

Local Preference in Municipal Audit Markets

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Abstract

We investigate the influence of local preference policies on auditor selection in the municipal audit market. A local preference occurs when local firms are favored in audit procurement over non-local firms for reasons unrelated to the audit itself. We construct four auction models of the competitive bidding process differentiated by possible objectives of the municipality: cost minimization versus surplus maximization and with or without a local preference policy. Which model is most descriptive is ultimately an empirical question. We generate predictions that allow for empirical identification and find evidence of local preference. We use the identified model to analyze theoretically the unobservable net audit-related effect of a municipality adopting a local preference policy. We show that a local preference policy can benefit even a municipality guided solely by audit-related concerns by encouraging price concessions from non-local auditors.

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

Local Preference in Municipal Audit Markets

1 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 and Walther 1996), regulatory (e.g., bans on competitive negotiation, Hackenbrack, Jensen, and Payne 2000), imposed by the profession through its codes of conduct (e.g., bans on solicitation, Chaney, Jeter, and Shaw 1997), or a consequence of auditor behavior (e.g., low-balling, DeAngelo 1981a). We study both theoretically and empirically an auditee-imposed restriction on the auditor selection process, local preference in the municipal audit market.

A local preference occurs when a local firm is favored in audit procurement over non-local firms for reasons unrelated to the audit itself, perhaps a benevolent desire to support the local economy or a result of social or political ties. Examples of the benevolent motive are plentiful, with local preference often an explicit part of city council deliberations.¹ More questionable motives for affording preference to local firms are, for obvious reasons, more anecdotal than formally documented. 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. A city manager in a Georgia town, in which only local firms have historically performed audits, described the city's selection criterion as favoring "the next good old boy in line."² One might be tempted to conclude that disadvantaging potentially viable, capable audit firms will necessarily harm a municipality's audit procurement. We demonstrate otherwise.

Understanding the consequences of local preference requires a model of competition. We break from the traditional supply and demand characterization of the audit service market (Simunic 1980), and instead model audit procurement as an auction. Researchers studying auditees' choices on whether to put out for bid an audit contract conclude that competitive bidding induces lower proposed audit fees (Johnstone, Bedard, and Ettredge 2004) and lower prices for municipalities (Rubin 1988). However, the effects of competitive bidding are likely to depend on market structure and the selection criteria used by municipalities.

Does a municipality simply wish to minimize the price paid, or does it value and therefore is willing to pay more for an audit by some firms than others? Value has two components. First is the assessment of the reliability of the financial statements by stakeholders, including citizens, governmental funding agencies, bond rating agencies, investment banks, and bond purchasers. Primary benefits to the

¹San Jose, CA, has a formal local preference policy for all procurement contracts and professional services, recently revised to be more advantageous for local firms. In Randolph County, NC, minutes from a meeting to select a new auditor read "We must select a new audit firm. The County Commissioners support local businesses whenever possible." In Hibbing, MN, a proposal before the City Council to approve an audit contract with a non-local firm was amended due to concerns voiced by the Mayor, shortening the contract to one year "in order for local firms, if interested, to bid for future City audits." (Memorandum of San Jose City Attorney to Mayor and City Council on Local Preference on Procurement, 25 March 2004; Randolph County Commissioners Minutes, 4 February 2002; Minutes of the Hibbing City Council Meeting, 17 January 2006).

²Private conversations in Tennessee and Georgia with the authors.

municipality include the avoidance of third-party litigation and favorable borrowing terms. Second is the quality of the municipality’s working relationship with the audit firm, including timeliness of the auditor’s work, quality of communication, and notification of emerging issues throughout the year.

We construct four analytical models of the competitive bidding process differentiated by possible objectives of the municipality. First, a municipality may have as its objective either minimizing cost or maximizing surplus, the difference between firm value and price paid. The prevailing view is that audits are a quality differentiated service, awarded on the basis of both a firm’s value and the price paid.³ Yet, the practice of selecting auditors on the basis of price alone was judged sufficiently worrisome and pervasive to earn censure from the General Accounting Office (GAO 1987) and to be banned by the Florida legislature, which required selection based only on an auditor’s ability to perform the audit (Florida Statutes, §473.317(1)).

Second, a municipality chooses whether to implement a local preference policy. A municipality may show preference for local firms in the auditor selection process by sharing with them the bids of non-local firms, allowing them to re-bid if a non-local firm would otherwise win (termed a “second chance” policy by local governments),⁴ casually letting a local firm know what it will likely take to win, and so on. These can be represented by local firms competing in an auction in which the best outsider’s bid serves as a reserve price, akin to models of procurement auctions with a preferred supplier (Burguet and Perry 2003, 2007). Which of our four models (cost or surplus auctions with or without local preference) is most descriptive of the municipal audit market is ultimately an empirical question. We generate testable predictions that allow for empirical identification and use the identified model to analyze the audit-related implications of a local preference policy.

Working from a dataset of municipal audits in eight states, we create measures of the number of audit firms, whether the winning firm is local, and the value difference between local and non-local firms. These variables are obtained by geocoding every firm in the sample states and calculating their distance to the city hall of each municipality. We add these variables to a traditional audit fee model and find that the modeled dynamics of the audit procurement process matter incrementally. We find that the price paid to an auditor is increasing in its value advantage over its rivals, indicative of a surplus auction. Additionally, location matters, with local firms receiving a higher audit fee than non-local firms, all else equal, suggesting the existence of (formal or informal) local preference policies, in more than isolated instances.

Our empirical results suggest that audits are awarded in a surplus auction, with municipalities awarding engagements based on the difference between a firm’s value and the audit fee. Since surplus is not directly observable, we analyze theoretically the influence of local preference on surplus. By

³The literature is replete with examples of higher fees paid for purportedly higher quality audit services (e.g., Craswell, Francis, and Taylor 1995). Others find evidence of firm differentiation in auditor selection (e.g., Simunic and Stein 1987), stock price reactions to earnings surprises (e.g., Teoh and Wong 1993), lawsuits against auditors (Palmrose 1988), and cost of debt financing (Mansi, Maxwell, and Miller 2004).

⁴For example, the City of Kalamazoo, Michigan, stipulates that the lowest local bidder “is afforded the opportunity 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.” (City of Kalamazoo Local Preference Policy, Department of Management Services; Hilliard City Ordinance §129.03(d)).

design, a local preference can further a municipality’s objective of having local firms win more often, but it also encourages non-local firms to bid lower fees for the engagement. By balancing lower prices against the distortionary effects of favoring local firms, we identify conditions under which a local preference can increase a municipality’s expected surplus from the audit engagement. We find that a local preference benefits even a municipality guided solely by audit-related concerns, but only when a non-local firm is sufficiently value advantaged.

We contribute to the literature in the following ways. First, we empirically identify an auction model of audit procurement that suggests municipalities select auditors based both on audit firm value and location. Second, while others have demonstrated that higher fees are paid to higher-valued firms, we find that more important than value is a firm’s value *advantage* over its rivals. Third, we determine the influence of local preference on audit procurement outcomes. Finally, we introduce measures of competition using spatially coded data into the traditional audit fee model which prove statistically and economically significant.

In the next section, we present our analytic models of competition and derive their empirical implications. Next, our empirical tests suggest a sizeable local preference and identify a descriptive analytic model. We then use that model to explore a counterfactual, the unobservable net benefit a municipality receives by adopting a local preference policy. We conclude with remarks about generality and alternate explanations for a local preference.

2 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 the municipality’s size, audit complexity, and the municipality’s internal control structure. The parameter θ , $\bar{c} > \theta > 0$, represents firm-specific heterogeneity, perhaps due to uncertainty about labor costs, employee availability, or client-specific expertise.

Each firm has a value to the municipality, v_j .⁵ 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.

We consider four ways for a municipality to hold auctions for audit engagements. First, a municipality may choose auditors on the basis of minimizing the price paid or by maximizing total surplus, the difference between the value of the winning auditor and the price paid. Second, a municipality may ignore firms’ locations or adopt a local preference, which allows local firms to win whenever they are willing to provide the audit at a price (or surplus) at or below (above) the best non-local firm. We characterize in turn the equilibrium outcomes of each of the four formats.

⁵For expositional simplicity, we assume here that an auditor’s cost is independent of its value. As discussed in the conclusion, this formulation is not necessary for our results.

2.1 Cost Auctions without Local Preference

We first consider the case in which the municipality selects the auditor that provides the lowest bid. Since auditors' costs are drawn from identical distributions, the expected price paid by the municipality is the same for all typical auction mechanisms, including first-price, second-price, English, and Dutch auctions (Myerson 1981). We begin with the simple insight that competition matters.

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

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

which is decreasing in n .

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

The proposition indicates that audit fees paid depend not only on client-specific engagement characteristics, captured by \bar{c} , but also on the number of competing firms. 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 $n \rightarrow \infty$, the price converges to $\bar{c} - \theta$, which is the lowest possible cost any firm can realize for the engagement.

2.2 Cost Auctions with Local Preference

We now provide a model of local preference in selecting an auditor. We term $n - 1$ of the bidders *insiders* who are local to the municipality, and the remaining bidder the *outsider*.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.

Denote the outsider's cost of performing the audit by c_o . If the outsider submits a bid of b_o , the outsider's expected profit is the chance that it wins times the difference between its bid and its cost. The outsider wins if all $n - 1$ insiders have costs higher than the outsider's bid.

$$\Pi_o(b_o, c_o) = (b_o - c_o)(1 - F(b_o))^{n-1} \quad (2)$$

⁶The 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 outsiders prior to allowing insiders to match or beat the lowest outsider's bid, typical of "second chance" policies observed in practice.

Maximizing the above with respect to b_o yields:

$$b_o(c_o) = \frac{\bar{c} + \theta + (n-1)c_o}{n} \quad (3)$$

The outsider's bid is the expected cost of the lowest-cost insider conditional on all insiders having a cost higher than the outsider. This results in a linear combination of the highest possible cost, $\bar{c} + \theta$, and its own cost, c_o . The greater the number of competing firms, the closer the outsider's bid is to c_o because the insiders' expected minimum cost moves closer to c_o . The following proposition summarizes the influence of local preference.

Proposition 2. *When auditors are chosen on the basis of cost, introducing a local 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:*

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

The proposition demonstrates that insiders benefit from a local preference at a cost to the outsider through a lower chance of winning and a cost to the municipality through higher average prices.

Without a local preference, the lowest cost firm would win the engagement. This is not necessarily the case with local preference. The outsider must still have the lowest cost to win, and an insider must still have the lowest cost among all insiders to win, but because the outsider's equilibrium bid is based on the distribution of insiders' costs as opposed to their realized costs, it is possible for an insider to win even when the outsider has the lowest cost. This occurs if an insider draws a cost between the outsider's bid and the outsider's cost ($b_o(c_o) > \min c_i > c_o$) and happens a nontrivial percentage of the time. When there is a single insider, the outsider has the lowest cost $\frac{1}{2}$ of the time, but wins only $\frac{1}{4}$ of the time, thus losing 50% of the auctions when it has the lowest cost.⁷ In our data, outsiders win 66% of engagements in the state of Florida (where local preference was statutorily banned), but win only 38% in states not subject to the ban. Because a local preference allows an insider to win even when it is not the lowest-cost firm, insiders win more often than without a local preference.

The increased probability of winning for the insiders is achieved by allowing them to win at higher prices. The introduction of a local preference does not change the expected price paid to the outsider when it wins. In a cost auction without local preference, the outsider wins if it has the lowest cost and receives a price equal to the cost of the lowest-cost insider.⁸ With local preference, the outsider bids

⁷Corollary 2.1 in the appendix shows that the proportion of auctions the outsider loses despite having the lowest cost is given by $\left(1 - \left(\frac{n-1}{n} \right)^{n-1} \right)$. This is between $\frac{1}{2}$ (when $n = 2$) and $1 - e^{-1} \approx 0.632$ (as n gets large).

⁸The outsider's price conditional on winning is: $E[\min_k \{c_i^k\} \mid \min_k \{c_i^k\} > c_o]$, where $c_i^k, k = 1, \dots, n-1$, are the insiders' costs. This follows from the revenue equivalence theorem (Myerson 1981). In a second-price auction, for example, bids are equal to costs, so the lowest cost firm receives the second-lowest cost as a payment. In a first-price auction, the equilibrium bid is the expectation of the next lowest cost conditional on one's own being the lowest.

precisely this amount (equation 3) and is paid this amount in equilibrium. The only difference for the outsider between a cost auction with and without a local preference is the probability of winning; it wins when all insiders have costs higher than its *cost* (without local preference) or its *bid* (with local preference).

Since insiders win more often and at a higher average price and outsiders win less often at the same average price, it follows that the average price a municipality pays in a cost auction will be higher with a local preference than without a local preference.

2.3 Surplus Auctions without Local Preference

We now turn to settings in which municipalities select firms on the basis of surplus. For expositional simplicity, we concentrate on the case of two firms. The general n firm case is presented in the appendix. It provides the same insights as the two firm case at the expense of substantial algebraic overhead.

In this setting, a municipality's objective is not to minimize the price paid for audit services, but to maximize its surplus, $S \equiv v_{winner} - p$, the difference between the value of the winning auditor and the price paid. Let v_o and v_i denote the two firms' values, and let b_o and b_i denote their bids.⁹ 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. We concentrate on the interesting cases for which $|\delta| \leq 1$. When $|\delta| > 1$, the higher valued firm could simply bid $\bar{c} + \theta$, the highest possible cost, and be assured of winning.

While the previous two sections solved for the equilibrium price independent of the specific auction mechanism (e.g., first price or second price), these auction mechanisms are not revenue-equivalent when firms have different values (e.g., Maskin and Riley 2000). Asymmetric first-price auctions are not amenable to analytical solutions except in very stylized cases (Plum 1992). We present analytic results for a second-price (or equivalently, English) auction, and offer numerical solutions for the first-price (or equivalently, Dutch) auction.

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 municipality 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, receiving the price, p , which solves $v_o - p = v_i - b_i$. For example, consider two firms with the values \$40,000 and \$50,000. If the lower-valued firm bids \$10,000, the value-bid difference is \$30,000. The higher-valued firm can generate a value-bid difference greater than \$30,000 with any bid below \$20,000, and win the audit engagement. The price paid would be \$20,000, the price that yields the municipality a surplus of \$30,000, equal to the second-highest value-bid difference.

⁹Without local preference, 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.

The analytical tractability of the second-price auction is due to the simplicity of the equilibrium. It is a dominant strategy for each firm to place a bid equal to its cost.¹⁰ If firm o wins, the resulting price, $p = c_i + v_o - v_i$, is the rival firm's cost plus one's value advantage.

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

$$p^{surplus} = p^{cost} + \frac{\delta^2(9 - 4|\delta|)}{3}\theta \quad (5)$$

$$S^{surplus} = \frac{v_o + v_i}{2} - \bar{c} - \frac{1}{3}\theta - \left(\frac{3 - |\delta|}{3}\right)\delta^2\theta \quad (6)$$

(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 $|\delta|$.

Solutions for the n -firm case are in the appendix, and solutions for a first price auction are also obtained, though numerically.¹¹

As the disparity between firm values, $|\delta|$, increases, so does the price paid by the municipality. Holding constant the average value of the competing firms, the surplus expression suggests this price increase is accompanied by a decrease in the municipality's surplus. To illustrate the underlying intuition, consider an art auction where two museums with the highest values for a prized painting each value it at about \$10 million. Each will likely continue to raise the other's bids until a price near \$10 million is reached. Instead, if the two museums have values of \$15 million and \$5 million (leaving the average value of the two bidders unchanged), the bidder with the higher value would win as soon as the price reaches \$5 million. Therefore, the auctioneer's revenue declines in the presence of greater asymmetry.

Similarly, in our setting, the firm with the highest difference between its value and cost will win the audit engagement, but the municipality's ability to extract surplus from the winner depends on the presence of a bidder offering a close substitute. The price paid to a firm is the rival's cost plus its value advantage over its rival. As the value advantage rises, so does the price. A municipality 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 municipality, will extract most of the firm's value advantage in the form of a higher audit fee paid.

¹⁰The intuition for this result rests on the idea that my bid is not my resulting price in a second-price auction, but represents the point below which I prefer not to win the auction. I wish to win precisely in those cases where the resulting price is above my cost, and lose when the price is below my cost.

¹¹The estimated equilibrium price and surplus in a first-price auction is given by:

$$p^{surplus} \simeq \bar{c} + \frac{1}{3}\theta + \frac{\delta^2(3.092 - 0.547|\delta|)}{3}\theta$$

$$S^{surplus} \simeq \frac{v_o + v_i}{2} - \bar{c} - \frac{1 + \delta^2(0.100 + 0.198|\delta|)}{3}\theta$$

Note that the comparative statics in the proposition hold for these functions. The numerical methods adapt the equations derived by Kaplan and Zamir (2007) to our setting. Mathematica code is available from the authors.

2.4 Surplus Auctions with Local Preference

We now provide a model of local preference in settings in which municipalities select firms on the basis of surplus. We restrict our attention to the case of two firms. The outsider submits a bid, b_o . By accepting this bid, the municipality realizes a surplus of $v_o - b_o$. The outsider wins the audit engagement at a price equal to its bid if the resulting surplus is greater than the surplus the insider can profitably provide, $v_i - c_i$. This means that the outsider wins only when the insider's cost is greater than the outsider's bid minus the outsider's value advantage, $c_i > b_o - v_o + v_i$. The outsider's expected profit is given by:

$$\Pi_o(b_o, c_o) = (b_o - c_o)(1 - F(b_o - v_o + v_i)) \quad (7)$$

When $1 \geq \delta \geq 0$, maximizing the above with respect to b_o yields:¹²

$$b_o(c_o) = \left[\frac{\bar{c} + \theta + c_o}{2} \right] + \theta\delta \quad (8)$$

The first term in the bid is identical to the outsider's bid in a cost auction with local preference (equation 3 when $n = 2$). The second term indicates that the outsider augments its bid by half of its value advantage (since $\theta\delta = \frac{v_o - v_i}{2}$). For concreteness, consider an outsider whose audit is valued by the municipality \$10,000 higher than the insider's audit. Imagine that previously the municipality determined winners based only on cost, but with a local preference. Then, the outsider's value differential is inconsequential, so it bids as if $\delta = 0$ (the first term in equation 8). Now, imagine that the municipality switches to a surplus auction. If the outsider continues to bid as before, it will win more often since the insider's costs must now be \$10,000 lower. Alternately, the outsider could increase its bid by \$10,000, winning just as often as before, but at a higher profit. Trading off the probability of winning and the profit from winning, the outsider elects to balance them evenly, increasing its bid by \$5,000, or half of its value advantage (the second term in equation 8). The following proposition identifies the expected price and surplus for the municipality.

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

$$p^{surplus, pref} = p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta - 1)}{2}\theta \quad (9)$$

$$S^{surplus, pref} = \frac{v_o + v_i}{2} - \bar{c} - \frac{1}{2}\theta \quad (10)$$

(i) *Price is decreasing in δ when $\delta < \frac{1}{4}$ and increasing when $\delta > \frac{1}{4}$,*

¹²The 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 scenario for the municipality) or using the same bidding function as for low costs (a unique equilibrium if there is some uncertainty about the range of insider's costs), yields empirical predictions which are natural complements to the case for $\delta \geq 0$.

- (ii) surplus is increasing in the average value of the firms, $\frac{v_o+v_i}{2}$, and is independent of δ , 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 $\delta > \delta'$.

If the outsider bids b_o and is awarded the engagement, the municipality realizes a surplus of $v_o - b_o$. For an insider with local preference to be awarded the engagement, the insider must accept a price that yields the municipality the very same surplus. Thus, the municipality's expected surplus is the same regardless of the identity of the winner, and is given by $v_o - E_{c_o}[b_o(c_o)]$ where the bid is given by equation (8). This yields $S^{surplus, pref}$ in the proposition. 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, $\frac{v_o+v_i}{2}$, for both surplus auctions with and without a local preference. Surplus is also sensitive to the difference in firm values in surplus auctions without local preference but not in surplus auctions with local preference. To see why, consider two municipalities, A and B. The outsider and insider have values of \$20,000 and \$10,000 in market A, and both firms have a value of \$15,000 in market B. The average value of the firms in each market is the same, but firm values differ by \$10,000 in Market A. Since the outsider augments its bid by *half* of its value advantage (equation 8), the outsider's bid will be \$5,000 higher in market A than in market B, exactly offsetting the difference in the two outsiders' values (\$20,000-\$15,000), implying that both municipalities receive the same surplus. Consequently, a municipality's surplus depends only on the average of competing firm's values and not on their differences in values.

We defer discussion of the implications of a local preference until we determine which of the four auction formats developed in this section best describes what we observe empirically.

2.5 Model Identification

Empirically, we observe neither auditors' costs nor the surplus obtained by the municipality. We also do not observe the relative probability of outsiders winning because we do not have full information on which firms were seriously competing for the engagement. 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 the four models described in this section. First, prices increasing in δ is descriptive of surplus auctions but not of cost auctions. Second, a difference between prices earned by insiders and outsiders suggests a local preference. However, Proposition 4 (part iii) indicates that an outsider can earn a higher or lower price depending on the value of δ . We resolve this indeterminacy by deriving expressions for the price in each model conditional on whether the insider or outsider wins.

Figure 1 presents the models' empirical predictions for the price paid to insiders and outsiders as a function of δ . In a cost auction without local preference (panel a), insiders and outsiders receive the same price independent of δ , while a cost auction with local preference (panel b) affords the insider a higher price. 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.

3 Method

3.1 Sample Selection and Design

We began with the sample of 414 municipal 1992 annual GAAS financial statement audits used in the audit fee model reported in Hackenbrack, Jensen, and Payne (2000). The purpose of their study was to document the price and quality effects of a unique Florida regulation that prohibited price competition in the audit service market. More specifically, the law (i) banned the inclusion of fee information in auditors’ proposals to perform an audit, (ii) required auditees to rank prospective auditors in order of their ability to perform the audit, and then (iii) required auditees to negotiate a contract including fee with only the most able auditor.¹³ The sample year precedes the year the state Supreme Court ruled unconstitutional Florida’s ban on price competition (*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 firm 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. Since Florida banned competitive bidding during the sample period, we do not expect to observe a local preference effect in Florida. This provides an additional test of the theory should a local preference be observed outside of Florida.

A second atypical regulation characterized the Florida audit services market in 1992—a ban on solicitation.¹⁴ 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

¹³Florida Statute §473.317(1) provides “a licensee [CPA] shall not make a competitive bid for a professional engagement in which the licensee will attest as an expert in accountancy to the reliability or fairness of presentation of financial information.” The statute defines “competitive bid” as the submission of an offer to a prospective auditee either orally or in writing, directly or indirectly, to perform an attest engagement for an estimated fee, a fixed fee, or a basis of fee.

¹⁴Rule 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.

Carolina, and North Carolina municipal audits (BASELINE) because the solicitation restrictions and Florida’s ban on price competition have been shown to affect audit fees paid (Hackenbrack, Jensen, and Payne 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). Four hundred seventy-seven surveys were returned with responses (rates) by regulatory regime of 122 (68%), 193 (47%), and 162 (48%), respectively. Descriptive statistics are presented with the empirical model in section 3.3.

3.2 Test Variables

Supply (n). 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.¹⁵ 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.¹⁶ We define the relevant audit market, SUPPLY, as the log of all 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.¹⁷

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% to 90% (Elzinga and Hogarty 1973, 1978) with a radius that includes 80% of the suppliers the most common metric in antitrust disputes (Harris and Jorde 1984, Fournier and Gai 2007) and in case law (e.g., *FTC v. Freeman Hospital*, op. cit.). 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, and our results are robust to changing the radius within this range. The tabulated results are based on a radius of 30 miles both because it corresponds to the most common metric used and because empirically it 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.

¹⁵All 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.

¹⁶The 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).

¹⁷Geographic 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).

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 (ii) above, using a radius of 5 or 15 miles, eliminating the 12 observations without any insider firm, and excluding observations in which a Big 6 firm was the winner.

Value advantage (δ). Ever since DeAngelo (1981b) suggested the link, researchers have used the 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 and 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 and Wilson 1988), number of clients (DeAngelo 1981b), and number of employees (O’Keefe and Westort 1992).

Our measure of the value advantage of outside firms over local firms, DELTA, is based on the number of employees as reported in the American Business Disc (1994).¹⁸ 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 and 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 the variable fails to capture gradations of value differences, particularly among non-Big 6 firms.

3.3 Empirical Model, Data Sources, and Descriptive Statistics

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

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

¹⁸‘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.

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, Jensen, and Payne (2000). To these, we add our test variables and two interactions: (i) the interaction of DELTA and INSIDER because it is diagnostic of the auction format (section 2.5), and (ii) the interaction of INSIDER and FLORIDA as we do not expect a local preference effect in Florida (section 3.1).

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, Kuh, and Welsch (1980) variance decomposition support this conjecture.

4 Results

4.1 Estimation of the Empirical Model

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, Kuh, and Welsch (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. Columns 3 and 4 present the parameter estimates and associated test statistics for a robust regression on all 409 observations. Columns 5 and 6 present 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 test variables added to the empirical model reported in Hackenbrack, Jensen, and Payne (2000) are jointly significant ($p = .0019$).

4.2 Empirical Results

Markets Matter. One consequence of the analytic model is competition matters; the greater the number of competing firms, the lower the price paid. Surprisingly, the audit literature is equivocal on the influence of competition, with Ettredge and Greenberg (1990) finding fee discounts increase with the number of bidding firms and Copley, Doucet, and Gaver (1994) finding that the number of bidding firms has no effect on audit fees paid. We find the price paid for municipal audit services is sensitive to the number of competing firms. The coefficient on SUPPLY is negative and statistically significant ($p = .0016$). Predicted audit fees fall by .05% with a 1% increase in the number of audit firms within 30 miles. In our sample, predicted audit fees at the 75th percentile of SUPPLY are 10% lower than at the 25th percentile.

Local Preference. All else equal, higher audit fees are paid to local firms than to outside firms in non-Florida jurisdictions. The coefficient on $\text{INSIDER} \times \text{NOT FLORIDA}$ is positive and statistically significant ($p = .0091$); local firms are predicted to earn a 13% fee premium over a rival outsider of the same value. This relationship does not exist in Florida where price competition was prohibited ($p = .1762$ for the coefficient on $\text{INSIDER} \times \text{FLORIDA}$). 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 a cost or a surplus auction requires examining whether firm value plays a role in determining the price paid.

Surplus Auction with Local Preference. 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 $\text{DELTA} \times \text{OUTSIDER}$ is positive and statistically significant ($p = .0065$). Predicted audit fees for outside winners rise by .04% when our measure of the outsiders' value advantage increases by 1%. In our sample, this implies that outsiders at the 75th percentile of DELTA earn 12% 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 $\text{DELTA} \times \text{INSIDER}$).¹⁹ While we exercise caution interpreting the lack of a variable's significance, one explanation may be a more extreme local preference than modeled. If a subset of municipalities only considers insiders, the existence of higher-valued outsiders would not require local auditors to bid lower to match the outsider's value advantage.

In a surplus auction with local preference, Proposition 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 $\text{INSIDER} \times \text{NOT FLORIDA}$ as the intercept and $\text{DELTA} \times \text{OUTSIDER}$ and $\text{DELTA} \times \text{INSIDER}$ 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.

¹⁹The parameter estimate on $\text{DELTA} \times \text{INSIDER}$ 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.

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. We learn from the audit fee regressions that the surplus auction with a local preference best describes the competition for municipal audit engagements. Now we examine when a municipality should choose to implement a local preference policy.

5 The Influence of Local Preference

We demonstrate in this section that a local preference can serve to increase a municipality’s surplus, but only when the outsider is sufficiently value advantaged.

The rising popularity of auctions as a mechanism for allocating goods and services is due in large part to Myerson (1981) and Riley and 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 from the standpoint of the municipality discriminates against the strongest bidder, allowing a weaker bidder to win even in cases where its bid is not best (Myerson 1981).

An auction discriminates against the stronger bidder to encourage that bidder to bid lower. To see why this is the case, consider two bidders, W and S (for *weak* and *strong*) with costs drawn uniformly from $[0, 1]$ and values $v_W = 1$ and $v_S = 2$. In a first-price auction, for example, in which the firm offering the highest value-bid difference ($v_j - b_j$) is awarded the engagement at a price equal to its bid, S never has an incentive to bid lower than 1. The municipality’s surplus when S submits a winning bid of 1 ($v_S - b_S = 1$) is greater than the maximum surplus W can provide ($v_w - 0 = 1$). If the municipality announces some discriminatory rule that allows the weak firm to win even when its value-bid difference is lower (and makes this more likely for higher bids by the strong firm), then the strong firm bids lower in accordance with the advantage granted the weaker firm. The tradeoff for a municipality is between occasionally awarding the engagement to the lower-valued weak firm (which decreases surplus), and paying lower prices to the strong firm when it wins (which increases surplus).

The precise discriminatory rule that maximizes the auctioneer’s surplus is known theoretically (e.g., Bulow and Roberts 1989), though rarely implementable in actual markets. A local preference serves the same purpose as an optimal discriminatory rule, though more crudely. While local preference also encourages the outsider to grant higher surplus to the municipality, on average, it does not allow the fine tuning of a discriminatory rule to the exact differences in firm values. Despite its imprecise nature, local preference still offers an improvement in the municipality’s surplus when outsiders are substantially stronger than inside firms.

Proposition 5. *When auditors are chosen among one insider and one outsider on the basis of surplus, introducing a local preference*

- (i) *increases the expected price paid for an audit and decreases the municipality's surplus for low levels of differentiation ($\delta \lesssim .20$),*
- (ii) *decreases the expected price paid for an audit and decreases the municipality's surplus for intermediate levels of differentiation ($.20 \lesssim \delta \lesssim .44$), and*
- (iii) *decreases the expected price paid for audit services and increases the municipality's surplus for high levels of differentiation ($\delta \gtrsim .44$)*

Theoretically, a municipality could secure an improvement in its surplus for any δ by prescribing an optimal discriminatory rule commensurate with firms' value differences. Since a local preference offers a sizeable advantage for the insider, optimality is sacrificed for ease of implementation. If the outsider has only a slight value advantage, the auction is nearly symmetric. A local preference skews the auction in the insider's favor too much, creating asymmetry, higher prices, and lower surplus. When the outsider has a large value advantage, the small surplus loss from occasionally awarding the engagement to the lower-valued insider is offset by the price concessions of the outsider. In these cases, adopting a policy of local preference will benefit the municipality not only through its possible objective of having local firms win more often, but also in securing a higher surplus for the municipality.

6 Conclusion

To the extent municipalities have concerns beyond the audit such as providing business for local accounting firms, a local preference policy may serve its purpose. We cannot assess whether a municipality is better served spending resources on the annual audit rather than on, say, police protection. Our aim is to understand the audit-related costs and benefits of such a policy.

In selecting auditors, municipalities balance several goals. First, the municipality wishes to secure the services of the highest value firm available, while economizing on audit costs. Second, municipalities favor local firms over non-local rivals. When outsiders are sufficiently value-advantaged, these two goals need not be in conflict. Without local preference, a value-advantaged outsider can extract its value advantage in the form of higher audit fees. With local preference, an outsider must share this value advantage with the municipality, accepting a lower fee, increasing a municipality's surplus.

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. However, 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: local firms

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 β 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) 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. For example, 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 and 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 and Shor 2008). If local firms have lower (or more certain estimates of) cost, we may expect this to be reflected in lower prices 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.

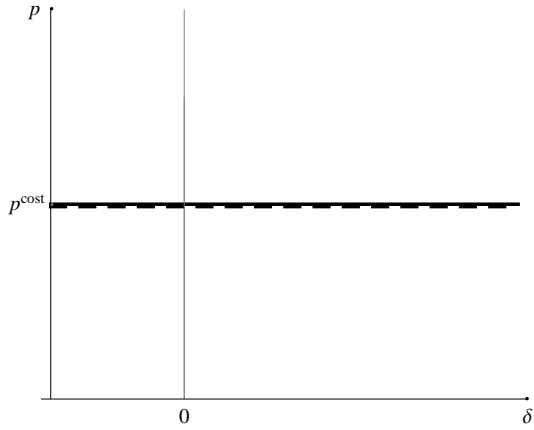
While local preference may benefit a municipality, audits are not a purely private good. The positive social externality that audits provide increase with the value of the firm performing the audit. This externality is not fully reflected in audit selection processes that trade off firm value and price. A local preference always increases the likelihood that local firms win. If local firms are, on average, of higher value than non-local rivals, then local preference serves to increase the average value of the winning firm. Alternately, if (as is likely) the broader audit market has higher-valued firms than the local market, a local preference serves to decrease the average value of a winning firm. Consequently, in precisely those cases where local preference is most valuable for the municipality—when outsiders are highly value-advantaged—local preference is most likely to reduce the value of the winning firm and the social externality of the audit.

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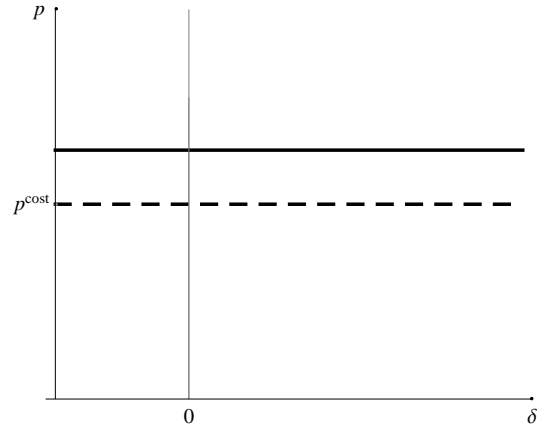
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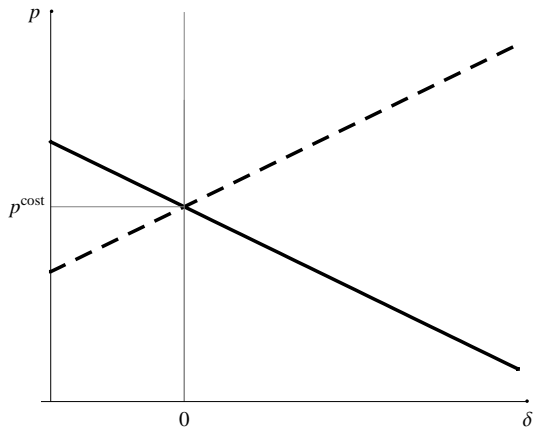
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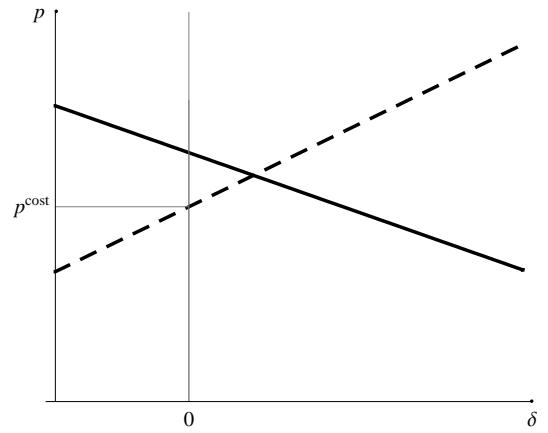
(a) Cost auction without local preference



(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 the four models described in Section 2. 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); (19) and (21) for panel (b); (34) and (38) for panel (c); and (53) and (55) 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	Source	Motivation	% equal to 1
Variable Name and Definitions			
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%
OUTSIDER: 1-INSIDER	calculated	local preference	45.5%
CONTINUOUS VARIABLES			
Variable Name and Definitions			
AUDIT FEE: log of 1992 audit fee paid	Source	Motivation	Mean / Median (Std. Dev./IQR)
EXPENDITURES: log of 1992 expenditures for government operations and enterprise activities in thousands	Questionnaire ^b	dependent variable	10.1 / 10.1 (0.8 / 9.5-10.6)
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	transaction volume	9.7 / 9.5 (1.3 / 8.8-11.6)
SPECIALIZATION: number of sample engagements where the office of the municipality's 1992 auditor assumed primary responsibility for the audit	1992 Financial Statements	engagement risk	0.95 / 0.84 (0.68 / 0.47-1.25)
SUPPLY: log of the number of audit firms within 30 miles of city hall	1992 Financial Statements	industry experience	2.0 / 1.0 (1.5 / 1.0-3.0)
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)	competition	5.3 / 5.3 (1.5 / 4.5-6.4)
	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		Ordinary Least Squares	
		Coefficient	Chi-Square	Coefficient	Chi-Square ^b
constant		5.856	1015.44***	5.765	1237.60***
<u>Baseline Model</u>					
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***
<u>Test Variables</u>					
SUPPLY	-	-0.052	10.32***	-0.046	9.91***
INSIDER × NOT FLORIDA	+	0.121	4.86**	0.134	6.80***
INSIDER × FLORIDA	NS	-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***
	<i>N</i>		409		392
	Model F-statistic			112.03 ($p < .0001$)	
	Adjusted R^2		0.5849		0.799

^a The sign for the variables in the baseline model are the results reported in Hackenbrack, Jensen, and Payne (2000). The signs for the test variables are predicted by the analytic model. 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 Proposition 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:

$$\begin{aligned} p^{cost} &= \int_{\bar{c}-\theta}^{\bar{c}+\theta} n(n-1)cf(c)F(c)(1-F(c))^{n-2}dc \\ &= \bar{c} - \frac{n-3}{n+1}\theta \quad \square \end{aligned} \quad (12)$$

Proof of Proposition 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:

$$q_o \equiv \Pr\{o \text{ wins}\} \quad (13)$$

$$= \int_{c_o} f(c_o) \Pr\{b_o(c_o) < c\}^{n-1} dc_o \quad (14)$$

$$= \left(\frac{n-1}{n}\right)^{n-1} \frac{1}{n} \quad (15)$$

The outsider's equilibrium bid is given in (3). The expected price paid to the outsider conditional on winning is given by:

$$p_o^{cost, pref} = \int_{c_o} b_o(c_o) f(c_o) \Pr\{b_o(c_o) < c\}^{n-1} dc_o / q_o \quad (16)$$

$$= \left(\frac{1}{2\theta}\right)^n \int_{\bar{c}-\theta}^{\bar{c}+\theta} (\bar{c} - c_o + \theta)^{n-1} (\bar{c} + \theta + (n-1)c_o) dc_o \quad (17)$$

$$= \bar{c} - \frac{n-3}{n+1}\theta \quad (18)$$

$$= p^{cost} \quad (19)$$

The expected price paid to an insider conditional on winning is given by:

$$p_i^{cost, pref} = \left[\int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o) \int_{\bar{c}-\theta}^{b_o(c_o)} (n-1)(n-2)cf(c)F(c)(1-F(c))^{n-3} dc dc_o \right. \\ \left. + \int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o)(n-1)b_o(c_o)F(b_o(c_o))(1-F(b_o(c_o)))^{n-2} dc_o \right] / (1-q_o) \quad (20)$$

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

$$p_i^{cost, pref} = p^{cost} + \frac{4}{n(n+1)} \left(\frac{1 - \left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1}}{1 + \left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1}} \right) \theta \quad (21)$$

(i) The probability of the outsider winning in (15) is less than $\frac{1}{n}$, which is the outsider's probability of winning without local preference.

(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 $\lim_{n \rightarrow \infty} \left(\frac{n-1}{n}\right)^n = 1/e < 1/2$, the insider's price conditional on winning in (21) is greater than p^{cost} .

(iii) The outsider's expected price conditional on winning in (19) is identical to the price in a cost auction without local preference in (1).

(iv) The expected price is given by

$$p^{cost, pref} = p_i^{cost, pref} (1 - \Pr\{o \text{ wins}\}) + p_o^{cost, pref} \Pr\{o \text{ wins}\} \quad (22)$$

$$= p^{cost} + \left[\frac{4}{n(n+1)} \left(1 - \left(\frac{n-1}{n}\right)^n - \left(\frac{n-1}{n}\right)^{n-1} \right) \theta \right] \quad (23)$$

Since the outsider receives p^{cost} and the insider receives a $p > p^{cost}$, their convex combination is higher than p^{cost} . \square

In footnote 7, we present an expression for the probability that the outsider loses despite having the lowest cost, derived in the following remark.

Corollary 2.1. *The outsider loses when having the lowest cost 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

$$1 - nq_o = 1 - \left(\frac{n-1}{n}\right)^{n-1} \quad (24)$$

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

$$\lim_{n \rightarrow \infty} 1 - nq_o = 1 - \lim_{n \rightarrow \infty} \left(\frac{n-1}{n}\right)^{n-1} \quad (25)$$

$$= 1 - \lim_{n \rightarrow \infty} e^{\log\left(\frac{n-1}{n}\right)/\frac{1}{n-1}} \quad (26)$$

$$= 1 - \lim_{n \rightarrow \infty} e^{-\frac{n-1}{n}} \text{ by L'Hôpital's rule} \quad (27)$$

$$= 1 - \frac{1}{e} \quad \square$$

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

$$q_o = \int_{\bar{c}-\theta}^{\bar{c}+\theta} f(c_o) \Pr\{v_o - c_o > v_i - c_i\}^{n-1} dc_o \quad (28)$$

$$= \begin{cases} \frac{(1+\delta)^n}{n} & -1 \leq \delta < 0 \\ \frac{1-\delta^n}{n} + \delta & 0 \leq \delta \leq 1 \end{cases} \quad (29)$$

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, the price paid to the outsider when he wins is $\min\{c_i\} + v_o - v_i$, the lowest cost 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

$$S_o^{surplus} = \int_{c_i} (v_i - c_i)(n-1)f(c_i)(1-F(c_i))^{n-2}F(c_i + v_o - v_i)dc_i/q_o \quad (30)$$

$$= \left[\int_{\bar{c}-\theta}^{\bar{c}+\theta-v_o+v_i} (v_i - c_i)(n-1)(\bar{c} - c_i + \theta)^{n-2} \left(\frac{c_i - \bar{c} + \theta + v_o - v_i}{(2\theta)^n} \right) dc_i \right. \\ \left. + \int_{\bar{c}+\theta-v_o+v_i}^{\bar{c}+\theta} (v_i - c_i)(n-1) \frac{(\bar{c} - c_i + \theta)^{n-2}}{(2\theta)^{n-1}} dc_i \right] / q_o \quad (31)$$

Integrating, and substituting q_o from (29) yields:

$$S_o^{surplus} = v_i - \bar{c} + \left(\frac{n-3}{n+1} \right) \theta + 2 \left(\frac{n-1}{n+1} \right) \left(\frac{1 + \delta^{n-1} - \delta^n}{1 + n\delta - \delta^n} \right) \delta \theta \quad (32)$$

Further,

$$p_o^{surplus} = v_o - S_o^{surplus} \quad (33)$$

$$= p^{cost} + 2 \left[\frac{2(1 - \delta^n) + n(n+1)\delta - (n-1)\delta^{n-1}}{(n+1)(1 + n\delta - \delta^n)} \right] \delta \theta \quad (34)$$

For the insider,

$$S_i^{surplus} = \int_{\bar{c}-\theta+v_o-v_i}^{\bar{c}+\theta} (v_o - c_o)(n-1)f(c_o)F(c_o - v_o + v_i)(1-F(c_o - v_o + v_i))^{n-2}dc_o/(1-q_o) \\ + \int_{\bar{c}-\theta+v_o-v_i}^{\bar{c}+\theta} \int_{\bar{c}-\theta}^{c_o-v_o+v_i} (v_i - c_i)(n-1)(n-2)f(c_o)f(c_i)F(c_i) \\ \times (1-F(c_i))^{n-3} dc_i dc_o/(1-q_o) \quad (35)$$

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.

$$S_i^{surplus} = v_i - \bar{c} + \left(\frac{n-3}{n+1} \right) \theta + 4 \left(\frac{1 - n\delta^{n-1} + (n-1)\delta^n}{(n+1)(n-1 - n\delta + \delta^n)} \right) \delta \theta \quad (36)$$

$$p_i^{surplus} = v_i - S_i^{surplus} \quad (37)$$

$$= p^{cost} - 4 \left[\frac{1 - n\delta^{n-1} + (n-1)\delta^n}{(n+1)(n-1 - n\delta + \delta^n)} \right] \delta \theta \quad (38)$$

Lastly, we can derive the average price and surplus:

$$p^{surplus} = p_o^{surplus} q_o + p_i^{surplus} (1 - q_o) \quad (39)$$

$$= p^{cost} + \frac{2}{n} \left[n\delta + \delta^{n-1} - 2 \left(\frac{n}{n+1} \right) \delta^n \right] \delta \theta \quad (40)$$

$$S^{surplus} = S_o^{surplus} q_o + S_i^{surplus} (1 - q_o) \quad (41)$$

$$= \frac{(n-1)v_i + v_o}{n} - \bar{c} + \left(\frac{n-3}{n+1} \right) \theta - 2 \left[\frac{(n+1) - (n-1)\delta}{n(n+1)} \right] \delta^n \theta \quad (42)$$

Substituting $n = 2$ into the above expressions yields equations (5) and (6) 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 on the right hand side of (42) 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. \square

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

$$\Pi_o(b_o, c_o) = (b_o - c_o)(1 - F(b_o - v_o + v_i))^{n-1} \quad (43)$$

which yields a profit-maximizing bid of

$$b_o(c_o) = \begin{cases} \bar{c} - \theta + 2\theta\delta & c_o < \bar{c} - \theta + 2\left(\delta - \frac{1}{n-1}\right)\theta \\ \left[\frac{\bar{c} + \theta + (n-1)c_o}{n}\right] + \frac{2}{n}\theta\delta & c_o \geq \bar{c} - \theta + 2\left(\delta - \frac{1}{n-1}\right)\theta \end{cases} \quad (44)$$

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

$$q_o = \int_{c_o} f(c_o)(1 - F(b_o(c_o) - 2\theta\delta))^{n-1} dc_o \quad (45)$$

$$= \int_{c_o} \frac{1}{(2\theta)^n} \left(\frac{n-1}{n}\right)^{n-1} (\bar{c} - c_o + \theta + 2\delta\theta)^{n-1} dc_o \quad (46)$$

$$= \left(\frac{n-1}{n}\right)^{n-1} \frac{1}{n} ((1+\delta)^n - \delta^n) \quad (47)$$

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

$$S^{surplus, pref} = E[v_o - b_o(c_o)] \quad (48)$$

$$= v_o - \frac{1}{2}\bar{c} - \frac{1}{2}\theta - \frac{1}{2}E[c_o] - \frac{1}{2}(v_o - v_i) \quad (49)$$

$$= \frac{1}{2}(v_o + v_i) - \bar{c} - \frac{1}{2}\theta \quad (50)$$

and prices are given by

$$p_o^{surplus, pref} = \int_{c_o} f(c_o) b_o(c_o) (1 - F(b_o(c_o) + v_o - v_i)) dc_o / q_o \quad (51)$$

$$= \int_{c_o} \frac{1}{(4\theta)^2} (\bar{c} + \theta + c_o + 2\theta\delta)(\bar{c} + \theta - c_o + 2\theta\delta) dc_o / q_o \quad (52)$$

$$= p^{cost} + \frac{2}{3} \left(\frac{2 + 3\delta}{1 + 2\delta} \right) \delta\theta \quad (53)$$

$$p_i^{surplus, pref} = \int_{c_o} f(c_o) (b_o(c_o) - v_o + v_i) F(b_o(c_o) + v_o - v_i) dc_o / (1 - q_o) \quad (54)$$

$$= p^{cost} + \frac{2}{3} \left(\frac{1 - 5\delta + 3\delta^2}{3 - 2\delta} \right) \theta \quad (55)$$

$$p^{surplus, pref} = p_i^{surplus, pref} (1 - q_o) + p_o^{surplus, pref} q_o \quad (56)$$

$$= p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta - 1)}{2}\theta \quad (57)$$

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

$$\Delta(\delta) \equiv p_o^{surplus, pref} - p_i^{surplus, pref} \propto 3(3 - 2\delta)(1 + 2\delta)\delta - 1 \quad (58)$$

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 $\delta \approx 0.1$. \square

Proof of Proposition 5. Surplus is greater with local preference than without whenever:

$$S^{surplus, pref} > S^{surplus} \quad (59)$$

$$\Leftrightarrow \frac{1}{2}(v_o + v_i) - \bar{c} - \frac{1}{2}\theta > \frac{1}{2}(v_o + v_i) - \bar{c} - \frac{1 + \delta^2(3 - \delta)}{3}\theta \quad (60)$$

$$\Leftrightarrow -1 + 2\delta^2(3 - \delta) > 0 \quad (61)$$

$$\Leftrightarrow \delta \gtrsim 0.442 \quad (62)$$

Similarly, for price

$$p^{surplus, pref} > p^{surplus} \quad (63)$$

$$\Leftrightarrow p^{cost} + \frac{1}{6}\theta + \frac{\delta(2\delta - 1)}{2}\theta > p^{cost} + \frac{\delta^2(9 - 4\delta)}{3}\theta \quad (64)$$

$$\Leftrightarrow 1 + 8\delta^3 - 3\delta(1 + 4\delta) > 0 \quad (65)$$

$$\Leftrightarrow \delta \lesssim 0.197 \quad \square$$