

# Transmission Integration and the Market for Congestion Revenue Rights: The Case of the Texas Electricity Market

*Gaurav Doshi,<sup>a</sup> and Xiaodong Du<sup>b</sup>*

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This paper looks at the effect of transmission expansion on the market of Congestion Revenue Rights (CRR) in the Texas electricity market. CRRs are financial contracts that enable the holders (e.g., generating companies and retailers) to hedge the risk due to transmission congestion costs in the Day Ahead Market (DAM). CRRs also serve as a financial instrument used for speculative purposes by various market players such as financial traders. Our paper answers the question about how the addition of electricity transmission lines affects the prices of CRR? We also measure how this effect varies across different times of the day and spatial locations? We provide empirical evidence by analyzing the effect of transmission expansion due to Competitive Renewable Energy Zones (CREZ) on the CRR prices at different Times of Use (ToU) and spatial locations.

A brief overview of the analysis and main findings is as follows:

- We conduct a spatial heterogeneity analysis by estimating the effect of transmission expansion for CRRs across different spatial locations. We find that the CREZ induced drop in prices is most pronounced for CRRs associated with West zone. This effect is consistent across Peak Weekday, Peak Weekend, and Off Peak.
- We also find evidence of distributional heterogeneity in the effect of transmission expansion. The decline in prices is primarily driven by CRRs that were historically (prior to CREZ) at third and fourth quintile of CRR price distribution.
- We also discern the differential effects of CREZ on CRR prices across different firm types: generating firms, retailers, and financial traders. Analysis reveals that the drop in prices is largest in magnitude for generators followed by retailers and then by traders. These effects are due to different incentives and strategies adopted by various firms in the Texas electricity market.
- Finally, we find convergence in prices for CRRs between West and other zones which is indicative of increase in efficiency of the CRR market.

The results on price convergence and heterogeneity in the effects of transmission integration are informative about the efficiency of wholesale electricity market. Convergence of CRR prices across different locations limit the ability of market participants to accrue profits from speculative behavior in the CRR market. Several years since CREZ, congestion continues to increase across different zones in the Texas electricity market. Recognizing this, ERCOT has been investing in transmission lines across the state. Our findings shed light on how these investments in transmission capacity would affect the CRR market as well as the strategic behavior of different market participants.

a Corresponding author. Department of Agriculture and Applied Economics, University of Wisconsin Madison, 427 Lorch St., Madison, WI 53706, United States of America. E-mail: gdoshi2@wisc.edu.

b Department of Agriculture and Applied Economics, and Renk Agribusiness Institute, University of Wisconsin Madison. E-mail: xdu23@wisc.edu.