Policy Reversals in Transitional Markets: The Effect of Changing Marginal Cost to Physical Order Dispatch in the Mexican Power Sector

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1. Motivations underlying the research

The purpose of this research is to analyze the implications of the 2021 Mexican Electric Reform, which proposed a transition from a marginal-cost-based power dispatch system to a command-and-control physical system. This reform aimed to prioritize power generation from the state power company (CFE) over other market competitors. The study was motivated by the need to understand the potential effects of this policy change on the Mexican power sector's generation mix, energy emissions, and market structure.

2. A short account of the research performed

Using the GENeSYS-MOD techno-economic energy model, our research analyzed the impact of the reform considering two main scenarios: Merit Order Dispatch (MOD) and Ownership & Physical Order Dispatch (OPOD). While MOD optimizes the energy sector without changing the merit order, OPOD changes the dispatch from the merit order to the physical delivery dispatch with priority for CFE-owned power plants until 2050. We considered the changes in the generation mix, energy emissions, and market structure of the Mexican power sector.

3. Main conclusions and policy implications of the work

The study's findings reveal a significant shift in Mexico's energy landscape due to the 2021 Mexican Electricity Reform, particularly the transition from marginal-cost-based to command-and-control physical order dispatch. Initially, this shift led to an increase in the share of electricity generation derived from fossil fuels, along with a rise in CO2 emissions. However, as time progressed, this trajectory gradually converged with the MOD scenario. This convergence primarily stemmed from the replacement of old state-owned power plants with renewable facilities. It's important to note that this alignment occurred after the year 2030.

Nonetheless, despite eventual alignment, a critical finding centers on the reduction in renewable energy within the OPOD scenario. This translates to the missed opportunities to harness existing renewable facilities and the consequent upsurge in emissions. These missed opportunities represent untapped renewable energy potential amounting to 189 TWh of capacity. Furthermore, the policy change precipitates a marked increase in emissions. In order to compensate for reduced renewable energy, state-based fossil fuel-based electricity generation experiences a surge, resulting in an additional 188.93 million metric tons of CO2 emissions—an alarming environmental concern.

Another notable outcome pertains to the shifting dynamics of market power. The transition to the OPOD scenario has the potential to significantly bolster CFE's market share, potentially reaching 67% by 2050. This shift in market dynamics carries significant implications for regulatory and competition policies within the sector.

In addition, it is vital to underscore that, despite initial adverse impacts, both scenarios ultimately converge in terms of the generation mix and emissions trajectory after the year 2030. This convergence

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primarily stems from the replacement of outdated and less efficient state-owned power plants with cost-competitive renewable alternatives.

Regarding the policy implications, firstly, it is essential to recognize that while both scenarios ultimately lead to emission reductions over the long term, through the phasing out of polluting facilities in favor of cleaner renewables, there exists an initial missed opportunity in utilizing existing renewable capacity within the first decade in the OPOD scenario. This underscores the imperative for decision-makers to contemplate and implement additional measures to offset this initial setback, should the policy change be implemented. Furthermore, understanding the evolving market dynamics and the expanding market dominance of CFE holds critical importance for shaping regulatory and competition policies within the energy sector. Legal considerations, particularly those related to competition, legal security, and environmental sustainability, warrant further exploration in future research.

In conclusion, the 2021 Mexican Electric Reform's proposal for transitioning to command-and-control physical order dispatch signifies a pivotal juncture in Mexico's energy transition. This policy shift introduces a spectrum of challenges and opportunities within the broader context of evolving energy markets. The research conducted through the application of energy system modeling unveils potential consequences, including initial increases in fossil fuel utilization and CO2 emissions, alongside shifts in market dynamics. In a world increasingly dedicated to combatting climate change, comprehending the far-reaching implications of such policy changes assumes paramount importance. It underscores the necessity for judicious policymaking, informed decision-making by industry stakeholders, and continuous research efforts to adeptly navigate the ever-evolving energy landscape and realize sustainable energy objectives.