

A Game-Theoretic Approach to Innovate Government Procurement: The Case for Non-Traditional Acquisitions

Eighteen months after the Build America, Buy America act took effect in May 2022, the federal government has obligated \$18 billion to contractors.ⁱ As the costs from onshoring construction purchases continue to rise, now estimated to be equivalent to a 25 percent tariff and 5-10 percent increase to pricesⁱⁱ, the application of game theory holds the potential to yield considerable savings for procurement professionals.

By: Ben Wilson

The government shoulders a significant responsibility in procuring products, a critical endeavor that propels agencies towards fulfilling their mandates and serving citizens. With the enactment of the Build America, Buy America Act, there is a renewed emphasis on onshoring spending within the United States, necessitating government agencies to allocate more funds to products and supplies that were traditionally offshored for cost savings.

Procurement officers are now tasked with the challenge of onshoring purchasing, a move that inevitably raises prices due to the premiums associated with domestic production and decreased supply for procurement. In light of these changes, the time is now for procurement offices to reevaluate their strategies as the conventional closed bid procurement process falls short in optimizing results for agencies. To address this, A&M has introduced a three-part series that delves into the application of game theory to government procurement.

Starting with ***A New Paradigm for Public Sector Procurement with Vickrey Second Price Acquisitions***, we dismantle the limitations of traditional closed bid acquisition formats and unveil the innovative potential of the Vickrey second price format to slash bid prices. In our second installment, ***The Power of Proposal Reduction with Combinatorial Clock Acquisitions***, we explore the innovative use of Combinatorial Clock Acquisitions (CCAs), showcasing their unparalleled ability to streamline government procurement processes and amplify efficiency. Culminating the series, ***Hidden Bias: Rate Discounting and Its Distorting Effect on Contract Award Equity*** offers a critical examination of the subtle interplay between game theory and behavioral decision-making, revealing the hidden cognitive biases that are inadvertently tilting the scales in government contract awards.

This series aims to equip procurement officers with innovative strategies to navigate this new terrain with a promise of curbing costs and amplifying contract allocation efficiency, providing agencies with a robust tool for stretching their budgets and ensuring they receive the greatest value for their investments.

Hidden Bias: Rate Discounting and Its Distorting Effect on Contract Award Equity

Estimated Time to Read: 6-8 minutes

From Game Theory to Behavioral Biases

The focus of the prior pair of articles in this series has been on empowering procurement professionals to apply game theory as a tool to navigate the cost challenges inherent in the Build America, Buy America Act. In ***A New Paradigm for Public Sector Procurement with Vickrey Second Price Acquisitions***, the limitations to conventional closed bid acquisitions were highlighted with scenarios to utilize the Vickrey second price format. Within ***The Power of Proposal Reduction with Combinatorial Clock Acquisitions***, instances were identified for governments to capitalize on bundling contracts with combinatorial clock acquisitions.

The three-part series concludes at the intersection of behavioral decision-making and game theory, focusing on cognitive biases in the government's procurement of products. While conventional game theory relies on rationality, incorporating behavioral decision-making uncovers the biases in procurement officers choices—particularly those psychological influences affecting contract choices (behavioral decision-making) amid circumstances shaped by firms' strategies (game theory). Through this process, it becomes evident that the **government has introduced unintended bias into the award process** of source selection as it pursued price transparency.

Anchoring and Framing Dynamics

In federal government contracting, government-wide contract vehicles such as Solutions for Enterprise-Wide Procurement (NASA SEWP) and General Services Administration (GSA) schedules serve as contractor price catalogs and are commonly used alongside discounts in proposals. This appears standard. However, the government unknowingly introduced two psychological challenges:

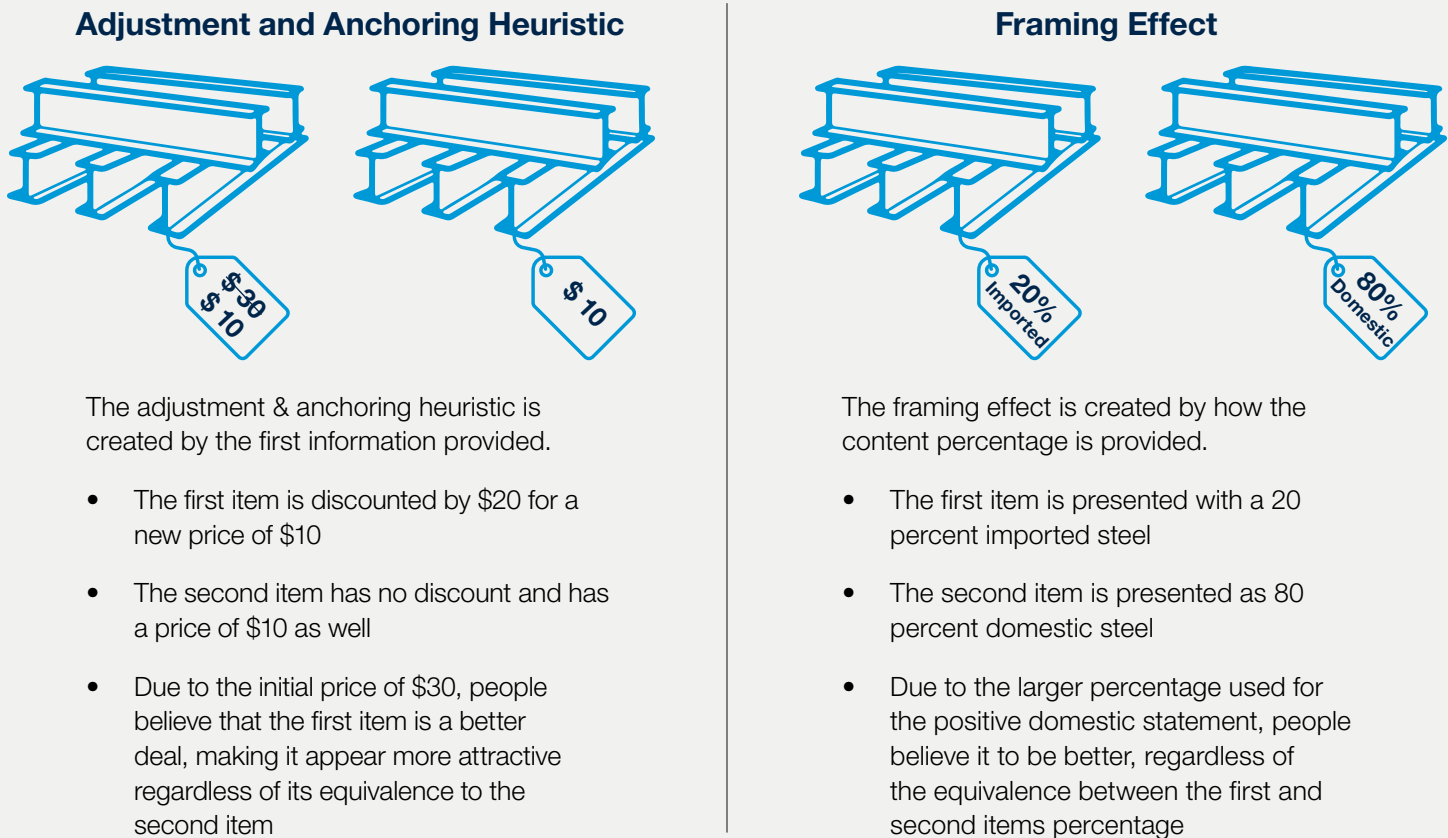
- Adjustment and anchoring heuristic: This occurs when individuals rely too heavily on the first piece of information they receive (the "anchor") while making decisions, irrespective of whether that information is irrelevant.ⁱⁱⁱ
- Framing effect: A cognitive bias where people's decisions are influenced by how information is presented or framed.

In the government's process of evaluation and source selection, the anchoring and framing dynamic yields a distorting effect. **A high-priced rate card for products sets an "anchor"**, analogous to initiating a negotiation with a high opening bid. Contractors effectively initiate opening bids via their rate card prior to submitting a proposal, anchoring the government's perception.^{iv} This leads to subconscious comparisons of future bids against the initial rates for the products, making subsequent bids appear more reasonable and attractive by comparison.

The government's **discount rate request establishes the frame**. Contractors discount product prices in proposals, emphasizing the **difference between the initial price and the final, discounted product price**. Larger discounts provide these contractors with a more pronounced advantage in bids, shifting focus from absolute cost of the proposal to perceived savings. The strength of this framing effect is heightened when: 1) language stresses significant savings, and 2) greater discounts are applied in response to the government's request.

Figure 1 offers simplified examples that, although abridged, represent each bias in the evaluation process.

Figure 1 - Psychological Challenges Examples



Considerable research has explored the origin of these biases. Anchoring bias might relate to the primacy effect, where people remember things they saw first more than what came later.⁹ For proposals, when we first encounter a rate card price and it's notably higher than later prices, we're more inclined to purchase.

Ramifications From Unintended Outcomes

These psychological influences can lead to selecting a contract that is objectively more expensive yet doesn't offer additional value. I do not advocate for exclusively choosing the lowest bids. The goal is to identify the unintended bias caused by emphasizing discounts from rate cards, regardless of the contract's price.

Discussion about this topic raises the question whether **contractors exploit this process** to manipulate the government's perception, thereby eliciting ethical concerns. Though it is possible, it is unlikely. A rate card functions as an upper price cap, and (rational) companies must include all assumptions to mitigate business risks. Furthermore, many proposals mandate discount transparency. Contractors are ensuring compliance, not creating bias.

Have certain groups experienced a **disproportionate impact in contract selection** due to bias? It is challenging to pinpoint one cluster adversely affected, but contractors with lower rate cards have a greater chance, such as small businesses with low costs that defined rates with limited flexibility. To counter this, the government should reform policy to remove processes vulnerable to bias. One approach includes forbidding any reference to discounts or original rates, so contracts exclusively present the bid price.



Converging Strategies in Government Procurement

It has been over a year since the Build America, Buy America Act. This legislation necessitates a shift towards domestic sourcing, which could potentially result in higher costs passed onto the government, especially as the supply sources decrease. There is a critical need now for government procurement professionals to adopt innovative strategies, leveraging the principles of game theory to ensure cost-effectiveness while understanding behavioral decision making to eliminate unintentional biases that leads to higher-priced products. Traditional closed first-price acquisition formats are not always optimal for government procurement, as bidders are less likely to bid their true value, costing the government. Combinatorial Clock and Vickrey formats enhance transparency and increase competition and accurate pricing, offering material savings for the government. Factoring in behavioral decision-making removes unintended bias for improved contract allocation. However, these formats are not universally suitable, as procurement success depends on the design, participants, and nature of the products. Furthermore, this does not diminish the importance of traditional closed bid formats, as they remain ideal for specialized product procurement. Additionally, participants' rationality remains an impediment to any format, requiring greater thought into the factors influencing bidders' decision-making. Therefore, careful considerations are required prior to implementing any acquisition-based procurement process.

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