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When Does Regulation Distort Costs? Lessons from Fuel Procurement in US Electricity Generation: Reply†

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The average effect of deregulatory policies on fuel prices at coal-fired power plants is strongly influenced by plants that were initially paying the highest prices for fuel. Primary sources document that these plants were locked into long-term, high-cost fuel contracts, and only secured market rates post-deregulation. While these plants' fuel costs were unusual, their response to deregulation was not: both coal- and gas-fired plants reduce fuel prices one-for-one with the amount they were initially paying above their neighbors' costs. Our understanding of deregulation is not improved by excluding those who stand to benefit most. (*JEL* L51, L71, L94, L98, Q35, Q41, Q48)

Cicala (2015) asks the question, "*When* does regulation distort costs?" The main message of the paper is that the deregulation *can* be a powerful cost-reducing tool, but the opportunity to reduce costs has to exist in order for such reforms to have an impact. In their comment, Han et al. (2021) question one of the results of Cicala (2015) based on the large cost reductions experienced by coal-fired plants owned by Chicagoland's Commonwealth Edison (ComEd).

The first issue regards internal validity: Han et al. (2021) claim that a 1992 contract renegotiation is responsible for the price drops at ComEd plants, so the plants' inclusion biases the average treatment on the treated (ATT) estimate. I show that Han et al.'s narrative regarding the 1992 renegotiation is contradicted by primary source documents. Dropping ComEd plants is effectively removing the very sickest patients who experience the largest benefits from a treatment.

The second issue concerns external validity. If one-half of the ATT for coal is driven by ComEd plants, a policymaker might anticipate smaller impacts from deregulation. I show that both coal- and gas-fired plants reduce their costs essentially one-for-one with the amount they were initially paying above their neighbors' input prices. The difference in overall average effects for coal and gas reflects the fact that there was more fat to cut in coal costs, as described in Cicala (2015). While

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ComEd plants paid unusually high prices for coal before industry restructuring, their response to deregulation was not unusual.

I. Internal Validity of Cicala (2015)

Commonwealth Edison (ComEd) is a large utility with a long history of problematic operations that are closely tied to "Chicago-style politics."[1] This section reviews its troubled history of fuel procurement in the context of Han et al. (2021)'s claim (p. 1368) that "In the absence of deregulation, the decreasing cost trend for ComEd plants would have likely continued as per the renegotiated contract terms in 1992."

A. *Background*

In the mid-1970s, ComEd signed a series of long-term contracts with Peter Kiewit Sons' Inc. and their partners for low-sulfur coal from the Decker and Black Butte mines in Montana and Wyoming. These are referred to collectively as the "Decker" contracts. ComEd was engaged in lawsuits with Decker throughout the 1980s over attempts to reduce purchases of expensive coal. In a final decision in 1987 in US district court, Decker was awarded everything they demanded, plus interest (*Commonwealth Edison Co. v. Decker Coal Co., 653 F. Supp. 841* (N.D. Illinois 1987)).[2] ComEd had no choice but to fulfill its obligations under its contracts, which entailed paying more than twice the market price for coal.

To guide the discussion of ComEd's coal purchases, Figure 1 plots the time series of residualized fuel prices (relative to neighbors, as in Cicala 2015) for the plants that purchased Decker coal.[3] The size of the dots reflect the volume of fuel delivered, and the colors break the history of purchases into four distinct periods. I discuss each period in turn.

B. *Pre-Renegotiation: 1990–1992*

Deliveries from 1990–1992 occurred under the original Decker contracts. These were extremely lucrative for Kiewit and their partners. As a 50 percent partner in both the Decker and Black Butte contracts, Kiewit reported $98 million in earnings on $246 million in mining revenue in 1992 (Kiewit Peter Sons' Inc. 1993). In the *Chicago Tribune*, John N. Maclean[4] reports 43.4 percent gross margins back to at

[1] The state of Illinois and City of Chicago have a long history of demonstrably corrupt arrangements with ComEd. While the *Chicago Tribune* describes the situation in 1991 as "not as bad as it used to be" (John Kass, "Playing Power Games at City Hall," *Chicago Tribune,* July 3, 1991), they are currently embroiled in a scandal for hiring the relatives of politicians for "no-show" jobs in exchange for favorable regulatory treatment. Four executives and consultants, including their CEO, were indicted on federal bribery charges in November 2020.

[2] Han et al. (2021) argue that ComEd's accumulated purchase of reserve coal yet to be mined was a source of leverage in their subsequent negotiations. The ruling is clear that this was not the case: "In short, it [ComEd] obligated itself to pay for coal in the ground but not for its extraction; but if it did not choose to have the coal extracted, it would lose what it had obligated itself to pay for securing the coal interests" (653 F. Supp. 841 (1987)).

[3] Six of ComEd's seven plants were part of the Decker contracts. The seventh was a mine-mouth plant that purchased from its local supplier and experienced more modest cost reductions following divestiture.

[4] See John N. MacLean, "Ratepayers Stand to Gain from Challenge to Edison Coal Costs," *Chicago Tribune,* May 6, 1992.

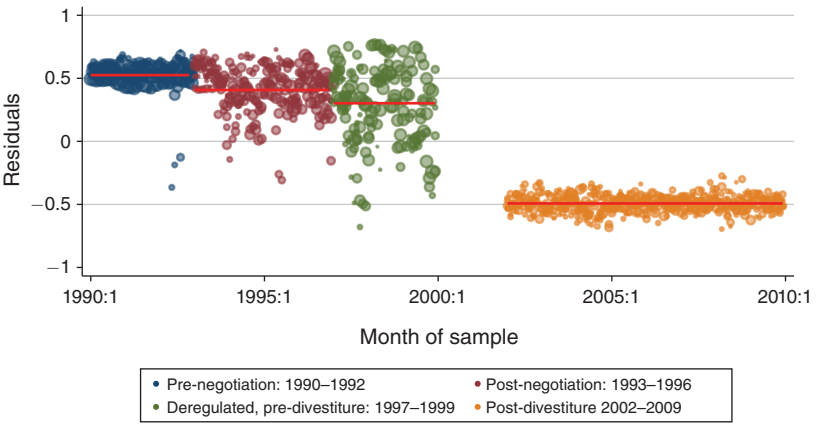

FIGURE 1. RESIDUALIZED COAL PRICES AT COMED PLANTS: FOUR SEPARATE EPISODES

Notes: Plant-month residuals from a match-weighted regression of $\log(price)$ on month and plant fixed effects is shown. Restricted-access post-divestiture data are suppressed, but the average outcome implied by coefficient changes in Han et al. (2021) is represented by the horizontal line. Variance around the mean reflects that of post-divestiture purchases. Marker sizes reflect quantities delivered.

least 1990 as "far higher than the industry average." This corresponds to a markup of 76.7 percent over Decker's mining costs.[5]

C. *Post-Renegotiation: 1993–1996*

Between 1993 and 1996, deliveries were made under the terms of the renegotiated fuel contracts. Without knowing the terms of the renegotiation, Han et al. describe a hypothetical contract structure that would have caused persistently declining fuel prices. Han et al. then include ComEd-specific time trends to account for a decreasing price path "as per the renegotiated contract terms in 1992" (Han et al. 2021, p. 1368).

SEC filings from ComEd's suppliers make clear that the conjectured events that motivate Han et al. (2021)'s treatment of ComEd plants did not occur. Instead, the settlement locked in Kiewit's existing margins for over 100 million tons of coal through 2015, while allowing the suppliers to sell ComEd coal from different mines.[6] In their 1995 SEC 10-K filing, Kiewit reports:

> Since 1993, the amended contract between Commonwealth and Black Butte provides that Commonwealth's delivery commitments will be satisfied, not with coal produced from the Black Butte mine, but with coal purchased from three unaffiliated mines in the Powder River Basin of Wyoming and Decker. The contract amendment allows Black Butte to purchase alternate source coal at a price below its production costs, and

[5] Earnings margin over revenues averages to $m = (p - c)/p$, rearranging as a markup over costs is $(p - c)/c = m/(1 - m)$. When $m = 0.434$, $m/(1 - m) = 0.767$.

[6] Two of the three mines that would provide alternate source coal were owned by Union Pacific Resources Group, Kiewit's partner in the Decker contracts (Union Pacific Resources Group 1997).

> to pass the cost savings through to Commonwealth *while maintaining the profit margins available under the original contract.*

Decker's mining costs were relatively high, and the original contracts required delivery from the uneconomical mines they operated. The potential surplus to be divided between parties in the 1992 renegotiation was the difference between Decker's costs and the costs of alternative suppliers, not the difference between the original contract price and the market price. Decker continued to earn upward of 40 percent on its mining revenues through 1996, with an average price per ton of $24 before delivery charges.[7]

Note, $24/ton is quite different from the $7/ton figure cited by Han et al. (2021), referencing a Department of Interior decision regarding royalty payments (Decker Coal Company. 176 IBLA 277, 2009). What accounts for the difference? ComEd and Decker reported the $7/ton figure to the federal government in an attempt to minimize their royalty payments. It was not the renegotiated price of coal as Han et al. represent. In fact, the source that Han et al. cite is a regulatory decision that describes $7/ton figure as a "sham" (172 IBLA 25). In the conclusion of the case, auditors from the Minerals Management Service (MMS) determined, "ComEd paid a price adjusted for rail transportation rates of between $31.19 and $36.75 per ton of coal during the period 1993–1999" (176 IBLA 281).[8]

Han et al. (2021, p. 1366) quote from ComEd's 1993 SEC 10-K filing, "the Company's western coal contracts and its rail contracts for delivery of the western coal were renegotiated […] to provide, among other things, for significant reductions in the delivered price of the coal over the duration of the contracts." Han et al. (2021) do not include the next sentence in the filing, "However, the renegotiated contracts provide for the purchase of certain coal at prices substantially above currently prevailing market prices and the Company has significant purchase commitments under its contracts."

ComEd's suppliers summarized the renegotiation in their 1993 SEC 10-K as follows: "The Company does not expect that the financial impact of the renegotiation will be material to its mining operations, cash flows, or financial position." The second period of deliveries in Figure 1 indicate deliveries with a modestly lower mean price, but higher dispersion.[9] Delivered prices did not gradually decrease over this period.

D. *Fuel Adjustment Clause Termination: 1997–2000*

Cicala (2015) focuses on divestiture policy because the sale of power plants represented an unambiguous break from regulatory oversight. In the case of ComEd, however, incentives to reduce fuel costs began before their power plants were sold.

[7] From 1993–1996, Kiewit reports an average $94 million in earnings on $226 million in mining revenue and 9.5 million tons per year, with ComEd and Detroit Edison accounting for 80 percent of mining business (Kiewit SEC 10-K filings of respective years). ComEd paid higher prices than Detroit Edison, so these figures understate ComEd's charges somewhat.

[8] The overall average revenue per ton ($24) Decker reports in their SEC 10-K includes deliveries to Detroit Edison, who paid less for their coal.

[9] Because one of the renegotiated terms was that ComEd would buy instead of rent the rail cars that delivered coal, it is unclear how much of the apparent drop in delivered prices comes from ComEd bearing the capital costs of rail cars in lieu of payments to a third party that would otherwise show up as part of the delivered price of fuel.

The Illinois Electric Service Customer Choice and Rate Relief Law of 1997 created the opportunity for large utilities to eliminate their fuel adjustment clauses, effective January 1, 1997 (Sec. 9-220(e)). ComEd exercised this option (Commonwealth Edison Co. 1997), which meant they were able to keep any savings from fuel price reductions after this date. In their first SEC 10-K filing after eliminating fuel adjustments, ComEd emphasized the need pursue "costs control efforts" specifically for areas of operation that could not be passed on to consumers (Commonwealth Edison Co. 1997).

SEC filings describe what these cost control efforts entailed. Following the termination of automatic fuel adjustments, the coal reserves ComEd had already paid for became a stranded asset and wrapped into a "competitive transition charge" that consumers would pay through at least 2006 (Commonwealth Edison Co. 1998). In 1998, ComEd renegotiated with suppliers to accelerate its deliveries of "alternate source coal" (Level 3 Communications Inc. 1998), while in 1999 they agreed to buy out much of their long-term contracts rather than receive delivery (Level 3 Communications Inc. 2000).[10]

These actions preceded divestiture, but were clearly shaped by the new incentives of the 1997 law. What Han et al. characterize as a problematic pretrend from 1997–1999 in Figure 1 is actually deregulation-induced cost reduction. It is unrelated to the 1992 renegotiation.

E. *Post-Divestiture: 2002–2009*

The final period in Figure 1 represents deregulated purchases made by the new owner of the ComEd plants, Midwest Generation. Rather than plot plant-specific deliveries (which are business confidential), I plot simulated purchases drawn from a stationary distribution with the residual mean and variance of actual purchases during this period. There was an abrupt change in fuel prices following divestiture, as the new owners ceased high cost deliveries. This was not predetermined by the 1992 renegotiation: news reports describe the loss of the ComEd contracts at Decker as a "total shock."[11] Terminating Decker Coal deliveries was overwhelmingly the most consequential event for ComEd's fuel prices over the study period: approximately 80 out of the 100 log-point reduction in fuel prices occurred after divestiture.

F. *Bottom Line*

Overall, the picture that emerges is an exemplar of deregulation as a cost-reducing force. As a regulated utility ComEd locked itself into long-term contracts with an uneconomical supplier, marked up by over 75 percent. Decades of purported effort to reduce these costs failed to deliver meaningfully lower prices. A 1992 contract renegotiation allowed ComEd's suppliers to resell coal from lower cost mines while

[10] In 2000, Level 3 (formerly Kiewit Peter) reported, "In December 1999, [ComEd] and the Company renegotiated certain coal contracts whereby [ComEd] is no longer required to take delivery of its coal commitments *but still must pay Level 3 the margins Level 3 would have earned had the coal been delivered.*"

[11] See "Decker Coal Layoffs Higher than Expected," *Associated Press*, December 30, 2002.

maintaining the margins of the original contract. There was no prospect of ComEd paying anything close to market prices for more than two decades.

This rather dismal outlook contrasts sharply with the events following the 1997 restructuring law in Illinois. Once ComEd became the residual claimant of savings, they cream-skimmed from their contracts and bought out significant purchase obligations, passing the cost of the buy-out onto consumers in a separate charge. Instead of continuing to pay well-above market prices through 2015, the new owners of the plants secured market-rate deliveries by 2003. These post-restructuring activities account for about 90 percent of the overall reduction in coal prices that occurred from 1990–2008.

Restructuring policy was therefore extremely impactful at ComEd plants. One cannot arrive at an internally valid estimate of the ATT by selecting on the dependent variable, thereby excluding the most strongly affected units.

II. External Validity of Cicala (2015)

In this section I build on Han et al. (2021)'s examination of plant-specific cost changes to reinforce a key general-interest take-away of Cicala (2015): the impact of deregulation depends on potential cost reductions. There should be relatively little change for plants that were already paying competitive prices while regulated, while the savings should be larger for plants that were initially overpaying for fuel. The overall average impact of deregulation on costs is then a combination of the extent to which costs were too high, and the ability of deregulation to achieve reductions. Modeling heterogeneity in this manner, I show that while ComEd plants were paying unusually high prices when regulated, their response to deregulation was not unusual.

The matched difference-in-difference methods of Cicala (2015) are well suited to such an exercise because of the built-in comparison between individual treated plants and their regulated neighbors. The average treatment on the treated can be constructed by aggregating over the plant-specific estimates ($\hat{\tau}_i$) from separate difference-in-difference regressions for each treated plant with its respective matches. The plant-level differences at baseline between treatment and matched-controls provides a proxy for potential savings: a plant that is paying 20 percent more for the same fuel as its neighbors is better positioned to realize savings than a plant that started out already paying 20 percent less.[12]

Figure 2 presents these comparisons as scatterplots, with each divested plant represented as a point in the figure. The y-axis represents the plant-level estimated impacts of divestiture, $\hat{\tau}_i$ based on DD regressions with matched neighbors. The ATT is the mean value on the y-axis: -0.12 for coal and 0.012 for gas. The dispersion on the y-axis for coal reflects the heterogeneity described in Cicala (2015, p. 432), with the twenty-fifth, fiftieth, and seventy-fifth percentiles at -0.21, -0.09, and 0.02, respectively. The position on the x-axis is the mean difference in fuel prices between divested plants and their respective neighbors from 1990–1996.[13] Plants

[12] Both treatment and control may be overpaying for fuel while regulated, so the comparison with one's neighbors at baseline is less a measure of the efficient frontier than a dimension along which there should be variation in the magnitude of potential savings.

[13] I choose a fixed window instead of using the entire pre-treatment period because divestiture was staggered and the calculation is based on raw differences. Results are qualitatively similar across different baseline periods.

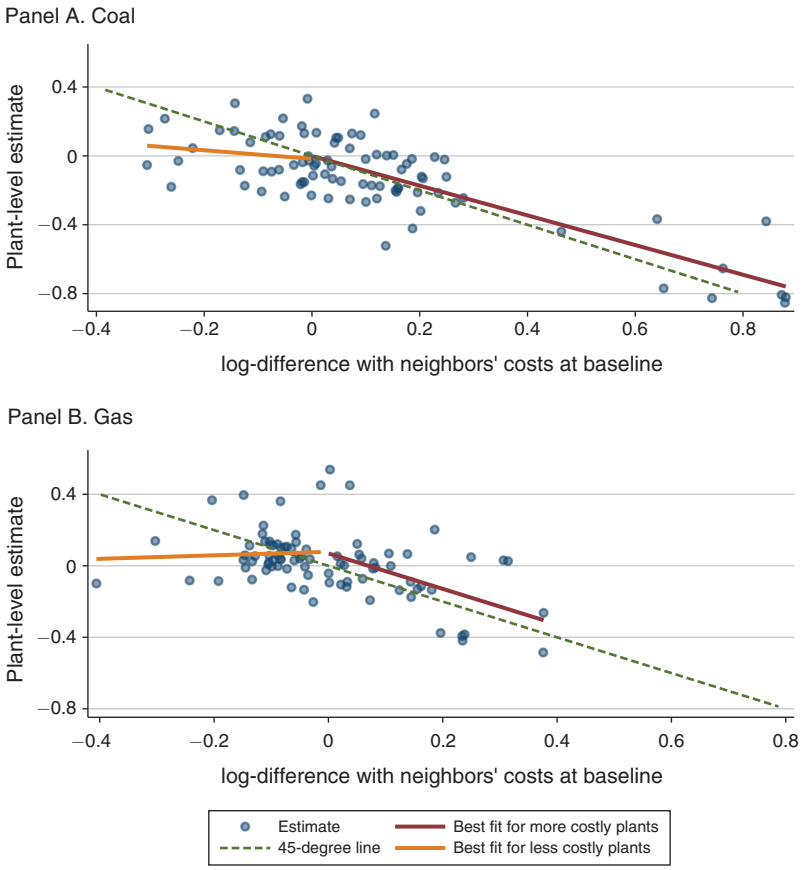

FIGURE 2. PLANT-LEVEL ESTIMATES OF DIVESTITURE AGAINST BASELINE COMPETITIVENESS

to the left of zero were paying less than their neighbors, and those to the right were paying more. The 45-degree lines are presented as a reference to compare estimates with the value that would eliminate baseline differences entirely. To be clear, Cicala (2015) *only* estimates what is plotted on the *y*-axis and does not consider heterogeneity with respect to initial contracting behavior relative to neighbors.

I plot the results for both coal and gas to show the common forces affecting plant-level fuel price changes, while also highlighting the difference in average estimates across fuels. Both coal and gas scatterplots are asymmetric around zero baseline cost difference. The best fit line for plants initially paying more than their neighbors is quite close to the 45-degree line, effectively erasing the gap. In other words, after divestiture prices fall essentially one-for-one with the initial cost gap. This is true for both coal- and gas-fired plants, and is not driven by ComEd. Plants that were initially paying less than their neighbors tend to preserve that position on average instead of reverting up to the 45-degree line.

As Han et al. highlight, six ComEd plants achieve the largest reductions, and correspond to the lowest points according to the *y*-axis of panel A in Figure 2. While these plants stand out for the magnitude of the price change, this response was not actually unusual given how much more they were initially paying relative to their

neighbors. The plant-level estimates for ComEd are all in the neighborhood of the 45-degree line, which is typical of cost-disadvantaged plants.

If both coal- and gas-fired plants respond in a similar manner to divestiture, why does Cicala (2015) report large reductions in coal prices but none for gas? Figure 2 highlights the fact that the overall impact of deregulation depends on how much prospective "fat" there was to cut. The coal-fired plants that became deregulated were initially paying significantly more for fuel than their matched neighbors on average. This was not the case for gas-fired plants. The fact that there were little savings that could be realized at gas-fired plants meant that deregulation had a small impact overall, even if deregulation had a similar, nearly one-for-one impact conditional on the initial extent of cost disadvantage. Removing ComEd's coal-fired plants from the sample does not affect the lesson one should take away from Cicala (2015): deregulatory policy was highly effective at reducing costs that were distorted by cost of service regulation, but not all costs were distorted.

III. Conclusion

Cicala (2015) finds that deregulation was an important, but by no means universal cost-reducing tool for the US electricity industry. While the large impacts in Illinois are specifically mentioned in the original paper, Han et al. (2021) have been able to provide a more granular description, focusing on coal-fired power plants owned by the Chicago-area utility, Commonwealth Edison (ComEd).

Han et al. (2021) question the validity of ComEd's inclusion in the sample because of a 1992 contract renegotiation. Han et al. assume that this renegotiation secured a return to market prices (and eventually below in specifications with trends) without knowing the terms of the agreement. Documentary evidence from both sides of the transaction is very much at odds with this characterization, which details ComEd's commitment to paying far above market rates for the next 23 years. In short, ComEd's plants rapidly transitioned to market price fuel following divestiture in spite of the renegotiation, not because of it. As exemplars of how deregulation can yield cost reduction, these plants play an appropriately large role in the estimated treatment effect. I further show that ComEd plants were not unusual in their response to deregulation, conditional upon the uneconomical nature of their regulated purchases. Gas-fired plants are found to behave similarly, but tended to be in less disadvantaged contracting positions before divestiture. These new results reinforce the findings of Cicala (2015).

REFERENCES

Cicala, Steve. 2015. "Replication Data for: When Does Regulation Distort Costs? Lessons from Fuel Procurement in US Electricity Generation." American Economic Association [publisher]. Inter-university Consortium for Political and Social Research [distributor], October 12, 2019. https://doi.org/10.3886/E112957V1.

Cicala, Steve. 2015. "When Does Regulation Distort Costs? Lessons from Fuel Procurement in US Electricity Generation." *American Economic Review* 105 (1): 411–44.

Cicala, Steve. 2021. Replication Data for: When Does Regulation Distort Costs? Lessons from Fuel Procurement in US Electricity Generation: Reply." American Economic Association [publisher], Inter-university Consortium for Political and Social Research [distributor]. https://doi.org/10.3886/E109622V1.

Commonwealth Edison Co. 1997. "SEC 8-K."
Commonwealth Edison Co. 1998. "SEC 8-K."
Han, Jin Soo, Jean-François Houde, Arthur A. van Benthem, and Jose Miguel Abito. 2021. "When Does Regulation Distort Costs? Lessons from Fuel Procurement in US Electricity Generation: Comment." *American Economic Review* 111 (4): 1356–72.
Interior Board of Land Appeals. 2009. "Decker Coal Company."
Kiewit Peter Sons' Inc. 1993. "SEC 10-K."
Level 3 Communications Inc. 1998. "SEC 10-K."
Level 3 Communications Inc. 2000. "SEC 10-K."
N. D. Illinois. 1987. "Commonwealth Edison Co. v. Decker Coal Co."
Union Pacic Resources Group. 1997. "SEC 10-K Exhibit 10.36."