

# Transition to Centralized Unit Commitment: An Econometric Analysis of Colombia's Experience

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## Executive Summary

The electricity market design literature is inconclusive in assessing the merits of a centralized day ahead market where participants submit multipart offers and the dispatch is determined by security constrained MIP based unit commitment optimization vs. a simple self-committed market where dispatch is based on simple linear supply curves for energy. In principle a centralized market has the potential of minimizing production cost given the true supply cost components and technical constraints. However, it has been argued that lack of incentive compatibility in such a centralized approach may lead to strategic behavior by generator who may distort production cost information, thus undermining the efficiency of the dispatch optimization.

This paper attempts to shed light on this issue by an empirical study of data from the Colombian market which in 2009 transitioned from the self-commitment paradigm with dispatch based on linear supply curve offers for energy, to a centralized unit commitment approach where generators offer linear supply function for energy along with startup costs while the commitment and dispatch are determined by the system operator (XM) using MIP based optimization.

The analysis involves the use of econometric methodology that estimates production costs before and after the change as well as production quantities and wholesale prices. The results that are corroborated by descriptive statistics indicate that the transition to centralized dispatch has resulted in productive efficiency gains by decreasing production costs. However, these gains have not translated into wholesale price decreases and in fact wholesale prices have increased after the change in the dispatch approach. These results suggests that the productive efficiency gains have been captured by the suppliers through the exercise of market power. Our results are inconclusive with regard to the impact of the transition on social welfare since, depending on the demand elasticity, the increase in price could have caused a reduction in consumer surplus in excess of the productive efficiency gains.