The Micro-Empirics of Collective Action: The Case of Business Improvement Districts

Leah Brooks
Department of Economics
University of Toronto
150 St. George St.
Toronto, ON M5S 3G7
Canada
leah.brooks@utoronto.ca
(416) 946-7630

William C. Strange
Rotman School of Management
105 St. George St.
University of Toronto
Toronto, ON M5S 3E6
Canada
wstrange@rotman.utoronto.ca
(416)978-1949

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Abstract

This paper carries out a micro-level analysis of collective goods provision by focusing on the formation of Business Improvement Districts (BIDs). The paper's theoretical and empirical analysis is unusually complete in that it considers the entire process of collective action, including participation in initial organization, voting, and ultimate impacts on property values. BID benefits are shown to be highly uneven, and BID formation is not a Pareto improvement. Furthermore, larger "anchor participants" benefit disproportionately, and are crucial for the viability of the institution, consistent with Olson (1965). These results, while demonstrated in a particular setting, apply to collective action more generally. Whenever a market failure leaves room for a collective response, the presence of anchor participants encourages collective action, and the action -- even though in a sense voluntary -- has uneven benefits.

1. Introduction

The theoretical issues regarding collective goods provision are fairly clear. Individual contributions fail to meet the Samuelson (1954) condition for optimal provision, unless there is collective good shopping at the level of the club (Buchanan, 1965) or community (Tiebout, 1956). This market failure is used -- along with the additional and sometimes implicit assumption of no countervailing government failure -- to justify collective action. The actual details of collective action are not nearly so clear as the theory, and they sometimes do not fit neatly into the Samuelsonian paradigm. What circumstances make collective action viable? How do supporters of collective action differ from opponents? Do all participants necessarily benefit? If not, how are benefits distributed?

This paper considers the empirical reality of collective action, addressing the above questions by focusing on a particular and increasingly important instance, the Business Improvement District. A BID is formed when a majority of commercial property owners in a neighborhood vote in favor of a package of taxes and expenditures on public goods that supplement those provided by traditional local governments. BID activities include posting signs, improving lighting, beautifying streets and sidewalks, and hiring security guards. BIDs resolve the problem of collective action by using the power of government to compel contributions after a majority vote in favor. Since their inception in the 1960s, BIDs have spread around the world and are now found in a long list of cities, including New York, Los Angeles, Vancouver, Cape Town and Melbourne (Houston, 1997). They are credited with decreasing crime (Brooks, 2008; Hoyt, 2005) and increasing property values (Ellen et al, 2007). BIDs are also important for the continued viability of downtowns in the face of a long and strong trend towards decentralization, as documented by Glaeser and Kahn (2004). They are also of interest as part of the larger trend towards self-help "private government" that has become increasingly important in recent years, including homeowner associations, residential community associations, and public utility districts (Cheung, 2008).

The paper addresses, both theoretically and empirically, the details of this resolution of the collective action problem. The theory has four crucial pieces.[1] First, interested parties (initial proponents) must incur costs in order to initiate the BID process. Second, the extent of

[1] The theory extends Helsley and Strange (1998, 2000a, 2000b). See also Epple and Romano (1996a, 1996b), Wildasin (1986), or the surveys by Helsley (2004) and Epple and Nechyba (2004).

the potential BID is determined, with a continuum of heterogeneous agents partitioned into BID members and nonmembers. Third, the potential members vote on whether the BID will exist or not, with the outcome determined by majority voting. Fourth, the BID and the traditional public sector (i.e., the city) choose levels of provision to maximize welfare of members (for the BID) and of the entire polity (for the traditional public sector). One key result of the model is that the support for and the benefits from a BID are uneven. In fact, despite being in a particular sense voluntary, BIDs are welfare but not Pareto improvements. The result does not depend on a governance failure within the BID such as its "capture" by some member. It is the group supplement nature of the BID -- a characteristic that BIDs share with other forms of collective action -- that leads to the result. This unevenness leads to another key result: the viability of a BID as a resolution of the collective action problem depends on the existence of "anchor participants." Because these large agents benefit disproportionately, they are willing to incur the costs of initiation.

The empirical analysis makes use of highly refined data from one California city. For all BIDs in this city, we observe aggregate elections results. For eight of these BIDs, we observe property level votes in BID elections and property level sales values before and after BID formation. In addition, we identify the initial proponents in the process of BID formation, and link these proponents to voting and property information. These data allow us to present an unusually complete analysis of an instance of collective goods provision.

The empirical analysis reaches three key conclusions, all of which are consistent with the theory. First, the benefits of collective action through BID formation are demonstrably uneven. This unevenness is clear in voting patterns and property value changes. Using property-level voting data from the eight-BID sample, we find that small property owners are generally less supportive of BID formation than are large property owners. More specifically, support for the BID increases with various measures of property size, consistent with the theoretical model. Using the property value data, we find further evidence of uneven benefits. Specifically, properties with yes-voters experience larger post-BID price changes than no-voters. This result is robust to a variety of methods of estimating post-BID price changes: comparing BIDs to all commercial parcels, to neighbors, to properties in neighborhoods that almost formed BIDs, or to a propensity score-weighted sample. Second, the collective action of a BID, while likely a welfare improvement, is not a Pareto improvement. This is most clearly seen in the sample of all

BIDs, where the aggregate mean yes vote is 73%, rather than the 100% we would expect if BIDs were simply benefits-tax financed group supplements. Third, a variety of evidence shows that anchor participants, who incur the costs of initiating and organizing the collective action, are crucial for BID viability. We reach this conclusion by identifying proponents with early activity in support of a BID. We then demonstrate that they are larger by several metrics than yes-voters. In addition, we compare BIDs that formed with BIDs that were considered but did not form, and find that BIDs that do form have more concentrated ownership structures. Thus, locations with numerous small owners are less fertile ground for the growth of this sort of collective action. In sum, the uneven benefits of the BID are crucial to its viability.

These findings contribute to two literatures: the general literature in public economics on the provision of collective goods and a more specific literature on the causes and consequences of BIDs. Regarding the former, there are two key themes. First, we consider the welfare effects of collective action. As motivated by the model, we consider the welfare effects by looking at voting in BID elections, the willingness to undertake costs associated with BID formation as a proponent, and property value effects. Micro-level analysis of voting is rare. Gerber and Lewis (2004) is an exception. The analysis of proponents is also scarce, although Libecap and Hansen (2004) investigate this issue to the extent that their more aggregate data allow. It is much more common to use property values as a welfare measure. Oates (1969) is seminal, and Black (1999) is a more recent contribution. To the best of our knowledge, no paper jointly considers all three of these welfare measures.

The second theme is the importance of large agents in resolving collective action problems. Olson (1965) argues that such problems are more likely to be successfully resolved when there are large agents, because they have strong incentives to participate in collective action. Our analysis is very much in this spirit Within a BID, the presence of large interested parties --what might be termed "anchor participants" – is favorable to BID formation. At first glance, this contrasts with the body of evidence showing that there is less public good provision in more heterogeneous groups (i.e., Alesina et al (1999), Alesina and La Ferrara (2000), Costa and Kahn (2003), Vigdor (2004), Miguel and Gugerty (2005)). There is not really a disagreement, however. These papers show that heterogeneity in taste reduces individual willingness to provide public goods.[2] Our analysis shows that heterogeneity in ability to bear fixed costs encourages the creation of an institution to respond to the collective good problem. Our fine-grain evidence is consistent with more the aggregate evidence in Libecap and Hansen (2004) showing that large farmers in the Dustbowl were critical to resolving collective action problems in wind erosion (Libecap and Wiggins (1984) also studies the role of heterogeneity).

Our research also builds on the relatively sparse economic literature on BIDs specifically and the new institutions of local government more generally.[3] Helsley and Strange (1998, 2000a, 2000b) model the formation of BIDs and consider the impact of BIDs on public sector performance. This paper builds on these papers by extending the theory to consider individual voting and contributions to BID formation and by empirically examining organization, voting, and the effects of BIDs. Brooks (2008), Hoyt (2005) and Ellen et al (2007) empirically examine the consequences of BIDs; Cheung (2008) considers the consequences of the related institution of homeowner associations. There are only two quantitative analyses of the determinants of BIDs. Brooks (2007) examines BID adoption at the city, not property level. Melzer (2008) studies the related but distinct question of which neighborhoods are likely to form BIDs and what determines BID borders. Thus, ours is the first paper to employ micro-data to consider every step of BID formation, including initial organization, voting, and the subsequent benefits from BID operation.

The remainder of the paper is organized as follows. Section 2 sets out the political and legal context of BID formation. Section 3 specifies and solves a theoretical model of BIDs consistent with the institutional record presented in Section 2. Section 4 elaborates on the micro data used in the estimation. Section 5 presents the results from the sample where we have only aggregate data. Section 6 presents the results on BID organization and voting from the eight-BID sample where we have parcel level data. Section 7 presents results on property value effects of BIDs for the same eight-BID sample. Section 8 concludes.

2. BIDs

[2] Miguel and Gugerty (2005) argue that an "inability to impose social sanctions in diverse communities leads to collective action failures."

[3] See Mitchell (2008) and Briffault (1999) for more detailed descriptions of BID institutions.

This section discusses the institutional and legal details of BIDs. We focus on California, where a 1994 law gives cities the ability to approve district formation and compel taxation from members. See the Appendix for more detail on the legalities of BIDs.

Figure 1 begins by mapping an example, the Old Pasadena Business Improvement District. As with the most of the BIDs we analyze, this BID has a relatively irregular shape, partially determined by natural borders, including a freeway and a park. The Old Pasadena District contains 339 individual parcels, the polygons in Figure 1. All parcels are assessed on the same tax base of land square footage, structure ground floor square footage, and structure non-ground floor square footage; the rates on these bases differ in each of the five zones. In 2005, the district collected $667,070 in assessment revenues. It provided security, maintenance and marketing and parking services. In this BID, security is provided by "ambassador guides," who provide bike and foot patrol, and who are in contact with the Pasadena Police Department. Maintenance includes cleaning curbs and alleyways, as well as pressure washing streets; marketing includes a "cinema in the park" series and holiday decorations.

In general, forming a BID like the Old Pasadena District can be divided into four major stages. First, proponent owners develop an initial proposal and try to convince others of its merits. In some cities, the city provides grant funds for a BID consultant if proponents are able to demonstrate substantial community support. Second, the proponents hire a consultant, who then works with both the proponents and with other stakeholders to refine the proposal. In doing so, the consultant makes a formal plan, called a Management Plan, which is the legal document that describes how the BID will function. A key part of the plan is the delineation of the BID's boundary. The Management Plan lays out the borders of the district, the district's duration, the tax on each parcel (known in California as an assessment), and the public goods and services that the district will provide. In general, districts are authorized for a three-to-five year life.

The third stage in the BID process is official adoption, in which the city conducts a vote by mailing ballots to property owners. If the value of assessment-weighted votes in favor exceeds the value of assessment-weighted votes opposed, the BID is formed. The BID assessment is collected as an addendum to the property tax bill, and failing to pay this assessment has the same legal consequences as failing to pay the property tax. In the fourth and final stage, the city funnels BID tax revenues to a non-profit administered by the BID's board of directions, and that non-profit coordinates the provision of public goods.

From the above description, it is clear that BIDs are instances of the more general phenomenon of collective goods provision. Specifically, they are "private governments," where a small group adopts an institution to address a collective goods problem left unresolved by the traditional public sector. We show below that the privateness of BIDs does not necessarily yield the same straightforward and universally positive effects as other sorts of private activity.

3. A simple model of BID formation

A. Primitives

As Section 2 shows, there are many institutional and economic nuances involved in BID formation. We capture them in a four stage model that extends Helsley-Strange (1998, 2000a, and 2000b). In stage I, potential founders decide whether to incur the costs of forming a BID. In stage II, the set of potential BID members is determined. In stage III, the potential members vote on whether or not the BID forms. In stage IV, if the BID has formed then the BID and the public sector provide services. The model has several key features. First, the process determining the set of BID members is voluntary in two senses: (a) founders must gain enough from the BID to be willing to bear the *ex ante* costs of BID formation and (b) given that the BID exists, the members would rather be involved than not. As will become clear, the latter does not mean that all members are happy that the BID has formed. Second, potential members vote for whether the BID should exist or not in a sincere way, with each member voting based on whether its payoff is greater with a BID than without (as opposed to inside the BID or outside given the BID's existence, as above).[4] Third, the BID provides supplementary public goods to a subset of the taxpaying population. It finances its costs by taxes on its members. Fourth, the traditional public sector (TPS henceforth; either a city or county government) and the BID respond to each other in their respective choices of public service provision and supplement. This approach seems to us to be a fair representation of the BID formation process as described in Section 2.

Agents are the owners of commercial property. For simplicity, for now we deal with them as a continuum, where they are differentiated by their taste for public services (θ). For the purposes of this model, we assume that agent valuations are distributed according to the continuous and differentiable probability density function $h(\theta)$, defined on the interval $[\underline{\theta}, \overline{\theta}]$.

[4] It would be straightforward to extend the model to allow abstention. In this case, only those with intense preferences would vote.

We assume that the goods and services provided by the BID are perfect substitutes for the goods and services provided by the traditional public sector. If we denote the publicly provided goods by g and the BID provided goods by γ, then agents benefit according to the total provision level, $G = g + \gamma$. We suppose that the gross benefits of a type-θ property owner equal $\theta f(G)$, for an increasing and strictly concave function f(-). As described in Section 2, the goods and services in question here include policing, cleanup, signage, and beautification. These goods, like nearly every other good or service provided by the local public sector, are congestible. We suppose that the costs of providing g units to a property owner are cg and that the fixed costs of operating the BID are equal to F. For simplicity, we assume no fixed costs associated with the public sector. For now, we suppose that these costs are covered as follows. All agents pay cg for the public good provided by the TPS. BID members pay $c\gamma$ for the supplement provided by the BID. Members also pay a fixed charge p to cover the fixed cost of BID formation. It is useful to define by $G(\theta)$ the most-preferred provision level for a type- θ property owner. Such a level solves $\theta f'(G) - c = 0$, which implies that $G(\theta) = f'^{-1}(c/\theta)$. It is easy to see that G(-) increases in θ.

The "publicness" present here derives from the assumption that all BID members consume the same level γ and that the entire population consumes the same g. In this case, the payoff for a nonmember property owner with taste parameter θ is $\theta f(g) - cg$. The payoff for a BID member is $\theta f(G) - cG - p$. Finally, we suppose that the BID includes all property owners of type greater than some critical level θ^*. As noted above, we suppose that θ^* is set so that the set of BID members is those agents who would join the BID given its existence.

B. BIDs and the traditional public sector

It is now possible to characterize the last stage of the model, the interaction between BID and TPS. We suppose that the BID chooses γ to maximize the aggregate welfare of BID members taking the choice of the TPS as given. The TPS chooses g to maximize the aggregate welfare of the entire population, both BID members and nonmembers, taking the choices of the BID as given.[5]

In this setup, in the absence of a BID, the public sector solves

[5] A natural alternative would be to suppose that both the BID and the traditional public sector set public good levels that are most-preferred by median owners, where the median BID member and median owner in the entire population are the decisive voters. As shown below, this setup has similar properties to welfare maximization, but is less tidy. Given the empirical focus of the paper, we have adopted the cleaner approach.

$$\max_g \int_{\underline{\theta}}^{\overline{\theta}} [f(g) - cg]\theta h(\theta)d\theta . \qquad (1)$$

This has the usual (Samuelson) first-order condition:

$$\int_{\underline{\theta}}^{\overline{\theta}} [f'(g) - c]\theta h(\theta)d\theta = 0. \qquad (2)$$

The second-order conditions for this and subsequent problems hold by the convexity of f(-). Let g^0 denote the solution to (2). It is straightforward to see that g^0 is the most-preferred level of g for an owner of type E(θ).

In the presence of a BID that provides γ to property owners of type greater than θ*, the public sector solves

$$\max_g \int_{\underline{\theta}}^{\theta^*} [f(g) - cg]\theta h(\theta)d\theta + \int_{\theta^*}^{\overline{\theta}} [f(g+\gamma) - cg - c\gamma]\theta h(\theta)d\theta - F. \qquad (3)$$

This has first-order condition

$$\int_{\underline{\theta}}^{\theta^*} [f'(g) - c]\theta h(\theta)d\theta + \int_{\theta^*}^{\overline{\theta}} [f'(g+\gamma) - c]\theta h(\theta)d\theta = 0. \qquad (4)$$

The difference here from the initial case is that the public sector now accounts for the impact of the supplement γ on the marginal utility of g for BID members.

The BID solves

$$\max_\gamma \int_{\theta^*}^{\overline{\theta}} [f(g+\gamma) - cg - c\gamma]\theta h(\theta)d\theta - F. \qquad (5)$$

This has first-order condition

$$\int_{\theta^*}^{\overline{\theta}} [f'(g+\gamma) - c]\theta h(\theta)d\theta = 0. \qquad (6)$$

The BID provides a level of γ that is most-preferred by a type-$E(\theta|\theta\geq\theta^*)$, the mean BID member.

Together, equations (4) and (6) characterize a Nash equilibrium between the public sector and the BID for a given membership. Let g^1 and γ^1 denote the solutions for the two provision levels. The equilibrium has two key features. First, the BID causes the public sector to reduce its provision in response to the BID: $g^1 < g^0$. Substituting (6) into (4) gives the condition determining g^1 as

$$\int_{\underline{\theta}}^{\theta^*}[f'(g) - c]\theta h(\theta)d\theta = 0. \tag{7}$$

(7) means that the level of public provision with a BID is thus the most-preferred level of the average non-member, of type-$E(\theta|\theta\leq\theta^*)$. Since the BID contains those with the greatest taste for provision, the public sector can reduce its own provision as these property owners take care of themselves through the BID. Second, the BID results in an increase in the total level of the public good for members: $g^1 + \gamma^1 > g^0$. This is because the initial level of provision g^0 was set by a Samuelson rule for the entire population, while the BID level $g^1 + \gamma^1$ meets a Samuelson condition for just BID members. Together, the BID's choice of γ^1 and the public sector's choice of g^1 are the most-preferred level of the mean BID member.

C. Voting on BIDs

In our setup, an agent's vote on the BID depends on whether the profits in the BID equilibrium exceed those in the equilibrium without a BID. Thus, voting requires each potential member to determine whether payoffs would be higher with formation than without. Formally, a potential BID member votes "yes" if

$$\theta f(g^0) - cg^0 \leq \theta f(g^1 + \gamma^1) - c^*(g^1 + \gamma^1) - p(\theta), \tag{8}$$

where $p(\theta)$ is the share of fixed costs allocated to a type-θ member. It is worth observing that this setup assumes that voters are deciding between a particular BID (marginal member θ^*) and no BID at all. Our reading of the history of BID formation is consistent with this specification of the context of BID voting.[6]

As discussed above, we suppose that the BID formation process sets θ^* so that members would rather join than not given that the BID forms. They still might, of course, prefer that the BID not form at all. This condition sets θ^* as a solution to

$$(\theta^*)[f(g + \gamma) - f(g)] - c\gamma - p(\theta^*) = 0. \quad (9)$$

It is noteworthy that in this favorable specification the BID -- despite its "voluntary group supplement" nature -- is not a Pareto improvement. Its formation will thus not be supported by all members. This is true even though we have restricted the set of members to be those who would choose to join the BID given its existence. Assume for now that $F = 0$. Marginal members are made worse off by BID formation. To see this, first suppose that a marginal member would have preferred a higher level of goods provision than was provided in the absence of a BID: $g^0 < G(\theta)$. Such a marginal member must be worse off, since the payoff with the BID equals $\theta^* f(g^1) - cg^1$, and $g^1 < g^0$. Second, suppose that a marginal member would have preferred a lower level of provision than in the absence of a BID: $g^0 > G(\theta)$. In this case, such a marginal member must also be worse off, since the payoff in the BID equals $\theta^* f(g^1 + \gamma^1) - c^*(g^1 + \gamma^1)$ and $g^1 + \gamma^1 > g^0$. Thus, the marginal member of the BID must be worse off. By continuity, other members who are nearby in type are also worse off. The result would continue to hold with $F > 0$, since that would tend to further reduce utility for the marginal member.

This result has direct implications for voting. Let θ^y denote the type of agent for which (8) is satisfied with equality:

$$\theta^y f(g^0) - cg^0 = \theta^y f(g^1 + \gamma^1) - c^*(g^1 + \gamma^1) - p^y, \quad (10).$$

where p^y is the share of fixed costs allocated to the marginal yes-voter. Then we have the fraction of the population voting affirmatively as $1 - H(\theta^y)$ and the fraction voting negatively as $H(\theta^y)$. Below, we consider these empirically. A corollary is that the effects of BID formation on agent

[6] It is possible, of course, that voters are instead comparing a particular BID with some other potential BID or even some other institutional setup entirely. A voter who opposes one particular BID may well be willing to support another BID that would make a more agreeable provision decision.

welfare (property values) are uneven, with the high-demand agents who vote yes benefitting to a greater degree than the low-demand agents who vote no. We consider this empirically as well.

It is worth emphasizing that none of this suggests that the BID has a comprehensively negative effect on welfare. The BID is created in response to heterogeneity in tastes for public goods. It is not surprising that some agents are made worse off from the BID's vertical segmentation of agents by their taste for the public good. As above, before the BID, g^0 is the most preferred level for a consumer of type $E(\theta)$. After, we have g^1 as the most preferred level of the mean nonmember, type $E(\theta|\theta<\theta^*)$, while $(g^1 + \gamma^1)$ is the most preferred level of the mean BID member, type $E(\theta|\theta>\theta^*)$. Clearly, those agents who before the BID were either completely satisfied or nearly so are now worse-off in the presence of the BID. So there must be some dissatisfaction. As the previous result shows, when θ^* is set so that marginal members would rather be in than out of the BID, then the BID is not even a Pareto improvement for its members. The BID does, of course, increase the welfare of those owners with high demand for the public good by moving towards meeting those demand. It also increases welfare of low demand nonmembers by directing the public sector's objectives in equilibrium towards low demand agents.

The BID also increases aggregate welfare for sufficiently low levels of the fixed costs of BID formation. To see this heuristically, let $F = 0$. By construction, the post-BID level g^1 maximizes aggregate welfare of nonmembers, those with type below θ^*. This is true regardless of F. Also by construction, the sum $g^1 + \gamma^1$ maximizes aggregate welfare of agents of type above θ^*. With $F = 0$, these imply that aggregate post-BID welfare, the sum of welfare for members and nonmembers, must rise. If F were positive, then even though $g^1 + \gamma^1$ maximizes gross member welfare, members might not enjoy a net welfare increase.

The no Pareto improvement result depends directly on the equal utility condition determining the scope of the BID. It is worthwhile to discuss alternatives. It is tempting to propose that there is some sort of "natural" membership for a BID, such as members of a business neighborhood. Formally, this corresponds to a fixed and arbitrary θ^*. If θ^* were very small, then the BID would trivially not be a Pareto improvement, since it would include low demand members. If θ^* were very large, then for large enough fixed cost of formation, the BID would not even add to welfare, and so it would not be a Pareto improvement either. These cases are easy to dismiss as uninteresting, since such BIDs would almost certainly not form. This then leads to the conclusion: BID membership must be in some sense endogenous so that we are considering only BIDs that might form. Is it reasonable to suppose that potential property owners who wanted to join a BID if it formed would be excluded? This seems to us to be inconsistent with the BID formation process described in Section 2 where negotiation identifies the group of similarly-interested property owners.

It is worth pointing out that in the case where a BID does increase aggregate welfare, side-payments could be made between members so that all members benefit. This is clearly the intent of the California legislation enabling BIDs, although side-payments are eschewed in favor of a graduated tax. It is not the intent in other places where BIDs are often financed by simple supplements to property tax. In any case, we empirically consider the degree to which potential members believe they would benefit and actually do experience property value increases.

D. BID organization

The institutional record shows clearly that the formation of a BID depends on the efforts of a few key property owners. These anchor participants bear the costs of working with the government to create a proposal that will ultimately be voted on. In order to consider the relationship between the size distribution of BID members and the willingness of members to incur these costs, it is necessary to depart from the continuous model of property ownership. Specifically, let BID member i own the interval $[\theta^i_L, \theta^i_H]$. The total ownership for this member is $H(\theta^i_H) - H(\theta^i_L) \equiv H^i$. This is a complete partition, so if we rank the members from lowest demand to highest, we have $\theta^1_L = \theta^*$, $\theta^1_H = \theta^2_L$, and so on. Empirically, we will measure this as the owner's share of property in the district. Each member derives benefits according to the average benefits of property on this interval. The fixed costs of BID operation are allocated proportionately, so we have $p^i = F^*H^i$. In this situation, the member's total payoff if the BID forms is

$$V_i^1 = \int_{\theta^i_L}^{\theta^i_H} [\theta f(g^1 + \gamma^1) - c(g^1 + \gamma^1)]h(\theta)d\theta - F^* H^i. \qquad (11)$$

If the BID does not form, the member's payoff is

$$V_i^0 = \int_{\theta_L^i}^{\theta_H^i} [\theta f(g^0) - cg^0] h(\theta) d\theta \,. \qquad (12)$$

We suppose that the BID formation process is initiated when enough agents choose to be founders. Denote the exogenous critical level of participation by Q. Let C denote the cost that an agent incurs from founding the BID. This cost need not be incurred by all members. It is instead borne only by those who actively push for the BID.[7] This situation is, of course, a classic public good problem. The BID has the potential to increase the welfare of many of its members, but the founding costs are incurred only by a subset.

In order for an agent to be willing to incur the costs of founding, several conditions must be met. First, the agent must enjoy a net payoff from the BID that outweighs the costs of founding: $V_i^1 - V_i^0 > C$. Second, the agent must believe its contribution to be critical in the sense that the BID will form with the contribution and will not without it. The institutional record does not tell us the number of participants required.

The sharpest result that can be obtained from this part of the model is that BID initiation depends on large agents. Slightly more formally, consider any arbitrary partition of member holdings. Let agent i be the largest holder. By (11) and (12), $V_i^1 - V_i^0$ becomes smaller as the agent's holdings H^i become smaller. It is therefore trivial that this owner would become unwilling to incur founding costs if its holdings were to become sufficiently small. This means that there exists a degree of dispersion of ownership such that all owners are unwilling to incur the cost. This then shows that the presence of large anchor participants is a necessary aspect of BID formation. As noted earlier, this is very much in the spirit of Olson (1965). Below, we assess empirically whether BID formation is consistent with this idea.

In sum, the model makes several predictions about BID formation. First, BIDs will tend to increase welfare. Second, they do so in an uneven way. The heterogeneity that spurs BID formation also means that there are differences within the BID in support for BID formation and also in the effects that the BID has on welfare. High demand members tend to gain, while low demand members lose. As yet, we have not specified exactly what it means to be a high or low demand member. Third, there may be BID members who do not gain from formation, and do

[7] An alternative would be to suppose that the probability of formation is an increasing function of the number of active founders. The key result below would not change in this case.

not vote for it. Fourth, anchor participants encourage BID formation. The rest of the paper considers these predictions empirically.

4. Data

The paper's empirical work relies on six data sources. These allow us to describe a collective action problem from organization to resolution: a dataset of all BID elections in our analysis city, a dataset of properties in neighborhoods that seriously considered adopting a BID but did not, a dataset of individual votes for an eight-BID sample of elections in the same city, a dataset with information on the initial proponents of these eight BIDs, property-level information on owners and characteristics, and property-level data on sales. Because our data on individual votes is private information, we do not disclose the name of the city we analyze.

BID-level election results are usually available in public city council records. Using the archived files of matters before the city council, which contain a record of council activity and supporting documents from the BID and the city clerk's office, we have assembled a dataset that includes all publicly available election results. From 1994 to 2005, there were 48 elections for BIDs, and we have information on 38 of them from information reported in the public files.[8] These data include the percentage of yes votes weighted by assessment; they sometimes include the unweighted percentage of yes votes.

By examining city council records, we also identify a set of 32 "Almost BIDs," which are our closest empirical correlated to actual BIDs[9] Six of these "Almost BIDs" did adopt BIDs: they consist of five neighborhoods that adopt BIDs after the end of our sample period, and one neighborhood that had a BID revoked (council members revoked establishment when the BID passed with less than 50 percent unweighted support). The remaining 26 Almost BIDs are neighborhoods that consider, but do not adopt BIDs. We call this subset the Never-Adopting Almost BIDs. We identify these neighborhoods through council records. If a neighborhood considers adopting a BID and demonstrates the support of a sizeable minority (a petition with 15% of the assessed value of the district), it receives funds from the city council to hire a BID

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[8] These 48 possible elections are elections for property-based BIDs. See the Appendix for information on for the different types of BIDs.

[9] The most likely candidates for Almost BIDs are neighborhoods where a BID vote just failed, as these neighborhoods and BIDs would share the same important, yet difficult-to-quantify factors that lead a neighborhood to adopt a BID. Unfortunately, there are no such failed votes in our city, which city officials attribute to the fact that property owners realize when a BID will fail and thus choose not to bring the BID to a vote.

consultant. To determine the boundaries of these potential districts, we used boundary descriptions if they were available in the file, and called proponents or city council offices to ask if they were not. In total, these 32 Almost BIDs consist of 11,426 properties.[10] We use the later-forming BIDs in our comparison group when we do our benefit analysis, but not when we compare formed BIDs to unformed BIDs.

The analysis primarily employs individual data. Specifically, for eight of the BIDs that do form, we observe individual votes by property. For each of the 2,067 parcels (a parcel is an individual property) eligible to vote in each of these eight elections, we observe the parcel's unique identifier, the parcel's BID assessment, and the parcel's vote: yes, no or abstain.

By carefully examining city council files for these eight BIDs, we also identify the names of the initial proponents of these BIDs. We consider a property owner a proponent if he or she sits on the initial board of directors, speaks at a city council meeting in support of the BID or was listed elsewhere in the file in a list of proponents. We then match each proponent's name with the parcel he or she owns. We are able to match a substantial fraction of these proponents; details on the quality of the match are available in the data appendix.

Using the parcel's unique identifier, we combine voting and proponent data with cross-sectional information purchased from private vendors that describe all parcels in the city. The cross-sectional information includes information on property characteristics, such as the size of the structure, the size of the lot, the age of the building, and the owner's name.

Our final data source is the last three sales on all parcels in the city from 1980 to 2005. For each sale we observe the sale amount, the sale date, and the parcel number. Using this parcel number, we link sales to property characteristics and votes; we use the sales data to estimate post-BID price changes for BID parcels.

5. Aggregate results

The model predicts, among other things, that BID benefits will be uneven. The model suggests that these uneven benefits will manifest themselves in several ways: in the voting for BID formation, in the efforts of proponents to bring a BID into existence, and ultimately in the effect of the BID on property values.

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[10] If a property is in more than one Almost BID, we include an observation for that property in each of the Almost BIDs to which it belongs.

Table 1 reports aggregate results of the first measure, the share of votes in favor of a BID. The first column shows that the average passage rate for BIDs for the 38 observed elections, the mean across BIDs of $1 - H(\theta^y)$ from the model, is 73 percent. The standard deviation of the passage rate is 0.09, showing that there is little dispersion in this mean. This result directly confirms that while BIDs frequently pass by wide margins, they do not enjoy universal support, and thus should not be considered Pareto improvements.

Comparing the weighted- and un-weighted BID passage rates allows us to evaluate whether higher-assessment members (larger members by some size metric; a proxy for the model's θ) are more supportive of BID adoption. Columns 2 and 3 in Table compare the weighted and unweighted results for the subset of 23 elections for which we have both types of results. The unweighted support – where each parcel counts as one vote, rather than being weighted by the value of the assessment for that parcel – is 62.9 percent, lower than the unweighted support of 74.4 percent.[11] For unweighted votes, the minimum support was 42 percent; the minimum is the only observation with less than fifty percent unweighted support. This BID was disbanded quickly after adoption by the city council due to vociferous citizen opposition.

Thus, BIDs are seemingly not Pareto improvements, since they do not have 100 percent support. Interestingly, the evidence also clearly shows that BIDs do not pass by simple majorities. Given that most BID pass by a substantial margin, it seems that organizers perceive benefits in having a larger than minimal winning coalition.

6. Individual-level results: organization, voting, and anchor participants

We now examine the model's predictions in greater detail by analyzing the eight-BID sample, for which we observe individual level proponent and voting information. Though these eight BIDs are not a random sample, we chose them due to data availability and not as a function of their characteristics.[12] On average, these BIDs spend slightly over a million dollars annually, compared to the all-city average of approximately 3/4 of a million. The most common bases for

[11] On average, these elections have 101 votes cast.

[12] Three of these elections are in neighborhoods with no existing BID, and five of the eight take place in neighborhoods with BIDs that are ceasing operation. It would be a mistake to interpret these districts with closing BIDs as voting on a reversion level of spending as in Romer and Rosenthal (1979). A new BID is a complete re-authorization with a new budget; if a new BID does not pass, no BID will exist.

assessment are linear frontage and lot size, and most BIDs levy an assessment on more than one tax base. Three of the BIDs have multiple zones, with BID charges differing within the BID.[13]

A. Organization

BID organization is initially undertaken by a group of proponents. In the model, these proponents bear the fixed costs of setting up the BID because they have a greater taste for the collective good (higher θ) than other property owners. Table 2 examines the characteristics of proponents. For each district and owner, we calculate the owner's share of the BID assessment, the assessed value of BID property, and the number of BID parcels. We then examine whether the mean of these shares differs between proponents and other BID members.

The first column of the table analyzes owners' share of BID assessments.[14] Row (a) shows that across BIDs, the average share of BID assessment among owners who spoke at the city council was 4 percent. Row (b) reports that across BIDs, the average share of BID assessments for owners who were on the initial board of directors was 3 percent; across BIDs, row (c) shows that those listed as initial proponents in the file accounted for 8 percent of assessments. For each BID, we calculate the mean assessment share of these three types of proponents, and row (d) reports that this mean across BIDs is 3.7 percent. Row (e) shows that the average share of BID assessment for non-proponent owners is 1 percent, while row (f) shows that the average share of BID assessment for yes-voting non-proponent owners is slightly larger at 2 percent. Rows (g) and (h) report the p value for a test of whether the average share of assessed value for BID proponents is larger than that of non-proponents (row (d) > row (e)), or than that of yes-voting non-proponents (row (d) > row (f)). Regardless of whether we consider owner's share of BID assessment, as in the first column, property assessed value, or number of parcels, the BID proponents' mean is always larger. For three of our measures of concentration, the average proponent is statistically significantly larger than the average yes-voting non-proponent.

The pattern in these results is clear. Proponents own larger shares of their BIDs and pay more of the taxes. This is consistent with our hypothesis that high demanders bear the initial fixed costs of BID formation. Broadly, it is consistent with Olson's contention that public goods may be provided by the "exploitation of the great by the small."

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[13] See Appendix Table 1 for more details on these BIDs.
[14] See Appendix Table 2 for BID-level results parallel to Table 2.

B. Voting

We now examine voting behavior. Table 3 reports summary statistics for yes and no votes only for the eight BIDs; a BID needs an assessment-weighted majority of votes cast to pass. Column 1 lists the total number of parcels that voted in each BID; in all, 877 properties participated in voting.

Column 2 of Table 3 shows that the lowest margin of passage among the eight BIDs is 62 percent, and that five of the BIDs have margins of passage over 80 percent. By electoral standards, these are high margins. Column 4 reports the unweighted vote shares, so that each vote is counted equally, instead of being weighted by its assessment. Of the eight elections, six have higher weighted than unweighted support, showing that on average, higher-assessment voters are more supportive of the BID. Columns 6 and 7 report the mean assessment for yes- and no-voters. In six out of the 8 cases, the mean assessment is higher for yes-voters than no-voters. Across all BIDs, the mean assessment for yes-voters is approximately $4,000, while the mean assessment for no voters is approximately $3,000.[15] This result is again consistent with larger property owners deriving more benefits from BIDs.[16]

By linking property-level voting behavior with property attributes, we further investigate the empirical correlates of BID support. We report summary statistics for key covariates in Table 4.[17] Column 1 reports the overall mean; for example, the mean parcel in a BID is located 0.06 km (60 meters) from the BID border. Columns 2, 3 and 4 report this mean for yes-voters, no-voters and abstainers, and Column 5 reports a t-test for whether the mean for yes-voters is significantly different than the mean for no-voters.

The first two sets of rows in the table show that yes voters are slightly more likely to be located farther from the border of the BID than no voters – 62 meters versus 46 meters. When we examine distance to the BID center, there is virtually no difference between yes- and no-voters. Appendix Figure 1 maps votes by BID for three of our BIDs, and confirms this lack of strong geographic pattern. We believe that there are two reasons for this. First, BIDs are

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[15] Do these mean figures mask differences in support at the tail of the distribution? An examination of the highest assessment voters suggests that this is not the case. We look, by BID, at the voters in the top two percent of the assessment distribution. Within this group, in all but one BID, there is at least one no vote or abstention.

[16] Appendix Table 3, which repeats this analysis for the sample including abstentions, shows that larger owners are more supportive of BID adoption. Regardless of whether we consider abstentions or not, our findings hold: BIDs enjoy strong, but not unanimous support, and yes-voters on average pay more BID assessments.

[17] Appendix Table 4 provides this same analysis for the full set of covariates we use in the analysis.

irregularly shaped, so that being near the center of the BID does not insulate properties against externalities associated with non-BID properties. Second, three of our eight BIDs use by-zone assessment. In essence, distance is already “priced” in these BIDs through the tax, so we would expect that only demand not accounted for by the tax should engender voting patterns by geography.

The second part of Table 4 shows summary statistics for measures of size (the model’s θ): property assessed value, improvement share ((assessed improvements/assessed land value)*100), lot size, structure size, and the owner’s share of total assessments in the BID. Following the predictions of the theory, we expect that yes-voters should be “larger” than no-voters. Yes-voters have a significantly higher mean assessed value –$5 million versus $1.4 million for no-voters – and a substantially larger mean lot size, at 50,620 versus 22,030 square feet. Yes-voters also have a larger average value of improvements per dollar of land, and larger structures than no-voters, but these differences are obscured by the larger variances in these two measures. The largest difference in this table, and one that will be consistently important in the regression analysis, is the difference between yes- and no-voters in the final row. On average, an owner of a yes-voting parcel, across all his parcels, pays 6 percent of the BID assessment; the owner of a no-voting parcel pays only 1 percent of the BID’s assessment across all his parcels.[18]

Equation (8) identifies a critical type of owner θ^y such that higher type owners will vote yes and lower type owners will vote no. At θ^y, the owner’s taste for additional public goods (her type) balances the owner’s assessment for additional public goods. Of course, we do not have a comprehensive set of measures that describe the owner’s type. Let x_i denote a vector of observable property level characteristics, and suppose that type is a linear function of observables and a random unobservable error: $\theta_i = a^* x_i + \varepsilon_i$. We then examine how property covariates singly and jointly impact support for the BID (a yes vote) by estimating

$$yes_{i,b} = \alpha_0 + \alpha_1 assessment_{i,b} + \alpha_2 x_{i,b} + BID_b + \varepsilon_{i,b} \qquad (13)$$

The unit of observation here is the individual parcel *i* in BID *b*, and the dependent variable is equal to one if the parcel voted yes and zero otherwise (we discuss robustness tests for variations

[18] This table counts multiple properties with a single owner more than once, as each individual property has unique characteristics. One might be concerned that this biases us in favor of finding that owners of multiple parcels are more likely to own a greater share of the BID assessments. However, when we re-do the analysis at the level of the owner, rather than the parcel, ownership share still statistically significantly explains yes-voting.

on this specification of the dependent variable below). The covariates are assessment_i, which is the BID assessment paid by parcel *i* if it joins the BID, measures of size and taste for the BID, $x_{i,b}$, and BID fixed effects (BID_b). We include BID fixed effects because the theory describes voting patterns within a BID, not voting patterns across BIDs. Our eight BIDs are quite different, so the fixed effects allow us to compare properties within the same BID. In addition, we weight observations so that each BID accounts for an equal weight.[19] To account for within-BID covariance, we cluster standard errors at the BID level.[20] All results are below are robust to a probit specification; we present the easier-to-interpret OLS results.

If all property owners' assessments were smaller than the benefit they received, we would expect all owners to vote yes, and the assessment to be uncorrelated with votes. Since there are no-voters, this cannot be the case. Suppose instead, as we think is the case, that the assessment is a noisy measure of benefits, and that benefits are correlated with demand. If this is the case, when we estimate (13) without the $x_{i,b}$ covariates, then we should find that $\alpha_1>0$. This does not literally mean, of course, that the demand curve slopes up. When we add covariates that capture elements of demand for the BID, we expect coefficients on the covariates to be positive, or $\alpha_2>0$. Furthermore, we expect that controlling for correlates of demand should decrease the coefficient on the assessment, α_1. If we fully control for demand, we expect that the assessment should have the usual negative effect on support for a tax, or that $\alpha_1<0$.

We interpret this regression as the demand for a BID given a fixed proposal for the BID. That is, given a border and a plan for the provision of local public goods, what do potential members prefer? Theory tells us that property characteristics are clearly endogenous to the BID formation, as only certain properties are potential BID members. However, for our question – given a BID proposal, how do pre-determined characteristics affect support? – we are not concerned with the endogeneity of characteristics relative to voting. In other words, voting comes after property characteristics are set. For membership endogeneity to be a concern, property owners would have to change their properties' characteristics between when the BID is proposed and voted on. Though this is not beyond the realm of possibility, for the majority of

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[19] Results are robust to this weighting; we estimate this way so that our results are not driven by the 1,000-plus member BID.
[20] The calculation of clustered standard errors is based on the assumption that the number of clusters goes to infinity. As we have eight BIDs, or clusters, these asymptotics may not be appropriate. We discuss methods to correct for this below.

characteristics about which we are interested – e.g., distance from the center of the BID, structure square feet – this seems implausible.

We begin by estimating equation (15) without the $x_{i,b}$ term and present the results in the first column of Table 5.[21] We find the non-standard public finance result that support for the tax *increases* in the amount of tax paid, or that $\alpha_1>0$. This confirms what we show in the summary tables: voters with larger assessments are more likely to vote yes. For each $1,000 of assessment, a voter is almost one percent more likely to vote in favor of the BID. We interpret this as evidence that BIDs charge more to higher demanders, but not so much more that they are indifferent between voting yes and no.

Columns 2 through 8 of the table add each of our distance and size covariates to the regression individually. As we saw in the summary statistics, Columns 2 and 3 show that there is little relationship between a parcel's distance to the center or border of the BID and that parcel's support for the BID.[22] Columns 4 through 7 show that all direct size measures – assessed value of property, improvement share, lot size and structure size – are all significantly, or nearly significantly, positively related to the likelihood of supporting a BID. An additional million dollars of assessed value, approximately one-third of the mean assessed value, increases support for the BID by half a percentage point.

Column 8 controls for the owner's share of all BID assessments. This is persistently the most significant variable in our regressions explaining BID support, and its addition more than doubles the R-squared. The coefficient tells us that an increase in the owner's share of assessments equal to the mean (3 percent), would increase the likelihood of support for the BID by 9 percentage points.[23] When we put all these covariates in the regression, as we do in the final column, the BID assessment is no longer significantly related to support for the BID, suggesting that the covariates capture the benefits element of the tax. Support for the BID increases in measures of distance and size, and strongly in the owner's share of BID

[21] This and all regression tables use the largest sample for which we observe the main variables in the analysis: 1919 observations, of the 2067 parcels in BIDs (93% of all observations).

[22] When we examine yes votes as a function of either distance, without controlling for assessment, neither distance significantly explains a yes vote.

[23] We use Appendix Table 6 to explore whether a specific type of concentration that motivates yes-voting. We find that, controlling for the owner's share of BID assessments, that the owner's share of property assessed value and structure square feet are positively related to yes-voting. The owner's share of all BID parcels is not.

assessments.[24] These results are robust to a variety of specification checks. Results are qualitatively unchanged if we (a) use the maximal possible sample for each regression, (b) use a probit estimation, (c) do not weight by BID, or (d) limit the sample to only yes- and no-voters. The last robustness check results in the loss of significance of a few variables; this is understandable as the sample size drops to 817 from 1,919.[25]

In sum, the results thus far are consistent with two of the predictions of the theory: the unevenness of BID benefits and the stronger result that, while BIDs do garner super-majority support, they are not Pareto improvements.

C. Anchor participants

We establish above that large owners are more likely to participate in the organization of BIDs and also more likely to vote for BIDs to form. Both of these findings suggest that that the viability of BIDs depends on these "anchor participants." The idea that large businesses are different than small ones is familiar in real estate economics, where "anchor tenants" are crucial to the profitability of shopping malls (Gatzlaff et al, 1994; Gould et al, 2005). Similarly, other research suggests that large innovators are important for local innovative activity (Agrawal-Cockburn, 2003; Feldman, 2003). Our results suggest that a neighborhood without anchor participants would be at a disadvantage in the BID formation process. To be competitive, neighborhoods without anchors might require the government's use of eminent domain, such as when a Lower Manhattan neighborhood of small shops was replaced by the World Trade Center.

Table 5 shows that anchor tenants are important supporters of those BIDs that form. However, it could also be true that there are anchor tenants in BIDs that do not form, and it is

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[24] Additionally, we examine the sensitivity of these results to the assumption implicit in calculating clustered standard errors – that there is a large number of groups. If our number of groups is not "large," standard errors may be "too small." The most straightforward way to account for the within-BID correlation in errors is to estimate each of the regressions in Table 5 once for each BID; by construction, this makes no assumption about the relationship of residuals across BIDs. When we do this, sample sizes decrease substantially. Even so, for three of the eight BIDs we find statistically significant negative coefficients for the assessment using the specification in the first column of Table 5. Using the specification in the second-to-last column of the table, the owner's share of total assessments is a significant explanatory variable at the five percent level for 5 of the 8 BID-level regressions; for the specification in the final column, this increases to 6 of the 8 BID-level regressions. We also use the wild cluster bootstrap approach, as suggested in Cameron, Gelbach, and Miller (2008). Our results are not robust to this method. We suspect that this is related to our use of a binary dependent variable, as later results using a continuous dependent variable are strongly robust to this method.

[25] Our data also allow us to use a richer set of covariates to describe voting behavior, which we do in Appendix Table 2. When we control for tax delinquency, BID assessment as a share of the property tax, zoning type, ownership type, and years since last sale, we still find that the owner's share of BID assessments strongly explains BID support.

some other key difference between BIDs and non-BID neighborhoods that allows BIDs to form. Table 7 offers evidence refuting this alternative hypothesis by comparing BIDs to the 26 Never-Adopting Almost BIDs. Let $z_{i,b}$ be an individual owner i's quantity of some size measure in BID b, e.g., number of parcels, and let Z_b be the total of all $z_{i,b}$ in BID b. We calculate a BID-level Hirfindahl index, $H_b = \sum_{i=1}^{N} s_{i,b}^2$, where $s_{i,b} = z_{i,b}/Z_b$ is the owner's share of the BID total of size measure Z_b. The larger H_b, the more concentrated is the district's ownership. We take the average of these BID-level (H_b) statistics for all BIDs in our eight-BID sample, and do the same procedure for the 26 Almost BIDs. Columns 2 and 3 report these means. The first row of the table reports that the mean BID has a concentration measure for owner's share of number of parcels of 0.046, while the mean Almost BID has a concentration measure about one-quarter of that: 0.014. Regardless of whether we measure concentration using number of parcels, structure square feet, or assessed value, BIDs are always more concentrated than Almost BIDs. This holds true as well when we compare all municipal BIDs in the bottom panel of the table – all 26 property-based BIDs in our city of interest – to Almost BIDs.

Columns 4 and 5 report the p values for tests whether these differences are statistically significant. We find that they frequently are. Column 4 tests the hypothesis that the average concentration in BIDs is equal to that of Almost BIDs; we reject that this is the case at the 10 percent level for two of the cases, and at the 11 percent level for a third. However, our hypothesis is more specifically a one-sided test: we would like to reject that BIDs are less concentrated than Almost BIDs. Column 5 reports the p values for this test, and we are able to reject this at the 10 percent level in three of six cases, and at the 13 percent level for two more. These results, in conjunction with the our earlier finding that proponents are disproportionately large, are consistent with Olson's (1965) conjecture that concentration can help to resolve the problem of collective action.

7. Individual-level results: property value effects.

We now estimate the final welfare indicator: post-BID changes in property values. We then relate this measure to property owners' behavior in the organization and voting stages. The analysis has three stages. First, we use a hedonic model to estimate post-BID price changes for property attributes. Second, we use these post-BID prices of attributes to calculate a per-property price change. Third, we examine that price change as a function of voting and proponent behavior.

A. *Estimating post-BID price changes*

Our hedonic model of the impact of BIDs on property values regresses property value on attributes and attributes interacted with a "post-BID" dummy variable. The major challenge with this approach is that BIDs are not assigned randomly across properties. If BIDs are adopted in neighborhoods that would have increased in value without a BID, we would overestimate the BID effect on property values. If BIDs are adopted in neighborhoods that would have declined in value without a BID, our method would underestimate the property value effect of the BID.

We address this problem of non-random selection of BID properties in three ways. First, we only analyze sales of commercial property; by excluding residential property we eliminate a large set of properties not comparable to BIDs and improve on the literature to date. Second, all models include census tract by year fixed effects, which control for time-varying neighborhood level heterogeneity. Third, we compare BIDs to three control groups that are substantially more like BIDs than the set of all municipal commercial properties. These control groups include properties in neighborhoods that considered forming BIDs and did not (Almost BIDs), properties that are nearby BIDs (less than 1 km away from a BID), and a propensity-score matched sample of properties.

The first control group is the Almost BIDs. As discussed above, we use both BIDs that never formed and those that formed after the end of our sales data sample (end of 2005), for a total of 32 Almost BIDs. These neighborhoods are likely to be older commercial neighborhoods, with property value trajectories similar to those of BID neighborhoods.

The second control group consists of the properties less than one kilometer away from any one of our eight BIDs.[26] In practice, these are the properties to which BID owners and BID consultants make comparisons in evaluating the success of the BID. By comparing BID properties to their geographic neighbors, we implicitly control for variables such as the strength of the local city council member, and the distance to key amenities, including transportation.

The final comparison group uses observable characteristics to weight BID-like properties more heavily in the estimation than non-BID-like properties. This alternate method controls for

[26] As with the Almost BIDs, if a property is a neighbor of multiple BIDs, we include an observation for each instance that property is a neighbor.

observables, but does so using a different functional form than in the initial estimation. Intuitively, if BID properties are larger than non-BID properties, this method applies weights so that the BID and non-BID properties are more similarly distributed.[27]

Regardless of control group, our interest is fundamentally in the distribution of post-BID property value changes across our eight-BID sample. Thus, even if our estimates over- or understate the effect of BIDs on property values, if the under- or overstatement is constant across properties within the BID, we can still make unbiased inferences about yes-voter behavior relative to no-voter behavior, and proponent behavior relative to non-proponents.

In our hedonic specifications, we use data on the last three sales for each property in the city for all ever-BID and never-BID properties. Because our focus is on estimating the distribution of benefits across parcels within the eight BIDs for which we have voting data, we divide the sample into quartiles based on the distribution of structure square feet in the eight-BID sample. We run a separate hedonic regression for each quartile. Using quartiles allows a one-story building to have a different marginal change in price per structure square feet post-BID relative to a skyscraper, which we believe to be reasonable. We look at the hedonic coefficients by the quartile of structure square feet because we would like to cut the distribution of buildings in a way that (a) groups like buildings together, (b) can be calculated for BID and non-BID properties and (c) does not depend on a variable which we think should be directly influenced by BID adoption. It is also possible to include voting behavior directly in the hedonic equation below, and estimate in one equation whether yes-voters experience larger post-BID price increases. We prefer our two-step strategy, because it allows us to use voting information for all parcels in the eight-BID sample, not just those parcels sold after BID adoption.

Specifically, for each quartile *r* of the eight-BID structure square feet distribution, we estimate

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[27] Specifically, we use a cross-section of all parcels to estimate the probit equation

$$\Pr(\text{BID}_{i,b} = 1) = \beta_0 + \beta_1 \text{M}_{i,b} + \text{BID}_{i,b} + \varepsilon_i ,$$

where *i* denotes the individual property, BID_i is a dummy variable indicating whether a parcel is in one of the eight voting BIDs, and M_i is vector of covariates. See the data appendix for the full list of covariates. We use these coefficients to calculate a predicted value, $\hat{BID}_i$, for each parcel. Following Imbens (2004), we define the propensity score regression weight as $\lambda_i = \sqrt{\frac{\text{BID}_i}{\hat{BID}_i} + \frac{(1-\text{BID}_i)}{(1-\hat{BID}_i)}}$. We then use this weight when we estimate post-BID price changes in Equation (19) below.

$$\text{log real price}_{i,b,y,m} = \beta_{0,r} + \beta_{1,r}C_{i,b,y} + \beta_{2,r}\,\text{after BID}_{i,b,y,m} + \beta_{3,r}\,\text{after BID}_{i,b,y,m} * C_{i,b,y} + \text{tract} * \text{year}_{b,y} + \text{month}_m + \varepsilon_{i,b,y,m}\,. \quad (16)$$

The unit of observation is the sale of a property *i* in census tract *b* in month *m* of year *y*. A tract is a census-delineated geography, which attempts to approximate neighborhoods. On average, a tract in our city contains 2,055 parcels. We denote coefficients with a quartile subscript to emphasize that they vary by quartile of structure square feet.

We use the log of the real sale price as the dependent variable so that results are not driven by outliers in the property value distribution.[28] Our covariates are characteristics C, which vary by year (*y*), parcel (*i*), and block group (*b*). The characteristics vector includes zoning code (five dummies; see the Appendix for details), log of lot size, log of structure sq ft, and year built. A parcel has the dummy variable "after BID" equal to 1 if the sale date is after the adoption date of the BID and zero otherwise. The coefficient on this variable, $\beta_{2,r}$, measures the mean change in price after BID adoption for parcels within the BID. The coefficient on the interaction term between "after BID" and the characteristics vector, $\beta_{3,r}$, measures the marginal per-characteristic change in price for parcels in the BID after BID adoption.

In order to account for different time trends by neighborhood, we control for block group times year fixed effects. These fixed effects also help us to net out both fixed and time-varying characteristics of neighborhoods that adopt BIDs. Identification in this demanding specification comes from differences in price over time between BID and non-BID parcels in the same block group. Finally, we use a set of month dummies to control for seasonal effects in property sales.

The estimation yields four vectors of $\hat{\beta}_{2,r}$ and $\hat{\beta}_{3,r}$ that report percentage changes in price for a given characteristic per structure square feet quartile. We evaluate these percentage changes in price at the median price for each quartile in order to arrive at a dollar value change per characteristic, which we call the vectors $\bar{\hat{\beta}}_{2,r}$ and $\bar{\hat{\beta}}_{3,r}$. For example, this estimation allows to say that for the first quartile of the structure square feet distribution, an addition unit of log lot size is correlated with an additional (or possibly a lowered) $X of property value post-BID. Using these hedonic prices, we calculate a per-parcel increase in value after BID adoption as a

[28]This is standard in the bulk of empirical work in this area (for example, see Figlio and Lucas (2004), and Black (1999)).

function of each voting parcel's characteristics: $B_{i,r} = \bar{\hat{\beta}}_{2,r} + \bar{\hat{\beta}}_{3,r} * C_i$. Our model suggests that there should be variation in benefits within a BID. We examine this claim below by looking at how the coefficients vary across quartiles of the structure square feet distribution.

B. Post-BID changes in price as a function of voting behavior

Given an estimated post-BID change in price for each parcel, we examine the relationship of price change to voting behavior. To do so, we estimate

$$B_{i,b} = \gamma_0 + \gamma_1 \text{ yes}_{i,b} + \gamma_2 \text{ assessment}_{i,b} + \text{BID}_b + \varepsilon_{i,b} \quad (17)$$

The unit of observation is a parcel *i* in one of our eight voting BIDs, *b*.[29] The covariates are a dummy variable for whether the parcel voted yes (yes_i), the parcel's BID assessment (assessment_i), and BID fixed effects. The dependent variable is the dollar amount by which the property increased in value after BID adoption relative to one of our four comparison groups. We expect this property value to have capitalized the net monetary costs and benefits of BID adoption.

In this framework, we interpret the constant, γ_0, as the mean post-BID price change for no-voters, and γ_1 as any additional post-BID price change for yes-voters. All else equal, we expect that yes voters should receive additional benefits, or $\gamma_1>0$. Our theory does not have a sharp prediction for the mean benefit received by no voters. As before, we include BID fixed effects so that we compare yes and no voters within the same BID, not across BIDs. We weight observations such that each BID contributes equally to the regressions, and we cluster standard errors at the BID level. When we add an additional covariate for whether the property was owned by a BID proponent, we expect that the coefficient on this variable should be positive.

C. Results

Table 7 presents the mean benefit of BID adoption relative to the four comparison groups. For the entire sample, and for each quartile of the eight-BID structure square feet distribution, the table begins by reporting the mean change in price after BID adoption. That is, we estimate (16) without the β_3 term in order to give a sense of the distribution and magnitudes

[29] We now suppress the quartile subscript as it is not relevant for the remaining equations.

of the price effects. To estimate benefits for the eight-BID sample (B_i), we use the full model in (16), the results of which are reported in Appendix Table 4.

The first column in Table 7 reports the average increase for properties in BIDs after BID adoption in our sample city. The first row compares price changes for commercial BID property relative to all other municipal commercial property: on average, properties in BIDs increase in price 19 percent more than properties not in BIDs after BID adoption. This average estimate varies across control groups from a high of 25 percent in the Almost BIDs sample to a low of 5 percent in the neighbors sample.

Columns two through five of the table show how property prices change across the distribution of structure square feet in the eight-BID sample. In general, properties in the first quartile of structure square feet show little gains, and properties in the third and fourth quartile have the largest gains. In the sample of all commercial properties, BID properties in the third quartile increase in value by 30 percent, and properties in the largest quartile by 35 percent.[30] While the magnitudes differ, this pattern is relatively consistent across the four samples we analyze. Restricting the comparison group, as we do when we compare BIDs to Almost BIDs and to neighbors in the second and third panels, tends to decrease the magnitudes of the coefficients. When we use the post-BID price changes derived from the propensity score matching method, we find an increases in value of 20 percent or more for the top three quartiles. Regardless of the sample, post-BID benefits differ by quartile of structure square feet, consistent with BID benefits being uneven.

The estimates of post-BID property value increases are large. To assess whether they are "too large," we compare them with the results of a repeat sales analysis, which controls for any attributes constant over time for a given property. When we do a repeat-sales analysis of BID properties relative to all other commercial properties, we find that BID properties are associated with a 13 percent increase in price after BID adoption, which is strikingly similar to the average results in Table 7 when evaluating post-BID prices relative to comparison groups. Unfortunately, the repeat sales approach is not a good fit for estimating post-BID price changes for our purposes, since by netting out key property characteristics, it removes from the estimation

[30] The quartiles do not have equal numbers of properties, because quartiles are defined by the structure square feet distribution of the eight-BID sample, not quartiles of the property sales sample. By using quartiles of eight-BID sample's structure square feet distribution as the base, we can report consistent quartiles across control groups.

exactly that which determines the variance we wish to examine.[31] Another way to evaluate whether the results are driven by selection is to evaluate whether BID and non-BID properties have differential trends in sales values by analysis quartile before BID adoption. For two of the four samples we cannot reject that before the BID, BID and non-BID price trends for all quartiles are jointly equal. For 13 of the 16 possible quartiles examined, we cannot reject that BID and non-BID trends pre-BID are equal. Appendix Figure 2 shows these prices trends by quartile for the sample of all commercial property; test results for all samples and quartiles are available upon request.

We now turn in Table 8 to examining post-BID price changes as a function of voting and proponent behavior. The first column examines post-BID price changes as a function of whether the parcel was a yes voter, controlling for assessment and BID fixed effects. In the sample of commercial property only, we find that yes voters experience an additional $226,000 worth of appreciation after BID adoption. For these voters, mean assessed value (which frequently understates market value) is $5 million. In the remaining three comparison groups, yes voters experience between $14,000 and $324,000 of additional appreciation post-BID. This figure is positive for all of the four comparison groups, and significantly so for three out of the four.

In this specification, the constant gives the mean benefit for no voters. As the Table 8 results hinted, the mean post-BID price change, even for no voters, is usually positive and substantial. Relative to the mean no-voter post-BID price change, yes voters additional gain an additional 75 percent in the commercial property sample. In the three other samples, this figure is larger.[32]

The second column of Table 8 adds a variable equal to 1 if the property is owned by an initial proponent. In all four comparison samples, proponents receive larger post-BID benefits than yes voters. In addition, these benefits sometimes exceed the mean benefit received by all members. However, our coefficients are estimated with enough noise that we cannot reject that the additional benefits received by proponents and the benefits received by yes voters are the same.[33]

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[31] The only other paper to examine the effect of BIDs on property values, Ellen et al (2007), finds post-BID price increase in the 16 percent range.

[32] We also estimate a more flexible form of Equation (20) that allows benefits to differ by abstention, and assessments to have a differential effect for yes and abstaining voters. In general, the qualitative results hold.

[33] As before, we examine whether these results are sensitive to the reliance of clustered standard errors on an assumption of a large number of groups. When we estimate the Table 8 regressions by individual BID we find that

In sum, these results show that regardless of comparison group, yes voters experience persistently larger post-BID price changes than do no voters – even though the average no voter also experiences a positive post-BID price change.[34] It is important to note that this is completely consistent with theory. Although the no voters' property value goes up (before vs. after) this does not mean that they prefer that the BID exist (with vs. without). The results are broadly favorable to BIDs as an institution. The property value effects are large, though uneven. Some members suffer declines, but a large fraction of BID members experience increases in property value. Of course, the property value estimates account for neither the time nor monetary costs of forming a BID, so they are a measure of gross rather than net welfare gain.

8. Conclusion

This paper considers the general issue of collective action by looking at BIDs, an increasingly important approach to the resolution of these problems. The paper has both theoretical and empirical parts. The theory shows that one should expect the benefits of BIDs to be uneven. In fact, even though BIDs are by design a self-help institution, where formation is a consultative process and taxes are supposed to be related to benefits, the theory shows that BIDs are not even Pareto improvements. The theory also shows that the viability of BIDs depends on the willingness of anchor participants to bear the fixed costs of formation.

The empirical analysis stems directly from the theory. The data allow us to match voting by parcel with property characteristics and with post-BID outcomes such as changes in property value. We demonstrate that the demand for BIDs and their impact are indeed quite uneven. This is seen in voting for BID creation and in the effects of BIDs on property values. The significant minority of votes against formation is consistent with the result that BIDs, while the choice of a supermajority, are not Pareto improvements. The empirical analysis also provides strong support for the importance of anchor participants. In particular, the concentration of a BID's properties among large owners is a particularly strong predictor of BID formation. To the extent that BIDs are an alternative to the spatial decentralization of commercial activity, anchor participants are also important for the continued viability of downtowns.

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at least one BID has a significant positive benefit for yes voters in each regression, save for the final regression in the table. When we calculate the standard errors following the Cameron, Gelbach and Miller (2008) method, p-values for all originally significant coefficients change by less than 1.5 percentage points. We take this as evidence that our results are not crucially driven by standard errors that were "too small."

[34] Some no voters do experience losses in property value.

The anchor participants result is widely applicable because it suggests the limits of BID-type resolutions of collective action problems. For instance, Nelson et al (2008) and Inman (2010) argue for the development of Residential Improvement Districts (RIDs) to resolve the many problems that beset older residential neighborhoods. Since BIDs have had successes in resolving market failures that afflict some commercial neighborhoods, it is appealingly symmetrical to believe that RIDs could solve the parallel market failures that afflict some residential neighborhoods. Despite this, residential private government has typically taken on an entirely different form, with neighborhood associations created by the initial developer of a neighborhood. The anchor participant result suggests a possible explanation: BIDs form because at least some commercial neighborhoods have large agents who can bear the costs required for formation. In contrast, all households in a residential neighborhood are small. Thus, the fixed costs of formation must be borne either by developers or by traditional government.

More broadly, our results highlight a crucial interaction between an institution and its underlying population. A BID is an Olsonian mechanism for resolving problems of collective action. However, even for this institution to succeed, a receptive population – whether that receptiveness is a feature of demand for the public good, or an ability to bear fixed costs – is required.

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Figure 1: An Example Business Improvement District: Old Pasadena BID

Notes: This map shows the boundaries of the Old Pasadena Business Improvement District. Individual polygons within the blue boundaries are individual property parcels. White numbers indicate the zones of the BID; see text for details.

Source: 2005 *Old Pasadena Annual Report*, accessed online May 15, 2008: http://www.oldpasadena.org/news/opm_ar06.pdf

Table 1: Voting: All Recorded BID Elections

	(1)	(2)	(3)
		Weighted and Unweighted Totals Observed	
	All Elections, Weighted Votes	Weighted Votes	Unweighted Votes
Mean	0.731	0.744	0.629
Standard Deviation	0.090	0.102	0.137
Minimum	0.531	0.531	0.402
Maximum	0.930	0.930	0.923
Number of Elections	38	23	23

Notes: Authors' tabulations from information in council files. Each observation in this table is an election result for an individual BID.
Source: See Data Section.

Table 2: Proponents Relative to Yes-Voters and All Members

		(1) BID Assessment	(2) Property Assessed Value	(3) Number of Parcels	(4) Square Feet of Structure
Proponent Types					
(a)	spoke at the council meeting	0.036	0.064	0.029	0.048
(b)	on the initial board of directors	0.030	0.061	0.022	0.049
(c)	listed as initial proponents	0.078	0.117	0.022	0.068
(d)	proponents of any type ((a) - (c))	0.037	0.068	0.023	0.052
Non-Proponents					
(e)	not proponents of any type	0.011	0.009	0.014	0.010
(f)	yes-voting, non-proponents of any type	0.019	0.013	0.019	0.015
Tests					
(g)	p-value, H_A: (d) > (e)	0.006	0.077	0.003	0.004
(h)	p-value, H_A: (d) > (f)	0.048	0.339	0.009	0.013

Notes: Authors' tabulations from information in council files. The first figure in the table (column 1, row (a)) is found by calculating each proponent owner's share of the BID assessment, taking the mean of those shares by BID, and averaging across all 8 BIDs. All other figures in rows (a)-(f) are calculated similarly.
Sources: See Data section and Data Appendix.

Table 3: Voting: Eight-BID Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Weighted Share of Votes		Unweighted Share of Votes		Mean Assessment, $1000s	
BID ID	Total Parcels	Yes	No	Yes	No	Yes	No
1	232	0.889	0.111	0.841	0.159	2.912	1.915
2	289	0.838	0.162	0.723	0.277	9.112	4.617
3	44	0.822	0.178	0.773	0.227	12.482	9.176
4	63	0.651	0.349	0.619	0.381	1.320	1.151
5	79	0.624	0.376	0.684	0.316	2.493	3.251
6	26	0.930	0.070	0.923	0.077	1.484	1.347
7	66	0.623	0.377	0.652	0.348	1.517	1.714
8	78	0.867	0.133	0.731	0.269	0.837	0.349
All BIDs	877	0.780	0.220	0.743	0.257	4.019	2.940

Notes: Votes in columns 2 and 3 are weighed by each parcel's BID assessment; votes in columns 4 and 5 are not. The final row reports an average across the eight BIDs, where each BID is weighted equally.
Source: See Data section in text.

Table 4: Property Characteristics by Voting Behavior

		(1)	(2)	(3)	(4)	(5)
			By Vote Type			t-test for
		Overall	Yes	No	Abstain	(2) vs (3)
Location						
Distance to the BID Border	mean	0.063	0.062	0.046	0.069	4.01
(km)	sd	0.066	0.058	0.049	0.075	
	count	2067	655	222	1190	
Distance to the BID Center		0.540	0.553	0.512	0.536	1.13
(km)		0.408	0.451	0.381	0.379	
		2067	655	222	1190	
Size						
Assessed Value, $millions	mean	2.984	5.050	1.350	1.802	4.79
	sd	12.747	18.151	3.476	8.156	
	count	2053	650	222	1181	
Improvement Share:		0.042	0.058	0.012	0.037	1.42
(Assessed Improvements/		1.279	1.798	0.017	0.915	
Assessed Land Value)/100		1995	628	219	1148	
Lot Size, 10,000s of square feet		3.593	5.062	2.203	2.809	4.78
		9.219	13.990	2.816	4.020	
		2062	654	221	1187	
Structure Size, 10,000s of square feet		3.106	4.217	2.970	2.286	1.21
		9.017	10.895	9.450	7.006	
		1966	616	217	1133	
Owner's Share of Total Assessments		0.032	0.063	0.011	0.015	7.87
in BID		0.062	0.090	0.012	0.021	
		2063	651	222	1190	

Notes: Statistics are calculated so that each BID has equal weight.
Sources: See Data Section in text.

Table 5: Voting Behavior as a Function of Distance and Size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
BID Assessment, $1000s	0.008*	0.008*	0.009*	0.001	0.008*	0.006**	0.002	0.005*	-0.003
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)
Distance to BID border, km		0.445							-0.035
		(0.680)							(0.410)
Distance to BID Centroid, km			0.027						0.120+
			(0.089)						(0.056)
Assessed Value of Property				0.005**					0.004*
$millions				(0.001)					(0.001)
Improvement Share					0.007*				0.004***
(improvement value/land value)/100					(0.003)				(0.001)
Lot Size						0.007			0.001
10,000s of square feet						(0.004)			(0.003)
Structure Size							0.006+		0.003*
10,000s of square feet							(0.003)		(0.001)
Owner's Share of Assessments in BID								2.954**	2.953**
								(0.740)	(0.695)
BID Fixed Effects	x	x	x	x	x	x	x	x	x
R-squared	0.071	0.073	0.072	0.082	0.072	0.081	0.077	0.188	0.203
Obs	1,919	1,919	1,919	1,919	1,919	1,919	1,919	1,919	1,919

Notes: + Significant at the 10% level * Significant at the 5 percent level. ** Significant at the 1% level. *** Significant at the .1% level. Observations are individual properties, and the dependent variable is one if the property voted yes and zero otherwise. All regressions include BID fixed effects, cluster standard errors by BID, and weight each BID equally.
Sources: See Data section in text.

Table 6: BIDs vs Almost BIDs

(1)	(2)	(3)	(4)	(5)
			p-values for test	
Concentration Based on Owner's	BIDs	Almost BIDs	H_0: BIDs = Almost BIDs	H_0: BIDs < Almost BIDs
8 Voting BIDs vs Almost BIDs				
Number of Parcels	0.046	0.014	0.024	0.012
	(0.011)	(0.003)		
Structure Square Feet	0.124	0.070	0.258	0.129
	(0.039)	(0.022)		
Assessed Value	0.167	0.055	0.110	0.055
	(0.061)	(0.015)		
All Municipal Property BIDs versus Almost BIDs				
Number of Parcels	0.024	0.014	0.095	0.048
	(0.005)	(0.003)		
Structure Square Feet	0.075	0.070	0.873	0.436
	(0.016)	(0.022)		
Assessed Value	0.088	0.055	0.225	0.113
	(0.022)	(0.015)		

Notes: This table reports the mean Herfindahl index for BIDs and Almost BIDs. This table uses the 26 Never-Adopting Almost BIDs. There are 26 total municipal property BIDs in our city of interest.
Sources: See Data section and Data Appendix.

Table 7: Post-BID Property Value Changes

	(1)	(2)	(3)	(4)	(5)
		Quartiles of Structure Square Feet of 8-BID Sample			
	Overall	Q1	Q2	Q3	Q4
BIDs and Everybody Else	0.193***	-0.088	0.254***	0.299***	0.345***
	(0.032)	(0.245)	(0.059)	(0.053)	(0.089)
R-squared	0.750	0.923	0.754	0.748	0.804
Obs	42,036	2,322	17,506	14,781	7,427
BIDs and Almost BIDs	0.254*	0.000	-0.025	0.334*	0.628*
	(0.100)	0.000	(0.234)	(0.151)	(0.258)
R-squared	0.697	0.858	0.749	0.733	0.744
Obs	5,779	348	1,812	2,229	1,390
BIDs and Neighbors (< 1 km)	0.055**	0.013	0.063+	0.036	0.050
	(0.021)	(0.102)	(0.037)	(0.028)	(0.040)
R-squared	0.685	0.898	0.736	0.694	0.797
Obs	25,215	1,017	8,185	10,808	5,205
Propensity Score Weighted	0.178***	-0.224	0.214***	0.324***	0.213*
	(0.030)	(0.248)	(0.058)	(0.053)	(0.090)
R-squared	0.761	0.948	0.768	0.757	0.820
Obs	36,835	2,099	15,824	12,579	6,333

Notes: + Significant at the 10% level * Significant at the 5 percent level. ** Significant at the 1% level. *** Significant at the .1% level. Each panel reports the coefficient on a variable equal to one if the property is in a BID and it is after the BID start date. All estimations use real log price as the dependent variable, limit the sample to commercial property only, and control for block group-year fixed effects, zone code (commercial, manufacturing, residential; parking is the omitted category), log of lot size, log of structure square feet, year built, and month dummies.
Sources: See Data section.

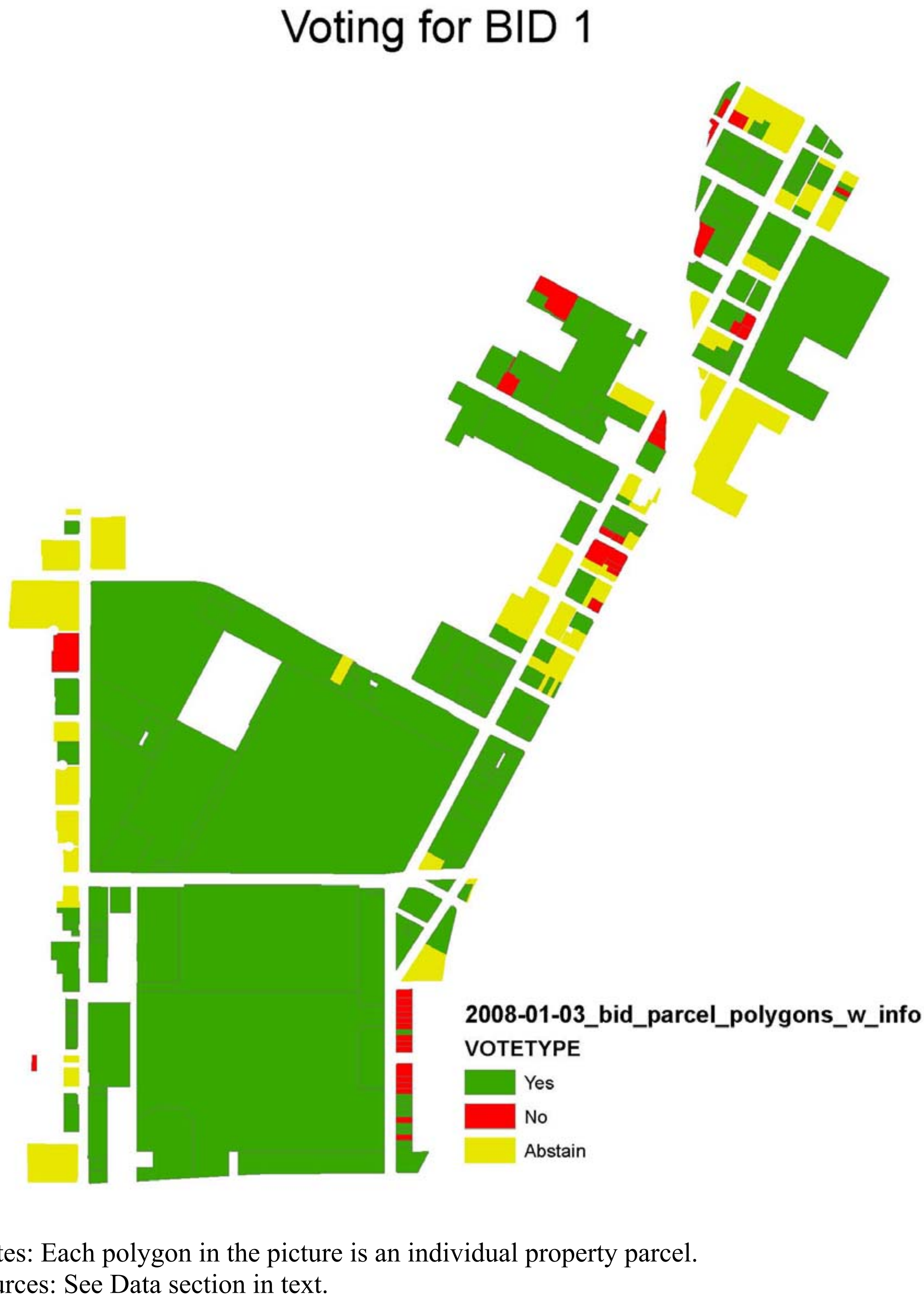
Table 8: Post-BID Property Price Change as a Function of Voting and Assessment

	(1)	(2)	(3)	(4)
	BIDs and Commercial Property		BIDs and Almost BIDs	
Yes	226.1*	166.3*	272.9*	204.9*
	(71.3)	(63.9)	(88.2)	(77.7)
BID Proponent		239.5*		272.5*
		(87.0)		(90.0)
Constant	304.7***	283.3***	62.3+	37.8
	(22.3)	(23.4)	(28.8)	(32.3)
	BIDs and Neighbors		BIDs and Propensity Score Wtd Smpl	
Yes	14.2	4.7	324.8*	297.4*
	(16.3)	(20.1)	(97.7)	(107.3)
BID Proponent		38.2		109.7
		(23.6)		(147.0)
Constant	5.9	2.5	-5.9	-15.7
	(5.4)	(4.8)	(33.8)	(37.8)

Notes: + Significant at the 10% level * Significant at the 5 percent level. ** Significant at the 1% level. *** Significant at the .1% level. Observations are individual properties, and the dependent variable is the dollar value of estimated benefit (in $1,000s) from BID adoption for that parcel. "Yes" is 1 if the property voted yes and zero otherwise. "BID Proponent" is one if the property was owned by a BID proponent, as described in Table 3, and zero otherwise. All regressions use the maximal set of 1,701 observations for which we are able to estimate benefits and control for the parcel's assessment. Regressions include BID fixed effects, cluster standard errors by BID, and weight each BID equally. Sources: See Data section in text.

APPENDIX – NOT FOR PUBLICATION

Appendix Figure 1.1: Voting for BIDs by Parcel



Notes: Each polygon in the picture is an individual property parcel.
Sources: See Data section in text.

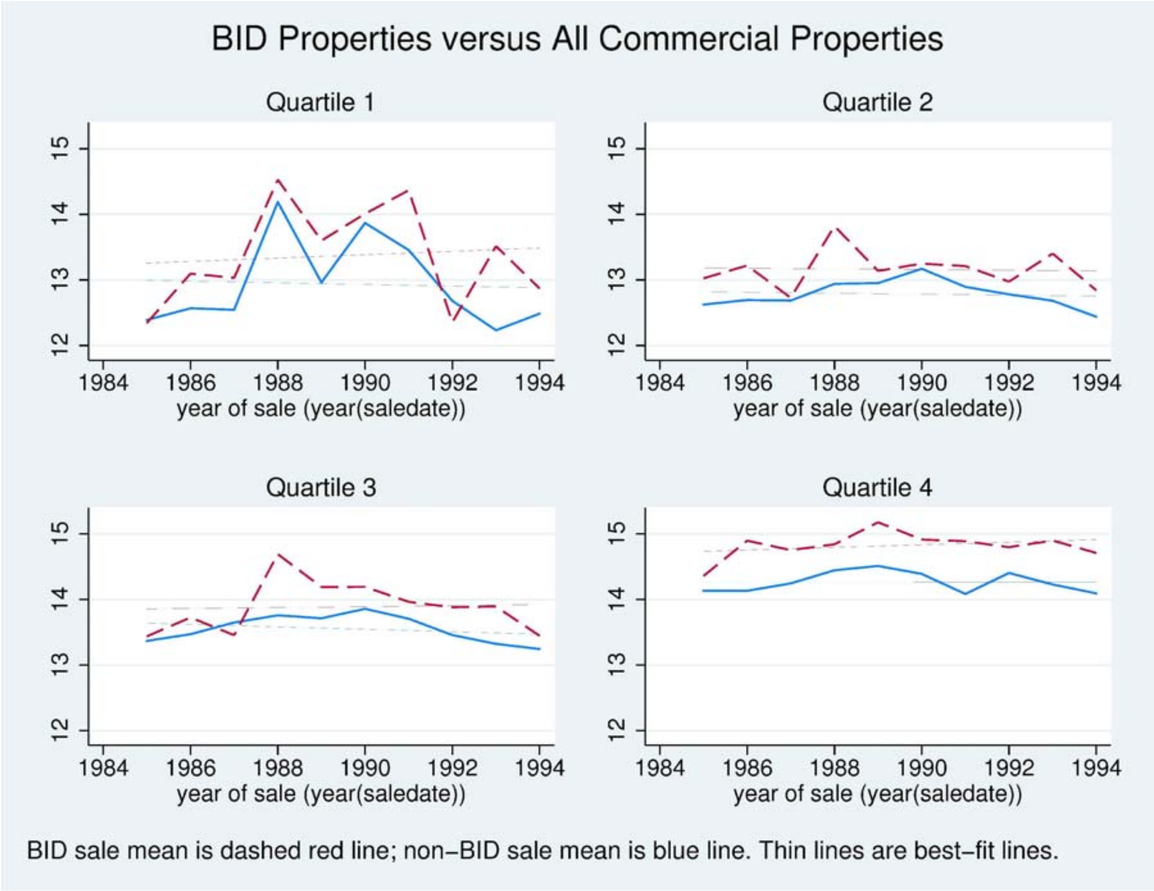
Appendix Figure 1.2 – Voting Patterns: BID 2

Notes: Each polygon in the picture is an individual property parcel.
Sources: See Data section in text.

Appendix Figure 1.3 – Voting Patterns: BID 3

Notes: Each polygon in the picture is an individual property parcel.
Sources: See Data section in text.

Appendix Figure 2: Pre-BID Trends in Prices for BID and non-BID Properties



Notes: This picture displays pre-BID trends in prices for future BID and non-BID properties. Results for the remaining three samples, as well as test results for the hypothesis that the trends are equal (which we cannot reject in most cases) are available upon request.
Source: See data section in text.

Appendix Table 1: BID Method of Assessment & Year and Type of Adoption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Assessment Based On						
BID	Linear Frontage	Linear Frontage, Specific Street	Structure Size	Lot Size	Multiple Zones?	Year of Election	New or Renewal?
1	x				Yes	2002	renewal
2			x		Yes	2002	renewal
3			x	x	No	2005	renewal*
4	x			x	Yes	2002	new
5	x			x	No	2001	renewal
6	x			x	No	2004	renewal
7		x			No	2001	new
8	x			x	No	2007	new

Notes: BIDs in our sample are assessed on at least one of four criteria for property size: linear frontage, linear frontage along a specific street, structure size, and lot size. "Multiple Zones?" describes whether the BID has more that one assessment schedule within the BID; differing assessments correspond with differing levels of service. Year of election is the year in which the BID election took place. New or renewal describes whether this was an election to initially form a BID (new) or a election to re-form when the BID's mandate ended (renewal). *This BID had both a renewal and an expansion.
Sources: See Data section.

Appendix Table 2: Proponents Relative to Yes-Voters and All Members

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	mean share of listed variable for owners who						t-test	
BID Number	spoke at the council meeting	were on the initial board of directors	were listed as initial proponents	were proponents of any type ((1) - (3))	were not proponents of any type	were yes-voting, non-proponents of any type	p-value, H_A: (4) > (5)	p-value, H_A: (4) > (6)
BID Assessment								
1	0.067	0.049		0.058	0.006	0.009		
2		0.009		0.009	0.002	0.003		
3		0.045		0.045	0.012	0.016		
4		0.029		0.029	0.010	0.027		
5		0.016		0.016	0.011	0.013		
6			0.078	0.078	0.031	0.055		
7	0.004	0.018		0.016	0.008	0.008		
8		0.047		0.047	0.009	0.020		
all BIDs	0.036	0.030	0.078	0.037	0.011	0.019	0.006	0.048
Property Assessed Value								
1	0.127	0.116		0.121	0.003	0.005		
2		0.011		0.011	0.002	0.003		
3		0.046		0.046	0.010	0.018		
4		0.097		0.097	0.004	0.004		
5		0.013		0.013	0.011	0.014		
6			0.117	0.117	0.028	0.052		
7	0.001	0.023		0.020	0.008	0.007		
8		0.118		0.118	0.004	0.005		
all BIDs	0.064	0.061	0.117	0.068	0.009	0.013	0.077	0.339
Number of Parcels								
1	0.051	0.037		0.044	0.007	0.010		
2		0.005		0.005	0.002	0.002		
3		0.018		0.018	0.028	0.029		
4		0.032		0.032	0.010	0.016		
5		0.017		0.017	0.011	0.012		
6			0.022	0.022	0.035	0.060		
7	0.007	0.011		0.010	0.009	0.009		
8		0.033		0.033	0.010	0.016		
all BIDs	0.029	0.022	0.022	0.023	0.014	0.019	0.003	0.009
Square Feet of Structure								
1	0.094	0.083		0.089	0.004	0.007		
2		0.007		0.007	0.002	0.003		
3		0.052		0.052	0.009	0.012		
4		0.081		0.081	0.005	0.004		
5		0.011		0.011	0.012	0.015		
6			0.068	0.068	0.032	0.064		
7	0.002	0.020		0.018	0.008	0.008		
8		0.090		0.090	0.006	0.006		
all BIDs	0.048	0.049	0.068	0.052	0.010	0.015	0.004	0.013

Notes: Authors' tabulations from information in council files.
Sources: See Data section and Data Appendix.

Appendix Table 3: Voting: Eight-BID Sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Weighted Share of Votes			Unweighted Share of Votes			Mean Assessment, $1000s		
BID ID	Total Parcels	Yes	No	Abstain	Yes	No	Abstain	Yes	No	Abstain
1	315	0.657	0.082	0.260	0.619	0.117	0.263	2.912	1.915	2.711
2	1,047	0.431	0.084	0.486	0.200	0.076	0.724	9.112	4.617	2.831
3	104	0.505	0.109	0.386	0.327	0.096	0.577	12.482	9.176	5.417
4	136	0.308	0.165	0.527	0.287	0.176	0.537	1.320	1.151	1.209
5	143	0.386	0.233	0.380	0.378	0.175	0.448	2.493	3.251	2.069
6	46	0.597	0.045	0.358	0.522	0.043	0.435	1.484	1.347	1.069
7	134	0.326	0.197	0.476	0.321	0.172	0.507	1.517	1.714	1.400
8	142	0.535	0.082	0.383	0.401	0.148	0.451	0.837	0.349	0.534
All BIDs	2,067	0.468	0.125	0.407	0.382	0.126	0.493	4.019	2.940	2.155

Notes: Votes in columns 2, 3 and 4 are weighed by each parcel's BID assessment; votes in columns 5, 6 and 7 are not. The final row reports an average across the eight BIDs, where each BID is weighted equally.
Source: See Data section in text.

Appendix Table 4: Additional Property Characteristics by Voting Behavior

		(1)	(2)	(3)	(4)	(5)
			By Vote Type			t-test for
		Overall	Yes	No	Abstain	(2) vs (3)
Years Since Last Sale	mean	15.3	15.2	15.7	15.2	0.50
	sd	9.8	9.3	8.9	10.5	
	min	0.3	1.5	0.3	0.5	
	max	50.1	46.2	44.5	50.1	
	count	1525	527	184	814	
1 if Taxes are Delinquent		0.107	0.135	0.030	0.105	4.92
		0.310	0.342	0.172	0.307	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
Year Structure was Built		1959.1	1957.9	1957.0	1960.5	0.33
		25.1	25.6	25.8	24.5	
		1876	1876	1887	1886	
		2004	2003	1998	2004	
		1719	508	182	1029	
BID Assessment as Share of Property Tax		0.371	0.362	0.374	0.377	0.24
		0.705	0.708	0.478	0.751	
		0	0	0	0	
		8.921	7.916	3.291	8.921	
		2010	636	220	1154	
1 if Owned by an Individual, in Trust		0.163	0.158	0.215	0.152	1.37
		0.369	0.365	0.412	0.359	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
1 if Owned by a NGO		0.084	0.154	0.014	0.049	8.27
		0.278	0.361	0.116	0.215	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
1 if No Ownership Information		0.003	0.007	0.000	0.000	1.87
		0.051	0.082	0.000	0.000	
		0	0	0	0	
		1	1	0	0	
		2067	655	222	1190	
1 if Owned by a Private Group (e.g., Inc., Corp.)		0.324	0.409	0.317	0.260	1.90
		0.468	0.492	0.466	0.439	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
1 if Owned by a Private Individual, Not in Trust		0.233	0.110	0.332	0.302	5.26
		0.423	0.313	0.472	0.460	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
1 if Publicly Owned		0.061	0.109	0.006	0.039	6.92
		0.240	0.312	0.075	0.194	
		0	0	0	0	
		1	1	1	1	
		2067	655	222	1190	
1 if Zoned Residential		0.035	0.074	0.010	0.012	3.41
		0.184	0.262	0.098	0.107	

	0	0	0	0	
	1	1	1	1	
	2067	655	222	1190	
1 if Zoned Commercial	0.620	0.626	0.684	0.599	1.27
	0.485	0.484	0.466	0.490	
	0	0	0	0	
	1	1	1	1	
	2067	655	222	1190	
1 if Zoned Manufacturing	0.216	0.196	0.218	0.231	0.54
	0.412	0.398	0.414	0.422	
	0	0	0	0	
	1	1	1	1	
	2067	655	222	1190	

Notes: Statistics are weighted so that each BID has equal weight.
Sources: See Data section in text.

Appendix Table 5:
Voting Behavior as a Function of Distance, Size and Other Characteristics

	(1)	(2)	(3)	(4)	(5)
BID Assessment, $1000s	-0.003	-0.004+	-0.004+	-0.003*	-0.004
	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Distance to BID Centroid, km	0.116+	0.132+	0.089+	0.098+	0.101+
	(0.049)	(0.065)	(0.040)	(0.047)	(0.049)
Distance to BID Border, km	-0.035	0.107	0.147	0.261	0.051
	(0.421)	(0.307)	(0.359)	(0.294)	(0.401)
Assessed Value of Property	0.004*	0.004*	0.004+	0.004+	0.006
$millions	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)
Improvement Share	0.003*	0.004***	-0.002	-0.002	0.003
(improvement value/land value)/100	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Lot Size	0.001	0.002	0	0	0.001
10,000s of square feet	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)
Structure Size	0.004*	0.003	0.003**	0.003+	0.001
10,000s of square feet	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Owner's Share of Assessments in BID	2.992**	2.923**	2.391**	2.446**	2.333**
	(0.698)	(0.652)	(0.465)	(0.470)	(0.500)
Taxes are Delinquent (binary variable)	0.137			0.016	-0.025
	(0.092)			(0.053)	(0.053)
BID Assessment as Share of Property Tax	-0.04			-0.066+	-0.008
	(0.022)			(0.029)	(0.026)
Zoning: 1 if zoned					
Commercial		0.095		0.093*	0.109*
		(0.056)		(0.033)	(0.039)
Manufacturing		0.014		0.052	0.034
		(0.085)		(0.076)	(0.063)
Residential		0.107		0.078	0.056
		(0.114)		(0.114)	(0.123)
Ownership					
1 if Owned by					
Non-governmental Organization			0.334***	0.341***	0.388***
			(0.054)	(0.053)	(0.050)
Private Group (e.g., Inc., Corp.)			0.235***	0.222***	0.218**
			(0.038)	(0.036)	(0.041)
Private Individual, Not in Trust			0.063	0.061	0.016
			(0.063)	(0.064)	(0.070)
Public (Government)			0.490**	0.531**	0.601**
			(0.137)	(0.110)	(0.161)
Private Individual, in Trust			0.195**	0.197**	0.205*
			(0.053)	(0.055)	(0.079)
Years Since Last Sale					-0.003
					(0.003)
BID Fixed Effects	x	x	x	x	x
R-squared	0.211	0.207	0.257	0.267	0.276
Obs	1,919	1,919	1,919	1,919	1,417

Notes: + Significant at the 10% level * Significant at the 5 percent level. ** Significant at the 1% level. *** Significant at the .1% level. Observations are individual properties, and the dependent variable is one if the property voted yes and zero otherwise. All regressions include BID fixed effects, cluster standard errors by BID, and weight each BID equally. All columns in this table estimate Equation (16), and repeat the maximal set of covariates from Table 6.
Sources: See Data section in text.

Appendix Table 6: Determinants of Voting Behavior: Anchor Participants

	(1)	(2)	(3)	(4)	(5)	(6)
	mean (sd dev)	regression results				
Assessment, $1000s		-0.003*	-0.003	0.000	0.000	-0.001
		(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
Owner's Share of						
Assessments in BID	0.032	2.446**	2.389*	1.204***	0.647	1.539+
	(0.062)	(0.470)	(0.709)	(0.166)	(0.367)	(0.798)
All Parcels in BID	0.046		0.075			-0.337
	(0.073)		(0.723)			(0.346)
Assessed Value in BID	0.050			0.855**		1.015
	(0.136)			(0.229)		(0.773)
Structure Sq Ft in BID	0.047				1.147**	-0.200
	(0.118)				(0.235)	(0.958)
Maximal Set of Controls		x	x	x	x	x
BID Fixed Effects		x	x	x	x	x
R-squared		0.267	0.267	0.288	0.284	0.289
Obs		1,919	1,919	1,919	1,919	1,919

Notes: + Significant at the 10% level * Significant at the 5 percent level. ** Significant at the 1% level. *** Significant at the .1% level. The dependent variable is one if the property voted yes and zero otherwise. Observations are individual properties. All regressions include BID fixed effects, cluster standard errors by BID, and weight each BID equally. Due to Proposition 13, note that assessed value is a noisy measure of market value.[35]

Sources: See Data section in text.

[35] As is true with the summary statistics, these results still hold even when we do the analysis at the level of the owner rather than the property; we prefer the property-level results as we can control separately for the characteristics of each property.

Appendix Table 7: Post-BID Price Changes by Property Characteristic and Quartile of Structure Square Feet

	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
BIDs and Commercial Property					BIDs and Almost BIDs			
after BID	0.000	13.629***	-4.337	-1.685	-104.421***	8.674+	-4.956	-9.219
	0.000	(2.615)	(2.722)	(4.042)	(24.532)	(5.096)	(4.295)	(6.770)
after BID * ln structure sq ft	0.314	0.100	0.031	-0.139*	-0.698	0.164	0.105	-0.145
	(0.350)	(0.079)	(0.119)	(0.062)	(0.459)	(0.143)	(0.182)	(0.108)
after BID * ln lot size	-0.235*	0.008	-0.142**	0.219***	-0.573*	-0.048	-0.289**	0.091
	(0.095)	(0.031)	(0.044)	(0.063)	(0.223)	(0.072)	(0.101)	(0.122)
after BID * zoned commercial	4.385	-0.155	-0.418*	0.298	.	-0.439	-0.302	0.457
	(6.628)	(0.215)	(0.181)	(0.303)	.	(0.551)	(0.285)	(0.602)
after BID * zoned manufacturing	4.256	0.064	-0.563**	0.807**	.	-0.271	-0.607*	1.294*
	(6.679)	(0.213)	(0.183)	(0.309)	.	(0.530)	(0.292)	(0.599)
after BID * zoned parking	.	1.366**	0.059	0.762+	.	-1.630	0.083	1.156
	.	(0.421)	(0.512)	(0.449)	.	(1.276)	(0.945)	(1.416)
after BID * year built	-0.002	-0.007***	0.003+	0.001	0.051***	-0.004	0.003	0.005
	(0.003)	(0.001)	(0.001)	(0.002)	(0.012)	(0.003)	(0.002)	(0.003)
R-squared	0.924	0.755	0.749	0.805	0.871	0.752	0.736	0.749
Obs	2,322	17,506	14,781	7,427	348	1,812	2,229	1,390
BIDs and Neighbors (< 1km) sample					BIDs and Propensity Score-Weighted Parcels			
after BID	2.901	0.833	-0.224	-3.155	0.000	11.202***	-2.970	4.151
	(6.690)	(1.884)	(1.522)	(2.199)	0.000	(2.170)	(2.447)	(3.803)
after BID * ln structure sq ft	-0.034	-0.078	-0.082	-0.002	0.965**	0.050	0.244*	-0.139*
	(0.127)	(0.053)	(0.062)	(0.037)	(0.309)	(0.062)	(0.103)	(0.064)
after BID * ln lot size	-0.023	0.011	0.003	0.015	0.271*	0.064*	-0.136**	0.269***
	(0.062)	(0.023)	(0.022)	(0.029)	(0.112)	(0.028)	(0.041)	(0.062)
after BID * zoned commercial	-0.137	0.008	-0.051	0.142	0.000	-0.021	-0.139	0.104
	(0.292)	(0.084)	(0.073)	(0.130)	0.000	(0.171)	(0.181)	(0.306)
after BID * zoned manufacturing	0.170	0.178+	-0.004	0.303*	16.041*	0.170	-0.308+	0.785*
	(0.284)	(0.095)	(0.078)	(0.135)	(6.535)	(0.168)	(0.175)	(0.319)
after BID * zoned parking	.	0.151	-0.319	0.513	.	0.836+	0.549	0.200
	.	(0.485)	(0.201)	(0.317)	.	(0.471)	(0.478)	(0.526)
after BID * year built	-0.002	0.000	0.000	0.002	-0.007*	-0.006***	0.002	-0.002
	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)
R-squared	0.899	0.736	0.694	0.797	0.950	0.769	0.758	0.822
Obs	1,017	8,185	10,808	5,205	2,099	15,824	12,579	6,333

Notes: Coefficients $\beta_{2,r}$ and $\beta_{3,r}$ from Equation 17. All samples include only commercial property. As noted in the equation, all estimations include a constant, block group * year fixed effects, and month fixed effects.
Sources: See Data section in text.

Appendix Table 8: Quality of Proponent to Property Data Match

BID Number	Group Type	Number of Proponents	Share Matched to Property Data
1	spoke at council meeting	8	0.750
1	initial board of directors	7	0.857
2	initial board of directors	31	0.871
3	initial board of directors	20	0.850
4	initial board of directors	7	1.000
5	initial board of directors	9	0.556
6	initial proponents	9	0.333
7	spoke at council meeting	3	0.333
7	initial board of directors	9	0.778
8	initial board of directors	7	0.857

Sources: See data section and appendix.

Appendix

A. Institutions

This Appendix supplements the brief description of the legal and institutional basis of California BIDs. In California, property-based BIDs are legally authorized by the Property and Business Improvement District Law of 1994 (California Streets and Highways Code, Division 18, Part 7). This law gives cities the ability to approve district formation and compel taxation from members. It also makes cities the final arbiter on whether BIDs comply with the state regulation.

California BIDs have a few exceptional features, which are motivated by Proposition 13. In 1978, California voters passed Proposition 13, which restricts assessment increases on all properties (commercial and residential) to the minimum of the increase in value of the property, or two percent per year. A property's assessed value returns to market value at sale. In virtually all years since 1978, most nominal property values have increased by more than two percent, so this law has two important consequences for understanding property assessments. First, property assessments are generally lower, and sometimes substantially lower, than market values. Second, the extent to which the assessed value does not reflect the market price may differ greatly even between two very similar properties. For these reasons, BIDs in California tend to base BID assessments on physically observable features of the property – e.g., lot size, structure square footage, or linear frontage – rather than on the property's assessed value.

In addition, Proposition 13 put very strict limits on new taxes, allowing only for new levies that provide "special benefits," where those special, rather than general, benefits are directly related to the tax cost. For this reason, the BID tax in California is known as a legally permissible "assessment," and not as an illegal new "tax." In addition, likely to avoid legal challenges, the law states that "Properties zoned solely for residential use, or that are zoned for agricultural use, are conclusively presumed not to benefit from the improvements and service funded through these assessments, and shall not be subject to any assessment pursuant to this part" (California Streets and Highways Code, Division 17, Part 7, 36662(c)).

All of the California BIDs that we consider are, like the Old Pasadena BID, "property" BIDs. The other prominent type of BID in California is a merchant-based BID, which levies taxes on businesses in the district. In general, these merchant-based BIDs spend less than property-based BIDs. Economic theory also suggests that merchant owners should be less willing than property owners to invest in a BID. For a given rent, businesses benefit from neighborhood improvements. However, if rents increase, business owners may not be able to recoup their investment.

B. Data

This paper uses a number of administrative data sources that we match together. This section provides details on the data and the quality of this matching.

BID-Level Information

BID-level information comes from public city council files that contain information and supporting documentation for all matters that come before the city council.

Voting Data

We observe 2,069 original votes across 8 BIDs. One of these votes does not have a parcel identifier in the proper format and we drop it, leaving us with information on 2,068 voting parcels.

Matching Voting Data to GIS Map

Over time, parcel numbers change. Our geographic data (a GIS map) are from 2006. To make the information from the voting data (from multiple years, see Table 2) congruent with the map, we use the county assessor's parcel change database to find parcel number changes for voting parcels that did not match parcel numbers in the map. We matched all but one parcels to the map. The final number of parcels when matched to the map is 2,652; this includes parcels that merge and parcels that split. We conduct the analysis at the level of the original voting parcel, but use the geographic information to make the maps in Appendix Figure 1, and to calculate the distance of a parcel to BID center and border.

Matching Voting Data to Parcel Attributes

Our data consist of multiple cross-sections of parcel data from 1999 to 2007. These data include a wide array of attributes on each parcel. We matched the voting parcel data to parcel attributes from the year closest to the BID election; when information from the closest year was not available, we used information from the closest possible year. We were able to match all but 21 parcels with attribute information.

Matching Proponents to Voting Data

We found names of BID proponents in city council files, and matched these proponents using the owner name variable in our property dataset. Overall, we were able to match almost all of the initial proponents. Appendix Table 5 details the quality of the match. Overall, we match the lion's share of the proponents to the property data.

Matching to Sales-Level Data

Sales level data include, as available, the last three sales for each parcel since 1980. For example, if a parcel was last sold in 1980, that parcel will report only one sale. We restrict the dataset to begin in 1980, as sales are less reliably covered before this year. We drop transactions that are not arm's length based on the transaction code. We also drop all sales with values below $10,000, observations with sales values equal to $999,999,999, and high price outliers with sales values above $ 180,000,000. These sales data use parcel numbers as of 2006.

We identify BID parcels in the sales data by overlaying a GIS map of BIDs on a GIS map of parcels. Using the results of this overlay, we identify a parcel as belonging in a BID if more than 50 percent of the land area of the parcel is accounted for by the BID. In examining the effect of

BIDs on property values, we focus exclusively on the effect of the BID institution on our eight-BID voting sample, excluding all other municipal BIDs.

Propensity Score Matching

We estimate the propensity score from a cross-sectional dataset using attributes as of 2006, where BID parcels are identified by geography as in the sales-level data. Covariates in the propensity score matching are log of lot size, year built, assessed value of improvements (from both data sources), Proposition 13 base year for improvements, assessed value of land, Proposition 13 base year for land assessment, tax paid, log of structure square feet, zoning dummies (commercial, manufacturing, parking, other and residential[36]), dummies for design type (80 categories), and dummies for construction type (23 categories).

[36] We use the "use code" variable to select commercial properties. A very few properties have a commercial use code and a residential zone.