SPRINGER NATURE Link

Log in

Range Volatility Models and Their Applications in Finance

Chapter

pp 1273–1281 | Cite this chapter



Handbook of Quantitative Finance and Risk Management

Ray Yeutien Chou, Hengchih Chou & Nathan Liu

1631 Accesses 56 Citations

Abstract

There has been a rapid growth of range volatility due to the demand of empirical finance. This paper contains a review of the important development of range volatility, including various range estimators and range-based volatility models. In addition, other alternative models developed recently, such as range-based multivariate volatility models and realized ranges, are also considered here. Finally, this paper provides some relevant financial applications for range volatility.

This is a preview of subscription content, log in via an institution to check access.

Access this chapter

Log in via an institution →

Institutional subscriptions →

Explore related subjects

Discover the latest articles, books and news in related subjects, suggested using machine learning.

Financial Econometrics | Financial Engineering | Mathematics in Business, Economics and Finance | Quantitative Finance | Statistical Finance | Mathematical Finance | Stochastic Volatility Modeling in Financial Markets

Notes

1. See Garman and Klass (1980), Beckers (1983), Ball and Torous (1984), Wiggins (1991), Rogers and Satchell (1991), Kunitomo (1992), Yang and Zhang (2000), Alizadeh et al. (2002), Brandt and Diebold (2006), Brandt and Jones (2006), Chou (2005, 2006), Cheung (2007), Martens and van Dijk (2007), Chou and Wang (2007), Chou et al. (2007), and Chou and Liu (2008a,b).

References

Alizadeh, S., M. Brandt, and F. Diebold. 2002. “Range-based estimation of Stochastic Volatility models.” *Journal of Finance* 57, 1047–1091.

Andersen, T., T. Bollerslev, F. Diebold, and H. Ebens. 2001. “The distribution of realized stock return volatility.” *Journal of Financial Economics* 61, 43–76.

Andersen, T., T. Bollerslev, F. Diebold and P. Labys. 2003. “Modeling and forecasting realized volatility.” *Econometrica* 71, 579–625.

Andersen, T., T. Bollerslev, P. Christoffersen, and F. Diebold. 2006a. “Volatility and correlation forecasting,” in *Handbook of economic forecasting*, G. Elliott, C. W. J. Granger, and A. Timmermann (Eds.). North-Holland, Amsterdam, pp. 778–878.

Andersen, T., T. Bollerslev, P. Christoffersen, and F. Diebold. 2006b. “Practical volatility and correlation modeling for financial market risk management,” in *Risks of financial institutions*, M. Carey, and R. Stulz (Eds.). University of Chicago Press for NBER, Chicago.

Ball, C. and W. Torous. 1984. “The maximum likelihood estimation of security price volatility: theory, evidence, and application to option pricing.” *Journal of Business* 57, 97–112.

Barndorff-Nielsen, O. and N. Shephard. 2003. “How accurate is the asymptotic approximation to the distribution of realised volatility?,” in *Identification and inference for econometric models*, A Festschrift for Tom Rothenberg, D. Andrews, J. Powell, P. Ruud, and J. Stock (Eds.). Econometric Society Monograph Series, Cambridge University Press, Cambridge.

Bauwens, L., S. Laurent, and J. V. K. Rombouts. 2006. “Multivariate GARCH models: a survey.” *Journal of Applied Econometrics* 21, 79–109.

Beckers, S. 1983. “Variances of security price returns based on highest, lowest, and closing prices.” *Journal of Business* 56, 97–112.

Bollerslev, T. 1986. “Generalized autoregressive conditional heteroscedasticity.” *Journal of Econometrics* 31, 307–327.

Bollerslev, T. 1990. “Modeling the coherence in short-run nominal exchange rates: a multivariate generalized ARCH model.” *Review of Economics and*

Statistics 72, 498–505.

Bollerslev, T., R. Y. Chou, and K. Kroner. 1992. “ARCH modeling in finance: a review of the theory and empirical evidence.” *Journal of Econometrics* 52, 5–59.

Brandt, M. and F. Diebold. 2006. “A no-arbitrage approach to range-based estimation of return covariances and correlations.” *Journal of Business* 79, 61–74.

Brandt, M and C. Jones. 2006. “Volatility forecasting with range-based EGARCH models.” *Journal of Business and Economic Statistics* 24, 470–486.

Cappiello L., R. Engle, and K. Sheppard. 2006. “Asymmetric dynamics in the correlations of global equity and bond returns.” *Journal of Financial Econometrics* 4, 537–572.

Cheung, Y. 2007. “An empirical model of daily highs and lows.” International *Journal of Finance and Economics* 12, 1–20.

Chou, R. 2005. “Forecasting financial volatilities with extreme values: the conditional autoregressive range (CARR) model.” *Journal of Money Credit and Banking* 37, 561–82.

Chou, R. 2006. “Modeling the asymmetry of stock movements using price ranges.” *Advances in Econometrics* 20A, 231–257.

Chou, R. Y. and N. Liu. 2008a. *The economic value of volatility timing using a range-based volatility model*, Working paper, Academia Sinica.

Chou, R. Y. and N. Liu. 2008b. *Estimating time-varying hedge ratios with a range-based multivariate volatility model*, Working paper, Academia Sinica.

Chou, H. and D. Wang. 2007. “Forecasting volatility of UK stock market: a test of conditional autoregressive range (CARR) model.” *International Research Journal of Finance and Economics* 10, 7–13.

Chou, R. Y., N. Liu, and C. Wu. 2007. *Forecasting time-varying covariance with a range-based dynamic conditional correlation model*, Working paper, Academia Sinica.

Christensen, K. and M. Podolskij. 2007. “Realized range-based estimation of integrated variance.” *Journal of Econometrics* 141, 323–349.

Christoffersen, P. F. 2002. *Elements of financial risk management, Academic Press*, San Diego.

Corrado, C. and C. Truong. 2007. “Forecasting stock index volatility: comparing implied volatility and the intraday high-low price range.” *Journal of Financial Research* 30, 201–215.

Cox, J. and M. Rubinstein. 1985. *Options markets*, Prentice-Hall, NJ.

Engle, R. F. 1982. “Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation.” *Econometrica* 50, 987–1007.

Engle, R. 2002a. “Dynamic conditional correlation: a simple class of multivariate GARCH models.” *Journal of Business and Economic Statistics* 20, 339–350.

Engle, R. 2002b. “New frontiers for ARCH models.” *Journal of Applied Econometrics* 17, 425–446.

Engle, R., and K. Sheppard. 2001. “Theoretical and empirical properties of dynamic conditional correlation multivariate GARCH.” *NBER Working Paper* 8554.

Fernandes, M., B. Mota, and G. Rocha. 2005. “A multivariate conditional autoregressive range model.” *Economics Letters* 86, 435–440.

Gallant, R., C. Hsu, and G. Tauchen. 1999. “Using daily range data to calibrate volatility diffusions and extracting integrated volatility.” *Review of Economics and Statistics* 81, 617–31.

Garman, M. and M. Klass. 1980. “On the estimation of security price volatilities from historical data.” *Journal of Business* 53, 67–78.

Grammatikos, T. and A. Saunders. 1986. “Futures price variability: a test of maturity and volume effects.” *Journal of Business* 59, 319–330.

Hanke, J. and D. Wichern. 2005. *Business forecasting*, 8th ed., Prentice Hall, New York.

Harvey, A., E. Ruiz, and N. Shephard. 1994. “Multivariate stochastic variance models.” *Review of Economic Studies* 61, 247–264.

Kalev, P. S. and H. N. Duong. 2008. “A test of the Samuelson Hypothesis using realized range.” *Journal of Futures Markets* 28, 680–696.

Kunitomo, N. 1992. “Improving the Parkinson method of estimating security price volatilities.” *Journal of Business* 65, 295–302.

Mandelbrot, B. 1971. “When can price be arbitraged efficiently? A limit to validity

of the random walk and martingale models.” *Review of Economics and Statistics* 53, 225–236.

Martens, M. and D. van Dijk. 2007. “Measuring volatility with the realized range.” *Journal of Econometrics* 138, 181–207.

McAleer, M. and M. Medeiros. 2008. “Realized volatility: a review.” *Econometric Reviews* 27, 10–45.

Nelson, D. 1991. “Conditional heteroskedasticity in asset returns: a new approach.” *Econometrica* 59, 347–370.

Nison, S. 1991. *Japanese candlestick charting techniques*, New York Institute of Finance, New York.

Parkinson, M. 1980. “The extreme value method for estimating the variance of the rate of return.” *Journal of Business* 53, 61–65.

Poon, S. H. and C. W. J. Granger. 2003. “Forecasting volatility in financial markets: a review.” *Journal of Economic Literature* 41, 478–639.

Rogers, L. and S. Satchell. 1991. “Estimating variance from high, low and closing prices.” *Annals of Applied Probability* 1, 504–512.

Rogers, L., S. Satchell, and Y. Yoon. 1994. “Estimating the volatility of stock prices: a comparison of methods that use high and low prices.” *Applied Financial Economics* 4, 241–247.

Shu, J. H. and J. E. Zhang. 2006. “Testing range estimators of historical volatility.” *Journal of Futures Markets* 26, 297–313.

Taylor, S. J. 1986. *Modelling financial time series*, Wiley, Chichester.

West, K. and D. Cho. 1995. “The predictive ability of several models of exchange rate volatility.” *Journal of Econometrics* 69, 367–391.

Wiggins J. 1991. “Empirical tests of the bias and efficiency of the extreme-value variance estimator for common stocks.” *Journal of Business* 64, 417–432.

Yang, D. and Q. Zhang. 2000. “Drift-independent volatility estimation-based on high, low, open, and closing prices.” *Journal of Business* 73, 477–491.

Author information

Authors and Affiliations

Institute of Economics, Academia Sinica, #128, Yen-Jio-Yuan Road, Sec 2, Nankang, Taipei, Taiwan, ROC
Ray Yeutien Chou

Institute of Business Management, National Chiao Tung University, Taipei, Taiwan, ROC
Ray Yeutien Chou

Department of Shipping & Transportation Management, National Taiwan Ocean University, Keelung, Taiwan, ROC
Hengchih Chou

Department of Finance, Feng Chia University, Taichung, Taiwan, ROC
Nathan Liu

Corresponding author

Correspondence to Ray Yeutien Chou.

Editor information

Editors and Affiliations

Department of Finance and Economics, Rutgers University, 94 Rockafeller Road, Janice H. Levin Bldg., New Brunswick, NJ, 08854-8054, USA

Cheng-Few Lee

State Street Corp., Boston, MA, 94132, USA

Alice C. Lee

Center for PBBEF Research, North Brunswick, NJ, USA

John Lee

Rights and permissions

Reprints and permissions

Copyright information

© 2010 Springer Science+Business Media, LLC

About this chapter

Cite this chapter

Chou, R.Y., Chou, H., Liu, N. (2010). Range Volatility Models and Their Applications in Finance. In: Lee, CF., Lee, A.C., Lee, J. (eds) Handbook of Quantitative Finance and Risk Management. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-77117-5_83

.RIS .ENW .BIB

DOI	Publisher Name	Print ISBN
https://doi.org/10.1007/978-0-387-77117-5_83	Springer, Boston, MA	978-0-387-77116-8
Online ISBN	eBook Packages	
978-0-387-77117-5	Business and Economics	
	Economics and Finance (R0)	

Economics and Finance (R0)

Keywords

CARR | DCC | GARCH | High/low range | Realized volatility | Multivariate volatility | Volatility

Publish with us

Policies and ethics

Search

Search by keyword or author

Navigation

Find a journal

Publish with us

Track your research