Auditor Preference

Karl Hackenbrack
Owen Graduate School of Management
Vanderbilt University

Mikhael Shor
Department of Economics
University of Connecticut

February 2012

Abstract

We analyze theoretically and empirically the effect of preference policies, which favor some auditors over others for reasons unrelated to the audit. For example, an auditee may prefer minority-owned auditors, all else equal. We construct an analytical model of the competitive bidding process for audit services. We show that preference policies can sometimes improve the audit procurement process by encouraging price concessions from non-preferenced auditors. We test model predictions in a setting amenable to empirical identification of preference; many municipalities prefer local firms over more distant firms. We find strong evidence of local preference, with local firms earning a 13 percent fee premium over non-local firms. We show that audit fees depend not only on the winning firm's capabilities but also crucially on the winning firm's *incremental* capabilities over the next best alternative. Lastly, we identify conditions under which preference policies benefit audit procurement outcomes.

Keywords: audit markets, auditor selection, competitive bidding, local preference

JEL: M42, D44, M48, H83

INTRODUCTION

Central to debates about auditor performance is the effect of the competitive environment on auditor selection. Much of the literature addresses impediments to achieving the competitive ideal, whether the impediment is structural (e.g., market domination by a handful of firms, Penno & Walther 1996), regulatory (e.g., bans on competitive negotiation, Hackenbrack et al. 2000), imposed by the profession through its codes of conduct (e.g., bans on solicitation, Chaney et al. 1997), or a consequence of auditor behavior (e.g., low-balling, DeAngelo 1981*a*). We study both theoretically and empirically an auditee-imposed restriction on the auditor selection process, a preference policy.

An auditee favoring some auditors over others for reasons unrelated to the audit is what we term a "preference." Favoring a personal connection is one type of preference.[1] Preferring to contract with minority-owned accounting firms, all else equal, is another. In procurement, organizations sometimes adopt a preference for local firms to advance broad goals, like a benevolent desire to support the local economy (Branco 1994), appeals to patriotism (e.g., "Buy American," Lowinger 1976), community ties, political aims (Mougeot & Naegelen 2005), and so on.

Since any preference manifests in the preferenced firm sometimes winning when a non-preferenced firm is better suited, one is tempted to conclude that a preference policy harms auditor procurement. We show that this need not be the case. Disadvantaging viable, capable, audit firms can actually benefit audit procurement by encouraging price concessions from the non-preferenced firms. The consequences of a preference policy depend critically on the competitive environment for audit services.

We construct an analytical model of the competitive bidding process for audit services and consider the audit-related consequences of preferring some firms. Not surprisingly, we find that an auditee driven entirely by a price-minimizing objective is always harmed by a preference policy. This is quite intuitive. If an auditee wishes only to minimize the price paid for an audit, any selection criteria aside from price will harm this objective. Alternatively, an auditee might assign varying values to the audits of competing firms. Our notion of value encompasses the traditional notion of audit quality—detecting and reporting material misstatements (DeAngelo 1981*b*)—benefiting the auditee through more favorable borrowing terms and a reduction in litigation (Mansi et al. 2004, Palmrose 1988). Value also encompasses benefits associated with an auditee's working relationship with the audit firm, including the timeliness of the auditor's work, quality of communication, and notification of emerging issues throughout the year.[2] When an auditee considers both audit value and price, we show that a preference policy need not be harmful as it induces non-preferenced firms to bid lower. A preference

[1] For example, managers in the Tennessee Comptroller's Office claim that the best predictor of an auditor change is a recent mayoral election, with the newly chosen auditor often having ties to the newly elected mayor (private conversations with the authors).

[2] Representative audit firm selection criteria, City of Gainesville, Florida "Request for Proposals for Professional Auditing Services," 2000.

balances the losses from allowing a preferenced firm to win when it is not optimal to do so against the gains from encouraging non-preferenced firms to accept lower prices when they win. Consequently, a preference can further the auditee's non-audit objectives, such as having minority-owned firms win more often, while simultaneously increasing its expected surplus from the audit engagement.

Empirically identifying auditor preference is challenging as preferences need not be formal or disclosed. We utilize a dataset of municipal audits not because we want to learn about municipal audits *per se*, but because it affords several empirical advantages. Municipal audits allow for empirical identification of (i) competing auditors and (ii) a specific type of preference, local preference, by which local auditors may be preferenced to non-local firms. Many examples of local preference can be found formally in state and municipal laws, and informally in numerous city council deliberations.[3] We add three measures of the competitive environment to a traditional audit fee model to identify key features of our analytical model.

First, we include a variable for the number of competing firms and find that audit fees decline with the number of viable competitors. Surprisingly, the audit literature is equivocal on the influence of competition. Ettredge & Greenberg (1990) and Bandyopadhyay & Kao (2004) find fees increase with industry concentration while Copley et al. (1994) and Pearson & Trompeter (1994) find that industry concentration has no effect on audit fees. Bandyopadhyay & Kao (2004) conjecture that more competition increases the auditee's bargaining power with respect to smaller audit firms, but conclude that "it remains a puzzle why, like Pearson and Trompeter 1994, we do not find any support for the prediction that audit fees charged by the Big 6 auditors are significantly higher in the more concentrated local markets" (p. 554). However, bargaining power is not only a function of the number of or concentration of competitors, but of the level of their asymmetry (Werden & Froeb 1994, Cantillon 2008). The existence of many small audit firms may not offer a credible threat when negotiating with a Big X firm. In a competitive environment, the concessions expected from a firm depend on the next best alternative. Accordingly, we introduce a second variable representing the value difference between the top two firms. We find that the price paid to an auditor is increasing in its value advantage over its rivals, indicative of a surplus auction. Lastly, we create an indicator for local firms, and find that local firms earn a 13% fee premium, all else equal.

We contribute to the literature in the following three ways. First, we empirically demonstrate that preference policies have economically and statistically significant impacts on the price paid for audit

[3]For example, the mayor of Los Angeles announced his support for a recent local preference policy to "stimulate the local economy and create jobs." Minutes from a meeting in Randolph County, NC, read "We must select a new audit firm. The County Commissioners support local businesses whenever possible." In Hibbing, MN, an audit contract with a non-local firm was shortened to one year by City Council "in order for local firms, if interested, to bid for future City audits." (Los Angeles Local Preference Ordinance, Sun Valley Chamber of Commerce, 10 September 2010; Randolph County Commissioners Minutes, 4 February 2002; Minutes of the Hibbing City Council Meeting, 17 January 2006). Similarly, in Canada, municipalities adopt either formal local preference policies, or informal ones by which bids are adjusted after they are unveiled (Bradford 2009).

services. Second, while others have demonstrated that higher fees are paid to higher-valued firms (e.g., the Big X fee premium), we find both theoretically and empirically that more important than a firm's *absolute* value is its value *advantage* over its rivals. Lastly, we identify theoretically the conditions under which preference policies may benefit audit procurement outcomes. While our empirical setting is the municipal audit market, our contribution addresses the more general question of the impact of preference in audit procurement, be it for noble or nepotistic reasons.

We present our analytic model of competition and derive empirical implications in the next section. We present the results of the empirical identification in the third section. We conclude with remarks about generality and prescriptions for when preference policies are likely to benefit audit procurement.

AN AUCTION THEORY OF AUDITS

Consider $n \geq 2$ firms competing for an audit engagement. Each firm has a cost, c_j, reflecting the lowest price at which it can profitably provide the audit, drawn independently from the uniform distribution on $[\bar{c} - \theta, \bar{c} + \theta]$. We interpret $\bar{c}$ as the predicted cost given client-specific engagement characteristics such as audit complexity and the auditee's size and internal control structure. The parameter θ, $\bar{c} > \theta > 0$, represents auditor-specific heterogeneity, perhaps due to uncertainty about labor costs, employee availability, or client-specific expertise.

Each firm has a value to the auditee, v_j.We assume these values are sufficiently high to ensure that each firm can profitably supply audit services, $v_j > \bar{c} + \theta$. Firm values and the distribution of costs are common knowledge, but c_j is known only to firm j. Firms are risk-neutral. For expositional simplicity, we assume that firms have the same distribution of costs, though our insights do not hinge on this assumption. As discussed in the conclusion, an appropriate relabeling can accommodate larger firms having either higher or lower average costs than smaller firms.

Auditors are selected based on the price paid, p, and value, v_j. The relative importance of each varies. We model two characterizations of auditor procurement. In one, an auditee chooses an auditor by minimizing the price paid (a cost auction). In the other, an auditee chooses an auditor by maximizing total surplus, $S \equiv v_{winner} - p$, the difference between the value of the winning auditor and the price paid (a surplus auction). The prevailing view is that corporate audits are a quality differentiated service (a surplus auction)[4] while many government entities effectively conduct cost auctions, selecting auditors primarily on the basis of price (GAO 1987). Thus, both extremes on the price/value continuum are plausible, as are points in between.

[4]The literature is replete with examples of higher fees paid for purportedly higher quality audit services (e.g., Craswell et al. 1995). Others find evidence of firm differentiation in auditor selection (e.g., Simunic & Stein 1987), stock price reactions to earnings surprises (e.g., Teoh & Wong 1993), lawsuits against auditors (Palmrose 1988), and cost of debt financing (Mansi et al. 2004).

The expected price paid in the cost auction is the same for all typical auction mechanisms, including first-price, second-price, English, and Dutch auctions (Myerson 1981). However, these mechanisms are not equivalent in surplus auctions when firms have different values (e.g., Maskin & Riley 2000). Asymmetric first-price auctions are not amenable to analytical solutions except in very stylized cases (Plum 1992). For the surplus auction, we present analytic results for a second-price (or equivalently, English) auction, and offer numerical solutions for the first-price (or equivalently, Dutch) auction.

Preference in Cost Auctions

We first consider the case in which the auditee selects the auditor that provides the lowest bid.

Lemma 1. *In the equilibrium of a cost auction without a preference policy, the expected price paid for an audit is given by:*

$$p^{cost} = \bar{c} - \frac{n-3}{n+1}\theta \tag{1}$$

which is decreasing in n*.*

The proof of this and other results are in the appendix.

The lemma is consistent with one's intuition, namely, the expected price paid for an audit depends not only on client-specific engagement characteristics, captured by $\bar{c}$, but also on the number of competing firms.[5]

We now consider the influence of a preference policy. An auditee may show preference for firms in the auditor selection process by sharing with them the bids of non-preferenced firms, allowing them to re-bid if a non-preferenced firm would otherwise win, casually letting a preferenced firm know what it will likely take to win, and so on. These can be represented by preferenced firms competing in an auction in which the best non-preferenced firm's bid serves as a reserve price, akin to models of procurement auctions with a preferenced supplier (Burguet & Perry 2007, 2009). We term $n-1$ bidders *insiders* who are the preferenced firms, and the remaining bidder the *outsider*. The assumption of one outsider allows for analytically tractable solutions, since derivation of equilibrium bids otherwise involves transcendental equations without closed form solutions. Effectively, the one outsider proxies for broader competition among multiple non-preferenced firms prior to allowing insiders to match or beat the lowest outsider's bid, typical of "second chance" policies observed in practice. For example, the City of Kalamazoo, Michigan, stipulates that the lowest local bidder "is afforded the opportunity

[5] As more firms compete for the engagement, the likelihood increases that firms obtain lower cost draws. Because bids are increasing in costs for any typical auction mechanism, increased competition decreases the expected price paid for an audit. With only two firms, the expected price is above the average cost, $\bar{c}$. In the limit, as $n \to \infty$, the price converges to $\bar{c} - \theta$, which is the lowest possible cost any firm can realize for the engagement. Bandyopadhyay & Kao (2004) find precisely this link between the number of competing firms and the audit fee. Researchers studying auditees' choices on whether to put out for bid an audit contract conclude that competitive bidding induces lower bids (Johnstone et al. 2004) and lower audit prices (Rubin 1988).

to become the successful bidder if it agrees to reduce its bid to match the lowest responsive bid." Hilliard, Ohio, applies a similar process for professional services, allowing a local firm to win if "the Local Business agrees to reduce its bid to match the lowest bid submitted by the Non-Local Business."[6]

First, the outsider places a bid. Second, insiders compete in an auction with the outsider's bid serving as a reserve price. The outsider receives the engagement at a price equal to its bid if no insider is willing to accept the engagement at that price. Should only one insider realize a cost lower than the outsider's bid, it would win the engagement at a price equal to the outsider's bid. If more than one insider realizes a cost below the outsider's bid, the reserve price equal to the outsider's bid is non-binding, and the inside firms compete for the engagement.

The expected price is provided in the following lemma.

Lemma 2. *In the equilibrium of a cost auction with a preference policy, the expected price paid for an audit is given by:*

$$p^{cost,\, pref} = p^{cost} + \left[\frac{4}{n(n+1)}\left(1 - \left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1}\right)\theta\right] \tag{2}$$

The price paid with a preference policy is equal to the price paid without a preference policy plus an additional term which is positive and decreasing in the number of firms. As n tends to infinity, the price premium associated with preference vanishes. Intuitively, having a large supply of preferenced firms implies that the auditee can get a good price even without outsiders. The following proposition summarizes the influence of a preference policy.

Proposition 1. *When auditors are chosen on the basis of cost, introducing a preference*

(i) provides inside firms a greater chance of winning and the outside firm a lower chance of winning,

(ii) provides inside firms a higher average audit price when they win,

(iii) does not change the outsider's average audit price conditional on winning, and

(iv) increases the expected price paid for an audit.

Because a preference policy allows an insider to win even when it is not the lowest-cost firm, insiders win more often and at higher prices than without a preference policy. When the outsider has the lowest cost, the proportion of auctions it nevertheless loses is significant, falling between $\frac{1}{2}$ (when $n = 2$) and $1 - e^{-1} \approx 0.632$ (as n gets large).[7] In our data, outsiders win 66 percent of engagements where local preference was statutorily banned, but 38 percent in jurisdictions not subject to the ban. The proposition indicates that the expected price paid to the outsider is independent of the existence of

[6] City of Kalamazoo Local Preference Policy, Department of Management Services, Purchasing/Risk Management Division, 2009; Hilliard City Ordinance §129.03(d), 2007.

[7] See Corollary 1.1 in the appendix for derivations.

a preference policy. The only difference for the outsider is the decreased probability of winning when preference policies are introduced.

The effect of a preference policy in cost auctions is intuitive. A preference policy is antithetical to the goal of minimizing the price paid. Any selection criteria aside from price will harm this goal. Preferenced firms win more often than in the absence of a preference, and at higher prices. However, the effect of preference in a surplus auction is much more nuanced, and may improve audit procurement in settings identified in the next section.

Preference in Surplus Auctions

We now turn to settings in which auditees select firms on the basis of surplus. For expositional simplicity, we concentrate on two firms. In the appendix, we present the general case which provides the same insights as the two firm case at the expense of substantial algebraic overhead. Let v_o and v_i denote the two firms' values, and let b_o and b_i denote their bids.[8] It will be convenient to define

$$\delta = \frac{v_o - v_i}{2\theta}$$

as the normalized difference in firm values. When the firms are of equal value ($\delta = 0$), the surplus auction is identical to the cost auction.[9]

Recall that we offer analytical results for second-price and English auctions, and numerical results for first-price auctions. Much like a second-price cost auction awards the engagement to the lowest bidder at a price equal to the second-lowest bid, the second-price surplus auction awards the engagement to the firm with the largest difference between its value and its bid at a price that provides the auditee a surplus equal to the second-highest value-bid difference. When $v_o - b_o > v_i - b_i$, firm o wins as it has the highest value-bid difference. For example, consider two firms with the values \$40,000 and \$50,000. If the lower-valued firm has a cost of \$10,000, the maximum surplus it can profitably generate is \$30,000. The higher-valued firm can generate the same surplus with any bid below \$20,000, and win the audit engagement. In equilibrium, firms bid their costs. If firm o wins, the resulting price, $p = c_i + v_o - v_i$, is the rival firm's cost plus firm o's value advantage.

[8] Without a preference policy, it does not matter whether a firm is an insider or outsider. We use the subscripts o and i in this section only for notational consistency.

[9] We concentrate on the interesting cases for which $|\delta| \leq 1$. When $|\delta| > 1$, the higher valued firm is preferred at *any* price and could simply bid $\bar{c} + \theta$, the highest possible cost, while still assuring that it wins.

Lemma 3. *In the equilibrium of a second-price or English surplus auction without a preference policy, the expected price paid for an audit and the expected surplus for the auditee are given by:*

$$p^{surplus} = p^{cost} + \frac{\delta^2(9-4|\delta|)}{3}\theta \tag{3}$$

$$S^{surplus} = \frac{v_o + v_i}{2} - \bar{c} - \frac{1}{3}\theta - \left(\frac{3-|\delta|}{3}\right)\delta^2\theta \tag{4}$$

(i) price is increasing in $|\delta|$*, and*

(ii) surplus is increasing in the average value of the firms, $\frac{v_o+v_i}{2}$*, and decreasing in* $|\delta|$*.*

The auditee's ability to extract surplus from the winner depends on the presence of a bidder offering a close substitute, which occurs when $|\delta|$ is small. As $|\delta|$ increases, so does the price paid by the auditee. Holding constant the average value of the competing firms, the surplus expression suggests this price increase is accompanied by a decrease in the auditee's surplus. These comparative statics also appear to hold for our numerical solutions in first-price auctions (see appendix).

The firm with the highest difference between its value and cost will win the audit engagement. An auditee which has a high-valued firm competing against a low-valued firm is not necessarily better off than one which has two moderate-valued firms competing for the audit engagement. Should the high-valued firm win the engagement in the first setting, the lack of a significant competitor suggests the high-valued firm, not the auditee, will extract most of the firm's value advantage in the form of a higher audit fee paid.

We now consider the influence of a preference policy. The outsider submits a bid, b_o. If the auditee accepts this bid, it realizes a surplus of $v_o - b_o$. The insider is afforded the chance to match the outsider's surplus and wins the audit engagement whenever it can offer the same surplus profitably, i.e., if $c_i \le b_o - v_o + v_i$. Thus, the auditee's expected surplus is the same regardless of the identity of the winner.

Lemma 4. *In the equilibrium of a surplus auction with a preference policy, the expected price paid for an audit and the expected surplus for the auditee are given by:*

$$p^{surplus,\, pref} = p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta-1)}{2}\theta \tag{5}$$

$$S^{surplus,\, pref} = \frac{v_o + v_i}{2} - \bar{c} - \frac{1}{2}\theta \tag{6}$$

(i) surplus is increasing in the average value of the firms, $\frac{v_o+v_i}{2}$*, and is independent of* δ*,*

(ii) price is decreasing in δ *when* $0 \le \delta < \frac{1}{4}$ *and increasing when* $\delta > \frac{1}{4}$*, and*

(iii) there exists a δ'*,* $0 < \delta' < 1$*, such that the price paid to the outsider is greater than the price paid to the insider if and only if* $\delta > \delta'$*.*

Since the insider wins whenever he is willing to match the outsider's bid minus the value differential, the auditee is indifferent between the insider and outsider winning from a purely audit procurement perspective. However, the prices paid the insider and outsider differ, and vary with the value advantage. As δ increases, the outsider receives a higher price and wins more often while the insider receives a lower price.

Surplus increases in the average value of the firms, $\frac{v_o+v_i}{2}$, with and without a preference policy, but is sensitive to the difference in firm values, δ, only absent a preference policy. Without a preference policy, the benefits of an outsider's value advantage accrue to the outsider—not the auditee—through higher prices. With a preference policy, the outsider incorporates only part of its value advantage into its bid, in essence sharing its value advantage with the auditee. When the outside firm's value advantage is very small, a preference policy inordinately favors the inside firm and allows it to win too often, even in cases where the outsider offers a higher surplus. When the outsider's value advantage is very large, the outsider usually wins, with or without a preference policy, but a preference policy encourages lower bids, improving the auditee's surplus. This suggests a cross-over point where the benefit of a preference policy begins to accrue to the auditee. The following proposition summarizes the influence of a preference policy.

Proposition 2. *When auditors are chosen on the basis of surplus, introducing a preference policy*

(i) increases the expected price paid for an audit and decreases the auditee's surplus for low levels of differentiation ($\delta \lessapprox .20$),

(ii) decreases the expected price paid for an audit and decreases the auditee's surplus for intermediate levels of differentiation ($.20 \lessapprox \delta \lessapprox .44$), and

(iii) decreases the expected price paid for audit services and increases the auditee's surplus for high levels of differentiation ($\delta \gtrapprox .44$)

The proposition demonstrates that a preference policy can have a beneficial effect for the auditee, both reducing the price paid and increasing the surplus from audit procurement. This occurs only when the insiders are sufficiently inferior to outsiders. The introduction of a preference has two effects: it occasionally awards the engagement to an insider even when it is not the better firm (which decreases surplus) and encourages the outsider to accept lower prices when it wins (which increases surplus). The proposition indicates that the second effect dominates the first for sufficiently large δ.

Together, the above propositions show that preference policies never benefit an auditee that selects auditors on the basis of price alone, but may sometimes benefit an auditee balancing both value and price. In the next subsection, we examine the empirically testable predictions that allow us to identify the auction model that is most descriptive of practice.

EMPIRICAL AUCTION MODEL IDENTIFICATION

Empirical Setting

While our focus is on auditor preferences, generally, such preferences are often not formalized, and public company board deliberations are not observable. We analyze the market for municipal audits, which allows for identification of the key features of our model, for three reasons.

First, the objectives of price minimization and surplus maximization are both clearly plausible in the municipal audit market. While some municipalities, like most public companies, purport to view audits as a differentiated service, others have been accused of aiming only to complete the minimum statutory requirement at the lowest cost (GAO 1987). This may entail, for example, accepting the lowest bid from among auditors capable of meeting minimum satisfactory quality in accord with GAAS. Selecting auditors on the basis of price was judged sufficiently worrisome and pervasive to earn censure from the General Accounting Office (GAO 1987).

Second, the market for municipal audit services is likely to be limited to a geographic region around each municipality. Additionally, examples abound of municipalities showing preference to local firms over more distant firms. Public databases and geocoding technologies allow us reasonably to identify competing audit firms in the municipal market and determine whether they are local to a municipality.

Third, an ideal empirical strategy would allow comparisons between municipalities that have local preference policies to those that do not. However, as local preferences need not be codified, and often are not, it is difficult to differentiate municipalities that treat all bidders identically from those that do not. To address this, we take advantage of a natural experiment. Up until 1993, the State of Florida banned solicitation and competitive bidding for audit services. Further, the statute banned the inclusion of fee information in auditors' proposals, and required auditees to negotiate the fee with only the best auditor selected solely on ability to perform the audit (Florida Statute §473.317(1)). In 1993, the Florida Supreme Court ruled that the ban on price competition was unconstitutional (State of Florida v. Rampell 1993). The Florida law effectively prohibited the type of competition that is fundamental to the strategic bid formation process modeled because it required auditees to maximize audit value as opposed to maximizing surplus or minimizing cost. The legislative intent was to thwart audit procurement practices that relied on criteria such as a local preference. As we would not expect to see a local preference under this ban, comparison of Florida municipalities to those in other states provides an important test of our theory. Thus, we use data from 1992, the last year of the statutory ban prior to the Supreme Court decision.

Auction Model Identification

Empirically, we observe neither auditors' costs nor the surplus obtained by the municipality. However, we do observe the price paid for audit services, whether the winning firm is local to the municipality, and a proxy measure for a firm's value. These three items lead to empirically testable predictions which differentiate among our auction models and the presence or absence of local preference. First, prices increasing in δ are descriptive of surplus auctions but not of cost auctions. Second, a difference between prices earned by insiders and outsiders suggests a local preference.

Figure 1 presents the models' empirical predictions for the price paid to insiders and outsiders as a function of δ.[10] In a cost auction without local preference (panel a), insiders and outsiders receive the same price, and this price is independent of δ. In a cost auction with local preference (panel b), the increased probability of winning for the insiders is achieved by allowing them to win at higher prices. In a surplus auction without local preference (panel c), a firm's price depends on its value advantage. When the outsider has a higher value ($\delta > 0$), the outsider earns a higher price; likewise, when $\delta < 0$, the insider earns a higher price. Lastly, a surplus auction with local preference (panel d) exhibits both a sensitivity to δ and a price advantage for the insider; when firms are similarly-valued, the insider receives a higher fee (as in panel b), but the outsider's price increases with its value advantage, exceeding the insider's price for sufficiently high δ.

Empirically, we add to a traditional audit fee model variables for the location of the winning firm and the value advantage of outside over inside firms. The pattern of parameter estimates on these explanatory variables allow us to differentiate among our auction models.

Sample Selection and Design

We began with the sample of 414 municipal 1992 annual GAAS financial statement audits across eight states used in the audit fee model reported in Hackenbrack et al. (2000). Two atypical regulations discussed above characterized the Florida audit services market in 1992—the ban on fee bidding and on solicitation.[11] No other state had a ban on fee bidding. Three other states banned direct, in-person, uninvited solicitation—Louisiana, Mississippi, and Texas—all southeastern states. Neither regulation was applicable in the southeastern states Alabama, Georgia, South Carolina, and North Carolina. Although the analytical model is agnostic about the effects of solicitation restrictions as the results depend on competitive bidding, whether invited or not, the empirical model distinguishes the three regulatory regimes with an indicator variable for Florida municipal audits (FLORIDA) and an indicator variable for Alabama, Georgia, South Carolina, and North Carolina municipal audits

[10] Expressions for the pictured price relations are given by (1) for panel (a); (15) and (17) for panel (b); (30) and (34) for panel (c); and (49) and (51) for panel (d).

[11] Rule 21A-24.02 (2), Florida Administrative Code, provided "a licensee shall not by any direct, in-person, uninvited solicitation solicit an engagement to perform public accounting services . . . where the engagement would be for a person or entity not already a client of the licensee . . . ." The U.S. Supreme Court in Edenfield v. Fane (1993) ruled the solicitation ban unconstitutional.

(BASELINE STATES) because the solicitation restrictions and Florida's ban on price competition have been shown to affect audit fees paid (Hackenbrack et al. 2000).

Data were obtained from public sources, a U.S. Census Bureau warehouse, and a questionnaire circularized in December 1995. Some states do not require sufficiently small municipalities to have audits. Municipalities with populations less than 5,000 or total expenditures less than \$100,000 were excluded, as these were the minimum conditions requiring an audit in all sample states. The number of engagements meeting the selection criteria in each market is 180 (FLORIDA), 407 (Louisiana, Mississippi, and Texas), and 341 (BASELINE STATES). Four hundred seventy-seven surveys were returned with responses (rates) by regulatory regime of 122 (68 percent), 193 (47 percent), and 162 (48 percent).

The primary source of data on the supply of audit firms is the American Business Disk (1994), a database of all companies listed in U.S. telephone directories.[12] We culled from the American Business Disc all companies in our sample states with the primary Standard Industrial Classification code 8721-01 (accountants). The correlation between the number of firms in our data set and the number of firms in the U.S. Census Bureau's 1994 Economic Census ZIP Business Patterns by zip code is .81 ($p < .0001$), which is quite high given the Census Bureau uses a four-digit and we use a six-digit SIC code.[13] We define the relevant audit market, SUPPLY, as the log of one plus the number of firms within 30 miles of the municipality served. Distance is measured linearly from the centroid of the city hall's zip code to the centroid of the audit firm's zip code.[14]

Our use of 30 miles is motivated by the notion that an appropriate market size is the smallest radius that can be drawn around engagements that contains some critical percentage of suppliers. Accepted percentages range from 75 percent to 90 percent (Elzinga & Hogarty 1973, 1978) with a radius that includes 80 percent of the suppliers the most common metric in antitrust disputes (Harris & Jorde 1984) and in case law (e.g., FTC v. Freeman Hospital, 1995). Seventy-five, eighty, and ninety percent of the winning audit firms in our sample are within 24, 28, and 43 miles of city hall, respectively. This range includes distances used by other researchers (Bandyopadhyay & Kao 2004), and our results are robust to changing the radius within this range. The tabulated results are based on a radius of 30 miles because it both corresponds to the most common metric used and empirically yields the highest F-statistic. The results are also robust to eliminating all firms with less than 5 employees or more than 500 employees, indicating the reported results are not driven by very small or very large firms.

[12] All references to an 'audit firm' are references to an 'office of an audit firm.' The American Business Disc lists offices of companies, not companies. Consequently, all associated data is compiled at the level of the office primarily responsible for the audit engagement. The primary office was determined from the audit opinion. The distance from a firm to a city hall is not sensible as firms with multiple offices have multiple addresses.

[13] The Census Bureau counts include all sub-codes under 8721 ('-01' through '-06'), including bookkeeping, billing, payroll, tax consulting, and other non-audit services, while we restrict our sample to SIC code 8721-01 (accountants).

[14] Geographic software can calculate straight-line distances between two addresses if the address information is in a very specific format which differs from the format used in American Business Disc. It is impractical to compile address data for all 25,591 firms in our data set. Throughout the manuscript, distance measurements refer to the distance between zip code centroids. These measures have been used for market delineation by scholars (Brooks 1995) and in legal cases FTC v. Freeman Hospital, 911 F.Supp. 1213 (W.D. MO. 1995), affd 69 F.3d 260 (8th Cir. 1995).

Test Variables

Insiders (i). While the concept 'supply' depends critically on what audit firms judge to be the market, the concept 'insider' considers only the municipality's perspective. That is, what do mayors, city managers, city commissions and their constituencies consider a local service provider? The indicator variable INSIDER equals one if (i) the firm's mailing address includes the municipality's name or (ii) the firm is within 10 miles of city hall. This two part definition is warranted because city hall is likely to consider audit firms in the community similarly to those firms literally within the municipal's legal boundary. The results are robust to defining insiders by only criteria (i) or (ii) above, using a radius of 5 or 15 miles, eliminating the 12 observations without an insider firm, and excluding observations in which a Big 6 firm was the winner.

Value advantage (δ). Audit quality is a primary driver of value. Ever since DeAngelo (1981*b*) suggested the link, researchers have used audit firm size as a proxy for audit quality. This is not a mere econometric convenience, as stakeholders who cannot directly observe audit quality also rely on firm size as a proxy (Dopuch & Simunic 1982), which makes larger firms more valuable to the municipality. By far, the most used empirical proxy is the dichotomous Big X variable. Other proxies have been suggested, all relating to an audit firm's size, including revenue (Francis & Wilson 1988), number of clients (DeAngelo 1981*b*), and number of employees (O'Keefe & Westort 1992).

Likewise, our measure of the value advantage of outside firms over local firms, DELTA, is a size measure. It is based on the number of firm employees as reported in the American Business Disc (1994).[15] DELTA is the difference in the (logged) number of employees between the second largest firm within 10 to 30 miles of city hall and the second-largest firm within 10 miles. Our results replicate if we instead use the largest firms. We use the second largest firm in the tabulated results because of the fundamental result in auction theory that an auction outcome (e.g., price) depends on the expectation of the relevant metric (e.g., cost, surplus) of the second-best bidder (Milgrom & Weber 1982). The radii 10 and 30 are consistent with the definitions of 'supply' and 'insider.' Our results are robust to changing the radii, along with consistent changes to the radii for 'supply' and 'insider.' For completeness, we include the traditional proxy, BIG6, though Big X firms are marginal players in the municipal audit market and an indicator variable cannot capture gradations of value differences, particularly among non-Big 6 firms.

[15]'Number of employees' is a categorical measure with 9 categories: 0–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499, 500–999, more than 999. We used the log of the midpoint of the ranges (1,200 for the ninth category) in our analysis. An alternate size measure, equal to firm revenue, is highly correlated with number of employees (highly significant Pearson and Spearman rank correlations, $p < 0.001$).

Empirical Model

We added our supply and test variables to the audit fee model reported in Hackenbrack et al. (2000) which itself is a variant of the empirical models found in the municipal audit fee literature:

$$\begin{aligned}\text{AUDIT FEE} = {} & \beta_0 + \beta_1\text{EXPENDITURES} + \beta_2\text{MANAGER} + \beta_3\text{DEBT/EXPENDITURES} \\ & + \beta_4\text{YEAR3} + \beta_5\text{BIG6} + \beta_6\text{SPECIALIZATION} + \beta_7\text{CAEFR AWARD} \\ & + \beta_8\text{BASELINE STATES} + \beta_9\text{FLORIDA} \\ & + \beta_{10}\text{SUPPLY} + \beta_{11}\text{INSIDER}_{\times\text{ NOT FLORIDA}} + \beta_{12}\text{INSIDER}_{\times\text{ FLORIDA}} \\ & + \beta_{13}\text{DELTA}_{\times\text{ INSIDER}} + \beta_{14}\text{DELTA}_{\times\text{ OUTSIDER}} + \epsilon \end{aligned} \tag{7}$$

Detailed variable descriptions, data sources, motivation for the variables, and descriptive statistics are presented in Table 1. The first three lines (variables 1 through 9) are the variables from Hackenbrack et al. (2000). To these, we add SUPPLY and our test variables through two interactions: (i) the interaction of DELTA with INSIDER (and with OUTSIDER, the complement of INSIDER) because they are diagnostic of the auction format (section), and (ii) the interaction of INSIDER and FLORIDA as we do not expect a local preference effect in Florida (section).

Of the initial sample of 414 observations, 409 observations remain after compiling data on the distance between the winning audit firm and city hall. The patterns of correlations (untabulated) among all variables are comparable to those reported in other studies and do not suggest a collinearity problem. Results of the Belsley et al. (1980) variance decomposition support this finding.

Seventeen of the 409 observations have studentized residuals greater than two in absolute value. Cook's D for each outlier exceeds the sample size-adjusted cutoff recommended by Belsley et al. (1980), indicating each outlier has a substantial influence on a regression fit. Scatter plots reveal that AUDIT FEE for the outliers is significantly different than expected based on EXPENDITURES alone. The audit fee paid on ten of the engagements was so low that the winning firms likely would not have expected the audit fee to cover the cost of the audit, so are the result of a process not covered by the analytical model. The audit fee paid on seven of the engagements was extremely high and might reflect measurement error such as survey responders including fees paid for non-general government units like utilities, airports, housing authorities or for non-audit services even though instructed not to do so. To address concerns that the results are unduly influenced by these observations, we present the results of both an ordinary least squares regression (OLS) and a robust regression. The specific method used, MM estimation (Yohai 1987), is robust to outliers in both the response and explanatory variables. Other popular robust methods yield virtually identical results.

Regression results are reported in Table 2. We present the parameter estimates and associated test statistics for a robust regression on all 409 observations and the parameter estimates and associated test statistics for an OLS on the 392 observations not identified as influential observations. Eliminating all but the four most egregious outliers yields virtually identical OLS results.

The robust regression and OLS results are so similar that we will couch our discussion of the empirical results in terms of OLS. The resulting model adjusted R^2 (.80) and F-statistic $(112, p < .0001)$ compare favorably to those associated with audit fee models reported elsewhere. The five variables added to the empirical model reported in Hackenbrack et al. (2000) are jointly significant ($p = .0019$). Not surprisingly, competition matters, with an increase in the number of firms (SUPPLY) reducing the price paid. This is consistent with the finding for non-Big X firms in Bandyopadhyay & Kao (2004). Predicted audit fees fall by 0.05 percent with a 1 percent increase in supply; predicted fees at the 75^{th} percentile of SUPPLY are 10 percent lower than at the 25^{th} percentile.

Empirical Results

Local Preference. All else equal, higher audit fees are paid to local firms than to non-local firms in non-Florida jurisdictions. The coefficient on INSIDER $_{\times \text{ NOT FLORIDA}}$ is positive and statistically significant ($p = .0091$); insider firms are predicted to earn a 13 percent fee premium over outsiders of the same value. This relationship does not exist in Florida where price competition was prohibited ($p = .1762$ for the coefficient on INSIDER $_{\times \text{ FLORIDA}}$). This result suggests that local firms are provided a preference in markets that allow competitive bidding. Thus, panel (b) or panel (d) of Figure 1 is most descriptive of the price paid. Distinguishing between panels (b) and (d)—between a cost and a surplus auction—requires examining whether firm value plays a role in determining the price paid.

Value Advantage. The evidence indicates the price paid for municipal audit services when an outside firm wins is sensitive to the outsider's value advantage, suggesting a surplus auction. The coefficient on DELTA$_{\times \text{ OUTSIDER}}$ is positive and statistically significant ($p = .0065$). Predicted audit fees for outside winners rise by .04 percent when our measure of the outsiders' value advantage increases by 1 percent. In our sample, this implies that outsiders at the 75th percentile of DELTA earn 12 percent higher fees than at the 25th percentile. The predicted audit fees for inside winners are not sensitive to the outsiders' value advantage ($p = .4942$ for the coefficient on DELTA$_{\times \text{ INSIDER}}$).[16] While we exercise caution interpreting the lack of a variable's significance, one explanation may be a more extreme local preference than modeled. If some municipalities only consider insiders, the existence of higher-valued outsiders would not require local auditors to bid lower to match the outsider's value advantage.

[16] The parameter estimate on DELTA$_{\times \text{ INSIDER}}$ is $-.0208$ and approaches statistical significance ($p = .0990$) when the largest firm is used to compile the proxy DELTA instead of the second largest firm.

In a surplus auction with local preference, Lemma 4 suggests that the price received by outsiders should exceed that of insiders only for a sufficiently large outsider's value advantage. This corresponds to Figure 1(d) with INSIDER $_{\times \text{ NOT FLORIDA}}$ as the intercept and DELTA $_{\times \text{ OUTSIDER}}$ and DELTA $_{\times \text{ INSIDER}}$ as the slope coefficients. Empirically, the crossing of the two price curves occurs when DELTA is approximately 2.7, the 84th percentile of our sample.

Taken together, the evidence suggests that the price paid for a municipal audit outside of Florida is higher for local firms than for similarly valued outside firms and is sensitive to a firm's value advantage over its competitors. Consequently, the surplus auction with a local preference best describes the competition for municipal audit engagements.

DISCUSSION

To the extent auditees have concerns beyond the audit such as supporting local commerce, a preference policy might serve its purpose. We do not examine whether an auditee's myriad goals are well served by a preference policy. Rather, our aim is to understand the audit-related costs and benefits of such policies. While our contribution addresses the more general question of the influence of preference in audit procurement, the municipal audit market affords certain empirical advantages in testing competing theories. In the likely case that viable quality audit firms exist outside of the municipality's borders, one is tempted to conclude that a local preference policy is detrimental to audit procurement. We show otherwise, and specify conditions when the goal of a local preference policy improves the audit procurement process while simultaneously forwarding other municipal goals such as growing the city's tax base. The reason for this result is that traditional auctions are highly suboptimal when bidders are asymmetric, and a local preference serves to improve the auction's performance. The rising popularity of auctions as a mechanism for allocating goods and services is due in large part to Myerson (1981) and Riley & Samuelson (1981), who demonstrated that typical auction formats result in greater surplus for the auctioneer than other allocation methods. However, this insight critically depends on bidders being symmetric, in a probabilistic sense, with none having an *a priori* greater chance of winning than any other. When bidders are asymmetric, which occurs in our model whenever $\delta \neq 0$, an optimal auction discriminates against the strongest bidder, encouraging better bids from stronger bidders (Myerson 1981). This is carried out by allowing the weaker bidder to win occasionally even when the auctioneer would have been better served by letting the stronger bidder win. If the proper discriminatory rule is used, the higher win probability for the weaker bidder is offset by the substantially lower prices paid to the stronger bidder when it is the winner. The precise discriminatory rule that maximizes the auctioneer's surplus is known theoretically (e.g., Bulow & Roberts 1989), though rarely implementable in actual markets. A preference policy serves the same purpose as an optimal discriminatory rule, though more crudely.

A local preference could originate as an instrument for local development, arise from a desire to grow the municipality's tax base, or perhaps serve clandestinely to reward local political allies. These motivations will likely manifest in different forms of auctions. Existing formal procedures are divided between "second chance" bidding for local firms, akin to our model, and bidding or value "credits" which augment a local firm's actual value or bid for the purpose of bid comparisons. More nefarious motives for introducing preference are likely to be exclusively a surreptitious form of bid matching. All such forms, while analytically different, offer similar qualitative insights: insiders can win even when, objectively, theirs are not the best bids, and outsiders respond by accepting lower prices, on average, to compensate for this preference.

We model firms as having identical cost distributions and introduce asymmetry through potentially different firm values. Similar intuition can be obtained if costs and values are not independent, perhaps because higher-valued firms have higher average costs. For example, if a firm with value v_j draws from a cost distribution which is uniform on the support

$$[(\bar{c} + \beta v_j) - \theta, (\bar{c} + \beta v_j) + \theta]$$

for $\beta < 1$, then a \$1 increase in value corresponds to a \$$\beta$ increase in average costs. The resulting surplus auction is similar to one where the firm has value $v_j(1 - \beta)$ and draws from the common support $[\bar{c} - \theta, \bar{c} + \theta]$, since the distribution of $v - c$ remains unchanged. In addition, alternate models in which outsiders draw $v - c$ from sufficiently more favorable distributions than insiders (in the sense of stochastic dominance) also allow for a local preference to benefit the municipality.

Besides institutional local preference, there are other reasons why a local firm may win an engagement with greater frequency than a non-local firm. Insiders may have lower costs of providing the audit due to local knowledge or lower transportation costs than outsiders. This would lead to stochastically lower bid distributions among local firms than non-local firms (Maskin & Riley 2000). Alternately, local firms may have better information about the nature of the audit engagement, and thus be better able to estimate the workload associated with its completion, which would also suggest lower bids by the better-informed local firms (Mares & Shor 2008). If local firms have lower (or more certain estimates of) cost, we may expect this to be reflected in lower prices in Florida, where competition was replaced with direct negotiation with a single firm. This is contrary to the results of our empirical estimation, where Florida insiders and outsiders negotiate similar fees.

References

American Business Disk (1994). American Business Information, Inc., Omaha, NE.

Bandyopadhyay, S. P. & Kao, J. L. (2004), 'Market structure and audit fees: A local analysis', *Contemporary Accounting Research* **21**(3), 529–61.

Belsley, D. A., Kuh, E. & Welsch, R. E. (1980), *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*, New York: Wiley.

Bradford, R. (2009), 'Local preference policies setting the clock back on tendering process', Daily Commercial News, Ontario, Canada, 21 August.

Branco, F. (1994), 'Favoring domestic firms in procurement contracts', *Journal of International Economics* **37**(1–2), 65–80.

Brooks, G. R. (1995), 'Defining market boundaries', *Strategic Management Journal* **16**(7), 535–549.

Bulow, J. & Roberts, J. (1989), 'The simple economics of optimal auctions', *Journal of Political Economy* **97**(5), 1060–90.

Burguet, R. & Perry, M. K. (2007), 'Bribery and favoritism by auctioneers in sealed-bid auctions', *Contributions to Theoretical Economics* **7**(1), Article 23.

Burguet, R. & Perry, M. K. (2009), 'Preferred suppliers in auction markets', *RAND Journal of Economics* **40**(2), 283–295.

Cantillon, E. (2008), 'The effect of bidders' asymmetries on expected revenue in auctions', *Games and Economic Behavior* **62**(1), 1–25.

Chaney, P. K., Jeter, D. C. & Shaw, P. E. (1997), 'Client-auditor realignment and restrictions on auditor solicitation', *The Accounting Review* **72**(3), 433–453.

Copley, P., Doucet, M. & Gaver, K. (1994), 'A simultaneous equations analysis of quality control review outcomes and engagment fees for audits of recipients of federal financial assistance', *The Accounting Review* **69**(1), 244–256.

Craswell, A., Francis, J. & Taylor, S. (1995), 'Auditor brand name reputations and industry expertise', *Journal of Accounting and Economics* **20**(3), 297–322.

DeAngelo, L. (1981*a*), 'Auditor independence, 'low-balling,' and disclosure regulation', *Journal of Accounting and Economics* **3**(2), 113–127.

DeAngelo, L. (1981*b*), 'Auditor size and audit quality', *Journal of Accounting and Economics* **3**(3), 183–199.

Dopuch, D. A. & Simunic, N. (1982), Competition in auditing research: An assessment, *in* 'Fourth Symposium on Auditing Research', Urbana: University of Illinois, pp. 401–450.

Elzinga, K. & Hogarty, T. (1973), 'The problem of geographic market delineation in antimerger suits', *Antitrust Bulletin* **18**(1), 45–81.

Elzinga, K. & Hogarty, T. (1978), 'The problem of geographic market delineation revisited: The case of coal', *Antitrust Bulletin* **23**(1), 1–18.

Ettredge, M. & Greenberg, R. (1990), 'Determinants of fee cutting on initial audit engagements', *Journal of Accounting Research* **28**(1), 198–210.

Francis, J. R. & Wilson, E. R. (1988), 'Auditor changes: A joint test of theories relating to agency costs and auditor differentiation', *The Accounting Review* **63**(4), 663–682.

GAO (1987), 'CPA audit quality: A framework for procuring audit services', General Accounting Office, Washington, D.C.

Hackenbrack, K., Jensen, K. L. & Payne, J. L. (2000), 'The effect of a bidding restriction on the audit services market', *Journal of Accounting Research* **38**(2), 355–374.

Harris, R. G. & Jorde, T. M. (1984), 'Antitrust market definition: An integrated approach', *California Law Review* **72**(1), 1–67.

Johnstone, K., Bedard, J. & Ettredge, M. (2004), 'The effect of competitive bidding on engagement planning and pricing', *Contemporary Accounting Research* **21**(1), 25–53.

Kaplan, T. R. & Zamir, S. (2010), 'Asymmetric first-price auctions with uniform distributions: Analytic solutions to the general case', *Economic Theory* (forthcoming).

Lowinger, T. C. (1976), 'Discrimination in government procurement of foreign goods in the u. s. and western europe', *Southern Economic Journal* **42**(3), 451–460.

Mansi, S., Maxwell, W. & Miller, D. (2004), 'Does auditor quality and tenure matter to investors? evidence from the bond market', *Journal of Accounting Research* **42**(4), 756–793.

Mares, V. & Shor, M. (2008), 'Industry concentration in common value auctions: Theory and evidence', *Economic Theory* **35**(1), 37–56.

Maskin, E. & Riley, J. (2000), 'Asymmetric auctions', *Review of Economic Studies* **67**(3), 413–438.

Milgrom, P. & Weber, R. (1982), 'A theory of auctions and competitive bidding', *Econometrica* **50**(5), 1089–1122.

Mougeot, M. & Naegelen, F. (2005), 'A political economy analysis of preferential public procurement policies', *European Journal of Political Economy* **21**(2), 483–501.

Myerson, R. B. (1981), 'Optimal auction design', *Mathematics of Operations Research* **6**(1), 58–73.

O'Keefe, T. B. & Westort, P. J. (1992), Conformance to GAAS reporting standards in municipal audits and the economics of auditing: The effects of audit firm size, CPA examination performance, and competition, *in* G. J. Previts, ed., 'Research in Accounting Regulation', Vol. 6, Oxford: JAI Press, pp. 39–77.

Palmrose, Z.-V. (1988), 'An analysis of auditor litigation and audit service quality', *The Accounting Review* **63**(1), 55–73.

Pearson, T. & Trompeter, G. (1994), 'Competition in the market for audit services: The effect of supplier concentration on audit fees', *Contemporary Accounting Research* **11**(1), 115–135.

Penno, M. & Walther, B. (1996), 'The concentration of local markets: A study of accounting, advertising and law', *Accounting Horizons* **10**(2), 88–99.

Plum, M. (1992), 'Characterization and computation of nash-equilibria for auctions with incomplete information', *International Journal of Game Theory* **20**(4), 393–418.

Riley, J. G. & Samuelson, W. F. (1981), 'Optimal auctions', *American Economic Review* **71**(3), 381–392.

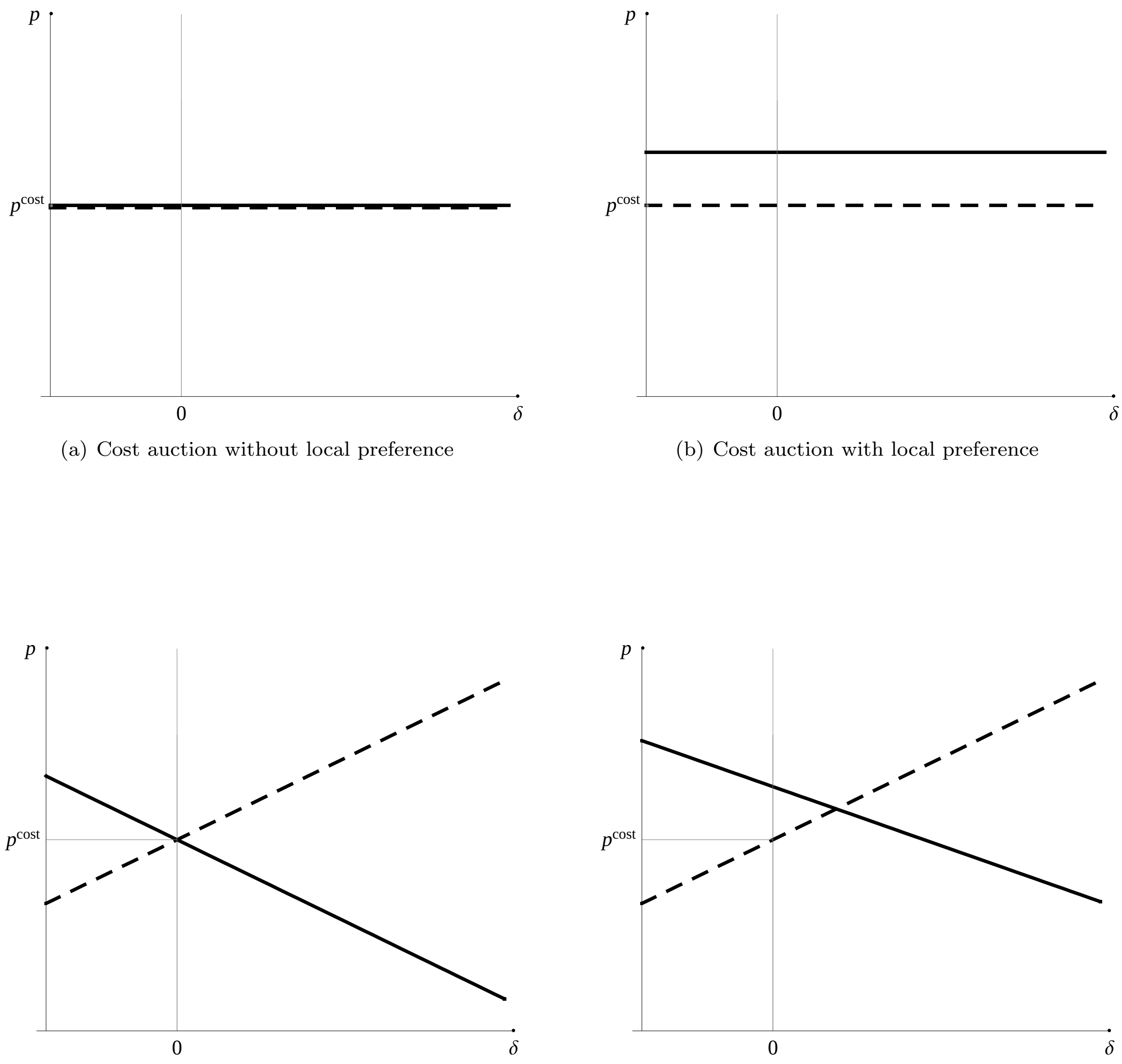
Rubin, M. (1988), 'Municipal audit fee determinants', *The Accounting Review* **63**(2), 219–236.

Simunic, D. & Stein, M. (1987), Product differentiation in auditing: Auditor choice in the market for unseasoned new issues. Canadian Certified General Accountants' Research Foundation, Research Monograph Number 13.

Teoh, S. & Wong, T. (1993), 'Perceived auditor quality and the earnings response coefficient', *The Accounting Review* **68**(2), 346–366.

Werden, G. J. & Froeb, L. M. (1994), 'The effects of mergers in differentiated products industries: Logit demand and merger policy', *Journal of Law, Economics and Organization* **10**(2), 407–26.

Yohai, V. (1987), 'High breakdown point and high efficiency robust estimates for regression', *Annuals of Statistics* **15**, 642–656.



(a) Cost auction without local preference

(b) Cost auction with local preference

(c) Surplus auction without local preference

(d) Surplus auction with local preference

Figure 1: Predicted price reactions to the difference in firm values (δ) under different models of audit procurement. The dashed line is the price when the outsider wins and the solid line is the price when the insider wins. The surplus auction plots (c and d) represent first-order Taylor series expansions, highlighting the linear effects (not the curvature) of price with respect to δ. Expressions for the pictured price relations are given by (1) for panel (a); (15) and (17) for panel (b); (30) and (34) for panel (c); and (49) and (51) for panel (d). The supply of firms (n) is held constant.

Table 1

Variable Names, Definitions, Sources of Data, Motivation for Independent Variables, and Descriptive Statistics (n=409)

INDICATOR (0,1) VARIABLES

Variable Name and Definitions	Source	Motivation	% equal to 1
MANAGER: one denotes an elected council or city commission hires a city manager and zero denotes an elected mayor	Municipal Yearbook (1992)	business practices	69.4%
YEAR3: one denotes the 1992 auditor had been engaged less than four consecutive years	Questionnaire[a]	initial contract	39.9%
BIG6: one denotes the 1992 auditor was one of the Big 6 public accounting firms	1992 Financial Statements	service quality	22.0%
CAEFR AWARD: one denotes the municipality received the 1992 Certificate of Achievement for Excellence in Financial Reporting	Government Finance Officers Association (1993)	disclosure practices	49.4%
BASELINE STATES: one denotes the municipality was in a market where competitive negotiation and solicitation were allowed in 1992	state statutes	regulation	34.0%
FLORIDA: one denotes the municipality was in a market where competitive negotiation and solicitation were banned in 1992	state statutes	regulation	26.4%
INSIDER: one denotes either the municipality's 1992 auditor's mailing address included the municipality's name or the auditor was within 10 miles of city hall	American Business Disc (1994)	local preference	54.5%

CONTINUOUS VARIABLES

Variable Name and Definitions	Source	Motivation	Mean / Median (Std. Dev./IQR)
AUDIT FEE: log of 1992 audit fee paid	Questionnaire[b]	dependent variable	10.1 / 10.1 (0.8 / 9.5–10.6)
EXPENDITURES: log of 1992 expenditures for government operations and enterprise activities in thousands	1992 Financial Statements	transaction volume	9.7 / 9.5 (1.3 / 8.8–11.6)
DEBT/EXPENDITURES: 1992 debt (including bonds, warrants, notes, pension and lease obligations for all funds) divided by 1992 expenditures (for government operations and enterprise activities)	1992 Financial Statements	engagement risk	0.95 / 0.84 (0.68 / 0.47–1.25)
SPECIALIZATION: number of sample engagements where the office of the municipality's 1992 auditor assumed primary responsibility for the audit	1992 Financial Statements	industry experience	2.0 / 1.0 (1.5 / 1.0–3.0)
SUPPLY: log of the number of audit firms within 30 miles of city hall	American Business Disc (1994)	competition	5.3 / 5.3 (1.5 / 4.5–6.4)
DELTA: $\log(1+Employees1030)-\log(1+Employees0010)$ where EmployeesXXYY is the number of employees of the second-largest audit firm between XX and YY miles of city hall	American Business Disc (1994)	value advantage	0.68 / 0.75 (1.98 / -0.75–2.08)

[a] "Prior to and including fiscal 1992, how many consecutive times had the public accounting firm been engaged to perform MUNICIPALITY's annual financial statement audit?"
[b] "What fee was paid for the audit of MUNICIPALITY's fiscal 1992 financial statements? Please do not include fees paid the public accounting firm for non-audit services."

Table 2

Regression of the natural logarithm of audit fees on selected variables

Independent Variables	Predicted Sign[a]	Robust Regression Coefficient	Robust Regression Chi-Square	Ordinary Least Squares Coefficient	Ordinary Least Squares Chi-Square[b]
constant		5.856	1015.44***	5.765	1237.60***
EXPENDITURES	+	0.452	556.73***	0.459	723.97***
MANAGER	−	−0.113	5.95***	−0.131	8.74***
DEBT/EXPENDITURES	+	0.086	8.23***	0.097	15.34***
YEAR3	−	−0.162	15.99***	−0.191	28.80***
BIG6	NS	0.085	2.30*	0.093	3.79*
SPECIALIZATION	NS	−0.003	0.04	−0.006	0.29
CAEFR AWARD	NS	0.088	3.66*	0.066	2.57
BASELINE STATES	−	−0.106	4.99**	−0.104	5.46**
FLORIDA	+	0.402	37.18***	0.405	60.62***
SUPPLY	−	−0.052	10.32***	−0.046	9.91***
Test Variables					
INSIDER × NOT FLORIDA		0.121	4.86**	0.134	6.80***
INSIDER × FLORIDA		−0.082	1.02	−0.080	1.83
DELTA × INSIDER		−0.006	0.16	−0.009	0.47
DELTA × OUTSIDER		0.038	4.94**	0.040	7.41***
N		409		392	
Model F-statistic				112.03 ($p < .0001$)	
Adjusted R^2		0.5849		0.799	

[a] The sign for SUPPLY is predicted by the analytic model. The predictions for the test variables vary with the analytical model and the existence of local preference. The signs for the remaining variables are the results reported in Hackenbrack et al. (2000). NS: not significant.

[b] Test statistic when the heteroscedastic consistent covariance matrix is used (White 1980).

* Statistically significant at $p < .05$ (two-tailed).

** Statistically significant at $p < .03$ (two-tailed).

*** Statistically significant at $p < .01$ (two-tailed).

EXPENDITURES is the natural logarithm of 1992 expenditures for government operations and enterprise activities in thousands. MANAGER is an indicator variable that equals 1 if an elected council or city commission hires a city manager. DEBT/EXPENDITURES is 1992 debt including bonds, warrants, notes, pension and lease obligations for all funds divided by 1992 expenditures for government operations and enterprise activities. YEAR3 is an indicator variable that equals 1 if the 1992 auditor had been engaged less than four consecutive years. BIG6 is an indicator variable that equals 1 if the 1992 auditor was one of the Big 6 public accounting firms. SPECIALIZATION is the number of sample engagements where the office of the municipality's 1992 auditor assumed primary responsibility for the audit. CAEFR AWARD is an indicator variable that equals 1 if the municipality received the 1992 Certificate of Achievement for Excellence in Financial Reporting. BASELINE STATES is an indicator variable that equals 1 if the municipality was in a market where competitive negotiation and solicitation were allowed in 1992. FLORIDA is an indicator variable that equals 1 if the municipality was in a market where competitive negotiation and solicitation were banned in 1992. SUPPLY is the natural logarithm of the number of audit firms within 30 miles of city hall. INSIDER is an indicator variable that equals 1 if the municipality's 1992 auditor's mailing address included the municipality's name or the auditor was within 10 miles of city hall. DELTA is the difference in the (logged) number of employees between the second largest firm within 10 to 30 miles of city hall and the second-largest firm within 10 miles.

APPENDIX: PROOFS

Proof of Lemma 1. Since the model satisfies the assumptions of revenue equivalence, the expected price for all typical auction formats is equal to the the expectation of the second-lowest cost:

$$p^{cost} = \int_{\bar{c}-\theta}^{\bar{c}+\theta} n(n-1)cf(c)F(c)(1-F(c))^{n-2}dc \tag{8}$$
$$= \bar{c} - \frac{n-3}{n+1}\theta \qquad \square$$

Proof of Proposition 1 and Lemma 2. We first derive the probability of insiders and outsiders winning, and the expected price conditional on each winning. Define q_o as the probability that the outsider wins:

$$q_o = \int_{c_o} f(c_o)\Pr\{b_o(c_o) < c\}^{n-1}dc_o \tag{9}$$
$$= \left(\frac{n-1}{n}\right)^{n-1}\frac{1}{n} \tag{10}$$

The outsider's expected profit is given by

$$\Pi_o(b_o, c_o) = (b_o - c_o)(1-F(b_o))^{n-1} \tag{11}$$

Maximizing the above with respect to b_o yields:

$$b_o(c_o) = \frac{\bar{c}+\theta+(n-1)c_o}{n} \tag{12}$$

The expected price paid to the outsider conditional on winning is given by:

$$p_o^{cost,\,pref} = \int_{c_o} b_o(c_o)f(c_o)\Pr\{b_o(c_o) < c\}^{n-1}dc_o \Big/ q_o \tag{13}$$
$$= \left(\frac{1}{2\theta}\right)^n \int_{\bar{c}-\theta}^{\bar{c}+\theta} (\bar{c}-c_o+\theta)^{n-1}(\bar{c}+\theta+(n-1)c_o)dc_o \tag{14}$$
$$= \bar{c} - \frac{n-3}{n+1}\theta \tag{15}$$

Which is p^{cost} by Lemma 1. The expected price paid to an insider conditional on winning is given by:

$$p_i^{cost,\,pref} = \left[\begin{array}{l} \displaystyle\int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o)\int_{\bar{c}-\theta}^{b_o(c_o)} (n-1)(n-2)cf(c)F(c)(1-F(c))^{n-3}\,dc\,dc_o \\ \displaystyle+\int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o)(n-1)b_o(c_o)F(b_o(c_o))(1-F(b_o(c_o)))^{n-2}\,dc_o \end{array}\right] \Bigg/ (1-q_o) \tag{16}$$

Where the first term inside the square brackets reflects the price when at least two have costs lower than the outsider's bid and the second term reflects precisely one insider having a lower cost than the outsider, matching the outsider's bid. This yields

$$p_i^{cost,\,pref} = p^{cost} + \frac{4}{n(n+1)}\left(\frac{1-\left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1}}{1+\left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1}}\right)\theta \tag{17}$$

(i) The probability of the outsider winning in (10) is less than $\frac{1}{n}$, which is the outsider's probability of winning without a preference policy.

(ii) Both $1-\left(\frac{n-1}{n}\right)^{n-1}$ and $\left(\frac{n-1}{n}\right)^{n}$ are increasing in $n \geq 2$. Since $1-\left(\frac{n-1}{n}\right)^{n-1}$ is at least $1/2$ (when $n=2$) and $\lim_{n\to\infty}\left(\frac{n-1}{n}\right)^{n} = 1/e < 1/2$, the insider's price conditional on winning in (17) is greater than p^{cost}.

(iii) The outsider's expected price conditional on winning in (15) is identical to the price in a cost auction without a preference policy in (1).

(iv) Expected price is a convex combination of p^{cost} (outsider) and $p > p^{cost}$ (insider):

$$\begin{aligned} p^{cost,\,pref} &= p_o^{cost,\,pref} q_o + p_i^{cost,\,pref}(1-q_o) \qquad (18)\\ &= p^{cost} + \left[\frac{4}{n(n+1)}\left(1-\left(\frac{n-1}{n}\right)^{n} - \left(\frac{n-1}{n}\right)^{n-1}\right)\theta\right] \qquad \square \end{aligned}$$

Corollary 1.1. *Conditional on having the lowest cost, the outsider loses in a cost auction with a preference policy with probability between $\frac{1}{2}$ and $1-e^{-1}$.*

Proof. The outsider wins with probability q_o and has the lowest cost with probability $1/n$. The probability that the outsider loses despite having the lowest cost is given by

$$1 - nq_o = 1 - \left(\frac{n-1}{n}\right)^{n-1} \qquad (19)$$

The derivative of $1-nq_o$ is positive for $n > 1$. Taking the limit,

$$\begin{aligned} \lim_{n\to\infty} 1 - \left(\frac{n-1}{n}\right)^{n-1} &= 1 - \lim_{n\to\infty} e^{\log\left(\frac{n-1}{n}\right)/\frac{1}{n-1}} \qquad (20)\\ &= 1 - \lim_{n\to\infty} e^{-\frac{n-1}{n}} \quad \text{by L'Hôpital's rule} \qquad (21)\\ &= 1 - \frac{1}{e} \qquad \square \end{aligned}$$

Proof of Lemma 3. We derive a more general result for $n-1$ insiders and 1 outsider. The probability of the outsider winning is given by:

$$\begin{aligned} q_o &= \int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o)\Pr\{v_o - c_o > v_i - c_i\}^{n-1} dc_o \qquad (22)\\ &= \begin{cases} \frac{(1+\delta)^n}{n} & -1 \leq \delta < 0 \\ \frac{1-\delta^n}{n} + \delta & 0 \leq \delta \leq 1 \end{cases} \qquad (23) \end{aligned}$$

Assume that $1 \geq \delta \geq 0$, so that $v_o \geq v_i$. The case of $-1 \leq \delta < 0$ is obtained analogously. In a second-price auction,[17] the price paid to the outsider when he wins is $\min\{c_i\} + v_o - v_i$, the lowest cost

[17]The properties in this lemma appear to apply to the price and surplus in first price auctions. Adapting the numerical methods in Kaplan & Zamir (2010) to our setting (Mathematica code available on request), price and surplus in a first-price auction are given by

$$\begin{aligned} p^{surplus} &\simeq \bar{c} + \frac{1}{3}\theta + \frac{\delta^2(3.092 - 0.547|\delta|)}{3}\theta \qquad (24)\\ S^{surplus} &\simeq \frac{v_o + v_i}{2} - \bar{c} - \frac{1 + \delta^2(0.100 + 0.198|\delta|)}{3}\theta \qquad (25) \end{aligned}$$

of any insider plus the value differential. This results in a surplus of $v_i - \min\{c_i\}$. The expected value of the surplus conditional on the insider winning is

$$S_o^{surplus} = \int_{c_i} (v_i - c_i)(n-1)f(c_i)(1-F(c_i))^{n-2}F(c_i + v_o - v_i)dc_i/q_o \tag{26}$$

$$= \left[\int_{\bar{c}-\theta}^{\bar{c}+\theta-v_o+v_i} (v_i - c_i)(n-1)(\bar{c} - c_i + \theta)^{n-2}\left(\frac{c_i - \bar{c} + \theta + v_o - v_i}{(2\theta)^n}\right) dc_i + \int_{\bar{c}+\theta-v_o+v_i}^{\bar{c}+\theta} (v_i - c_i)(n-1)\frac{(\bar{c} - c_i + \theta)^{n-2}}{(2\theta)^{n-1}} dc_i\right] \Big/ q_o \tag{27}$$

Integrating, and substituing q_o from (23) yields:

$$S_o^{surplus} = v_i - \bar{c} + \left(\frac{n-3}{n+1}\right)\theta + 2\left(\frac{n-1}{n+1}\right)\left(\frac{1+\delta^{n-1}-\delta^n}{1+n\delta-\delta^n}\right)\delta\theta \tag{28}$$

Further,

$$p_o^{surplus} = v_o - S_o^{surplus} \tag{29}$$

$$= p^{cost} + 2\left[\frac{2(1-\delta^n) + n(n+1)\delta - (n-1)\delta^{n-1}}{(n+1)(1+n\delta-\delta^n)}\right]\delta\theta \tag{30}$$

For the insider,

$$S_i^{surplus} = \int_{\bar{c}-\theta+v_o-v_i}^{\bar{c}+\theta} (v_o - c_o)(n-1)f(c_o)F(c_o - v_o + v_i)(1-F(c_o - v_o + v_i))^{n-2}dc_o/(1-q_o) + \int_{\bar{c}-\theta+v_o-v_i}^{\bar{c}+\theta}\int_{\bar{c}-\theta}^{c_o-v_o+v_i} (v_i - c_i)(n-1)(n-2)f(c_o)f(c_i)F(c_i) \times (1-F(c_i))^{n-3}\, dc_i\, dc_o/(1-q_o) \tag{31}$$

where the first integral reflects a single insider with a cost low enough to beat the outsider, and the second reflects at least two insiders with sufficiently low costs.

$$S_i^{surplus} = v_i - \bar{c} + \left(\frac{n-3}{n+1}\right)\theta + 4\left(\frac{1-n\delta^{n-1}+(n-1)\delta^n}{(n+1)\,(n-1-n\delta+\delta^n)}\right)\delta\theta \tag{32}$$

$$p_i^{surplus} = v_i - S_i^{surplus} \tag{33}$$

$$= p^{cost} - 4\left[\frac{1-n\delta^{n-1}+(n-1)\delta^n}{(n+1)\,(n-1-\delta n+\delta^n)}\right]\delta\theta \tag{34}$$

Lastly, we can derive the average price and surplus:

$$p^{surplus} = p_o^{surplus}q_o + p_i^{surplus}(1-q_o) \tag{35}$$

$$= p^{cost} + \frac{2}{n}\left[n\delta + \delta^{n-1} - 2(\tfrac{n}{n+1})\delta^n\right]\delta\theta \tag{36}$$

$$S^{surplus} = S_o^{surplus}q_o + S_i^{surplus}(1-q_o) \tag{37}$$

$$= \frac{(n-1)v_i + v_o}{n} - \bar{c} + \left(\frac{n-3}{n+1}\right)\theta - 2\left[\frac{(n+1)-(n-1)\delta}{n(n+1)}\right]\delta^n\theta \tag{38}$$

Substituting $n = 2$ into the above expressions yields equations (3) and (4) of the proposition.

(i) $\frac{dp^{surplus}}{d\delta} = 2\theta(2\delta + \delta^{n-1} - 2\delta^n) \geq 4\theta\delta(1 - \delta^{n-1}) \geq 0$

(ii) The first term in (38) is positive and is the average value of the n firms. $\frac{dS^{surplus}}{d\delta} = \frac{2\delta^{n-1}\theta}{n}((n-1)\delta - n)$ where the fraction is nonnegative and the term in parentheses is nonpositive. □

Proof of Lemma 4. The outsider's profit given a cost c_o and bid b_o is given by

$$\Pi_o(b_o, c_o) = (b_o - c_o)(1 - F(b_o - v_o + v_i))^{n-1} \tag{39}$$

which yields a profit-maximizing bid of

$$b_o(c_o) = \begin{cases} \bar{c} - \theta + 2\theta\delta & c_o < \bar{c} - \theta + 2\left(\delta - \frac{1}{n-1}\right)\theta \\ \left[\frac{\bar{c}+\theta+(n-1)c_o}{n}\right] + \frac{2}{n}\theta\delta & c_o \geq \bar{c} - \theta + 2\left(\delta - \frac{1}{n-1}\right)\theta \end{cases} \tag{40}$$

The first case is a corner solution in which the outsider ensures that it wins the auction. This solution is ruled out by our assumption that $\delta \leq 1, n = 2$ (and generally for $(n-1)\delta \leq 1$), thus we restrict attention to the interior solution. The probability that the outsider wins is

$$\begin{aligned} q_o &= \int_{c_o} f(c_o)(1 - F(b_o(c_o) - 2\theta\delta))^{n-1}\, dc_o & (41)\\ &= \int_{c_o} \frac{1}{(2\theta)^n}\left(\frac{n-1}{n}\right)^{n-1}(\bar{c} - c_o + \theta + 2\delta\theta)^{n-1}\, dc_o & (42)\\ &= \left(\frac{n-1}{n}\right)^{n-1}\frac{1}{n}\left((1+\delta)^n - \delta^n\right) & (43) \end{aligned}$$

With two firms, the resulting surplus is the same whether the outsider wins or the insider wins by matching the outsider's surplus. The expected surplus is given by

$$\begin{aligned} S^{surplus,\ pref} &= E[v_o - b_o(c_o)] & (44)\\ &= v_o - \frac{1}{2}\bar{c} - \frac{1}{2}\theta - \frac{1}{2}E[c_o] - \frac{1}{2}(v_o - v_i) & (45)\\ &= \frac{1}{2}(v_o + v_i) - \bar{c} - \frac{1}{2}\theta & (46) \end{aligned}$$

and prices are given by

$$\begin{aligned} p_o^{surplus,\ pref} &= \int_{c_o} f(c_o)b_o(c_o)(1 - F(b_o(c_o) + v_o - v_i))\, dc_o/q_o & (47)\\ &= \int_{c_o} \frac{1}{(4\theta)^2}(\bar{c} + \theta + c_o + 2\theta\delta)(\bar{c} + \theta - c_o + 2\theta\delta)\, dc_o/q_o & (48)\\ &= p^{cost} + \frac{2}{3}\left(\frac{2+3\delta}{1+2\delta}\right)\delta\theta & (49)\\ p_i^{surplus,\ pref} &= \int_{c_o} f(c_o)(b_o(c_o) - v_o + v_i)F(b_o(c_o) + v_o - v_i)\, dc_o/(1 - q_o) & (50)\\ &= p^{cost} + \frac{2}{3}\left(\frac{1 - 5\delta + 3\delta^2}{3 - 2\delta}\right)\theta & (51) \end{aligned}$$

$$p^{surplus,\, pref} = p_i^{surplus,\, pref}(1-q_o) + p_o^{surplus,\, pref} q_o \tag{52}$$
$$= p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta-1)}{2}\theta \tag{53}$$

(i) and (ii) are clear by inspection. For *(iii)*, define

$$\Delta(\delta) \equiv p_o^{surplus,\, pref} - p_i^{surplus,\, pref} \propto 3(3-2\delta)(1+2\delta)\delta - 1 \tag{54}$$

Observe that $\Delta(0) < 0$, $\Delta(1) > 0$, and $\frac{d\Delta(\delta)}{d\delta} = 3(3+8\delta-12\delta^2)$ indicates that $\Delta(\cdot)$ is unimodal. Therefore, $p_o^{surplus,\, pref} - p_i^{surplus,\, pref}$ crosses zero once at $1 > \delta' > 0$. The unique real root of $\Delta(\delta) = 0$ satisfying $0 \leq \delta \leq 1$ is at $\delta \approx 0.1$.

The derivation for the case when $\delta < 0$ is similar, though introduces a theoretical indeterminacy. Consider why the outsider doesn't bid unreasonably large sums, like $80 billion. Since these outrageous bids can never win, and other, more reasonable bids introduce a positive probability of profit, we can eliminate them in equilibrium. However, when the outsider is value disadvantaged ($\delta < 0$) and draws a very high cost, *any* bid above its cost would be matched by the insider. In these cases, since the outsider can never profitably win, *all* bids which the insider is sure to match (including $80 billion) are supported in equilibrium. Placing reasonable restrictions on the outsider's bid, such as the outsider bidding its cost in these cases (the best reasonable scenario for the auditee) or using the same bidding function as for low costs (a unique equilibrium if there is some random uncertainty about the range of insider's costs), yields empirical predictions which are natural complements to the case for $\delta \geq 0$. □

Proof of Proposition 2. Surplus is greater with a preference policy than without whenever:

$$S^{surplus,\, pref} > S^{surplus} \tag{55}$$
$$\Leftrightarrow \quad \frac{1}{2}(v_o+v_i) - \bar{c} - \frac{1}{2}\theta > \frac{1}{2}(v_o+v_i) - \bar{c} - \frac{1+\delta^2(3-\delta)}{3}\theta \tag{56}$$
$$\Leftrightarrow \quad -1 + 2\delta^2(3-\delta) > 0 \tag{57}$$
$$\Leftrightarrow \quad \delta \gtrapprox 0.442 \tag{58}$$

Similarly, for price

$$p^{surplus,\, pref} > p^{surplus} \tag{59}$$
$$\Leftrightarrow \quad p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta-1)}{2}\theta > p^{cost} + \frac{\delta^2(9-4\delta)}{3}\theta \tag{60}$$
$$\Leftrightarrow \quad 1 + 8\delta^3 - 3\delta(1+4\delta) > 0 \tag{61}$$
$$\Leftrightarrow \quad \delta \lessapprox 0.197$$
□