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Statistical causality and purely discontinuous local martingales

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ABSTRACT

The statistical concept of causality in continuous time between filtered probability spaces considered in this paper is based on Granger's definition of causality. The given concept of causality can be connected to the purely discontinuous property for martingale and filtration. If M is a purely discontinuous local martingale with respect to purely discontinuous filtration $(\mathcal{G}_t)$, we prove that M will remain purely discontinuous local martingale with respect to an extension $(\mathcal{F}_t)$ of the filtration $(\mathcal{G}_t)$ if and only if $(\mathcal{G}_t)$ is its own cause within $(\mathcal{F}_t)$. Moreover, we give conditions for a natural filtration of the purely discontinuous martingale X_t to be a purely discontinuous filtration, using the property of causality. We also, consider the connection between the concept of statistical causality and the weak predictable representation property for purely discontinuous local martingales.

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