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Research Article

# Pricing and hedging of quanto range accrual notes under Gaussian HJM with cross-currency Levy processes

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## Abstract

This study analyzes the pricing and hedging problems for quanto range accrual notes (RANs) under the Heath-Jarrow-Morton (HJM) framework with Levy processes for instantaneous domestic and foreign forward interest rates. We consider the effects of jump risk on both interest rates and exchange rates in the pricing of the notes. We first derive the pricing formula for quanto double interest rate digital options and quanto contingent payoff options; then we apply the method proposed by Turnbull (*Journal of Derivatives*, 1995, 3, 92–101) to replicate the quanto RAN by a combination of the quanto double interest rate digital options and the quanto contingent payoff options. Using the pricing formulas derived in this study, we obtain the hedging position for each issue of quanto RANs. In addition, by simulation and assuming the jump risk to follow a compound Poisson process, we further analyze the effects of jump risk and exchange rate risk on the coupons receivable in holding a RAN. © 2009 Wiley Periodicals, Inc. Jrl Fut Mark 29:973–998, 2009

## BIBLIOGRAPHY

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Björk, T., Kabanov, Y., & Runggaldier, W. (1997). Bond market structure in the presence of marked point processes. *Mathematical Finance*, **7**, 211–223.

Web of Science® | Google Scholar

Carr, P., & Madan, D. B. (1999). Option valuation using the fast Fourier transform. *Journal of Computational Finance*, **2**, 61–73.

Google Scholar

Cont, R., & Tankov, P. (2004). *Financial modelling with jump processes*. Boca Raton, FL: CRC Press.

Google Scholar

Das, S. R. (1994). Jump-diffusion processes and the bond markets (working paper). Stern School of Business. New York University.

Google Scholar

Das, S. R. (2002). The surprise element: Jumps in interest rates. *Journal of Econometrics*, **106**, 27–65.

Web of Science® | Google Scholar

Driessen, J., Klaassen, P., & Melenberg, B. (2000). The performance of multi-factor term structure models for pricing and hedging caps and swaptions (working paper). Tilburg University.

Google Scholar

Dwyer, G. P., & Hafer, R. W. (1989). Interest rates and economic announcements. Technical report, Federal Reserve Bank of St. Louis.

Google Scholar

Eberlein, E., & Kluge, W. (2006). Valuation of floating range notes in Levy term-structure models. *Mathematical Finance*, **16**, 237–254.

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Eberlein, E., & Raible, S. (1999). Term structure models driven by general Levy processes. *Mathematical Finance*, **9**, 31–53.

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Glasserman, P., & Kou, S. G. (2003). The term structure of simple forward rates with jump risk. *Mathematical Finance*, **13**, 383–410.

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Hardouvelis, G. A. (1988). Economic news, exchange rates and interest rates. *Journal of International Money and Finance*, **7**, 23–35.

Web of Science® | Google Scholar

Heston, S. L. (1995). A model of discontinuous interest rate behaviour, yield curves and volatility (working paper). University of Maryland.

Google Scholar

Huang, S. C., & Hung, M. W. (2005). Pricing foreign equity options under Levy processes. *The Journal of Futures Markets*, **25**, 917–944.

Web of Science® | Google Scholar

Jarrow, R. A., & Turnbull, S. M. (1994). Delta, gamma and bucket hedging of interest rate derivatives. *Applied Mathematical Finance*, **1**, 21–48.

Google Scholar

Koval, N. (2005). Time-inhomogeneous Lévy processes in cross-currency market models. Dissertation, Universität Freiburg.

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Navatte, P., & Quittard-Pinon, F. (1999). The valuation of interest rate digital options and range notes revisited. *European Financial Management*, **5**, 425–440.

Google Scholar

Nunes, J. P. V. (2004). Multifactor valuation of floating range notes. *Mathematical Finance*, **14**, 79–97.

Web of Science® | Google Scholar

Raible, S. (2000). Lévy processes in finance: Theory, numerics, and empirical Facts. Dissertation, Universität Freiburg.

Google Scholar

Reiner, E. (1992). Quanto mechanics. *Risk*, **5**, 59–63.

Google Scholar

Shirakawa, H. (1991). Interest rate option pricing with Poisson–Gaussian forward rate curve processes. *Mathematical Finance*, **1**, 77–94.

Google Scholar

Turnbull, S. (1995). Interest rate digital options and range notes. *Journal of Derivatives*, **3**, 92–101.

Google Scholar

Vasicek, O. (1977). An equilibrium characterization of the term structure. *Journal of Financial Economics*, **5**, 177–188.

Web of Science® | Google Scholar

Zhang, B. (2006). A new Levy based short rate model for the fixed income market and its estimation with particle filter. Dissertation, University of Maryland.

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