Volatility [TD]

ARCH/GARCH

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Library

The are different library for ARCH/GARCH models, I suggest arch

from arch import arch_model

fit = arch_model(returns,vol='ARCH', p=p).fit()

Note that likelihood estimation is unstable if the return are very small, a good idea is to annualize the returns.

It includes also GARCH

fit = arch_model(returns,vol='GARCH', p=p,q=q).fit()

then fit.conditional_volatility is the vector of conditional variances. The object includes as well the residue, BIC and AIC.

It is possible to use a t-distribution for fitting the GARCH by including the available dist='t'

TD

You can use “long_series_logret.csv” of the previous TD.

1. inspect the ACF of r^2
2. Find the best ARCH(p) model using BIC and AIC, look at the regressed parameters
3. Find the best GARCH(p,q) model using BIC and AIC, look at the regressed parameters
4. Find the best GARCH(p,q) model with t-distribution using BIC and AIC, look at the regressed parameters
5. compare the minimal BIC of the points 2),3),4).
6. Look at the ACF of the residue^2, conditional volatility, and devolatized returns of the best model. What do you observe?