

Comments about the Paper
Estimating and Forecasting the Volatility of
Brazilian Finance Series Using ARCH Models

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The paper by Prof. Issler uses ARCH and SWARCH models to estimate and forecast the volatility of some Brazilian Finance Series and also a commodity series. The paper present a review of the results for identification, estimation and forecasting in this class of model. The main finding of this paper is that some of the series do present regimes switching and/or asymmetries.

Our comments will be divided in two parts. The first one some general comments about some of the results of this paper and the second part a comparison with the results of Valls Pereira et alii (1999)¹ will be make.

The first point that we will like to make is about the was Prof. Issler treat the “missing data” of some of these series. In order to have equally spaced data, he complete the data using the most recent quote. This procedure preserves the spacing of the data but do introduces inliers in the series. For instance, suppose that the observed prices series is

$$y_1, y_3, y_4, y_6, y_9, \dots \quad (1)$$

in order to compute the return series a new series is used

$$y_1, y_1 y_3, y_4, y_4, y_6, y_6, y_6, y_9, \dots$$

¹Valls Pereira, P.L.; Hotta, L.K.; Souza, L.A.R. & Almeida, N.M.C.G. (1999). “Alternative models to extract asset volatility: a comparative study”. *Revista de Econometria*, this issue.

and the return series is given by

$$0, \ln(y_3) - \ln(y_1), \ln(y_4) - \ln(y_3), \ln(y_6) - \ln(y_4), 0, 0, \ln(y_9) - \ln(y_6), \dots$$

Note that for the original price series the returns are:

$$\ln(y_3) - \ln(y_1), \ln(y_4) - \ln(y_3), \ln(y_6) - \ln(y_4), \ln(y_9) - \ln(y_6) \quad (2)$$

which is unequally spaced but it is the same series, excluding the zeros. The effect of these zeros is to introduce inliers in the series which will affect the unconditional distribution of the returns, as can be seen by the figure.

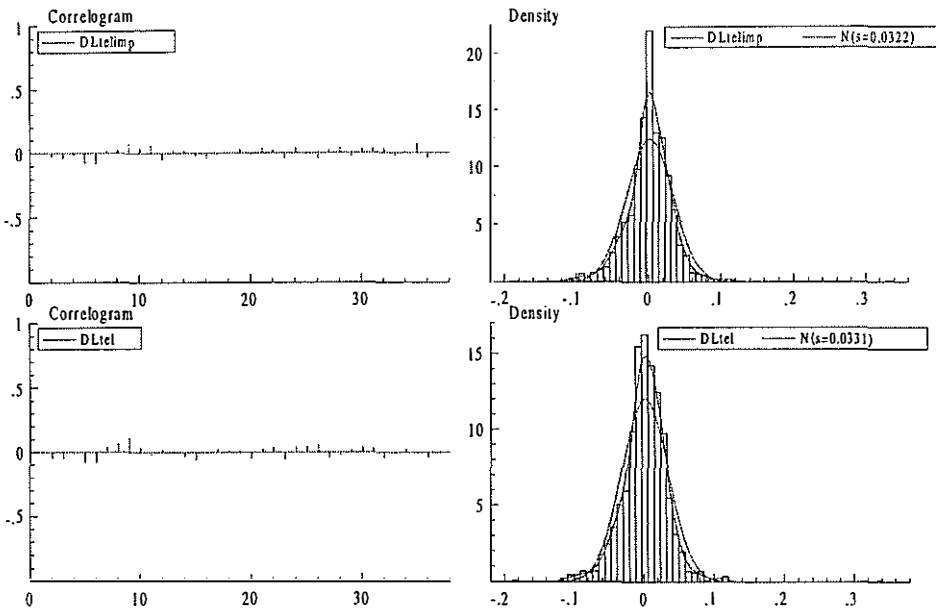


Figure 1
Correlogram and Empirical Distribution of the Returns

The figure presents the correlogram and empirical distribution for the returns of Telebras. The top panel is for the series used by Prof. Issler and the bottom panel for the series used in our paper. From the empirical distribution it is clear that Prof. Issler series does increase (above 5/autocorrelation which could be misleading. Below it is presented the argument.

Note also that if the data generating process for the log price series is a random walk, i.e.

$$y_t = y_{t-1} + u_t \text{ for } t = 1, \dots, T \quad (3)$$

when a missing observation occurs the data generating process (d.g.p.) changes to:

$$y_t = y_{t-m} + (1 + L + \dots + L^{m-1}) u_t \quad (4)$$

where m is the number of missing observations.

Note that the error in (4) is a white noise but the variance will be m times the variance of the white noise in (3). If the d.g.p. follows an ARIMA (p,1,q) the d.g.p. for the model with missing will be an ARIMA (p,1,q*) where $q^* = \left[\frac{p(m-1)+q}{m} \right]$ which could increase, decrease or remain the same, the structure of autocorrelation of the series.

The second point is about the unit root test reported in the paper. The effect of inliers in unit root tests is well known, see Cati et alli (1999),² but to perform this test in the volatility will be misleading because of the effect of these inliers.

²Cati, R.; Garcia, M. & Perron, P. (1999). "Unit roots in the presence of abrupt governmental interventions with an application to brazilian data". *Journal of Applied Econometrics*, 14, 27-56.

The third point is related to the estimation of ARCH models. Because the author uses the Eviews software, which uses an unconstrained optimization routine, some of the persistence is greater than one which does not make sense.

Now we will compare some of the Prof. Issler results with ours.

For all series the t-GARCH model does have comparable parameter but the number of degrees of freedom is reduced but 50%, which could be the effect of the increase in the kurtosis due to the introduction of the inliers.

For the three-regimes SWARCH model for Telebras and Cbond series the estimate of p_{33} indicating a overparametrized model. But in our three regimes this probability is about 0.98. Using the BIC criterion, our model for Cbond is better but his model for Telebras is better.

The forecast accuracy for Telebras, a comparison between table 14 of Issler and table 4.2 of our paper shows that SV model performs better than his best model except for the MSE criterion. When this criterion is used his best model (TARCH) performs better than our model if the GARCH with dummies is excluded.

For the Cbond, table 12 of Issler and table 4.4 of our paper, SV model performs better than Issler's best model except for the MSE criterion, where his best model (n-EGARCH) is better than our best model.

For the exchange rate series, table 11 of Issler and table 4.6 of our paper, SV model performs better than Issler's best model for all criteria.

Overall the main conclusion is that SV models are better than Issler's best model.