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Research Article

## Modelling the absolute returns of different stock indices: exploring the forecastability of an alternative measure of risk

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### Abstract

Conventional measures of the risk of a financial asset make use of the *unobserved* (conditional) variance or standard deviation of its return. In this paper, we treat the *observed* absolute return as a measure of risk and explore its forecastability. Two simple models are considered. One is a new *AR-like* model which is applied to the absolute return. The other is an *ARCH-like* model called Asymmetric Power ARCH. The forecastability is evaluated with the average log-likelihood of absolute return, instead of that of return itself. While the absolute return is interpreted as 'volatility', some quantities of its entire distribution, such as the 95th quantiles, can be interpreted as 'volatility of volatility'. We apply both models to three stock indices, namely the Hang Seng Index, the Nikkei 225 Index and the Standard and Poors 500 Index. The new model by and large outperforms the ARCH-like model in both in-sample goodness of fit and post-sample forecastability. It performs exceptionally well in the post-sample period after the outbreak of the Asian financial crisis. Copyright © 2000 John Wiley & Sons, Ltd.

### REFERENCES

Aigner DJ, Amemiya T, Poirier DJ. 1976. On the estimation of production frontiers: maximum likelihood estimation of the parameters of a discontinuous density function. *International Economic Review* 17: 377–396.

[Google Scholar](#)

Andersen TG, Bollerslev T. 1998. Answering the skeptics: yes, standard volatility models do provide accurate forecasts. *International Economic Review* 39: 885–905.

[Web of Science®](#) | [Google Scholar](#)

Bollerslev T, Engle RF, Nelson DB. 1994. ARCH model. In *Handbook of Econometrics, IV*, RF Engle, DC McFadden (eds). Elsevier Science: Amsterdam; 2959–3038.

[Google Scholar](#)

---

Cao CQ, Tsay RS. 1992. Nonlinear time series analysis of stock volatilities. *Journal of Applied Econometrics* 7: S165–S185.

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---

Diebold FX, Gunther TA, Tay AS. 1998. Evaluating density forecasts with applications to financial risk management. *International Economic Review* 39: 863–883.

[Web of Science®](#) | [Google Scholar](#)

---

Ding Z, Granger CWJ, Engle RF. 1993. A long memory property of stock market returns and a new model. *Journal of Empirical Finance* 1: 83–106.

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---

Efron B. 1991. Regression percentiles using asymmetric squared error loss. *Statistica Sinica* 1: 93–126.

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---

Ellis SP. 1998. Instability of least squares, least absolute deviation and least median of squares linear regression (with Comments and Rejoinder). *Statistical Science* 13: 337–350.

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---

Granger CWJ, Ding Z. 1995. Some properties of absolute return, an alternative measure of risk. *Annales d'Economie et de Statistique* 40: 67–91.

[Google Scholar](#)

---

Granger CWJ, Morris M. 1976. Time series modeling and interpretation. *Journal of the Royal Statistical Society Series A* 139: 246–257.

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---

Ho H-C, Lin CFJ. 1998. Real and spurious long-memory properties of stock-market data — comment. *Journal of Business and Economic Statistics* 16: 272.

[Web of Science®](#) | [Google Scholar](#)

---

Hogg RV, Craig AT. 1995. *Introduction to Mathematical Statistics*. Prentice Hall: Englewood Cliffs, NJ.

[Google Scholar](#)

Kariya T, Tsukuda Y, Maru J. 1990. Testing the random walk hypothesis for Japanese stock prices in S. Taylor's model. Hitotsubashi University Discussion Paper.

[Google Scholar](#)

---

Koenker R. 1992 When are expectiles percentiles? *Econometric Theory* 8: Problems: 423–424; Solutions: 526–527.

[Google Scholar](#)

---

Koenker R, Bassett G. 1978. Regression quantiles. *Econometrica* 46: 33–55.

[Web of Science®](#) | [Google Scholar](#)

---

Lee S-W, Hansen BE. 1994. Asymptotic theory for GARCH(1,1) quasi-maximum likelihood estimator. *Econometric Theory* 10: 29–52.

[Web of Science®](#) | [Google Scholar](#)

---

Lumsdaine RL. 1996. Consistency and asymptotic normality of the quasi-maximum likelihood estimator in IGARCH(1,1) and covariance stationary GARCH(1,1) models. *Econometrica* 64: 575–596.

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---

Newey WK, Powell JL. 1987. Asymmetric least squares estimation and testing. *Econometrica* 55: 819–847.

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---

Newey WK, West KD. 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica* 55: 703–708.

[Web of Science®](#) | [Google Scholar](#)

---

Portnoy S, Koenker R. 1997. The Gaussian hare and the Laplacian tortoise: computability of squared-error versus absolute-error estimators (with Comments and Rejoinder). *Statistical Science* 12: 279–300.

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---

Robinson PM, Zaffaroni P. 1997. Modelling nonlinearity and long memory in time series. In *Nonlinear Dynamics and Time Series (Fields Institute Communications 11)*, CD Cutler, DT Kaplan (eds).

[Google Scholar](#)

---

Sin C-Y, Granger CWJ. 1999. Estimating and forecasting quantiles with asymmetric least squares. *Journal of Econometrics*.

[Google Scholar](#)

Taylor S. 1986. *Modelling Financial Time Series*. John Wiley: New York.

[Google Scholar](#)

Vuong QH. 1989. Likelihood ratio tests for model selection and non-nested hypothesis. *Econometrica* 57: 307–333.

[Web of Science®](#) | [Google Scholar](#)

Wooldridge JM. 1991. On the application of robust regression-based diagnostics to models of conditional means and conditional variances. *Journal of Econometrics* 47: 5–46.

[Web of Science®](#) | [Google Scholar](#)

Yao Q, Tong H. 1996. Asymmetric least squares regression estimation: a nonparametric approach. *Journal of Nonparametric Statistics* 6: 273–292.

[Google Scholar](#)

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