

Parameter estimation for ARCH model with exogenous variable and missing values

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Abstract

This work deals with the problem of parameter estimation of a variant of the ARCH(1) model, in which an additional covariate is included and missing values are considered. To estimate the parameters of the model we use a least square type estimation procedure. Thus, an extensive simulation study is shown to illustrate our results and the small sample behavior of the estimation method for this type of model. Finally, a real data application is implemented using monthly data from the anchovy fishery in northern Chile from 2010-2020 with an environmental exogenous variable. The results show the good performance of the model and its capability to be applied in several real-data problems.

References

1. Bondon, P. and Bahamonde, N. (2012). Least squares estimation of ARCH models with missing observations. *Journal of Time Series Analysis*, 33(6): 880-891.
2. Bose, A. and Mukherjee, K. (2003). Estimating the ARCH parameters by solving linear equations. *Journal of Time Series Analysis*, 24(2): 127-136.
3. Yáñez, E., Barbieri, M., Silva, C., Nieto, K., and Espíndola, F. (2001). Climate variability and pelagic fisheries in northern Chile. *Progress in Oceanography*, 49(1-4): 581-596.