

# *Auction Design Influences Efficiency: California's Consignment Mechanism in Perspective*

BY NOAH C. DORMADY

In our modern economy, auctions are used as a market allocation mechanism to price all manner of commodities. From energy to telecommunications spectrum, from consumer products to treasuries, the benefits of auctions touch on numerous facets of our everyday lives.

Unfortunately, there exists a commonplace assumption among many—particularly among policymakers and regulators—that simply because an auction was held and that a nonzero sum of bidders participated, that the auction results are “efficient.” These policymakers and regulators are placed in the unfortunate position of defending auction-determined allocations and prices because, in many cases, they are called upon to certify the results of the auctions as “competitive.”

However, it has been known for millennia—yes millennia—that the rules and structure of an auction can greatly affect its efficiency. A little history seems appropriate. Oxford University historian Robin Lane Fox chronicles the use of auctions in the ancient world, as far back as the Ptolemies and into ancient Rome.<sup>1</sup> In the absence of a centralized tax system like the Internal Revenue Service, rulers would engage in the practice of ‘tax farming.’ Auctions would be used whereby the collection of a particular tax (say a tax on salt) was bid for in advance by contractors. This system was preferred by rulers who sought the assurance of predictable state revenue. Winning the auction gave the contractor the legitimate coercive power of the state, giving them legitimacy in collecting taxes far exceeding the bid-for sum. With these powers, they could extract revenues from provincials with brutality. This practice gave rise to the first use of the phrase “shaking them down” several years later when this practice was continued into Imperial Rome.<sup>2</sup> The auctions were so fiercely competitive that contractors eventually pooled their financial resources to improve their bidding position, forming what was called a ‘corpus,’ and from them the inception of the modern corporation.

The finding that the design of a market mechanism can influence the market’s price and overall market behavior is hardly novel among economists today. From slight modifications of bidding procedures to outright auction format changes, mechanism adjustments can greatly influence the market price. This is an important fact to highlight for policymakers who would argue that simply because an auction was held, the market allocation is efficient. Efficiency should not be considered in relativistic terms—an efficient allocation should be independent of the auction format. This principle is indelibly highlighted

by contrasting the auction mechanisms in two regional U.S. carbon auctions.

Carbon markets, also known as cap-and-trade programs, play an important role in influencing electricity markets. Indeed, one of the intended goals behind implementing carbon markets to begin with, was that they would effectively “put a price on carbon” that would influence fuel diversity. Like electricity markets, carbon markets utilize an auction mechanism for price determination.

In the northeastern U.S., the Regional Greenhouse Gas Initiative (RGGI) operates a multi-state carbon market whereby an auction is used to allocate carbon permits/allowances to the electric generation sector. In California (and in recent years joined by Quebec) the Assembly Bill 32 cap-and-trade program operates in much the same way. However, there is one critical difference in the rules of the auction between these two systems. Whereas both auctions utilize a uniform-price auction format, only California utilizes a consignment mechanism for revenue recovery.

What is consignment? A variation of the old Hahn-Noll revenue-neutral auction design,<sup>3</sup> the consignment mechanism returns the revenues from the auction back to the bidders for a small subset of bidders. In California, electric distribution utilities are pre-allocated a quantity of emissions allowances and then are required to consign, or sell, them into the auction. They then receive the revenues obtained from the sale of those allowances, which they are then required to use for the broadly-defined purpose of benefitting their ratepayers. Other bidders in the auction, such as wholesale generation firms or petroleum refiners, etc., do not obtain such an allocation. Without conducting much analysis, it should be clear to a reasonable person—all caveats aside—that one’s incentive in bidding in an auction might be distorted if one receives the revenues from that auction. It only makes sense. However, policymakers, particularly in California, hotly dispute this commonsense point.

Recently published research highlights how significant the auction price and allocation quantities can be between these two auction styles. In our recent paper,<sup>4</sup> my co-author PJ Healy (Ohio State Department of Economics) and I design a laboratory experiment to test the influence of the consignment mechanism. We design a four-treatment experiment that includes variation in producers (e.g., fuel types), variation in underlying energy demand, and with it, demand for

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See footnotes at end of text.

allowances. We also varied the mix of which generation types were consigning.

The results of the experiments are quite interesting—though they simply confirm the above controversial point that one who receives revenue from an auction will behave differently as a bidder than one who does not. The experimental results find that auction bidding behavior significantly affects the auction clearing price, price and quantity bids, and results in more frequent occurrences of bidders not receiving a sufficient quantity of allowances in the auction necessary for program compliance. In other words, the misallocation problem not only distorts bidding behavior and auction prices—it can also force some firms onto the secondary market to acquire allowances they need to comply with the underlying regulators.

The underlying mechanism for these distortions, the paper finds, are due entirely to the nature of consignment allocation. If the consigning bidders are consigning a share of allowances that exceed the quantity of allowances they themselves need to acquire for program compliance, this makes them ‘net sellers.’ If, on the other hand, the consigning bidders are consigning a share of allowances that is exceeded by the quantity of allowances they themselves need to acquire, this makes them ‘net buyers.’ The results of the experiments confirm that net sellers manipulate their bids to inflate the auction price, and that net buyers bid in a manner consistent with a standard uniform-price auction without consignment. In other words, the auction is distorted by bid manipulations of those bidders receiving a rent from the auction.

Further research from non-experimental bidding and auction data is needed to confirm the obvious conclusion identified in the laboratory. However, it should be noted that carbon markets vigorously defend

the propriety of their auction participant’s bidding information and deny all public records requests on the grounds of trade secrets protections. Internal auditors and market monitors should consider ex-post evaluation protocols for assessing the efficiency of auctions, paying careful attention to the behavior of net sellers.

This begs an obvious public policy question. What motivated the regulators of California’s cap-and-trade program, the California Air Resources Board, to pursue such an auction mechanism? One could speculate that it was a necessary carve out to obtain stakeholder approval from the three investor-owned utilities, and those utilities likely argued before the Board, and likely vigorously lobbied, for the use of consignment on the grounds that it would provide protections to consumers. Today, many households in California receive a line-item rebate on their electric bills whereby some of these consignment funds are returned to them. The ultimate question for households is then obvious—given that the carbon price influences the wholesale electric price, does the rebate they receive cancel out the adverse effects of the higher carbon price? Further analysis of the welfare implications of consignment should be pursued.

## Footnotes

<sup>1</sup> Fox, R.L. 2006. *The classical world: An epic history from Homer to Hadrian*. New York: Basic Books.

<sup>2</sup> *Ibid*, at pp. 490.

<sup>3</sup> Hahn, R.W., Noll, R.G., 1983. Barriers to implementing tradable air pollution permits: Problems of regulatory interactions. *Yale J. Regul.* 1, 63–91.

<sup>4</sup> Dormady, N., Healy, P. 2019. The consignment mechanism in carbon markets: A laboratory investigation. *J. Commodity Markets*, forthcoming.

Michael Lynch - continued from page 10

## Lessons of an Oil Market Analyst (and the value of an IAEE membership)

### Footnotes

<sup>1</sup> Romm, Joseph, “Michael Lynch, Wrong on Oil Prices for Over a Decade, is Wrong About Peak Oil,” [https://www.huffpost.com/entry/michael-lynch-who-predict\\_b\\_269877](https://www.huffpost.com/entry/michael-lynch-who-predict_b_269877)

<sup>2</sup> Carter, James, “Address to the Nation,” April 18, 1977. <https://millercenter.org/the-presidency/presidential-speeches/april-18-1977-address-nation-energy>

<sup>3</sup> Simon, Herbert, “Theories of Bounded Rationality,” in McGuire and Radner, eds., *Decision and Organization*, North-Holland, 1972.

<sup>4</sup> Solow, Robert “The economics of resources or the resources of economics?” In: *American Economic Review Proceedings*, 1974

<sup>5</sup> Barnett, Harold J. and Chandler Morse, *Scarcity and Growth: The Economics of Natural Resource Availability, Resources for the Future Press*, 1963.

<sup>6</sup> See especially Adelman, M. A., “Mineral Depletion Theory with Special Reference to Petroleum.” In: *Journal of Economics and Statistics*, 1990. Also, Watkins, Campbell, “The Hotelling Principle: Autobahn or Cul de Sac.” In: *The Energy Journal*, 1992. Gordon, Richard L., “Hicks, Hayek, Hotelling, Hubbert, and Hysteria or Energy, Exhaustion, Environmentalism, and Etatism in the 21st Century,” In: *The Energy Journal*, 2009.

<sup>7</sup> Slade, Margaret E. and Henry Thille, “Whither Hotelling: Tests of the Theory of Exhaustible Resources,” in *Annual Review of Resource Economics*, volume 1, 2009, p. 252.

<sup>8</sup> Adelman, M. A., “The Competitive Floor to World Oil Prices,” *The Energy Journal*, 1986.

<sup>9</sup> Lynch, Michael C., “An Omitted Variable in OECD Supply Forecasting,” delivered to the 12th Annual North American Conference, International Association of Energy Economics, Ottawa Canada, October 1990.