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AUTHOR CORRECTION

Correction to: An Itō Formula in the Space of Tempered Distributions

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The following corrections are required in Theorem 4.7 of [2].

Recall that the following condition is included in the assumptions (see [1, Chapt. 6, Sect. 2]) made on the coefficient $\bar{F}$; for example, there exists $K > 0$ such that

$$\int_{0<|x|<1} |\bar{F}(y,x)|^2\, \nu(\mathrm{d}x) \leq K\,(1+|y|^2),\ \forall y \in \mathbb{R}. \tag{1}$$

Consequently, we have

$$\begin{aligned}&\int_0^t \int_{(0<|x|<1)} |\bar{F}(X_{s-},x)|^2\, \nu(\mathrm{d}x)\mathrm{d}s\\ &\quad\leq \int_0^t K(1+|X_{s-}|^2)\,\mathrm{d}s \leq K\left(1+\sup_{s\in[0,t]}|X_{s-}|^2\right)t,\end{aligned}$$

and hence, we get a.s.

$$\int_0^t \int_{(0<|x|<1)} |\bar{F}(X_{s-},x)|^2\, \nu(\mathrm{d}x)\mathrm{d}s < \infty,\ \forall t \geq 0. \tag{2}$$

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The integrability condition (2) was originally stated as an assumption.

However, we now make a new integrability assumption. a.s.

$$\int_0^t \int_{(0<|x|<1)} |\bar{F}(X_{s-}, x)|^4 \, \nu(\mathrm{d}x)\mathrm{d}s < \infty, \; \forall t \geq 0. \tag{3}$$

Note that, if $\bar{F}$ is bounded, using (2), (3) is satisfied.

Correction to Proof of Theorem 4.7 Equation (4.9) is to be read as

$$\triangle X_t = \bar{F}(X_{t-}, \triangle N_t)\mathbb{1}_{(0<|\triangle N_t|<1)} + \bar{G}(X_{t-}, \triangle N_t)\mathbb{1}_{(|\triangle N_t|\geq 1)}.$$

As such, the first observation mentioned in the article does not hold. However, due to (2), (3) and eq. (4.1), we still get

$$\begin{aligned}
&\sum_{s\leq t}\left[\tau_{X_s}\phi - \tau_{X_{s-}}\phi + \triangle X_s\,\partial\tau_{X_{s-}}\phi\right] \\
&= \int_0^t \int_{(0<|x|<1)} \left(\tau_{\bar{F}(X_{s-},x)} - Id + \bar{F}(X_{s-}, x)\,\partial\right)\tau_{X_{s-}}\phi\,\widetilde{N}(\mathrm{d}s\mathrm{d}x) \\
&+ \int_0^t \int_{(0<|x|<1)} \left(\tau_{\bar{F}(X_{s-},x)} - Id + \bar{F}(X_{s-}, x)\,\partial\right)\tau_{X_{s-}}\phi\,\nu(\mathrm{d}x)\mathrm{d}s \\
&+ \int_0^t \int_{(|x|\geq 1)} \left(\tau_{\bar{G}(X_{s-},x)} - Id + \bar{G}(X_{s-}, x)\,\partial\right)\tau_{X_{s-}}\phi\,N(\mathrm{d}s\mathrm{d}x).
\end{aligned}$$

The proof now can be continued as before. □

References

1. Applebaum, D.: Lévy Processes and Stochastic Calculus, 2nd edn. Cambridge Studies in Advanced Mathematics, vol. 116. Cambridge University Press, Cambridge (2009)
2. Bhar, S.: An Itō formula in the space of tempered distributions. J. Theoret. Probab. **30**(2), 510–528 (2017)