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Structural oversupply and credibility in California's carbon market

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ABSTRACT

For several years, California's carbon market has cleared just above a quarterly auction price floor. Following an anemic February 2016 auction, however, secondary market prices fell below the price floor. At the May auction, 90% of available allowances went unsold—$880 million worth, if valued at the price floor. These developments suggest that a combination of allowance oversupply and uncertainty over post-2020 climate policy has destabilized the market.

1. Introduction

At first glance, California's carbon market might appear to be the engine of the most progressive climate mitigation policy system in the United States. By the market regulator's own estimates, however, the market plays a much smaller role: emission reductions reported in the carbon market are expected to deliver less than one-third of the state's total mitigation efforts. Nevertheless, revenue from the carbon market plays a critical role in the political economy of California's ambitious climate mitigation goals. But recent events indicate that the stability of the market—and the revenue it was expected to generate—is no longer assured, especially without a credible plan for the market's post-2020 future. Here, we review the recent performance of the market during a period of rapid transformation that has critical implications for the future of state energy and climate policy.

The California Air Resources Board (CARB) is responsible for implementing AB 32, the Global Warming Solutions Act of 2006, which established a statewide target of reducing greenhouse gas emissions to their 1990 levels by 2020.[1] Although AB 32 authorized the use of market-based policy measures—including a carbon market that now covers approximately 85% of state emissions—CARB ultimately selected a broad portfolio of traditional regulatory instruments and sector-specific policies.[2]

In state policy conversations, non-cap-and-trade instruments are collectively known as *complementary policies* or *complementary measures*, suggesting they exist to support the carbon market's implementation.[3] These labels are somewhat confusing, however, because complementary policies dominate California's current mitigation policy portfolio. Their prominence is articulated in the 2008 Scoping Plan, which laid out CARB's initial public vision for achieving the state's 2020 climate target. The 2008 Scoping Plan estimated that complementary measures would account for 80% of the mitigation necessary to reduce emissions to 1990 levels, while cap-and-trade would only drive the remaining 20%[4]—a share subsequently estimated at 29% in the 2014 Scoping Plan Update.[5] As a result of these design choices, the carbon market's role in

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[1] Cal. Health & Safety Code § 38550 (requiring CARB to establish a 2020 emissions limit at least as strict as the state's 1990 emissions level); California Air Resources Board, Climate Change Scoping Plan: A Framework for Change (December 2008) (establishing the 2020 emissions limit at 1990 levels), *available at* http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm.

[2] Michael Wara, California's energy and climate policy: A full plate, but perhaps not a model policy. *Bulletin of the Atomic Scientists* 70(5): 26–34 (2014).

[3] Some complementary policies are also market-based instruments. For example, the Low Carbon Fuel Standard (LCFS) is an emissions trading program that applies to the emissions intensity of transportation fuels sold in California (on a gCO_2e/MJ fuel basis). Other complementary policies harness market powers in ways that are not strictly regulatory in nature. For example, the Renewable Portfolio Standard (RPS) imposes obligations on investor-owned utilities to deliver a certain percentage of the energy from qualified renewable energy resources, but leaves the ultimate mixture and contracting up to the judgment of these private utilities and their counterparties.

[4] California Air Resources Board, *supra* note 1 at 17.

[5] California Air Resources Board, First Update to the Climate Change Scoping Plan: Building on the Framework 1, 93 (May 2014) *available at* http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm.

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driving climate mitigation and ensuring the economic efficiency across sectors is far less significant than at first it might appear.

A second wave of policy reforms further weakened the market's contribution to overall greenhouse gas mitigation.[6] Just before its initial auction of allowances in mid-November 2012, CARB released a guidance document clarifying its enforcement of cross-border electricity transaction regulations in the carbon market. This document enumerated a number of "safe harbor" exceptions to the regulatory prohibition on resource shuffling, a practice whereby electricity importers preferentially swap out higher-emitting resources and replace them with lower-emitting resources. Resource shuffling leads to emissions leakage because the apparent reduction reported within the carbon market is matched by an equally sized increase in out-of-state emissions liability—and no net change in emissions to the atmosphere.

By the time CARB approved formal regulations codifying its permissive approach to resource shuffling in April 2014,[7] it was clear that California utilities were divesting long-term legacy contracts with out-of-state coal-fired power plants.[8] Coal contract divestment led to significant leakage, despite AB 32's requirement to the contrary.[9] CARB's reforms also enabled other types of resource shuffling trades—including certain kinds of market-clearing transactions in the wholesale electricity market (CAISO) and bilateral contracts—though the biggest source of leakage was projected to come from coal divestment.[10]

Perhaps the best analysis of anticipated carbon market dynamics came from CARB's own economic advisers, known as the Market Simulation Group and comprised of academic economists from UC Berkeley, UC Davis, and Stanford.[11] The MSG economists estimated that resource shuffling would enable regulated parties to avoid a significant amount of carbon liability, reducing demand for allowances.[12] They concluded that the most likely market outcome was a persistent condition in which the supply of compliance instruments (including both allowances and CARB-approved carbon offset credits) would exceed market demand.[13]

In previous emissions trading systems—such as the European Union's Emission Trading System (EU ETS)—oversupply famously led to price crashes. California policymakers hoped to avoid this outcome. Many believed this would be possible because the state's allowance auction has a price floor ($10/tCO$_2$e, rising at CPI plus 5% per year), below which the state will not sell allowances.[14] And indeed, for several years after the resource shuffling reforms, both the allowance auctions and secondary trading prices followed predictable patterns, resting either at or slightly above the auction price floor (Fig. 1).

Beginning in early 2016, however, the market began to change. For the first time since the market's launch, the Q1 2016 auction in February failed to sell out of all available current year allowances, although 95% of available allowances were purchased. Since then, secondary market prices fell below the auction price floor. More dramatically yet, the Q2 2016 auction sold only 10% of available allowances. We review these remarkable developments and place them in the context of post-2020 climate and energy policy discussions underway in California.

2. Data and methods

We review the history of allowance auctions and secondary market trading data to provide a quantitative context for recent market developments. Our analysis relies on three sources of data. Carbon market compliance instruments include allowances and carbon offsets, both of which are denominated in metric tons of carbon dioxide equivalent (tCO$_2$e).[15] Primary allowance auction data comes directly from CARB's quarterly auction reports.[16] Carbon offset credit data also come directly from CARB.[18] Secondary market trading data (for current year vintage trading only) comes from ICE, Inc.,[17] via the Climate Policy Initiative's California Carbon Dashboard.[19]

Allowance auctions are conducted on a quarterly basis and offer two different allowance vintages: a current-year vintage and a future-year vintage (three years forward). CARB allows banking and borrowing of allowances, such that the current and future year vintages are essentially equivalent from a compliance perspective.[20]

One methodological limitation is that our secondary market trading data is not comprehensive. Secondary market trading occurs over exchanges, such as ICE, and also via bilateral, over-the-counter transactions. Although the dynamics reported on ICE should be representative of overall market trends, to the extent secondary market trading behavior outside ICE departs from the patterns observed within ICE, our secondary market analysis will fail to capture these developments.

[6] For full details and a citations to all regulatory developments, see Danny Cullenward, How California's carbon market actually works. *Bulletin of the Atomic Scientists* 70 (5): 35–44 (2014).

[7] Cal. Code Regs. tit. 17, § 95852(b)(2)(A) (codifying CARB's resource shuffling safe harbors, which are exempted by definition from the prohibition on resource shuffling).

[8] Danny Cullenward, Leakage in California's Carbon Market. *The Electricity Journal* 27(9): 36–48 (2014).

[9] Cal. Health & Safety Code § 38562(b)(8) (requiring CARB's regulations to "minimize leakage").

[10] Danny Cullenward & David Weiskopf, Resource Shuffling and the California Carbon Market. Stanford Law School ENRLP Working Paper 1, 19–26 (July 2013), *available at* https://law.stanford.edu/publications/resource-shuffling-and-the-california-carbon-market/.

[11] Severin Borenstein, James Bushnell, Frank A. Wolak, and Matthew Zarazoga-Watkins, Report of the Market Simulation Group on Competitive Supply/Demand Balance in the California Allowance Market and the Potential for Market Manipulation (June 2014), *available at* http://www.arb.ca.gov/cc/capandtrade/simulationgroup/simulationgroup.htm.

[12] *Id*. at 17 (Fig. 1) (indicating a significant supply of "reshuffling" in the carbon market).

[13] *Id*. at 3 (finding that the most likely 2020 market price will be very close to the auction reserve price floor.). Although the MSG report concluded that the market was most likely to reach equilibrium at the auction price floor, the authors were particularly concerned with the relatively low chance but high consequence scenario in which demand far outpaced supply. This could lead to politically unsustainable market prices because the market lacks a firm price ceiling. *Id*. at 18 (Fig. 2) (presenting a stylized probability density function describing the likelihood of various market outcomes).

[14] Cal. Code Regs. tit. 17, § 95911(c).

[15] Cal. Code Regs. tit. 17, § 95802(a)(69). CARB and most stakeholders discuss emissions in CO$_2$e terms without identifying the global warming potentials (GWPs) used to convert non-CO$_2$ gases into their CO$_2$-equivalents. In the carbon market, CARB uses 100-year GWPs drawn from the IPCC's Second Assessment Report. *Id*. at § 95802(a)(56) (citing Cal. Code Regs. tit. 17, § 95102(a)); *id*. at § 95102(a)(66) (defining CO$_2$e by reference to GWPs listed in Table A-1 to 40 C.F.R. Part 98); 40 C.F.R. Part 98, Table A-1 (listing 100-year GWPs from the IPCC Second Assessment Report). GWPs are most relevant in the context of carbon offset protocols, several of which reward companies outside the carbon market for reducing methane, a potent but short-lived climate pollutant. In contrast, sectors covered by the carbon market primarily emit carbon dioxide; by definition, CO$_2$ is equivalent to CO$_2$e, obviating the need for GWP conversion.

[16] California Air Resources Board, Auction and Reserve Sale Information, http://www.arb.ca.gov/cc/capandtrade/auction/auction.htm.

[18] Intercontinental Exchange, Inc., Report Center: End of Day Report, ICE Futures U. S. -Energy Division, https://www.theice.com/marketdata/reports/142.

[17] California Air Resources Board, Compliance Offset Program, http://www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm.

[19] Climate Policy Initiative, CalCarbonDashboard.org.

[20] Cal. Code Regs. tit. 17, § 95922.