

Cash Dividends and Futures Prices on Discontinuous Filtrations

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ABSTRACT

We derive a general formula for the futures price process without the restriction that the assets used in the future margin account are continuous and of finite variation. To do so, we model tradeable securities with dividends which are not necessarily cash dividends at fixed times or continuously paid dividends. A future contract can then be modelled as an asset which pays dividends but has zero value in itself. We show that the futures price is not necessarily a martingale under the equivalent martingale measure, but that it remains a martingale under a new measure which is closely connected to multiplicative Doob-Meyer decompositions. Our definition of self-financing replication is different from some earlier ones, even for assets that do not pay dividends, and we argue that for discontinuous asset price processes it could be more natural than the usual formulation.

References

- [1] Duffie, D. and R. Stanton (1992). Pricing continuously resettled contingent claims. *Journal of Economic Dynamics and Control* 16, 561–573.
- [2] Jamshidian, F. (2007). The duality of optimal exercise and domineering claims: a Doob-Meyer decomposition approach to the Snell envelope. *Stochastics* 79, 199–218.
- [3] Pozdnyakov, V. and M. Steele (2004). On the martingale framework for futures prices. *Stochastic Processes and Their Applications* 109, 69–77.