship of interest is artifactual, then so would unobservables and the specification from which that measure emerged is likely to have included covariates that "matter." Moreover, the random selection assumption is a conservative one. If it is invalid, it is more likely to be the case that the relationship of

interest is more correlated with the relationship between observed covariates and the dependent variable than with unobserved covariates and the dependent variable (i.e., $\frac{A}{B} \to \infty$).

The Altonji et al. (2002) index can thus address the potential for omitted variables bias, and does so in a manner similar to that of the fixed effects estimator. Notice that, in estimating the covariation of interest from a panel, a fixed-effects estimator would essentially remove from consideration the covariation that area *B* represents. Altonji et al.'s (2002) method acts as a substitute by telling us how large the "fixed effects" must be to invalidate inference from measured relationships of interest.

D. Results

Evidence that emerges from both our baseline and extended specifications is consistent with firms employing governance producing organizational features as substitutes for auditor independence. Moreover our application of Altonji et al.'s (2002) method confidently suggests that this evidence is not an artifact of omitted variables bias.

Table 2 presents the results from the baseline specification. Auditor, exchange, and industry dummy estimates are suppressed for brevity. The fraction of fees paid to auditors for audit services is positively correlated with a larger total bill paid to their auditors, as measured by the log of total fees paid to auditors (ln_auditfeestot_cl). This simply reflects the fact that audit fees are fixed in scale while consulting fees are, potentially, unlimited.

Auditor independence is correlated with the natural log of annual sales. This finding is consistent with the interpretation that managers of larger firms, with greater scope to indulge in morally hazardous action, may need to employ more dependent

auditors. This interpretation is even more compelling in light of the fact that larger firms have a larger scope of consulting needs, while their audit service needs are relatively more fixed.

Auditor independence is also negatively correlated with the fraction of shares held by CEO's. Governance derived from ownership structures where the CEO has a greater stake in the firm appears to substitute for independent auditors.

Table 2 – Base line specification results

Variable	Estimate	Error	t Value	Pr > |t|
Intercept	1.37032	0.22333	6.14	<.0001
lnsale	0.05004	0.01264	3.96	<.0001
lnemp	0.01445	0.01177	1.23	0.2201
fcata	-0.02175	0.05219	-0.42	0.6770
fdtv	-0.05170	0.05445	-0.95	0.3428
f_ceoshheld_cl	-0.40150	0.11953	-3.36	0.0008
ln_auditfeestot_cl	-0.14467	0.00924	-15.65	<.0001
froa	-0.08070	0.05491	-1.47	0.1422
vol	-0.02763	0.01666	-1.66	0.0978
F	7.24			
Adjusted R2	0.432			
N	592			

Table 3 reports results from the specification that employs and expanded set of regressors. Auditor, exchange, and industry fixed effects are again suppressed. The results of the base line specification appear robust to inclusion of the expanded set of potentially governance producing structural features.

A number of measures of board structure variables exhibit a significant relationship with auditor independence. Auditor independence appears higher in firms with larger boards (ln_dirs_cl). This relationship, perhaps, reflects a correlation between firm size and board size rather than any relationship between the governance services derived from board size and auditor independence. The fraction of the nominating

committee that is independent (f_nomcomind_i) is also positive, suggesting complementarity between auditor and nominating committee independence.

Table 3 – Extended regressor set specification results

Variable	Estimate	Error	t Value	Pr > |t|
Intercept	1.32140	0.30389	4.35	<.0001
lnsale	0.03831	0.01336	2.87	0.0043
lnemp	0.01917	0.01216	1.58	0.1156
fcata	-0.01586	0.05313	-0.30	0.7654
fdtv	-0.04628	0.05557	-0.83	0.4054
f_ceoshheld_cl	-0.38425	0.12666	-3.03	0.0025
d_audnew_i	-0.01432	0.02827	-0.51	0.6127
ln_dirs_cl	0.06844	0.03637	1.88	0.0604
ln_boardmtg_i	0.02088	0.02084	1.00	0.3168
f_boardind_cl	-0.08820	0.05896	-1.50	0.1353
d_dirtenlmt_i	0.05518	0.04184	1.32	0.1879
d_boardleaddir_i	-0.00579	0.03460	-0.17	0.8672
d_chneceo_i	-0.03083	0.01645	-1.87	0.0615
f_direxpgt15yrs_cl	-0.03515	0.04739	-0.74	0.4587
f_dironlt4boards_cl	0.08426	0.07020	1.20	0.2306
d_corpgovcom_i	0.00590	0.01467	0.40	0.6877
ln_naudcommem_cl	-0.00538	0.02943	-0.18	0.8551
f_audcomind_i	-0.08539	0.04716	-1.81	0.0708
f_nomcomind_i	0.05094	0.03097	1.64	0.1007
f_comcomind_i	0.03774	0.04456	0.85	0.3974
f_dirwshhldgs_cl	-0.02307	0.04970	-0.46	0.6426
f_shhldbyinsider_cl	-1.31005	4.46697	-0.29	0.7694
f_shhldbyinstitu_cl	4.99135	4.13100	1.21	0.2275
ln_dirbasepay_cl	0.01289	0.01530	0.84	0.3997
f_ceolopocomp_cl	0.00005320	0.02897	0.00	0.9985
ln_auditfeestot_cl	-0.14751	0.00956	-15.43	<.0001
froa	-0.06648	0.05665	-1.17	0.2411
vol	-0.01640	0.01718	-0.95	0.3402
F	5.98			
Adjusted R2	0.434			
N	592			

Governance derived from separation of the CEO and Chairman of the Board does appear to substitute for auditor independence. Auditor independence is lower in firms with separation between these two roles (d_chneceo_i = 1). In addition, the coefficient on audit committee independence (f_audcomind_i) is also negative, suggesting governance attributable to this board structural feature also may substitute for auditor independence. Finally, the fraction of board members that are independent

(f_boardind_cl) is also negatively related to auditor independence, though not significantly so at conventional levels.

The OLS estimates presented here assume an error term uncorrelated with the regressors. Of particular interest to the present argument are the negative coefficients estimated for the fraction of shares held by CEO (f_ceoshheld_cl), the dummy for separation between chairman and CEO (d_chneceo_i), and the fractional audit committee independence (f_audcomind_i). These are governance attributes widely considered under the control of the CEO or Board. If these variables are, in fact, correlated with some omitted variable subsumed in the error term, these coefficients will be biased.

Altonji et al. (2002) propose a qualitative measure for assessing coefficients suspected of being attributable to omitted variable bias. As illustrated earlier in figure 2, they begin with the assumption that other, non-suspect regressors are chosen at random from the total potential set of regressors. The interpretation is that the relationship of interest will be rationalizeable by the unobserved covariates only to the degree that observed covariates are able to do so. Following this assumption and implication, they propose a statistic that quantifies the approximate magnitude of the bias that could be attributable to omitted variables. The statistic quantifies how the value of observed variables varies with the value of the suspect variable. In the case of the fraction of shares held by the firm CEO, the potential bias is 0.019. Given the scale of our estimated coefficient is 0.384, the variation in omitted variables with the suspect variable (f_ceoshheld_cl) would have to be 20.2 (= 0.384 / 0.019) times greater than the variation in observed variables with the suspected variable in order for this coefficient to be dismissed as an artifact of omitted variable bias. Similar statistics calculated for

d_chneceo_i and f_audcomind_i also suggest it would be difficult to dismiss these coefficients as artifacts of omitted variable bias under the maintained assumption that unobserved variables are likely to be correlated with these suspect regressors to a similar degree as are observed variables.

4. Conclusion

Evidence that we develop in the present article confidently suggests that several governance producing organizational features and the independence of its auditors are codetermined. This evidence has important implications for how likely Sarbanes-Oxley-type regulations are to fulfill their public interest objectives. To be sure, it suggests that firms' strategic responses will tend to offset increases in governance that may result from such regulations.

The coefficient estimates presented in table 2 can be used to calculate the extent to which firms may 'undo' prescriptive regulation of auditor independence. Evaluated at the mean of the data used in this analysis, the Sarbanes-Oxley provision requiring complete auditor independence will 'produce governance' of 1.0 – 0.43 = 0.57, measured in fractional-auditor-independence units. In those same units, we can calculate how far firms can be expected to adjust back on each governance input margin toward their 'preferred' level of auditor independence. For example, given the mean value of f_audcomind_i is 0.904, firms forced to increase auditor independence to 100 percent can conceivably respond by decreasing audit committee independence from 90.4 percent to 0. If they did so, this set of firms could reduce their governance, in fractional-auditor-independence units, by 0.077 (= 0.904 * 0.085). Similar calculations for d_chneceo_i and f_ceoshheld_cl suggest adjustment on these margins could reduce corporate

governance by another 0.008 (= 0.27*0.031) and 0.010 (= 0.027 * 0.384), for a total of 0.095 fractional-auditor-independence units. It is important to note that the calculation presented here is derived from a local estimation. While these adjustment shares do not add up to fully offset the 0.57 unit regulatory increase in auditor independence, assuming diminishing marginal product of governance from auditor independence, they are likely to represent only a lower bound on the amount of adjustment possible on these margins.[14]

At least two interesting directions for future research exist: one normative and one positive. An interesting normative direction may be one that more precisely develops the welfare implications of mechanisms like that of Sarbanes-Oxley. Even if auditor independence and substitute organizational features are codetermined, public regulation may still have room to increase welfare. In this case, firms will employ governance factors to the extent that the private benefits of doing so equal associated costs. But as recent accounting scandals have evidenced, private governance decisions can have consequences for capital markets more generally. Consequently, it may be interesting to consider the implications of a public good aspect to capital market integrity and welfare and a regulatory approach more tailored to affecting such a public good. In this case, there may be desirable welfare objectives to be achieved through public policy aimed at increasing firm-specific levels of governance. However, our results would still suggest prescriptive regulation of Auditor Independence as legislated in Sarbanes-Oxley would be unlikely to achieve such an objective.

[14] Moreover, recall the significant relationship between auditor independence and firm size. While it is unlikely that managers could effectively engineer the 268,000 ($= \frac{e^{\left[\frac{0.475}{0.038}+\ln(5,753x10^6)\right]}}{5,753x10^6}$) times increase in sales needed to offset the 0.475 net increase in fractional-auditor-independence units of governance, such a calculation suggests prescriptive regulation of auditor independence also holds potential to affect industrial structure.

Our results also highlight an interesting positive question – i.e., if private responses to Sarbanes-Oxley are indeed likely to offset any consequent increase in governance services, then why did Sarbanes-Oxley pass in the first place? An interesting literature with which to begin answering this question is that on the political economy of financial regulation. Randy Kroszner and Raghuram Rajan (1997), for example, find evidence that the Glass-Steagall Act may have enriched industry pressure groups while reducing the economy's total surplus. Watts (1977) contemplates how incentives to produce information in political markets may interact with financial crises to facilitate the passing of such legislation. Extended to the present application, these inquiries might identify pivotal groups that can benefit from a regulatory separation of audit and consulting services, and how a financial crisis may have let coalitions form that could implement such a separation, even if doing so might diminish social welfare.

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