Explicit Equations for ACF in the Presence of Heteroscedasticity Disturbances in First-Order Autoregressive Models, $AR(1)$

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Abstract:

The autocorrelation function, ACF, is an important guide to the properties of a time series. We derive explicit equations for ACF in the presence of heteroscedasticity disturbances in first-order autoregressive, $AR(1)$, models. We present two cases: (1) when the disturbance follows the general covariance matrix, $\mathbf{\Sigma}$, and (2) when the diagonal elements of $\mathbf{\Sigma}$ are not all identical but $\sigma_{i,j} = 0 \; \forall \; i \neq j$. In addition, we derive an equation to transform a model with heteroscedastic disturbances such that the model has homoscedastic disturbances.

Keywords: Heteroscedasticity, Homoscedasticity, Autocorrelation, Autoregressive, Covariance, Disturbance, Time Series.