



**Advances in Finance and Stochastics** pp 137–159

## Risk Management for Derivatives in Illiquid Markets: A Simulation Study

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Chapter

**537** Accesses | **30** Citations

### Summary

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In this paper we study the hedging of derivatives in illiquid markets. More specifically we consider a model where the implementation of a hedging strategy affects the price of the underlying security. Following earlier work we characterize perfect hedging strategies by a nonlinear version of the Black-Scholes PDE. The core of the paper consists of a simulation study. We present numerical results on the impact of market illiquidity on hedge cost and Greeks of derivatives.

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illiquid markets

nonlinear Black-Scholes equation

simulation study

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Research of the second author was supported by Credit Suisse Group, Swiss Re and UBS AG through RiskLab, Switzerland and by the Swiss Banking Institute, University of Zurich.

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## References

1. Avellaneda, M., A. Levy, and A. Paras (1995): "Pricing and Hedging Derivative Securities in Markets with Uncertain Volatilities," *Applied Mathematical Finance*, 2, 73–88.

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4. Donaldson, R., and H. Uhlig (1993): “The impact of large portfolio insurers on asset prices,” *Journal of Finance*, 48, 1943–1955.

---

5. El Karoui, N., M. Jeanblanc-Picqué, and S. Shreve (1998): “Robustness of the Black and Scholes Formula,” *Mathematical Finance*, 8, 93–126.

---

6. Embrechts, P., R. Frey, and H. Furrer (2001): “Stochastic Processes in Insurance and Finance,” in *Handbook of Statistics*, ed. by D. Shanbag, and C. Rao, vol. 19, pp. 365–412. North Holland.

---

7. Frey, R. (1998): “Perfect Option Replication for a Large Trader,” *Finance and Stochastics*, 2, 115–148.

---

8. Frey, R. (2000): “Market Illiquidity as a Source of Model Risk in Dynamic Hedging,” in *Model Risk*, ed. by R. Gibson, pp. 125–136. Risk

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10. Frey, R., and A. Stremme (1997): “Market Volatility and Feedback Effects from Dynamic Hedging,” *Mathematical Finance*, 7 (4), 351–374.

---

11. Grossman, S., and Z. Zhou (1996): “Equilibrium Analysis of Portfolio Insurance,” *Journal of Finance*, 51 (4), 1379–1403.

---

12. Holthausen, R. W., and R. Leftwich (1987): “The Effect of Large Block Transactions on Security Prices — A Cross-Sectional Analysis,” *Journal of Financial Economics*, 19, 237–267.

---

13. Jarrow, R. (1994): “Derivative Securities Markets, Market Manipulation and Option Pricing Theory,” *Journal of Financial and Quantitative Analysis*, 29, 241–261.

---

14. Kampovsky, A., and S. Trautmann (2000): “Price impact of Xetra-traders,” Preprint, Department of Economics, University of Mainz.

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---

17. Platen, E., and M. Schweizer (1998): “On feedback effects from hedging derivatives,” *Mathematical Finance*, 8, 67–84.

---

18. Rubinstein, M. (1985): “Nonparametric Tests of Option Pricing Models Using All Reported Trades and Quotes on the 30 Most Active CBOE Option Classes from August 23, 1976 to August 31, 1978,” *Journal of Finance*, 40, 455–480.

---

19. Schönbucher, P., and P. Wilmott (2000): “The feedback-effect of hedging in illiquid markets,” *SIAM Journal of Applied Mathematics*, 61, 232–272.

---

20. Sircar, R., and G. Papanicolaou (1998): “General Black-Scholes Models Accounting for Increased Market Volatility from Hedging Strategies,” *Applied Mathematical Finance*, 5, 45–82.

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### Cite this chapter

Frey, R., Patie, P. (2002). Risk Management for  
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