

**Radically rethinking public purchasing:**  
How new mechanisms can improve efficiency and equality  
in government spending.



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This version: December 30, 2019

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## Executive Summary

**The RxC Approach to government purchasing:** The RadicalxChange Foundation (RxC) is committed to advancing the public good--and rebalancing public and private power--through innovative social technologies, or “mechanisms.” We think that public procurement is ripe for mechanism redesign. Current inefficiencies in procurement present enormous opportunity. In the U.S. alone, there may be \$0.5 trillion in savings at stake, or \$1,500 per person.<sup>1</sup> With many state and local governments facing looming budgetary stress,<sup>2</sup> it’s more crucial than ever for the public sector to serve citizens’ needs cost-effectively. In the course of producing this report, we mapped out a wide range of potential reform areas and initiative in government purchasing. This report focuses on two mechanisms, rooted in academic work by RadicalxChange affiliates:

**I. Improving the decision of *what* to purchase through QV (quadratic voting):** Traditional voting procedures (e.g., yes/no votes with majority winner) fall prey to problems because voters cannot express the intensity of their preferences. Our previous work has demonstrated the superiority of quadratic voting and we believe that this mechanism can better aggregate information from stakeholders in deciding *what* to procure.

**II. Improving service provision through SALSA (self-assessed license sold via auction):** For certain types of goods in particular--relatively homogenous goods with a “deep” market of many potential providers--current procurement mechanisms may result in bad deals for the public. For these kinds of goods, a contract of any duration gives a supplying firm some “market power” through which they can extract payments from the public above what a potentially more efficient producer--kept out of the market because of the contract length--would accept. Under a SALSA license, a supplying firm would win the right to supply a good at auction and pay a recurring fee (a set percentage of their self-assessed value of the license, which can be updated in real time in an online platform). Then, as soon as a new, more efficient firm enters the market, it could out-bid the original supplier and have the license transferred to it.

In the following sections of this report we will discuss the RadicalxChange approach to public problems (Section 1), the scope of the opportunity for public gains through procurement reform (Section 2), and the two mechanisms in our “toolkit” that we believe could transform procurement (Section 3).

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<sup>1</sup> \$500 billion opportunity divided by 330 million population. U.S. population from United Nations World Population Prospectus (<https://population.un.org/wpp/>).

<sup>2</sup> See, e.g., Pew, *Fiscal 50: State Trends and Analysis*, <https://www.pewtrusts.org/en/research-and-analysis/data-visualizations/2014/fiscal-50#ind4>

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*Acknowledgements:* We would like to thank the following experts, whose feedback on this report has been invaluable: Max Nathanson (Office of Colorado Governor Jared Polis), Alfredo Kemm (Joint Budget Committee Staff, Colorado General Assembly), and Stephanie Henley (Xcel Energy). We would also like to thank seven other experts who wished to remain anonymous, with experience in impact investing, management consulting, state government, public relations, and infrastructure.

# 1 Introduction to the RadicalxChange approach

Good governance means striking a fair balance between public and private power. Public power, properly exercised, has the potential to be exceptionally fair and democratic. But governments sometimes wield their power incompetently and counterproductively. Private power, conversely, has the potential to be uniquely flexible and efficient. But private actors sometimes wield their power without regard for democracy and social welfare.

In many ways, the politics of the past century was characterized by a long tug-of-war between public and private power. But these debates have passed their sell-by date. The extreme public vs. private positions simply don't hold water anymore. What we need now is a fresh perspective--a new methodology for mixing, blending, and balancing public and private power.

History offers some clues. During the Industrial era, technological disruption placed immense strains on society and hastened the need for new ways of governing. The resultant reforms included the expansion of democracy, toward universal suffrage; the end of child labor and the rise of unions; the rise of antitrust law; and the beginnings of the welfare state. These new modes of social organization helped society accommodate radical changes in technology.

These changes were not “pro-government” or “anti-government.” Rather, they were social innovations. Their common feature was that they pushed power outwards, away from sites of highly concentrated public or private power, and into the hands of individuals and communities. They enabled new, more responsive, and more democratic institutions to sustain technological progress, while also maintaining an open and free society. They served as a counterweight against the tendency of new technologies to generate sticky concentrations of power in either government or industry--and the corresponding tendencies of those power concentrations to push societies toward anti-democratic modes of government.

We need similar social innovations in today's public procurement practices. In recent years, social technologists have been developing new ways of striking a proper balance between public and private power. The RadicalxChange Foundation was born out of the 2018 book on Radical Markets, which put forward four new mechanisms for allocating resources across many societal contexts. With this document, we aim to apply two of these ideas to public procurement—an enormously important, yet underrated area of government activity. While the ideas may seem unfamiliar at first, the values and the way of thinking are well-known. They sit firmly within the tradition of defending liberal and democratic values.

## 2 The procurement opportunity

Governments around the world buy an enormous amount of goods and services on behalf of their citizens. In the United States, for instance, government spending is ~**45%** of GDP, and ~**25%** of this government spending is procurement--this means that the public sector (federal, state, and local combined) procure ~**\$2 trillion dollars** worth of goods, works, and services each year.<sup>3</sup>

Due to the sheer size of public purchasing, it's worth asking: could government get more / higher-quality products at current spending levels, or procure its current level of goods at lower prices? Current estimates suggest that, globally, the public sector could save **28%** of current spending if it adopted best practice reforms.<sup>4</sup> In the U.S. alone, this would equate to a **\$0.5 trillion** saving opportunity. We at RadicalxChange are focused on one slice of this opportunity: the potential for new mechanisms to improve both equality and efficiency in procurement. This narrow focus intentionally ignores other levers for improving government purchasing and the entire set of opportunities where government is a *seller* of resources (for instance, allocation of street parking spaces<sup>5</sup> and even privatization of parking operations<sup>6</sup>).

### ***Our focus on two reform levers***

When we observe governments paying a price that seems to be “unnecessarily” high, the underlying drivers of this price distortion may be directly related to procurement design or may be due to broader constraints on the procurement process. For instance, recent research highlights at least three examples of such broader constraints. *First*, political power dynamics, like the rise of “local voice”, i.e., community opposition to infrastructure or development projects, may be responsible for the rising cost of infrastructure.<sup>7</sup> *Second*, changing regulatory priorities, like an increased legislative priority on noise reduction, may also drive up the SALSA (self-assessed license sold via auction) of building infrastructure. *Third*, lobbying by certain industry groups may entrench costly methods of production at the public's expense.<sup>8</sup> The

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<sup>3</sup> Our World in Data, Government Spending (2019),

<https://ourworldindata.org/government-spending#recent-data-on-public-procurement>.

<sup>4</sup> Tera Allas, Diego Barilla, Simon Kennedy & Aly Spencer, *How Smarter Purchasing Can Improve Public-sector Performance*, McKinsey & Company (Mar 2018),

<https://www.mckinsey.com/industries/public-sector/our-insights/how-smarter-purchasing-can-improve-public-sector-performance>.

<sup>5</sup> Henry Grabar, *New York City Street Parking Is Preposterously Corrupt*, Slate (May 3, 2018),

<https://slate.com/business/2018/05/new-york-citys-corrupt-street-parking.html>.

<sup>6</sup> Fran Spielman, *Parking meter deal keeps getting worse for city as meter revenues rise*, Chicago Sun Times (May 14, 2018),

<https://chicago.suntimes.com/2018/5/14/18348206/parking-meter-deal-keeps-getting-worse-for-city-as-meter-revenues-rise>.

<sup>7</sup> Leah Brooks & Zachary D. Liscow, *Infrastructure Costs* (July 31, 2019) (unpublished manuscript),

<https://ssrn.com/abstract=3428675>.

<sup>8</sup> Hiroko Tabuchi, *\$300 Billion War Beneath the Street: Fighting to Replace America's Water Pipes*, New York Times (Nov 10, 2017),

<https://www.nytimes.com/2017/11/10/climate/water-pipes-plastic-lead.html>.

RadicalxChange community has begun working on proposals for the best way to tax lobbying.<sup>9</sup> The key point about these broader constraints is that no amount of technocratic redesign would overcome this problem without some change to the political sphere.

However, we think there are significant opportunities within the realm of public procurement design. That is, with no change in broader political dynamics or regulation, governments could deliver more value to their citizens. To be more precise, we view “procurement design” opportunities in three distinct categories (see below). Our focus at RadicalxChange is on *mechanism design*--i.e., we focus on the ways that resource allocation mechanisms themselves influence the societal gains or losses from procurement processes. As in our broader work across RxC, we emphasize decentralization and dynamism as ways of alleviating concentrated accumulations of power and wealth. However, not all procurement types are equally well-suited to decentralized mechanisms. The following section highlights the particular types of procurement that we feel are best suited for our mechanisms.

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<sup>9</sup> Andrew Kortina, *Speech is Free, Distribution is Not*, Kortina.NYC Blog (Jun 17, 2019), <https://kortina.nyc/essays/speech-is-free-distribution-is-not-a-tax-on-the-purchase-of-human-attention-and-political-power/>.

Figure 1: Our proposals within the full range of procurement policy and reform areas

RxC focus area		
Reform area	Policy choice areas	Potential reforms <sup>1</sup>
<b>1</b> Legal & regulatory environment	<ul style="list-style-type: none"> <li>• <b>Public procurement regulations</b> (e.g., Federal Acquisition Act and state equivalents)</li> <li>• <b>Service provision regulations</b> (e.g., environmental, noise reduction, etc.)</li> <li>• <b>Interest group regulations</b> (e.g., lobbying)</li> </ul>	<ul style="list-style-type: none"> <li>• Comply fully with laws already "on the books" (e.g., rebid contracts as frequently as required by law)</li> </ul>
<b>2</b> Organizational & demand-side	<ul style="list-style-type: none"> <li>• <b>Demand management</b> (deciding what to buy, how much, what kind, etc.)</li> <li>• <b>Centralization</b> (achieve scale discounts and/or reduce variation in products procured across local units)</li> <li>• <b>Human capital</b> (recruiting and retaining more skilled procurement professionals)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>RxC QV (Quadratic Voting) mechanism</b></li> <li>• Centralize decisionmaking for standardized goods/services</li> <li>• Improve human capital through hiring/retention/compensation changes</li> <li>• Improve technology adoption in the public sector to improve labor productivity</li> </ul>
<b>3</b> Contract design	<ul style="list-style-type: none"> <li>• <b>Single winners vs. multiple winners</b></li> <li>• <b>Type of contract</b> (cost-plus, fixed price, time, etc.)</li> <li>• <b>Information disclosed</b> (various levels of transparency)</li> <li>• <b>Award criteria</b> (lowest price vs. taking non-price factors)</li> <li>• <b>Subcontracting rules</b> (various restrictions imposed)</li> </ul>	<ul style="list-style-type: none"> <li>• For large infrastructure contracts and other PPPs, move away from design-bid-build (DBB) and toward design-build and design-build-operate structures</li> </ul>
<b>4</b> Auction design	<ul style="list-style-type: none"> <li>• <b>Choices about auction form</b> (e.g., first-price sealed bid, two-stage sealed bid, combinatorial, average bid, framework agreement, etc.)</li> <li>• <b>Joint bidding</b> (to encourage smaller orgs. to participate)</li> <li>• <b>Joint procurement</b> (multiple smaller buyers buy together)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>RxC SALSA (Self-Assessed License Sold via Auction) mechanism</b></li> </ul>

(1) Source: expert interviews conducted in the production of this report

## 3 Radical mechanisms

### *Introduction and a guiding example*

As discussed above, there are many ways in which private power can reduce value to the public in procurement. We at RxC are concerned with mechanism design. We will illustrate our approach with the following example.

Imagine a downtown Business Improvement District (BID) that decides to use its funds to procure services that will enhance the beauty and productivity of its downtown area (e.g., road maintenance, street cleaning, solar-powered trash cans, etc.). The BID uses a simple yes/no voting scheme among its seven members and decides that it will procure the service that gets the most yes votes via a five year contract to the lowest bidding firm. In our view, there are two important ways in which this process can be improved:

- (1) ***The voting mechanism:*** A traditional yes/no or “majority wins” voting process does not allow voters to express the intensity of their preferences. Thus, it runs the risk of allowing a majority who feels weakly about one particular option towards a minority who feels very strongly about it. In our context, an inefficient voting mechanism will not harness the expertise and knowledge possessed by the BID’s board members as well as possible. As we will discuss below, innovative governments can apply QV for a variety of internal committee decisions (or even more broadly to incorporate citizens’ voices into purchasing decisions).
- (2) ***The allocation mechanism:*** A five-year contract might allow a private firm to extract “rents” from the public. If, for instance, a lower-cost provider comes along two years into the contract, the public will have no choice but to continue paying the original firm a supra-competitive price for the remaining three years. As we show below, for goods and services with low switching costs, a more dynamic allocation mechanism can transfer potential gains away from private firms and toward the public more effectively.

To address these two problems, we propose two mechanisms.<sup>10</sup>

- (1) ***Quadratic voting (QV):*** Quadratic voting is a twist on normal voting procedures, which allows voters to express their wishes with more precision. It lets voters trade some of their overall voting power for the right to “speak louder” on the issues they deem most important. In quadratic voting, each voter starts with an equal budget of “voting credits”. They can then allocate these credits to different voting issues as they please. To illustrate, picture a ballot with 10 issues or questions on it. Each voter likewise has 10 voting credits, and each vote “costs” one voting credit. So, she may simply choose to spend her 10 voting credits by casting one vote on each issue. But if she prefers to concentrate her

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<sup>10</sup> These mechanisms are adapted from the work of Glen Weyl, Eric Posner, and many others, codified in the book *Radical Markets*. This document will explain and apply the mechanisms to procurement, but please see *Radical Markets* for an even more comprehensive treatment.



voting power on a particular issue, she must pay a special cost for doing so. This cost is calculated as the square of the number of votes cast. In other words, if she chooses to vote twice on an issue, she must spend four voting credits (because two squared equals four). Similarly, if she chooses to vote three times on an issue, she must spend nine voting credits (because three squared equals nine).

- (2) ***Self-assessed License Sold via Auction (SALSA)***: The SALSA mechanism combines self-assessment and continuous bidding to maximize value for the public. Firms bid on the contract at an initial auction. Then, the initial winner maintains a self-declared valuation for the contract in an online marketplace and pays a yearly fee for the right to continue holding the contract. And--this is where the magic of SALSA happens--if any potential vendor would submit a lower bid than the holder's declared self-assessment, the initial holder *must* sell the license at this new, higher value, unless she decreases her own value to match the new offer.

## ***Quadratic Voting (QV)***

Quadratic voting is a twist on normal voting procedures, which allows voters to express their wishes with more precision.<sup>11</sup> It lets voters trade some of their overall voting power for the right to “speak louder” on the issues they deem most important. A growing body of academic work and real-world use cases indicates that quadratic voting captures more precise and useable information than simple voting. For example, in 2019 the Democratic Caucus of the Colorado House of Representatives successfully used quadratic voting to decide which spending bills to prioritize.<sup>12</sup> The experiment was a success, and cutting-edge institutions all over the world are now adopting quadratic voting for both internal and public decision-making processes.<sup>13</sup>

### *The Rationale Behind Quadratic Voting*

Letting voters reallocate votes to issues they care more about is an old idea with a clear appeal. It would obviously be a boon to democracy if people could indicate how strongly they felt about issues, in addition to which choice they preferred. For example, if a voter cares weakly about one issue, but strongly about another, why shouldn't they be able to vote twice on the one they care strongly about, while abstaining from the other?

Yet, simply allowing people to concentrate their votes on single issues has failed to become a popular democratic practice, because it leads to a serious problem. Namely, people and groups who aggressively concentrate their votes nearly always win their favorite issues. This

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<sup>11</sup> Steven Lalley & Eric Glen Weyl, *Quadratic Voting: How Mechanism Design Can Radicalize Democracy* (December 24, 2017). American Economic Association Papers and Proceedings, Vol. 1, No. 1 (2018), <https://ssrn.com/abstract=2003531>.

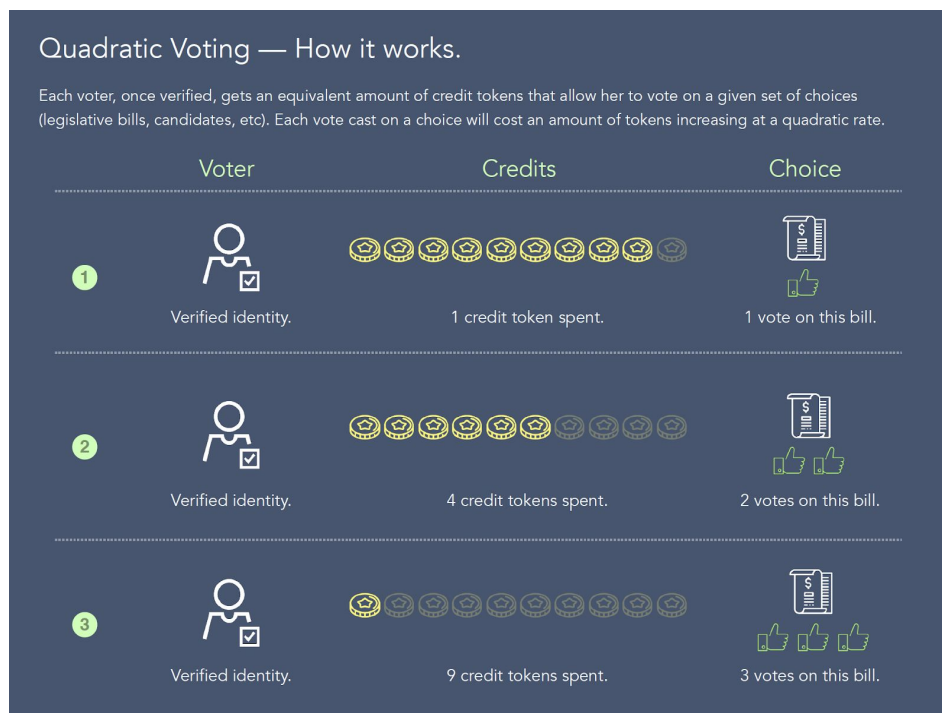
<sup>12</sup> Peter Coy, *A New Way of Voting That Makes Zealotry Expensive*, Bloomberg (May 1, 2019), <https://www.bloomberg.com/news/articles/2019-05-01/a-new-way-of-voting-that-makes-zealotry-expensive>.

<sup>13</sup> E.g., Taiwan's Presidential Hackathon, <https://presidential-hackathon.taiwan.gov.tw/en/>.

drowns out nuance, empowering the loudest and most zealous voices in the electorate. It encourages everyone to concentrate their votes on single issues as much as they can stand to, meaning that the ballots stop capturing voters' views on other issues, which they care about more moderately. It ultimately impoverishes the voting process.

Quadratic voting retains the flexibility and benefits of allowing vote reallocation--but it solves the “loudest voices in the room” problem. It does so by (1) allowing voters to reallocate their votes, while also (2) imposing a precisely calibrated, non-monetary cost on voters who choose to do so. The “cost” increases with the degree of concentration, so that the more they concentrate their votes, the fewer votes they get to cast overall.

In quadratic voting, each voter starts with an equal budget of “voting credits”. They can then allocate these credits to different voting issues as they please. To illustrate, picture a ballot with 10 issues or questions on it. Each voter likewise has 10 voting credits, and each vote “costs” one voting credit. So, she may simply choose to spend her 10 voting credits by casting one vote on each issue. But if she prefers to concentrate her voting power on a particular issue, she must pay a special cost for doing so. This cost is calculated as the square of the number of votes cast. In other words, if she chooses to vote twice on an issue, she must spend four voting credits (because two squared equals four). Similarly, if she chooses to vote three times on an issue, she must spend nine voting credits (because three squared equals nine). This dynamic is illustrated in the graphic below.



### Application to BID example

Imagine that our Business Improvement District (BID) needs to decide which services to procure and at what level (e.g., street sweepers, fancy signs/lights, electronic kiosks). Because BIDs already have some governance structure, we do not face any “voter participation” problems (discussed below). Instead, QV enables the BID to better aggregate the preferences of its members (which, presumably, would result in higher productivity for the area).

Figure 2: QV in Business Improvement District procurement

Board members' preferences		
	Advertisement signs	Street cleaners
Board member 1	2	1
Board member 2	2	1
Board member 3	2	1
Board member 4	2	1
Board member 5	0	3
Board member 6	0	3
Board member 7	0	3

Legend:

0	Strongly disprefer
1	Weakly disprefer
2	Weakly prefer
3	Strongly prefer

It’s easy to see that under a typical voting system, the advertisements will win. Four people prefer them, versus three people who prefer the street cleaners.

However, a QV system would result in the street cleaners winning.

QV: each board member allocates 100 points using QV

	Advertisement signs	Street cleaners
Board member 1	8.2	5.8
Board member 2	8.2	5.8
Board member 3	8.2	5.8
Board member 4	8.2	5.8
Board member 5	-	10.0
Board member 6	-	10.0
Board member 7	-	10.0
<b>Total votes:</b>	32.7	53.1

### *Additional concerns and risks*

Participation: In procurement, it's best to use QV in groups that are *already* engaged in some voting process. Otherwise, there is a risk that those who do “show up” will impose their preferences on the rest of the relevant population.

### ***Self-assessed License Sold via Auction (SALSA)***

Quadratic voting helps an organization understand *what* to procure, and SALSA provides a method for *how* to procure it. To continue the brief example laid out above, imagine that the Business Improvement District decides to procure road maintenance services.

#### *The Rationale Behind SALSA*

As mentioned above, SALSA helps to mitigate market power and rent-seeking behavior by private firms in the procurement process. Because contract-holders face the constant threat of another firm submitting a lower bid, they will be unable to extract above-profit rents from the public. Here's how it works:

Step 1: The government auctions a contract for a given good, work or service to the lowest bidder. Any auction format will work, though we recommend using an ascending price auction or a channel auction.<sup>14</sup>

Step 2: Contract-holders maintain their valuations in an online platform and pay annual license fees on their self-assessed valuation (e.g., a 20% fee). The right annual fee rate will be somewhere between zero and the turnover rate (i.e., the probability that a higher-value purchaser comes along within a year).

Step 3: Firms with a lower bid may opt to take over the contract through the online marketplace. Three elements are pointed out here:

- Valuation procedure: For offers that require inspection by the buyer (e.g., government needs to confirm certain qualifications of the offering firm), the purchaser could freeze the listed price and pay a small percentage to the seller in order to inspect it, before deciding whether to proceed.
- Turnover time: A reasonable amount of time to turn the contract over will depend on the contract type. For a 5 year contract, the turn-over time will likely be around 3 months.

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<sup>14</sup> In a channel auction--a new idea proposed by RadicalxChange founder Glen Weyl, among others--there is a lower bound price, which gradually rises, and an upper bound price, which gradually descends. Buyers are committed to buy for at least the lower bound price, but may purchase directly at the upper bound price at any time. See Eduardo M. Azevedo et al., *Channel Auctions* (Aug 5, 2019) (unpublished manuscript), <https://ssrn.com/abstract=3241744>.

- Asset maintenance: To the extent that maintenance is required, we suggest an automated way to monitor maintenance and even subsidize (via reduced tax rates) positive investments made by the previous seller.

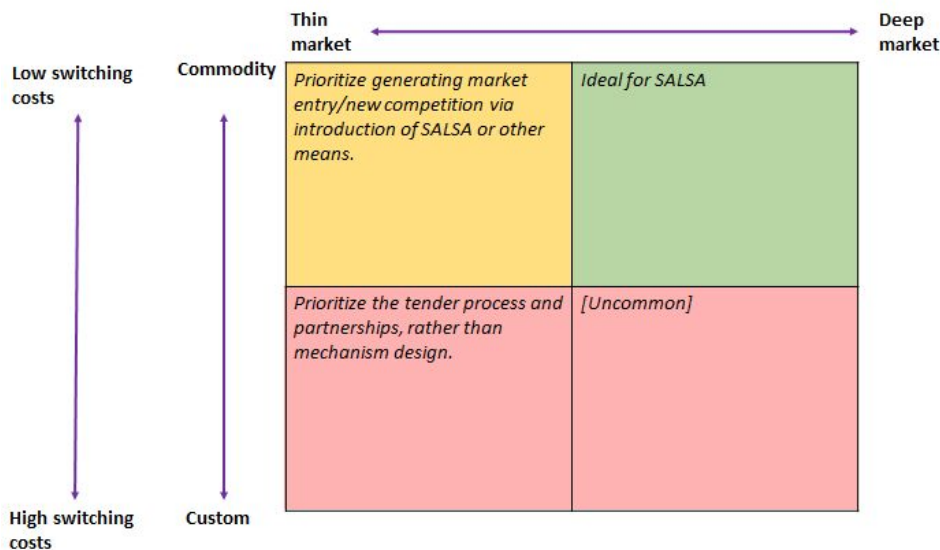
### *What is the right percentage fee rate?*

Some simple arithmetic shows that setting the tax rate equal to the turnover rate--i.e., the percent chance that someone who values the contract higher (in other words, would submit a lower bid) will come along within any given time period--will incentivize owners to self-assess honestly, at their actual subjective valuation.<sup>15</sup>

### *Product/service type matters*

The product or service being procured matters significantly in determining what the “right” design will be. We think that the products most ripe for our proposed mechanisms are relatively commoditized products with a deep market (i.e., many potential firms that can provide the product). The table below illustrates the different categories:

*Figure 3: Product/market matrix*



<sup>15</sup> Imagine that there is a 30% chance that a higher-value purchases comes along in any given year. If the asset holder sets her self-assessed value above her actual value by  $\Delta P$ , then she will benefit by  $0.3\Delta P$  (this is the 30% probability that a higher-valuing buyer comes along and buys the asset at the new higher price), but she will also have to pay a higher annual fee on the asset. And if the government sets the fee rate equal to the turnover rate, this will penalize the asset-holder by exactly  $0.3\Delta P$ , cancelling out the gain to her from setting her valuation above her true valuation. See pages 57-58 in Eric A. Posner & E. Glen Weyl, *Radical Markets* (2018).

It's important to keep in mind that the categories above are, to some extent, determined by procurement choices (e.g., the set of services that the public sector bundles into a given contract). We encourage governments to think about decoupling procurement activities so that the low-switching costs elements can be put up for bid and separate from initial investment activities, without losing valuable synergies through bundling exercises.

### *Application to BID example*

The following parameters and assumptions guide the analysis that follows:

- The social benefit of each unit of road maintenance is \$10.
- Firm 1 (the only firm present at the time of the bidding), has an up-front fixed cost of \$10 and a marginal cost of \$5 per unit of road maintenance.
- Firm 2 (which enters later on, say, at time period 3) has the same \$10 fixed cost but a lower marginal cost of \$2 per unit.
- There is a switching cost of \$10
- The SALSAs give an “investment incentive”, which is a credit for fixed costs made on the firm's SALSA payment.

Firm 1 initially charges the public sector the full \$10, which the government is willing to pay, and makes a bid, which reflects the net present value (NPV) of the contract to the firm (taking into account its anticipated SALSA payments).

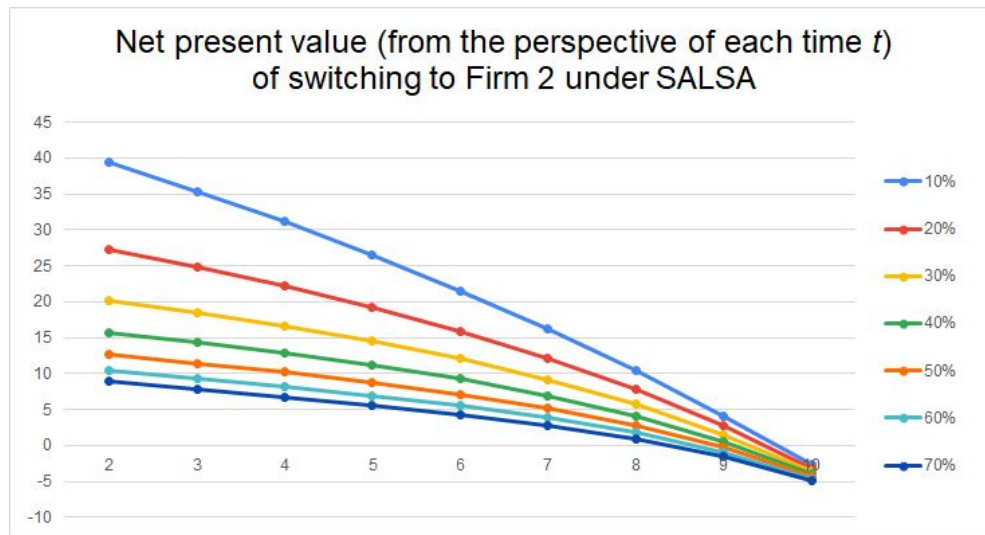
Firm 2 enters and, knowing that it is a lower-cost provider, makes a bid that is just below Firm 1's breakeven value, similarly submitting a value that reflects its perceived contract value, taking into account future SALS payments.

As you can intuit, the town realizes gains by switching to Firm 2 (which is possible in the SALSA, but not possible when a fixed-term contract encompasses the period in which Firm 2 would have entered). The table below shows how the social gains from this switch to Firm 2 are a function of the SALSA assessment rate and the time period in which Firm 2 enters. As one might expect, the gains from this switch decrease with a higher SALSA rate (i.e., because a higher rate allows society to capture more of the gains from Firm 1 initially) and the time period of Firm 2's market entry (there is less time for this lower-cost provider to provide the service). Not shown, but similarly intuitive, increased switching costs will decrease the gains from switching and may make the SALSA mechanism less attractive.

Figure 4: NPV of social gains from switching from Firm 1 to Firm 2 under SALSA, as SALSA rate (y axis) and Firm 2 entry point change

\$39	2	3	4	5	6	7	8	9	10
10%	\$ 39.37	\$ 35.40	\$ 31.13	\$ 26.53	\$ 21.57	\$ 16.22	\$ 10.43	\$ 4.17	\$ -2.63
20.0%	\$ 27.26	\$ 24.90	\$ 22.27	\$ 19.31	\$ 15.96	\$ 12.15	\$ 7.77	\$ 2.71	\$ -3.16
30.0%	\$ 20.16	\$ 18.50	\$ 16.64	\$ 14.53	\$ 12.07	\$ 9.19	\$ 5.73	\$ 1.54	\$ -3.61
40.0%	\$ 15.68	\$ 14.34	\$ 12.88	\$ 11.20	\$ 9.27	\$ 6.98	\$ 4.14	\$ 0.58	\$ -3.99
50.0%	\$ 12.66	\$ 11.47	\$ 10.20	\$ 8.79	\$ 7.17	\$ 5.25	\$ 2.87	\$ -0.21	\$ -4.33
60.0%	\$ 10.51	\$ 9.41	\$ 8.25	\$ 6.99	\$ 5.57	\$ 3.90	\$ 1.83	\$ -0.88	\$ -4.62
70.0%	\$ 8.93	\$ 7.87	\$ 6.77	\$ 5.60	\$ 4.31	\$ 2.82	\$ 0.98	\$ -1.45	\$ -4.88

Figure 5: NPV of social gains from switching from Firm 1 to Firm 2 under SALSA (each line represents a different SALSA rate)



### Additional concerns and risks

*Social equity considerations to allocate assets on non-economic grounds:* There are many reasons why local governments may not want to allocate on a purely financial basis. For instance, many governments have some form of affirmative action contracting, whereby the government grants preferences to businesses owned by certain demographic groups. In our view, it's possible to integrate such schemes into SALSA by granting such advantaged firms a certain dollar or percentage advantage (e.g., a \$100 bid by an advantaged firm would be recorded as a \$90 bid, and so on).





## Appendix 1: Snapshot (and shortcomings) of current mechanisms

In this section, we provide a brief overview of the advantages and disadvantages of current procurement mechanisms that are commonly used. In addition to the auctions mentioned here, most public procurement laws, including the U.S. Federal Acquisition Regulation (FAR), also know the procedure type of single sourcing, also known as private negotiations or direct awards in the EU regime. Here, we focus on auction design, the different forms of auction and their respective advantages and drawbacks.

As an introductory note, it is emphasized that in public procurement law two concepts need to be distinguished: type of procedure (different auction designs) and type of contracts (second box in the figure above). While the first price sealed bid auction and the two-stage sealed bidding are the two major procedures used in public procurement law, the combinatorial auction and average bid auction are subforms that are less frequently used in procurement.<sup>16</sup> Framework agreements (EU terminology) or multiple-award contracts (U.S. terminology) are often subsumed under contract type. But since these framework contracts form the foundation for our SALSA mechanism (discussed below), we discuss framework agreements here.

### I. First Price Sealed Bidding

The most common tendering mechanism in public procurement are first price reverse auctions. In the context of public procurement, they are almost always sealed bid auctions.

#### Advantages

A major advantage of these auctions is that open solicitation attracts many competitors and can therefore secure low prices. It is a very simple evaluation mechanism based on the lowest price. Another advantage of sealed bids is that the disallowance of communication with the agency and other suppliers before the bid, prevents corruption on the agency and supplier side and can alleviate collusion among the suppliers.

#### Disadvantages

The mentioned simplicity of the evaluation mechanism solely based on price can also be a major drawback: Whenever the auction is not (solely) based on price, sealed-bid auctions fail. The winner cannot be declared on the price alone. This disadvantage is closely related to the problem that the desired product must be clearly specified by the government agency in terms of quantity and quality, so that the only thing left to the suppliers is to offer a price. This mechanism does only work for commoditized/standardized goods and not for complex, tailor-made goods, which often lack clear specifications. The aforementioned no-communication rule of sealed bidding

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<sup>16</sup> U.S. Federal Procurement Report (2007), <https://www.fpds.gov/fpdsng/cms/index.php/en/reports/55-federal-procurement-report.html>. For more recent reports see <https://datalab.usaspending.gov/contracts-over-time.html>.

can also exacerbate a major problem in public procurement, which is the frequent lack of expertise on the agency side vis-a-vis the knowledgeable supplier. This information asymmetry and lack of project specification at the outset of the auction may lead to costly *ex post* adaptations during the course of the project. This problem is particularly pertinent in the construction sector where many change orders and *ex post* adaptations are invoked.<sup>17</sup>

## II. Two-stage Sealed Bidding

The two-stage sealed bidding is the second most common form of procurement auctions in most jurisdictions.<sup>18</sup> The EU public procurement regime knows this procedure under the name “selective procedure”. At the first stage, the agency selects the most appropriate suppliers that are allowed to bid based on their credentials and references. At the second stage, the selected suppliers can then submit their bids. Same as in the standard version, the bids are sealed and can only be opened by designated government officials after the expiration of the bidding deadline.

### Advantages

The biggest advantage of this two-step procedure is that no resources are wasted for the evaluation of the offer before making sure that the supplier has the necessary experience and references to diligently executing the project.

### Disadvantages

Most jurisdictions were very excited about this more sophisticated type of procedure. However, practice has shown that neither government agencies nor suppliers use this method in practice.<sup>19</sup> The question is why and the answer is simple: it is too costly for the government to have a two-stage process. This is not (only) because the government needs to evaluate the suppliers and the bids separately--which often happens in reverse auctions too--but because most public procurement regimes allow for bid protests at both stages.<sup>20</sup> Hence, the costly element to these method and the impediment to its success is the risk of future bid protests, which would consume enormous amounts of resources, both in terms of delays and litigation costs.

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<sup>17</sup> Houghton Bajari & Steven Tadelis, *Bidding for Incomplete Contracts: An Empirical Analysis of Adaptation Costs*, American Economic Review 104(4): 1288-1319 (2014).

<sup>18</sup> FPDS (2007), *U.S. Federal Procurement Report*, <https://www.fpds.gov/fpdsng/cms/index.php/en/reports/55-federal-procurement-report.html>; PWC (2011), *Cost and Effectiveness Study of Public Procurement in the EU*, <https://op.europa.eu/en/publication-detail/-/publication/ocfa3445-7724-4af5-8c2b-d657cd690c03>.

<sup>19</sup> *Id.*

<sup>20</sup> *Id.*

### III. Combinatorial auctions

The combinatorial auction is a subform of the reverse auction. It is important to note here that combinatorial auctions do not combine different auction methods, but rather different *items* or *quantities* that are auctioned together. Often, this mixed form is not specifically mentioned in public procurement regulations. The U.S. FAR for example, does not mention this form.

#### Advantages

The main advantage of bulk buying is that it creates economies of scale and synergies to reduce the administrative costs of agencies. While the use of package auctioning is rather limited and not promoted by most public procurement regulations, the form of unit-price auction is vastly used in the construction industry.<sup>21</sup> In these auctions, the government buys large quantities of homogenous goods, such as concrete or steel in bundles and asks the suppliers to offer a price for a certain quantity of the good. Other applications of combinatorial auctions are the auctioning of spectrum licences, highway or railroad segments, or airport time slots.<sup>22</sup>

#### Disadvantages

The largest disadvantage of combinatorial auctions is that bundling creates larger public procurement projects that can limit the access for small- and medium-sized enterprises (SMEs) and can often only be handled by large suppliers. In a sense, these bundling auctions can be seen as the opposite of building lots--an instrument that was applied to allow access to SMEs both in the United States and Europe.<sup>23</sup>

### IV. Average bid auctions

Average bid auctions are a subform of reverse auctions and build the counterpart of first bid auctions. In an average bid auction, the public contract is not awarded to the bidder with the lowest price but to the offeror that is closest to the average bid.

#### Advantages

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<sup>21</sup> Houghton Bajari and Steven Tadelis, *Bidding for Incomplete Contracts: An Empirical Analysis of Adaptation Costs*, American Economic Review 104(4): 1288-1319 (2014).

<sup>22</sup> Sven de Vries and Rakesh Vohra, *Combinatorial Auctions: A Survey*, Journal of Computing 15(3): 284-309 (2003); S. J. Rassenti, V. L. Smith and R. L. Bulfin, *A Combinatorial Auction Mechanism for Airport Time Slot Allocation*, The Bell Journal of Economics 13(2): 402-417 (1982).

<sup>23</sup> See e.g., EU Public Procurement Directive 2014,  
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&from=EN>.

The idea and advantage behind this auction design is to prevent awarding the contract to a defaulting contractor or one that later asks for high *ex post* adaptation costs.<sup>24</sup> Hence, the idea of average bid auctions is very appealing.

### Disadvantages

Literature, however, is divided whether average bid auctions in real-life deliver better results than the standard first price sealed bid auction.<sup>25</sup> The difference lies in whether or not a jurisdiction imposes and enforces a *penalty* on a defaulting supplier. If the penalty is large, such as in the U.S., the average bid auction is less efficient and the production costs are higher than in sealed bid auctions.<sup>26</sup> In jurisdictions that do not impose penalties on defaulting suppliers, like Italy, or the states of Florida and New York, the average bid auctions delivers more efficient results than sealed bid auctions.<sup>27</sup>

## V. Framework agreements

Framework agreements in the EU regime are structured in the following way: an (often centralized) procuring agency publicly tenders a project for a certain amount of years, often 4 years,<sup>28</sup> and will select several suppliers that it considers apt to deliver the respective good or service. Whenever the agency, or some subagency is in need of the respective good or service, a mini-tender is launched between the winning suppliers of the framework contract, often around 5 suppliers.<sup>29</sup> The supplier offering the lowest price for the desired good wins the bid.

Framework agreements are most often used for standardized goods or services, such as repair and maintenance work. The U.S. procurement regime knows a very similar concepts under the name of multiple-award indefinite delivery/indefinite quantity (IDIQ) contracts.<sup>30</sup> As

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<sup>24</sup> Pro average bid auctions: Wei-Shiun Chang, Bo Chen and Timothy C. Salmon, *An Investigation of the Average Bid Mechanism for Procurement Auctions*, *Informs* 61(6): 1237-1254 (2014), <https://doi.org/10.1287/mnsc.2013.1893>.

<sup>25</sup> For average bid auctions: Wei-Shiun Chang, Bo Chen and Timothy C. Salmon, *An Investigation of the Average Bid Mechanism for Procurement Auctions*, *Informs* 61(6): 1237-1254 (2014), <https://doi.org/10.1287/mnsc.2013.1893>. Against average bid auctions: Francesco Decarolis, *Comparing Public Procurement Auctions*, *International Economic Review* 59(2): 391-419 (2018), <https://doi.org/10.1111/iere.12274>; Jin Hyung Lee (2017), *Two Essays on The Average Bid Auction*, Dissertation, <https://core.ac.uk/download/pdf/154406203.pdf>.

<sup>26</sup> Jin Hyung Lee (2017), *Two Essays on The Average Bid Auction*, Dissertation, <https://core.ac.uk/download/pdf/154406203.pdf>.

<sup>27</sup> Wei-Shiun Chang, Bo Chen and Timothy C. Salmon, *An Investigation of the Average Bid Mechanism for Procurement Auctions*, *Informs* 61(6): 1237-1254 (2014), <https://doi.org/10.1287/mnsc.2013.1893>; Francesco Decarolis, *Comparing Public Procurement Auctions*, *International Economic Review* 59(2): 391-419 (2018), <https://doi.org/10.1111/iere.12274>.

<sup>28</sup> PWC (2011), *Cost and Effectiveness Study of Public Procurement in the EU*, <https://op.europa.eu/en/publication-detail/-/publication/ocfa3445-7724-4af5-8c2b-d657cd690c03>.

<sup>29</sup> PWC (2011), *Cost and Effectiveness Study of Public Procurement in the EU*, <https://op.europa.eu/en/publication-detail/-/publication/ocfa3445-7724-4af5-8c2b-d657cd690c03>.

<sup>30</sup> FAR, § 12.207.

mentioned above, this concept is seen as a contract type rather than a procurement procedure. Same as the EU framework agreement, IDIQ contracts encompass multiple awards and have a lifespan of several years.

### **Advantages**

Framework agreements have the advantage to be more efficient, i.e. to save tendering costs for the procurement agency, since the agency only has to tender one framework contract under which it can call off projects with less formalistic procedures. Also, the contracts usually expand over several years and do not need to be tendered every year or every couple of months.

### **Disadvantages**

However, this long lifespan of framework contracts is also the largest disadvantage in the sense that it blocks out competition and new entrants (main claim of SALSA). Excluding new competitors from participation might also prevent innovation that was not existent at the tendering time of the framework contract. This major disadvantage builds the basis for the RxC SALSA project, which has been described in more detail above.

## **Appendix 2: Additional insight from expert network**

In the course of producing this report, we interviewed ten experts with backgrounds in academia, public, and private sectors. Their feedback and refinement on our two main mechanisms, QV and SALSA, is reflected in the material above. However, our experts had much to say about procurement outside of these two mechanisms. This appendix presents these additional insights, which were previewed above in Figure 1.

**(1) Organizational reforms may present “lower-hanging fruit” to be pursued before implementing QV or SALSA.** Several experts voiced the opinion that many government purchasing organizations may be best off by pursuing lower-hanging fruit before implementing QV or SALSA. In particular, several experts pointed to large efficiency gains in three areas:

- *Human capital:* Experts with government experience uniformly agreed that government purchasing agencies suffer from a lack of highly qualified, talented staff members. Increasing compensation levels, and especially linking compensation and advancement to performance rather than seniority, may deliver large gains to the public with no policy tweaks required.
- *Technology:* Similarly, experts with experience in government agreed that outdated and poorly maintained IT systems hold back organizational performance in public agencies. Research on technological capabilities across sectors confirms that, in the United States

at least, government lags behind other sectors in its adoption of productivity-enhancing technology.<sup>31</sup>

- *Scale of decision-making:* For relatively standardized goods and services, many of our experts thought that large gains are available for agencies that centralize purchasing. Via centralization, agencies can realize gains from economies of scale, greater bargaining power, and/or demand rationalization (i.e., purchasing the same type of computer for all employees rather than allowing individual departments to purchasing different types).<sup>32</sup>

**(2) Similarly, compliance with procedures that are already on the books may present low-hanging fruit for many organizations.** Experts with experience in government discussed how sometimes there is a discrepancy between public procurement processes on the books and what actually happens in the real world. For instance, sometimes governments--due to lack of organizational capacity or other constraints--fail to rebid service contracts as frequently as they are required to by law.

**(3) For large infrastructure projects especially, shifting from design-bid-build to design-build may present large gains in the United States context.** A few of our experts agreed that the dominance of the design-bid-build (DBB) contract format in the United States is at least partially responsible for less cost-effective infrastructure procurement relative to other countries, where design-build (DB) is more prevalent. DB, and other alternative formats like Construction Manager at Risk (CMAR), allocates a greater share of project risk to the private construction firm providing services. Thus, DB generally has been found to reduce cost overruns and improve project outcomes. DB is in fact growing in the United States, which gives us reason for optimism.<sup>33</sup>

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<sup>31</sup>James Manyika et al., *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute (Dec 2015),

<https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/digital-america-a-tale-of-the-haves-and-have-mores>.

<sup>32</sup> See also *Centralised and Decentralised Public Procurement*, OECD (Oct 2000),

<https://www.oecd-ilibrary.org/docserver/5kml6ow5dxr1-en.pdf?expires=1574697578&id=id&accname=guest&checksum=38872435ACFE05A767FF4E30EF4A9795>.

<sup>33</sup> Kathleen Brown, *Report: Design-build to deliver almost half of US projects by 2021*, Construction Dive (Jul 9, 2018),

<https://www.constructiondive.com/news/report-design-build-to-deliver-almost-half-of-us-projects-by-2021/526463/>; Falls Management Institute, *Design-Build Utilization* (Jun 2018), <https://dbia.org/wp-content/uploads/2018/06/Design-Build-Market-Research-FMI-2018.pdf>.