

Financial Twins: Adapting Long-term Contract Designs to new Electricity Systems

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Abstract

The energy transition requires investments in low-carbon generation and storage, but risk-averse, private investors face growing, hard-to-hedge risks in incomplete electricity markets. Hybrid market designs that add Capacity Remuneration Mechanisms, Contracts for Difference (CfDs), and other instruments improve risk sharing, but their efficiency in systems with high shares of renewables and storage remains under-quantified. This paper fills this gap by introducing *Financial Twins*: financial contracts that generalise *Financial CfDs* to all assets—including storage and demand—and replicate each asset’s profit stream. We show that a hybrid power market design with one Financial Twin per technology is first-best in a two-stage stochastic equilibrium model with investment and contracting under uncertainty followed by spot trading. In an application to the Spanish market, we rank instruments using Shapley values and find that Financial Twins for generation and demand create more value than those for storage, suggesting policy priority for these technologies.

Keywords Contracts for Difference, Incomplete markets, Stochastic equilibrium, Hybrid Market Design, Risk aversion.

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