UP, UP, AND AWAY

The Impact of Restrictive Tendering

ON MUNICIPAL CONTRACTING IN ONTARIO

DECEMBER 2017

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Cardus Construction Competitiveness Monitor: Research Paper

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EXECUTIVE SUMMARY

The empirical results of this paper, which compiles bidding data from a variety of Ontario municipalities over time, suggest that restricting tendering to a select group of firms on the basis of their workers' affiliations will lead to higher costs for municipalities than if they tendered their projects to all qualified bidders, with the strong possibility that municipalities will pay *a substantial magnitude* more.

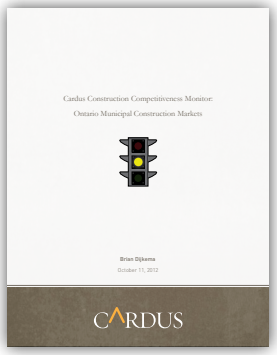
Theoretical considerations as well as results from the general literature suggest that restrictive bidding should widen the gap between the lowest winning bid and the benchmark bids as well as increasing the dispersion across bids. Conversely, the competitive pressures from open bidding should reduce the gap between the lowest winning bid and the benchmark bids as well as reducing the dispersion across bids—essentially fostering the law of one price.

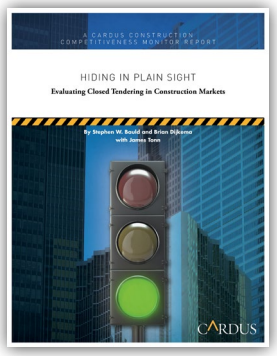
Our empirical analysis confirms these expectations. No matter which benchmark is used (the runner-up bid, the average bid, the maximum bid) or the coefficient of variation, in the period when Hamilton was on restricted bidding, that restricted bidding was associated with a statistically significant wider gap between Hamilton and the various open bidding regimes, as well as greater dispersion across bids (row 4 in table 3). The magnitude was also very large, effectively doubling the gap that prevailed in the open bidding regimes.

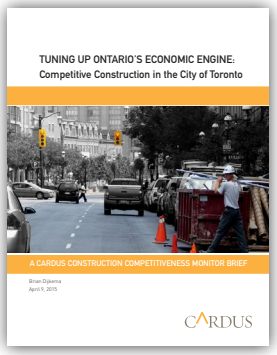
These substantial impacts highlight that restricted bidding reduces the competitive pressures that can otherwise discipline the bidding process toward a competitive norm—that provides municipalities with best value. Our results support the theory that restricting competition on public projects leads to upward pressure on prices paid for construction by municipal governments. It lends further support to the rationale behind the almost universal adoption of procurement and policies by public bodies that encourage or require open competition on public projects.

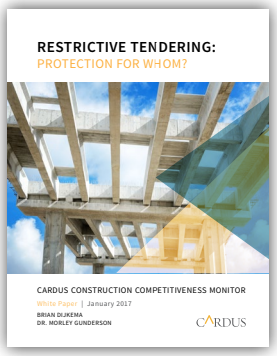
THE IMPACT OF RESTRICTIVE TENDERING IN MUNICIPAL CONTRACTING IN ONTARIO

This report is the fifth in a series of Cardus Construction Competitiveness Monitor (CCCM) reports, which examines the effect of restrictive tendering on public construction projects in Ontario. The particular type of restriction studied is one whereby bidding on public construction projects is limited, by law, to firms associated with a particular union. As noted in the first paper, by Brian Dijkema, *Ontario Municipal Construction Markets* (2012), a clause in the construction section of Ontario's Labour Relations Act inadvertently restricted tendering on many construction contracts in cities and municipalities, school boards, and Crown corporations to a small subset of unionized contractors. The second paper, by Stephen Bauld and Brian Dijkema with James Ton, *Hiding in Plain Sight: Evaluating Closed Tendering in Construction Markets* (2014), noted how such restrictions work counter to widely accepted procurement practices and public policies governing procurement more generally. It focused on the negative aspects of the restrictions on competition associated with restricted tendering and on the positive aspects of the enhanced competition associated with a more open bidding process. The third paper, by Brian Dijkema, *Tuning Up Ontario's Economic Engine: Competitive Construction in the City of Toronto* (2015), provides a critical assessment of a 2008 staff report for the city of Toronto that provided an estimate of only a 1.7 percent cost increase from the tendering that was restricted to union contracts in construction in Toronto. Their paper discussed related studies that suggest the cost increase for Toronto would be more in the neighbourhood of 20 to 30 percent and perhaps as high as 40 percent. The fourth report, *Restrictive Tendering: Protection for Whom?*, By Brian Dijkema and Morley Gunderson (2016), reviewed the literature on the impact of restrictive tendering as well as outlining the methodologies and data requirements that would be necessary to estimate the impact of restricted tendering. This fifth report builds on that previous report by providing empirical evidence on the impact of restricted tendering in municipal government contracts in construction in Ontario.









The earlier report by Dijkema and Gunderson (2016) highlighted a wide range of factors that motivate the empirical analysis of this report. They discussed the importance of cost containment in public tendering arising from various factors:

- Pressures to reduce deficits.
- Increased infrastructure spending fuelled by increased pressures on existing infrastructure, including the age of infrastructure and population growth.
- Recent corruption scandals in the tendering process including in Toronto.
- Growing public attention to the importance of an open, transparent bidding process to offset collusive behaviour among contractors.

They also highlighted the negative consequences of restrictions on the bidding process that give monopoly or oligopoly power to a small number of bidders. These include the following:

- Higher prices (i.e., higher bids) knowing that there are fewer competitors that may bid lower.
- Fewer of the services consumed (e.g., construction infrastructure projects) given the higher prices.
- Less innovation and efficient practices because of less incentive to cut costs since they can be awarded the contracts at their higher costs.

- More discrimination because the contractors are under less pressure to cut costs by hiring the best people for the job.
- Devoting resources toward protecting their privileged positions and deterring new entry.
- Engaging in collusive bid-rigging.
- Expensive litigation in situations where tenders have not been conducted under an open, fair, and transparent basis.
- Extensive resources devoted to "defensive bulletproofing" RFPs (adding criteria that transfer greater risk onto contractors) and the tendering process to protect against potential liability.
- More complex contracting process caused by bulletproofing RFPs, which in turn can deter smaller contractors from bidding.

Dijkema and Gunderson (2016) also documented that the negative consequences of tendering not being conducted on an open, transparent, and competitive basis have been recognized extensively in public documents, the general academic literature on competition, and both domestic and international procurement guidelines. Because of these concerns and the importance of these issues, they called for empirical evidence of the effect of restrictions on the public tendering process. This report is a response to that call. It provides evidence of the effect of restrictions on tendering in municipal government contracts in construction in southern Ontario.

The report is organized as follows: We begin with brief discussion as to how restricted tendering in municipal government affects public construction contracts in Ontario. We then discuss the methodology used to estimate the impact of restricted tendering on various outcomes of the bidding process, before discussing the data used to estimate those impacts. Following this, we present the empirical results and discuss the implications of the evidence.

HOW RESTRICTED TENDERING OCCURS IN MUNICIPAL CONSTRUCTION CONTRACTS IN ONTARIO

As discussed in Dijkema (2012) the restrictive tendering we describe is the inadvertent consequence of labour law that forces governments to receive bids only from contractors affiliated with a particular subset of construction unions that are organized on a craft basis. These differ from non-union firms as well as other construction unions that are organized on an industrial or "wall-to-wall" basis (e.g., the Building Union of Canada, CUPE, CLAC, or Unifor, which also represent workers in the trades). These industrial unions bargain for all trades within a company, and they bargain on a company-by-company basis. In contrast, the craft unions and their contractors are subject to separate province-wide collective agreements that prevail for each trade, and which contain centralized wage schedules. Further, these province-wide collective agreements contain subcontracting clauses that prevent those who are signatory from contracting or subcontracting work to firms that have a different affiliation from the general contractor even if they are unionized with another union.

This situation occurs because labour relations in construction in Ontario are governed under a separate construction section of the Ontario Labour Relations Act. Labour Board decisions have interpreted the meaning of a "construction employer" broadly to include government bodies that contract out their projects through the tendering process, as virtually all do. This allows unions to organize a government entity (e.g., a municipality like Hamilton, Toronto, or the Region of Waterloo; a Crown corporation like Ontario Power Generation; or the Toronto District School Board) as if it were a private, for-profit contractor like, for instance, Ellis Don. This gives rise to restricted tendering not simply because they are now unionized, but because they become subject to the province-wide collective bargaining agreement, which contains clauses that disallow a given contractor from contracting or subcontracting to firms that are not associated with *that particular union.* For example, the city of Hamilton, which is organized by the Carpenters' Union, can only tender projects for which carpentry work is involved to firms affiliated with the Carpenters' Union. In effect this prevents firms whose workers affiliate with other unions like the Labourers International Union, as well as companies whose workers affiliate with alternative construction unions, or those whose workers choose not to affiliate with any union. The ultimate effect is that vast swaths of public construction work are placed under restrictions that are imposed not for procurement best practices, but because of an unrelated piece of labour law intended to achieve a separate and unrelated objective. Workers who exercise their right to affiliate with other unions, or no union, are forbidden to work on a public project because of that choice. In effect, only a subset of the population is able to bid on work that is paid for, and built on behalf of, the whole population.

RESTRICTED MUNICIPALITIES IN ONTARIO

METHODOLOGY

As indicated in Dijkema and Gunderson (2016), our ideal comparison between restricted and open contracting regimes would involve comparing a measure of cost per unit of standardized or homogeneous output in the two regimes. An example of such a cost comparator would be public schools where there exist widely accepted standards for the cost of construction per square foot. This would allow us to cleanly test our expectation that costs would be higher under restricted regimes than those with open bidding regimes. Unfortunately, such standardized cost information is not available to us, at least at this stage. The recent Ontario Labour Board decision in 2016 whereby the Greater Essex County District School Board was deemed a "non-construction" employer may provide the possibility of such measurement in the future.

As an alternative, we use a number of measures that *are* available to examine the effect of reduced competition on the bidding process. We discuss those measures below.

Competition should foster bids that are closer to each other—effectively, the law of one price. In a competitive bidding environment, where equally qualified firms have equal access to a given market, bid prices will converge on the lowest price, as all firms attempt to provide the lowest price that enables them to win the job while meeting the parameters set by the project owner. This implies that competitive open bidding should lead to bids that are closer to each other and to the winning bid; conversely restrictive bidding should lead to bids that are further from each other and further from the winning bid.

To test this hypothesis, we created four outcome measures that would reflect the closeness of the bids. They are as follows:

- $(Y_w - Y_n)/Y_n$ where Y denotes the dollar value of the bid, the subscript w denotes the winning bid, and the subscript n denotes the benchmark of the runner-up bid, which is almost always the next-lowest bid.

- $(Y_w - Y_a)/Y_a$ where Y denotes the dollar value of the bid, the subscript w denotes the winning bid, and the subscript a denotes the benchmark of the average value of the bids.

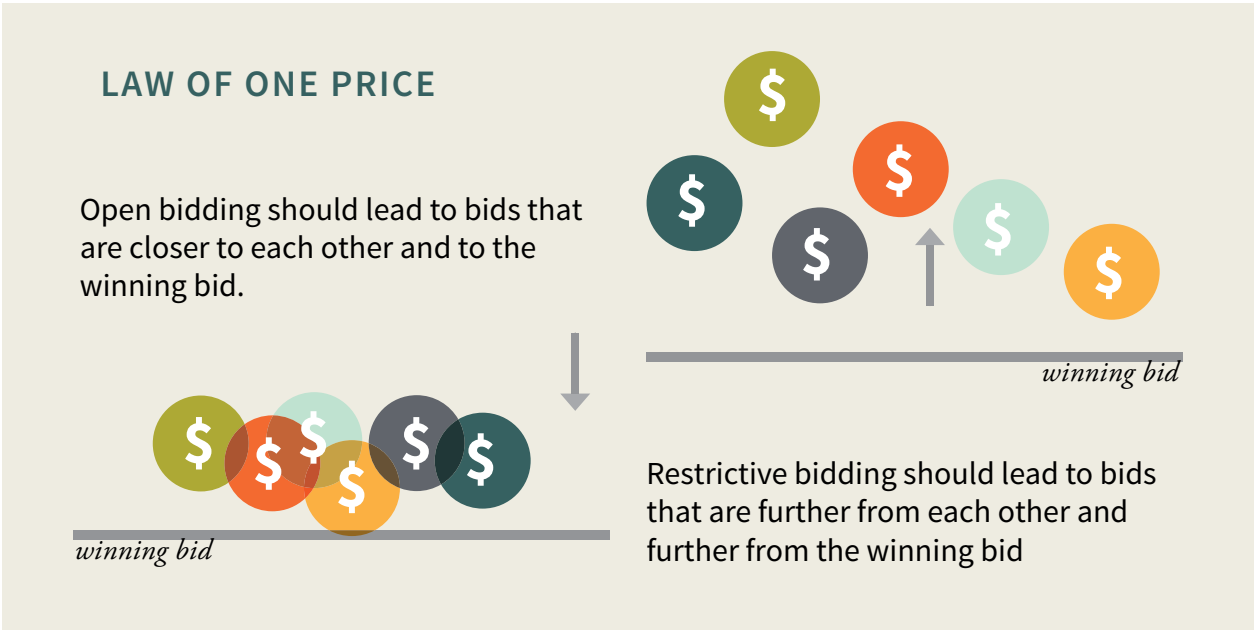
- $(Y_w - Y_m)/Y_m$ where Y denotes the dollar value of the bid, the subscript w denotes the winning bid, and the subscript m denotes the benchmark of the value of the maximum or highest bid.

- Coefficient of Variation (CV), or the standard deviation divided by the mean, as a measure of overall dispersion or variation across all bids. Dividing the standard deviation by the mean effectively controls for the magnitude of the bids and ensures that the measure is "unit free."

Since Y_w, the winning bid, is the lowest bid (in all but few cases), each of the measures would be negative, reflecting the percent amount that the winning bid is lower than each of the other benchmarks. All measures are in percent terms so they can be compared across contracts of different sizes.

Given the law of the lowest price discussed above, the expectation is that competitive open bidding would reduce the gap or difference between the winning bid and each of the other benchmarks. Conversely, restricted bidding would increase the gaps leading to larger negative numbers.

We test this hypothesis by estimating the bid gap between the winning bid and each of these benchmark bids in Hamilton, a municipality that shifted from open to restricted bidding, and remained on restricted bidding for a time period that was sufficiently long for its impact to be detected (October 2005 to December 2011). These bid gaps are then compared to the gaps in twelve other open-bidding comparison group municipalities



combined over the same time period. The twelve comparison group jurisdictions are contiguous or close to Hamilton with its restricted bidding. They are Brantford, Durham/Dufferin, Elgin, Guelph, Haldeman/Norfolk, Halton, Niagara, Oxford, Peel, Perth, York, and Middlesex. Figure XYZ visualizes the geographical locations of these regions.

Hamilton is the only municipality in our data set that has restricted bidding over a time period that could reasonably reflect its effect on bid gaps. The Region of Waterloo also shifted from open to restricted bidding, but the post-restricted bidding period was insufficiently long (only eighteen contracts in the first eighteen months after shifting to restricted bidding) for its effect to be detected. Toronto and Sault Ste. Marie also have restricted bidding, but sufficient information on it was not available to us.

Our methodology involves comparing the various gaps between the winning bid and the various benchmark bids (runner-up, average, and maximum) as well as the CV, under the restricted bidding regime in Hamilton, compared to the gaps in the twelve comparison-group open bidding regimes in that time period. The expectation is that the gaps would be smaller in the open regimes since competition should reduce the gaps—the law of one price.

The differences in the bid gaps could be due to factors other than their being an open versus restricted bidding regime. To control for this possibility, we also estimate the gaps between Hamilton and the twelve open comparator jurisdiction in the pre-treatment time period when neither are affected by restricted bidding. This should capture the effect of factors other than restricted bidding that could affect the gaps. This pre-treatment gap that is affected by factors other than restricted bidding is then subtracted from the post-treatment gap that can affect both these factors and restricted bidding to get a purer estimate of the effect of restricted bidding alone.

We have less confidence in this "netting out" procedure for two reasons. First, the pre-intervention period in Hamilton is less than two years (January 2004 to August 2005) and involves few contract observations (twenty-six in the restricted jurisdiction of Hamilton and fifteen in the comparison jurisdictions). Second,

it assumes that whatever factors affect the restricted jurisdiction and the open jurisdictions in the short pre-treatment period will continue to have their same effect in the post-treatment period. This could be reasonable if there was a longer pre-treatment period and their patterns were similar over that longer period, but it is not reasonable based on such a short pre-treatment time period. In essence, our ability to use the pre-treatment period to net out the effect of other factors will have to wait the availability of data for a longer pre-treatment period, which, because of the nature of public record keeping is very difficult to procure. As such, we will rely more heavily on the post-treatment-period data for comparisons between the restricted jurisdiction of Hamilton and the open-bidding comparison jurisdictions, recognizing fully the possibility that those differences could be due to other factors that we cannot control for at this stage.

An alternative way to present the analysis is to compare the difference in outcomes in the restricted jurisdictions *after* it shifted to restricted bidding compared to the period *before* they shifted, with this difference compared to the change in outcomes in the jurisdictions with open bidding. This is the conventional before-and-after comparison between jurisdictions that received a treatment (in this case moving to restricted bidding) compared to a comparison group of jurisdictions that remained on open bidding and did not move to restricted bidding.

In our presentation of the results we prefer the comparison based on the difference in the outcomes in the restricted jurisdictions minus the open bidding jurisdictions in the post-treatment period when restricted bidding is in place, less the difference in the pre-treatment period. This is so because in the case of Hamilton our data provides a reasonable time period when restricted bidding is in place (October 2005 to December, 2011), but a very short time period (January 2004 to September 2005) when both Hamilton and the comparison jurisdictions had open bidding. In essence, our pre-treatment-period differences are likely measured with considerable imprecision, while our post-treatment period is measured with more precision. As such, we have more confidence in the differences in the post-treatment period, and hence it is informative to have them measured on their own, recognizing that this difference may reflect the effect of other factors that are netted out by other factors that can only be measured with imprecision by the differences in the short pre-treatment periods.

TIMELINE OF MUNICIPAL RESTRICTIONS

Region of Waterloo
July 4, 2014
(Carpenters, ICI)

City of Hamilton
September 12, 2005
(Carpenters all sectors)

City of Sault Ste. Marie
August 7, 1987
(Carpenters, LIUNA)

City of Toronto
1970's-80's
(multiple trades)

DATA

The restricted jurisdiction Hamilton had information on the winning bid and each of the benchmark bids for 227 contracts spread over the six-plus-year post-treatment period October 2005 to December 31, 2011. The comparison group with open bidding had 53 contracts over that same period. As such, our comparison of restricted versus open bidding in the post-treatment period involved 280 contracts as observations. Prior to that period, Hamilton was on open bidding, but we have information for only 26 contracts in Hamilton and 15 in the comparison jurisdictions in the less-than-two-year pre-treatment period of January 2004 to August 2005. The post-treatment period refers to when Hamilton was on restricted bidding (the treatment), and the pre-treatment period refers to when it was on open bidding. The treatment or shift from open to restricted bidding occurred in September 2005. That month was left off the analysis since the shift to restricted bidding occurred in that month. The small number of contracts in the short pre-treatment period for Hamilton means that we have little confidence in the before-and-after comparisons for that jurisdiction.

For a small number of projects, information was missing on some of the middle bids. This was relevant only for our calculation of the average of the bids and the CV; they did not affect our calculation of the runner-up bid or the maximum-bid benchmarks. To provide an estimate of the missing bids to use in our calculation of the mean and CV, we conducted the following steps (done for only fourteen of our observations):

1. Estimate the missing interval by subtracting the lowest bid for which information is available from the highest bid for which information is available.

2. Divide by the number of missing bids plus 1. This is the same as the number of missing sub-intervals.

3. Add that to the lowest bid available to estimate the first missing bid.

4. Again, add that to the first missing bid to get an estimate of the second missing bid.

5. Continue the process until all missing bids are estimated.

Table 1 provides a summary picture of the number of contracts in Hamilton both before (26 contracts) and after it shifted to restricted bidding (227 contracts in the shaded area) compared to the number of contracts in the twelve comparison-group jurisdictions both before (15 contracts) and after the time period September 2005 (53 contracts) when Hamilton shifted to restricted bidding. As indicated, the small number of contracts in the brief pre-treatment period means that we have little confidence in using them as a comparison group for before-and-after comparisons for Hamilton or to compare Hamilton and the comparison groups in the pre-treatment period.

Table 1. Number of contracts in Hamilton and twelve comparison jurisdictions in pre- and post-treatment periods

	Pre-Treatment		Post-Treatment						
Jurisdiction	2004:1	2005:8	2005:10	2006	2007	2008	2009	2010	2011:12
Hamilton (Restricted)	6	20	4	18	10	35	59	48	53
12 Comparison (Open)	11	4	1	5	5	8	17	13	4

The data are drawn from a variety of sources, including public bidding websites such as biddingo.com (a procurement portal used by most, if not all, municipalities in Ontario, as well as the provincial government, and Crown corporations), municipal procurement office records, and the records of contractors who agreed to share historical bidding data. All data (including those from contractors) are part of the public record, and the vast majority of the observations are from municipal procurement offices.

Prior to discussing the empirical results, it is useful to define some of the symbols that will be used in the subsequent presentation of the results. They are set out in table 2.

Table 2. Definitions and symbols: illustration for comparison of winning bid and runner-up benchmark bid

Symbol	Concept
1. Mean	Average % difference between winning bid Y_w and benchmark bid
2. $B_r a$	% gap between winning bid and runner up in restricted jur. in post-restricted period
3. $B_o a$	% Gap between winning bid and runner up in open jur. in post-restricted period
4. $B_r a$-$B_o a$	Difference in the restricted and open % gap in the post-restricted period
5. $B_r b$	% gap between winning bid and runner up in restricted jur. in pre-restricted period
6. $B_o b$	% gap between winning bid and runner up in open jur. in pre-restricted period
7. $B_r b$-$B_o b$	Difference in the restricted and open % gap in the pre-restricted period
8. ($B_r a$-$B_o a$) – ($B_r b$-$B_o b$)	Difference in the difference in the restricted and open % gap in the post-restricted period less the difference in the restricted and open % gap in the pre-restricted period, i.e., the difference-in-difference or DD estimate

Note: B denotes % difference in the winning bid and benchmark, for example, runner-up (since the winning bid is lower than the runner-up the gap is negative); subscript r denotes restricted jurisdiction; subscript o denotes open bidding jurisdiction; subscript a denotes the post-treatment period when restricted bidding was in place for the restricted jurisdiction; subscript b denotes the pre-treatment period when open bidding was in place for all jurisdictions.

Table 3 gives our results for the different benchmarks: column 1 for the winning bid less the runner-up bid; column 2 for the winning bid less the average bid; column 3 for the winning bid less the maximum bid; and column 4 for the CV as a measure of overall dispersion. The presentation is complicated by the fact that the bid gaps are negative numbers since the winning bid is lower than the benchmark bids (runner-up, average, maximum).

Table 3. Estimates of various bid gaps in Hamilton restricted bidding versus twelve open-bidding comparison jurisdictions

Bid gap by restricted (r) vs. open (o) and before (b) and after (a)	% difference between winning bid Y_w and benchmarks			Coefficient of Variation
	$(Y_w - Y_n)/Y_n$ Y_n = runner-up	$(Y_w - Y_a)/Y_a$ Y_a = average	$(Y_w - Y_m)/Y_m$ Y_m = max bid	
	(1)	(2)	(3)	(4)
1. Overall Mean	-0.114	-0.182	-0.313	0.187
2. Bra	-0.131	-0.210	-0.354	0.220
3. Boa	-0.064	-0.098	-0.184	0.086
4. Bra–Boa [2–3]	-0.067***	-0.112***	-0.170***	0.134***
5. Brb	-0.105	-0.167	-0.304	0.177
6. Bob	-0.063	-0.088	-0.163	0.075
7. Brb–Bob [5–6]	-0.042	-0.079*	-0.141**	0.102***
8. DD or (Bra-Boa) – (Brb-Bob) [4–7]	-0.025	-0.033	-0.029	0.032

*** 1%, ** 5%, * 10%. Based on a t-test of the difference for restricted versus open in the post-restricted period for row 4 and in the pre-restricted period for row 7 and for the difference-in-difference for row 8.

RESULTS: WINNING BID LESS RUNNER-UP BID

We will discuss our results from column 1 in table 3 in considerable detail, since once that pattern is outlined it tends to apply to the other outcomes.

The first row of the first column of table 3 indicates that on average, across all bids, the winning bid was 11.4 percent lower than the runner up (i.e., mean $(Y_w - Y_n)/Y_n = -0.114$). This includes the time period when Hamilton was on open bidding as well as on restricted bidding, as well as the comparison jurisdictions that were on open bidding over that same time period (January 2004 to December 2011).

The second row of the first column indicates that when Hamilton shifted to restricted bidding, the post-treatment gap between the lowest bid and runner-up bid was an above-average -0.131 (i.e., 13.1 percent). This is consistent with the expectation that restricted bidding reduces the competitive pressures that otherwise would make the runner up closer to the winning bid. In this case, the gap between the winning bid and the runner up became above average.

The third row indicates that in the comparison jurisdictions where open bidding prevailed in that same time period when Hamilton was under restricted bidding, the gap between the winning and runner-up bid was considerably below average, at -0.064. This is consistent with the expectation that open bidding fosters the competitive pressures that make the runner up closer to the winning bid—that is, the law of one price where competition fosters movement to a competitive norm.

Open bidding is associated with gaps that are smaller, consistent with competitive bidding fostering a move to a competitive norm—the law of one price.

The fourth row indicates that in the post-treatment period when Hamilton was on restricted bidding, the difference in the bid gaps between the restricted bidding of Hamilton versus the open bidding regimes was a statistically significant -0.067 (i.e., the restricted bid gap of -0.131 in row 2 minus the open bid gap of -0.064 in row 3). That is, in the Hamilton projects where bidding was restricted, the gap between the lowest bid and the runner up was -0.131, which was -0.067 more than (i.e., twice) the gap of -0.064 in the open-bid projects of the comparison group. This *difference* in the bid gaps of being -0.067 greater in the restricted jurisdiction is a substantial magnitude, essentially being equal to the gap itself in the open jurisdictions, and therefore leading to a doubling of the gap in the restricted jurisdiction.

Since the bid gaps are negative numbers, a negative difference means it increases the negative gap. As expected, restricted bidding is associated with wider gaps between the lowest and runner-up bids. Conversely, open bidding is associated with gaps that are smaller, consistent with competitive bidding fostering a move to a competitive norm—the law of one price.

The fifth row indicates that in the pre-treatment or "before" period when all bids were open, the winning bids in Hamilton (the jurisdiction that *later* became restricted) were 10.5 percent lower than the next-lowest bid. This is close to the average of 11.4 percent lower across all bids.

The sixth row indicates that in the pre-treatment or "before" period when all bids were open, the winning bids in the open-bidding comparison jurisdictions were 6.3 percent lower than the next-lowest or runner-up bid. In essence, the comparison-group open-bidding jurisdictions had a smaller gap between the winning bid and the runner-up compared to Hamilton even when both had open bidding.

The gap between the price of the winning bid and runner up is 105% higher in the restricted jurisdiction.

The seventh row indicates that in the pre-treatment period when all jurisdictions were on open bidding, the difference in the bid gaps between Hamilton (which later shifted to restricted bidding) and the open bidding regimes was a statistically insignificant -0.042 (i.e., the bid gap of -0.105 in row 5 minus the bid gap of -0.063 in row 6). That is, in the Hamilton projects in the pre-treatment period before it shifted to restricted bidding, the gap between the lowest bid and the runner up was -0.105, which was -0.042 more than the gap of -0.063 in the comparison-group jurisdictions that had open bidding throughout the period. In essence, the bid gaps were wider in Hamilton even when it was not on restricted bidding, compared to the gaps in the comparison group that was on open bidding throughout the period. This suggests that there is something in the Hamilton jurisdiction that yields a larger gap between the winning bid and the runner up even when all jurisdictions are on open bidding. However, that gap of -0.042 is smaller than the gap of -0.067 in the post-intervention period when Hamilton shifted to restricted bidding. It is also statistically insignificantly different from zero and measured with imprecision given the small pre-intervention time period of less than two years.

The eighth row indicates the *difference-in-difference estimate*. As indicated previously, the difference in the bid gap between restricted bidding in Hamilton and the open bidding of the comparison jurisdictions in the post-treatment or after period when Hamilton shifted to restricted bidding was a statistically significant -0.067. This highlighted that the negative gap between the winning bid and the runner up was -0.067 greater in Hamilton compared to the open bidding jurisdictions. However, in the pre-intervention period there was also a *difference* in the gap that was -0.042 larger in Hamilton compared to the comparator jurisdictions, suggesting that there was something in Hamilton that made it less competitive even though both it and the comparison groups were under competitive bidding. That pre-intervention estimate, however, was not statistically significantly different from zero, likely reflecting the small pre-intervention period of less than two years. If it is taken as an accurate measure of the differences between Hamilton and the other jurisdictions, then subtracting it from the post-intervention difference would yield a difference-in-difference estimate of -0.067–(-0.042) = -0.025.

As indicated previously, we have reasonable confidence in our estimate of the gap between the winning bid and runner up being twice as high (or a statistically significant -0.067 greater) in the restricted jurisdiction of Hamilton (-0.131) compared to the open jurisdictions (-0.064) in the post-treatment period when Hamilton was on restricted bidding. That confidence arises because those estimates are based on a substantial number of contracts (280 in both Hamilton and the comparison jurisdictions) over a reasonably long period of time (October 2005 to December 2011). We have less confidence in our estimates in the pre-treatment period of a statistically *insignificant* difference of -0.042 in the pre-treatment period since it was based on information for only 41 contracts in both Hamilton and in the open jurisdictions, and a less-than-two-year period (January 2004 to August 2005).

Based on this reasoning we estimate the effect of restricted bidding as *increasing* the gap between the winning bid and the runner up by -0.067 (essentially doubling the gap) if based on the post-treatment period and not netting out any difference from the pre-treatment period. The rationale for not netting out the difference from the pre-treatment period is based on its being estimated from a small number of contracts and a short time period that yielded estimates that are insignificantly different from zero. If those less reliable estimates of the difference in the gap of -0.042 in the pre-treatment period when all jurisdictions were on open bidding is used to net out possible differences between Hamilton and the comparison jurisdictions, then the effect of restricted bidding is to increase that bid gap by -0.067–(-0.042) = -0.025. This difference-in-difference estimate, however, is statistically insignificant.

Overall, the effect of restricted bidding is to increase the gap between the winning bid and the next-lowest runner up by a range of -0.025 to -0.067 with our preferred estimates being at or closer to the higher estimate. Based on a gap of -0.064 in the open jurisdictions in the post-treatment period, this implies that restricted bidding increases the gap by a range of one-third to a doubling of the gap. In whatever manner it is estimated, the effect of restricted bidding on increasing the gap between the winning bid and the runner up is substantial.

RESULTS: WINNING BID LESS THE AVERAGE BID

Column 2 presents the results of using the average bid as a benchmark. As indicated in the first row, the gap between the winning bid and the average bid was -0.182, indicating that on average the winning bid across all jurisdictions over the full time period was 18.2 percent lower than the average bid. Obviously this will be larger than the gap between the winning bid and the runner up bid of column 1. Since in order to explain the pattern the results of column 1 were discussed in considerable detail, the exposition here will be brief.

The gap between the price of the winning and average bid is 114% higher in restricted jurisdictions.

As indicated in column 2, in the post-intervention period the gap between the winning bid and the average bid was -0.210 (row 2) in the restricted bidding regime of Hamilton, compared to less than half that amount of -0.098 (row 3) in the competitive open jurisdictions, for a statistically significant difference of -0.210–(-0.098) = -0.112 (row 4). Competitive open bidding is associated with reducing the gap between the winning bid and the average bid by about one-half (i.e., from -0.210 to -0.098); conversely restricted bidding is associated with roughly doubling the gap between open and restricted bidding, from -0.098 to -0.210.

In the pre-intervention period when all jurisdictions were on open bidding, the gap was also higher in Hamilton (-0.167, row 5) compared to the open jurisdictions (-0.088, row 6) for a difference of (-0.079, row 7), suggesting that there are other factors in Hamilton that foster a larger gap between the winning bid and the average bid over and above restricted bidding. As indicated, we have less confidence in pre-intervention bid differences, however, given the short time period (2004:1 to 2005:8) and the small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions).

If those less reliable estimates of the difference in the gap of -0.079 in the pre-treatment period when all jurisdictions were on open bidding is used to net out possible differences between Hamilton and the comparison jurisdictions, then the effect of restricted bidding is to increase that bid gap by -0.112–(-0.079) = -0.033. This difference-in-difference estimate, however, is statistically insignificant.

Overall, the effect of restricted bidding is to increase the gap between the winning bid and the average bid by a range of -0.033 to -0.112, with our preferred estimates being at or closer to the higher estimate. Based on a gap of -0.098 in the open jurisdictions in the post-treatment period, this implies that restricted bidding increases the gap by a range of one-third (-0.033/-0.098) to more than 100 percent (-0.112/-0.098). In whatever manner estimated, the effect of restricted bidding on increasing the gap between the winning bid and the average bid is substantial.

RESULTS: WINNING BID LESS THE MAXIMUM BID

Column 3 presents the results of using the maximum bid as a benchmark. As indicated in the first row, the gap between the winning bid and the maximum bid was -0.313, indicating that on average the winning bid across all jurisdictions over the full time period was 31.3 percent lower than the maximum bid. Obviously, this will be larger than the gap between the winning bid and the runner-up bid of column 1 or between the winning bid and the average bid of column 2.

Restricted bidding is associated with increasing the gap between winning and high bids, by 92%.

We regard this benchmark as the least informative since the maximum bid could well be an outlier and not representative of the bidding process.

Subject to that caveat, the same pattern basically prevails as with the previous two benchmarks. In the post-intervention period the gap between the winning bid and the maximum bid was -0.354 (row 2) in the restricted bidding regime of Hamilton, compared to about half that amount of -0.184 (row 3) in the competitive open jurisdictions, for a statistically significant difference of -0.354–(-0.184) = -0.170 (row 4). Competitive open bidding is associated with reducing the gap between the winning bid and the maximum bid by about one-half (i.e., from -0.354 to -0.184); conversely restricted bidding is associated with roughly doubling the gap between open and restricted bidding, from -0.184 to -0.354.

In the pre-intervention period when all jurisdictions were on open bidding, the gap was also higher in Hamilton (-0.304, row 5) compared to the open jurisdictions (-0.163, row 6) for a difference of (-0.141, row 7) suggesting that there are other factors in Hamilton over and above restricted bidding that foster a larger gap between the winning bid and the maximum bid. As discussed previously, however, we have less confidence in pre-intervention bid differences given the short time period (2004:1 to 2005:8) and small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions).

If those less reliable estimates of the difference in the gap of -0.141 in the pre-treatment period when all jurisdictions were on open bidding is used to net out possible differences between Hamilton and the comparison jurisdictions, then the effect of restricted bidding is to increase that bid gap by -0.170–(-0.141) = -0.029. This difference-in-difference estimate, however, is statistically insignificant.

Overall, the effect of restricted bidding is to increase the gap between the winning bid and the maximum bid by a range of -0.029 to -0.170, with our preferred estimates being at or closer to the higher estimate. Based on a gap of -0.184 in the open jurisdictions in the post-treatment period, this implies that restricted bidding increases the gap by a range of one-sixth (-0.029/-0.184) to almost 100 percent (-0.170/-0.184). In whatever manner it is estimated, the effect of restricted bidding on increasing the gap between the winning bid and the maximum bid is substantial.

RESULTS: COEFFICIENT OF VARIATION

Column 4 gives the results based on the benchmark of the coefficient of variation (CV). As indicated previously, the CV is a measure of overall dispersion of the bids, calculated as the standard deviation divided by the mean. Dividing by the mean ensures that the measure is not affected by the magnitude of the measures; that is, it is "unit free."

Restricted bidding is associated with increasing the dispersion by 156%.

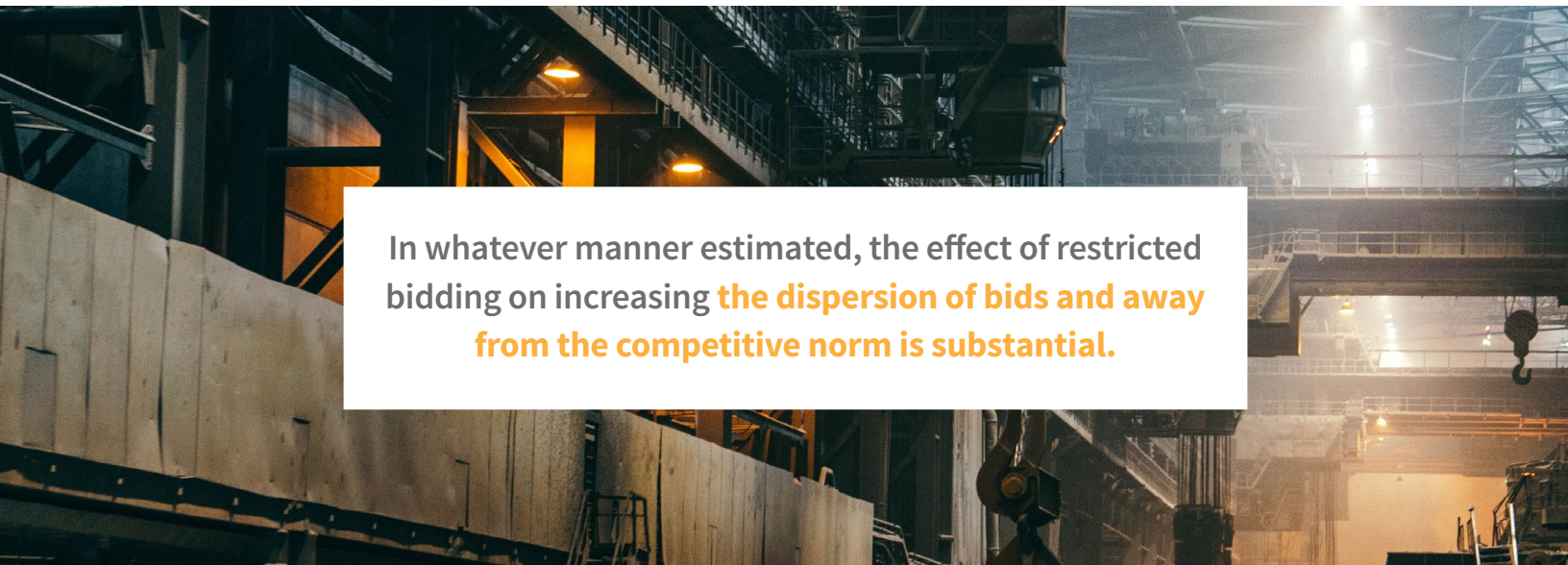
The expected signs are the opposite of those based on the other benchmarks. That is, restricted bidding is expected to increase the dispersion of the bids while open bidding is expected to decrease the dispersion by fostering the competition that will yield bids closer to the competitive norm—that is, the law of one price.

As indicated in the second row of column 4, in the post-intervention period the CV in the restricted bidding regime of Hamilton of 0.220 was about two and a half times the CV in the competitive open jurisdictions of 0.086 (row 3), for a statistically significant difference of 0.220–0.086 = 0.134 (row 4). Competitive open bidding is associated with reducing the dispersion of the bids to less than one-half of the original variation (i.e., from 0.220 to 0.086); conversely, restricted bidding is associated with more than doubling the dispersion, from 0.086 to 0.220.

In the pre-intervention period when all jurisdictions were on open bidding, the CV was also higher in Hamilton (0.177, row 5) compared to the open jurisdictions (0.075, row 6) for a difference of (0.102) suggesting that there are factors other than restricted bidding in Hamilton that foster greater dispersion in the bidding process. As with the other benchmarks, however, we have less confidence in pre-intervention bid differences given the short time period (2004:1 to 2005:8) and small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions).

If those less reliable estimates of the difference in the CV of 0.102 in the pre-treatment period when all jurisdictions were on open bidding is used to net out possible differences between Hamilton and the comparison jurisdictions, then the effect of restricted bidding is to increase the CV by 0.134–0.102 = 0.032. This difference-in-difference estimate is statistically insignificant.

Overall, the effect of restricted bidding is to increase the CV by a range of 0.032 to 0.134, with our preferred estimates being at or closer to the higher estimate. Based on a gap of 0.086 in the open jurisdictions in the post-treatment period, this implies that restricted bidding increases the gap by a range of almost one-third (0.032/0.086) to more than 150 percent (0.134/0.086). In whatever manner estimated, the effect of restricted bidding on increasing the dispersion of bids and away from the competitive norm is substantial.



In whatever manner estimated, the effect of restricted bidding on increasing the dispersion of bids and away from the competitive norm is substantial.

SUMMARY OF RESULTS ACROSS DIFFERENT BENCHMARKS

The following generalizations emerge from the empirical analysis:

- Theoretical considerations as well as results from the general literature suggest that restricted bidding should widen the gap between the lowest winning bid and the benchmark bids as well as increasing the dispersion across bids. Conversely, the competitive pressures from open bidding should reduce the gap between the lowest winning bid and the benchmark bids as well as reducing the dispersion across bids—essentially fostering the law of one price.

- Our empirical analysis confirms these expectations. No matter which benchmark is used (the runner-up bid, the average bid, the maximum bid) or the coefficient of variation, in the period when Hamilton was on restricted bidding, that restricted bidding was associated with a statistically significant wider gap between Hamilton and the various open bidding regimes, as well as greater dispersion across bids (row 4 in table 3). The magnitude was also very large, generally in the neighbourhood of doubling the gap that prevailed in the open bidding regimes.

- It is the case, however, that such a gap (albeit smaller) also existed in the pre-intervention time period between Hamilton when it was not on restricted bidding and the various open bidding comparison jurisdictions (row 7 in table 3). This could suggest that there is something other than restricted bidding that could affect the outcomes. We caution against the use of this information, however, to net out the effect of these other factors to get an estimate of the effect of restricted bidding given the short time period of less than two years (2004:1 to 2005:8) and small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions) over which this was estimated.

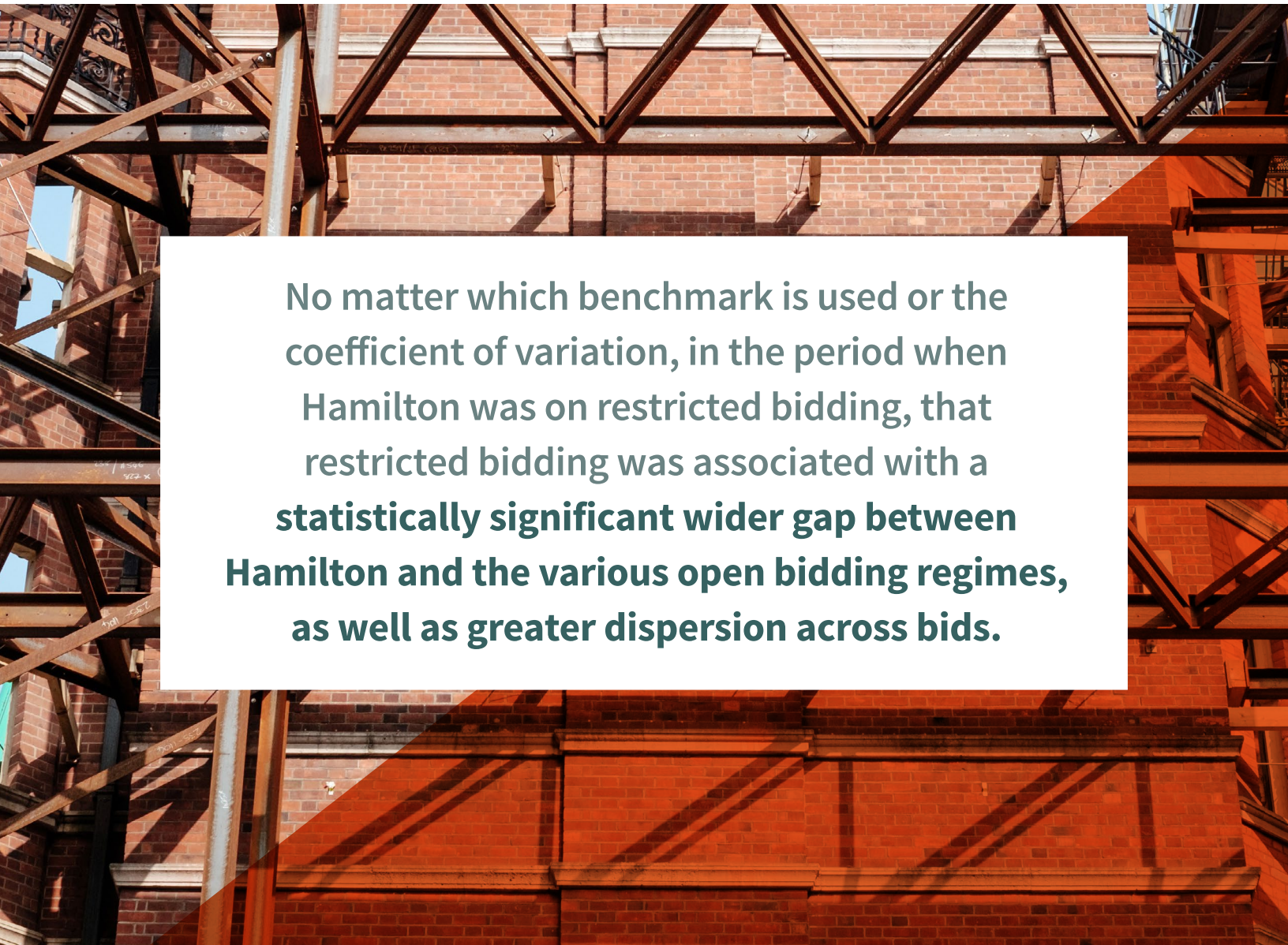
- If this pre-intervention time period is used to net out the effect of factors other than restricted bidding, the net effect of restricted bidding is still to widen the gap between the lowest winning bid and the various benchmark bids as well as to widen the dispersion across all bids, albeit the magnitude of the effect is much smaller and is statistically insignificant compared to the differences in the post-intervention period. Conversely, open bidding narrows the gaps as well as the dispersion, consistent with the notion that greater competition should foster movement toward a competitive norm—the law of one price.

- Our preferred estimate is based on the bid gap between the lowest winning bid and the next-lowest runner-up bid (column 1) on the grounds that the next-lowest runner up is likely to be a meaningful bid that can credibly discipline the winning bid to be competitive. For that benchmark, in the post-intervention period, the winning bid was -0.131 (13.1 percent) lower than the runner up in the restricted bidding regime of Hamilton, compared to a gap of half that size (-0.064) in the open-bidding jurisdictions, for a statistically significant difference of the gap being -0.131–(-0.064) = -0.067 greater under restricted bidding. In effect, restricted bidding was associated with a gap between the lowest winning bid and the next-lowest runner up that was twice the gap (-0.131) that prevailed in the competitive open bidding regimes (-0.064) for a difference of -0.067.

- Netting out the less reliable difference of -0.042 in the pre-intervention period that might reflect factors other than restricted bidding yields a difference-in-difference increase in the bid gap of -0.025, which is still substantial, being a one-third increase over the -0.064 gap in the open bidding regimes in the post-intervention period. Netting out that difference is questionable, however, since it is insignificantly different from zero and is based on a short time period of less than two years (2004:1 to 2005:8) and small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions).

- Overall, our estimates yield a range of effects of restricted bidding increasing the gap between the lowest winning bid and the next-lowest runner up, ranging from a low of -0.025 to a high of -0.067, with our preferred estimates closer to the higher end for reasons outlined. Relative to the gap of -0.064 in the open jurisdictions in the post-intervention period, these substantially increase the gap by one-third based on the low estimate and a doubling of the gap based on the higher estimate.

- These substantial impacts highlight that restricted bidding reduces the competitive pressures that can otherwise discipline the bidding process toward a competitive norm—effectively toward the law of one price. While this does not prove that the resulting winning bid is lower under restricted compared to open bidding regimes, it is suggestive of that effect in that the runners up (and the other benchmark bids) are closer to the winning bid and thereby induce more effective competitive pressure on the winning bid.



No matter which benchmark is used or the coefficient of variation, in the period when Hamilton was on restricted bidding, that restricted bidding was associated with a **statistically significant wider gap between Hamilton and the various open bidding regimes, as well as greater dispersion across bids.**

DISCUSSION REGARDING DATA NEEDS

Our results indicate that restricted bidding has a negative effect on the competitive bidding process by increasing the negative gap between the winning bid and the next-lowest runner up as well as the average and maximum bid, and it increases the overall dispersion of bids. Additional data, however, would help in extending our estimates. In rough descending order of importance, the additional data would include the following:

- Additional data for the restricted bidding regime of Hamilton from January 2012 onward to extend our post-intervention data that currently ends at December 2011 for that jurisdiction. We have information on the winning bids only, but not on the next-lowest or average or maximum for Hamilton. While information on all benchmarks would be useful, and they would enable a calculation of the coefficient of variation, the most important would be information on the next-lowest or runner-up bid since we regard it as the most informative for determining the effect of restricted bidding on the competitive bidding process. We do have data for the comparison group of open bidding regimes over that period that would enable meaningful comparisons with the restricted regime.

- Additional information for Hamilton when it was on open bidding prior to September 2005, when it shifted to restricted bidding. As indicated, we currently only have information for a short time period of less than two years (January 2004 to August 2005) and small number of projects (twenty-six in Hamilton and fifteen in the open jurisdictions) in the pre-intervention period for Hamilton. Prior to that we do have information for forty-four projects in the comparison open jurisdiction back to 2000, but none for Hamilton. Having a longer pre-intervention period would facilitate a more meaningful difference-in-difference analysis, including an examination as to whether they exhibited common trends in the pre-intervention period (with common trends indicating that the differences between the treatment and comparison groups reflect a stable pattern to facilitate netting out that difference from the difference in the post-treatment period).

- Waterloo is a jurisdiction that also changed from open bidding to restricted bidding, in this case in July 2014. In this situation, the opposite problem prevails—many projects in the pre-intervention open period, but few in the post-intervention period (i.e., only fifteen between August 2014 and December 2017). Even the pre-intervention period in Waterloo only goes back as far as January 2008 to June 2014, with thirty projects, so information prior to that period for Waterloo would be helpful not only to provide more observations but also to compare for common trends with the comparison group of other open jurisdictions.

- Information from the restricted jurisdiction of Toronto would also be helpful, especially given the large number of projects in that jurisdiction and the fact that it is contiguous to the jurisdictions used in this analysis.

- The same could be said of the restricted jurisdiction of Sault Ste. Marie, although it is not contiguous to the jurisdictions used in this analysis nor is it likely to have a large number of projects.

- Last, and in a different vein, information from a standardized set of projects that would enable standardized cost comparisons would enable more direct comparisons of the effect of restricted versus open bidding on project costs.

Information on any or all of these factors would facilitate evidence-based policy-making in this area of growing importance.

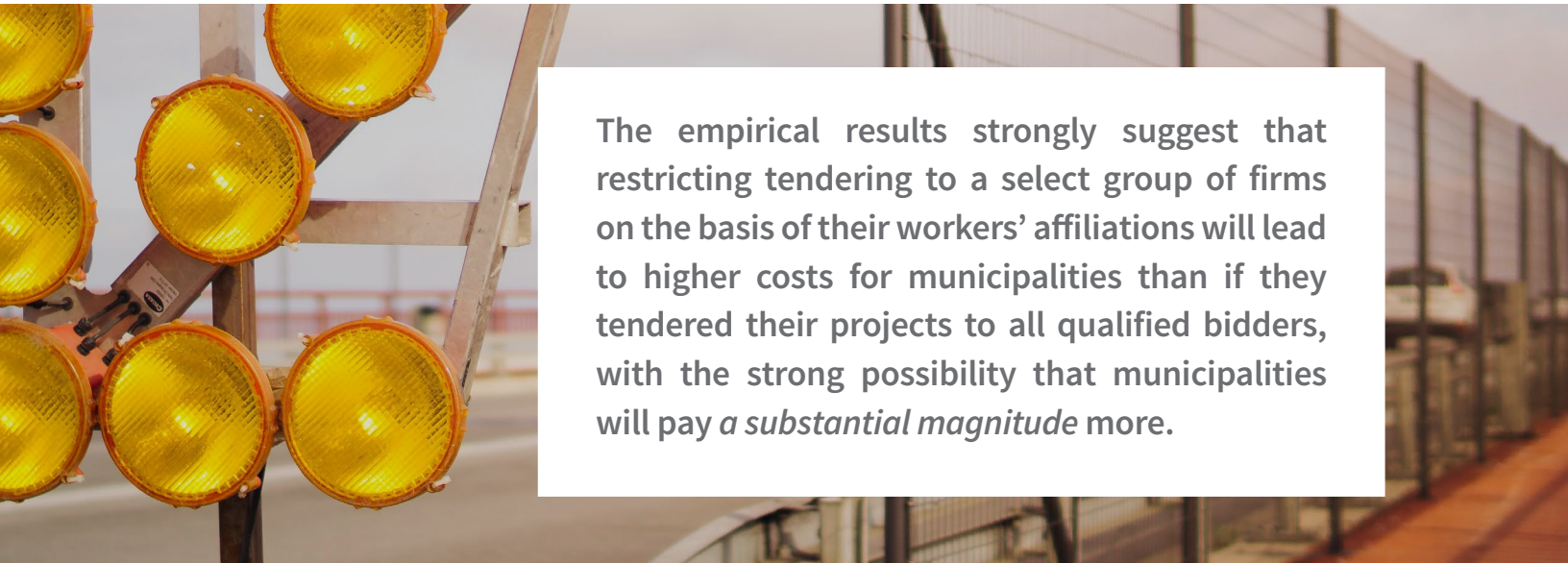
IMPLICATIONS FOR POLICY

While the limitations of our data do not allow us to claim that our results conclusively prove that restricted tendering leads to higher costs, the empirical results strongly suggest that restricting tendering to a select group of firms on the basis of their workers' affiliations will lead to higher costs for municipalities than if they tendered their projects to all qualified bidders, with the strong possibility that municipalities will pay *a substantial magnitude* more.

Further, as noted by Dijkema (2012), there is concern that restricted tendering can lead to continued upward pressure on bids over time as firms adjust to having to bid against fewer competitors. Our results, which showed both an increase in the gaps between the winning bid and our benchmarks, as well as an increase in the dispersion of bids, seem to offer support for this possibility as well. If competition serves to concentrate bids around the lowest price, restricting competition seems to have an effect akin to a hot air balloon—the introduction of less dense bids is likely to have the effect of causing prices to rise.

As noted by Bauld and Dijkema (2014), "the vast preponderance of evidence and practice suggests that restricting public bidding in this way is not only far outside of the norm, but can have significant and deleterious consequences for the public interest." Gunderson and Dijkema (2017) noted that the practice of restricting tendering to companies affiliated with a particular union was likely to increase corruption and costs, and lead to distortions in the healthy functioning of construction markets. Both papers noted how public procurement policies and directives, including those in Ontario, are premised on a consensus among procurement experts that fair, open, and transparent, competition among qualified bidders is the best way to ensure value for tax dollars and to prevent a host of negative social consequences.

The results of this paper support that consensus, which implies that policy-makers should either maintain, or return to, the norm of fair, open, and competitive tendering on public projects.



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