Boundary conditions for the numerical pricing of commodity futures

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Abstract

A commodity futures is an agreement to sell or buy a commodity on a specific date and price. These contracts are standardized in terms of maturity date, and their prices are determined by the expectations of future supply and demand conditions. They are traded in financial markets and are important for both commodity producers and consumers, as they allow them to hedge against price volatility and manage price risk. In advance, producers can lock in a price for their products, while consumers can ensure a stable supply of the commodities they need.

Moreover, commodity futures pricing is an essential tool for investors to make decisions. One of the key interests in describing the commodity futures dynamics is to understand better the factors that drive price movements, and develop models to forecast future price trends.

Traders, investors, and other market participants can use these pricing models to make informed decisions about buying and selling contracts. However, accurate pricing of futures contracts requires to solve partial differential equations whose solution is, in general, unknown. In these cases, numerical methods must be used to approximate, efficiently and accurately, the solution of these equations. To this end, in order to discretizate the problem, a bounded domain for the state variables must be considered. Then, one of the main difficulties is to incorporate suitable conditions on the boundaries that arise. However, this is a problem that has been little addressed in the literature of numerical resolution of this type of financial problems; for example, classic conditions such as Neumann or Dirichlet are usually considered (see [2]).

In this work, we investigate the incorporation of new boundary conditions to these particular financial derivatives (in a similar way to [1]), and adapt numerical methods for its pricing. Finally, we perform an empirical application with futures traded on the Commodity Exchange Inc. (COMEX).

References

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