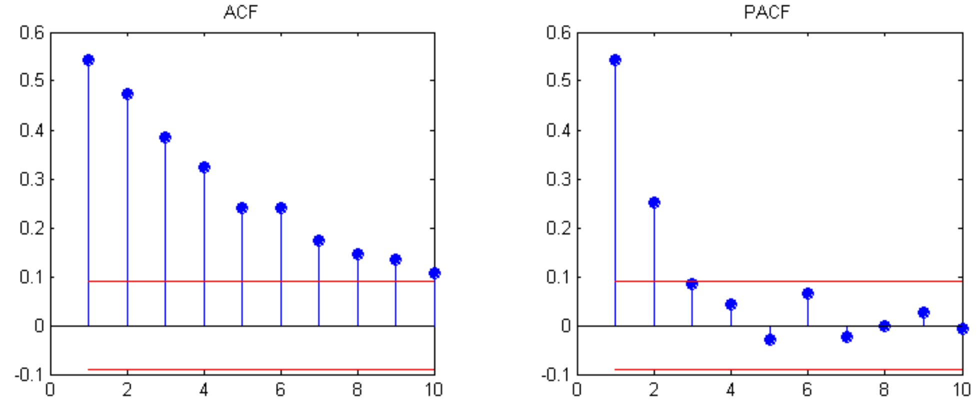
Econ232C Homework #1 Anton Cheremukhin

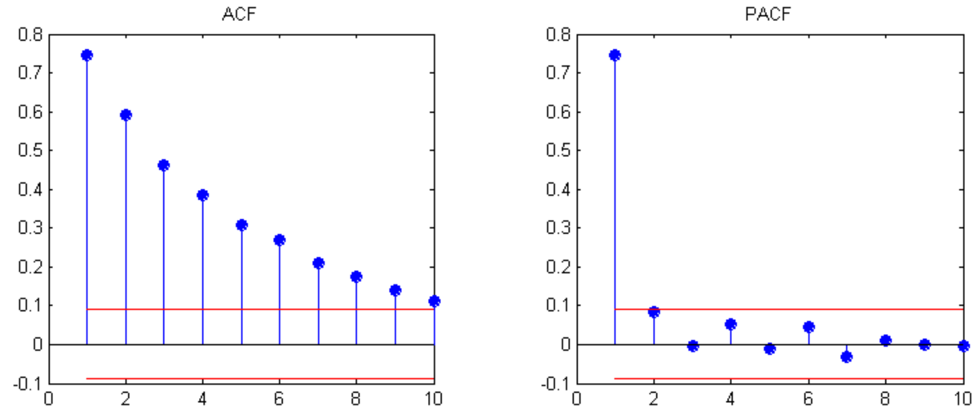
April 18, 2006

Exercise 1

Correlograms for Y_{1t} $(\sigma_x = 1, N = 100)$

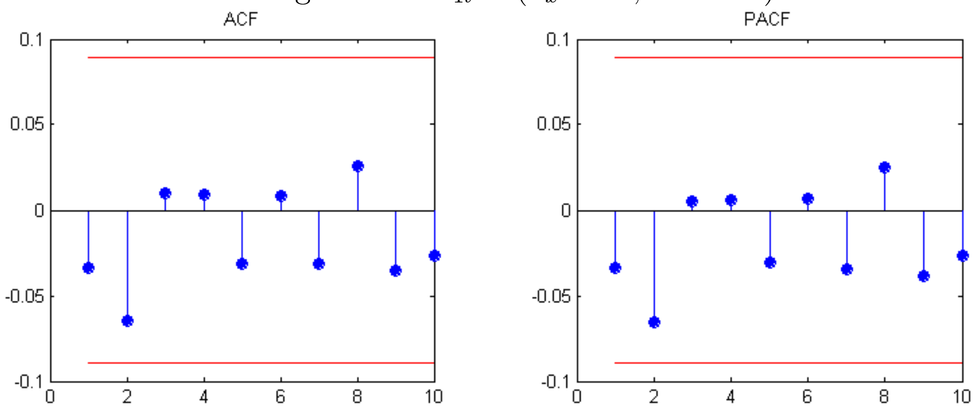


Correlograms for $SY_t = \Sigma_j Y_{jt}$ $(\sigma_x = 1, N = 100)$

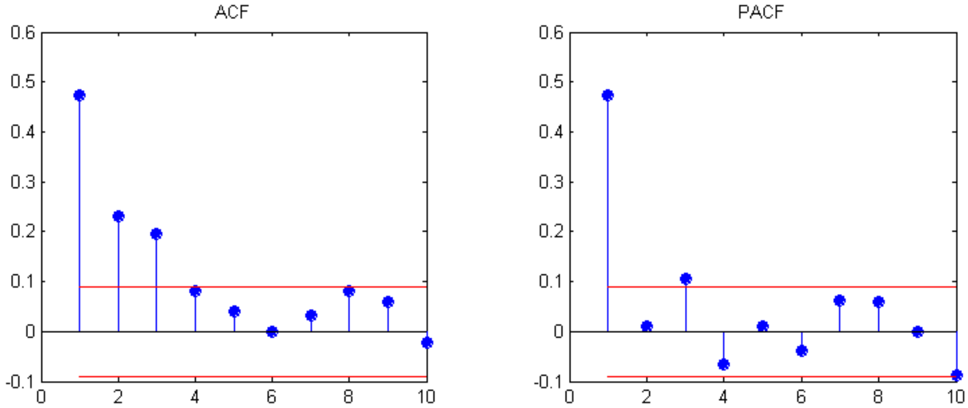


a) $Z_t = 0.7Z_{t-1} + \varepsilon_t$ $\quad Var\,(Z_t) = 0.49Var\,(Z_t) + 1 = \frac{1}{0.51} = 1.9608$
b) We can take $\sigma_x = 10$ and $N = 100$.

Correlograms for Y_{1t} $(\sigma_x = 10, N = 100)$



Correlograms for $SY_t = \Sigma_j Y_{jt} \quad (\sigma_x = 10, N = 100)$



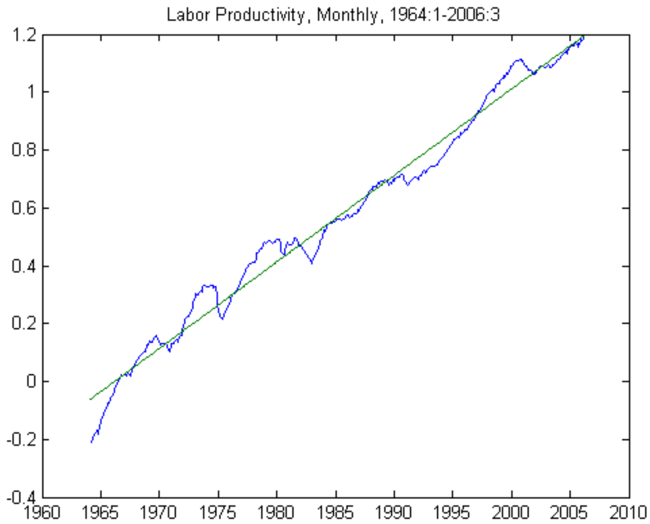
c) Intuition: We can regard Y_{jt} as some agent's characteristic, which is influenced by some economic variable Z_t following AR(1) and a measurement error X_{jt}. The result shows that if the error is big enough, we cannot identify the economic variable from individual Y_{jt} but can solve the problem by agregating the data.

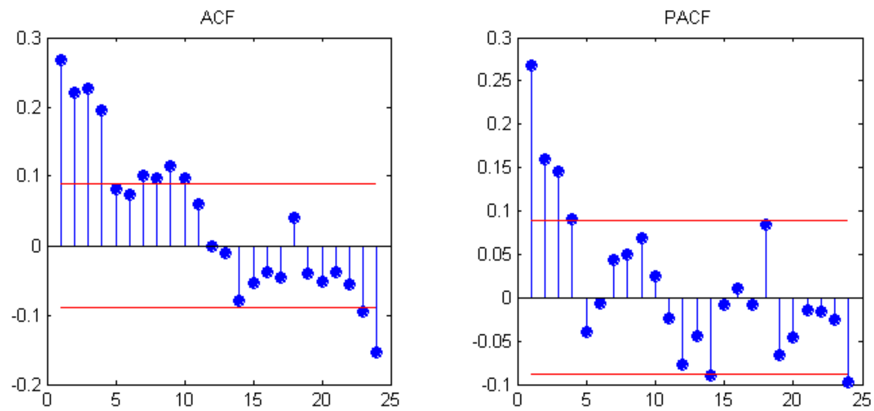
Another implication we might draw is that aggregating helps distinguish the DGP between AR(1) and ARMA(1,1), while there is an identification problem for individual series:

By construction: $Y_{jt} = Z_t + X_{jt} = 0.7Z_{t-1} + \varepsilon_t + X_{jt} = 0.7Y_{jt-1} + \varepsilon_t + X_{jt} - 0.7X_{jt-1}$

Alternative model: $Y_{jt} = 0.7Y_{jt-1} + \varepsilon_t - 0.7\varepsilon_t + X_{jt}$

Exercise 2

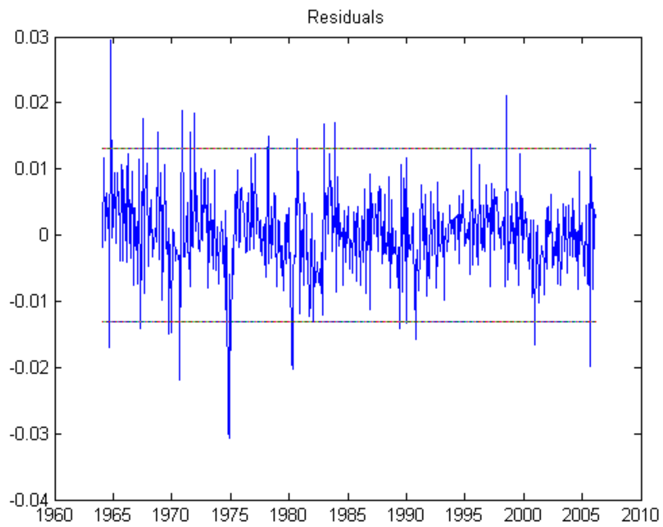


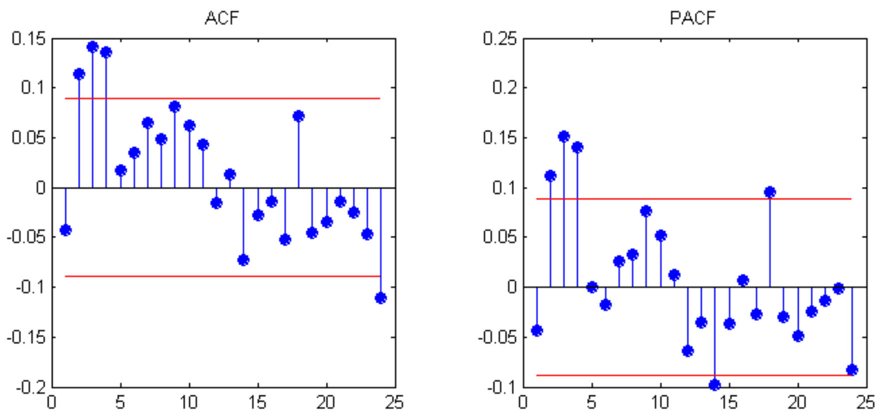


a) AR(1) model: $y_t = \alpha + \rho y_{t-1} + \varepsilon_t$

	beta	st.er.	t-stat.	p-value
α	0.0020	0.0003	6.4576	0.0000
ρ	0.2680	0.0430	6.2404	0.0000

P-value of hypothesis: $\rho = 0$: P-value **9.2736e-010** Rejected at 1%.



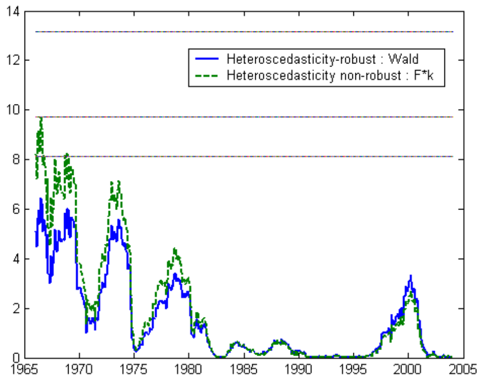


b) Breusch-Godfrey Test: $\varepsilon_t = c + ay_{t-1} + \gamma_1\varepsilon_{t-1} + \gamma_2\varepsilon_{t-2} + \gamma_3\varepsilon_{t-3} + \gamma_4\varepsilon_{t-4}$
(The ACF and PACF indicate 4 lags for the test)

	c	a	γ_1	γ_2	γ_3	γ_4
beta	0.0000	-0.0024	-0.0759	0.1026	0.1596	0.1410
st.er.	0.0003	0.0447	0.0449	0.0449	0.0445	0.0445
t-stat.	-0.0342	-0.0538	-1.6900	2.2867	3.5963	3.1688
p-value	0.9727	0.9571	0.0917	0.0226	0.0004	0.0016

R-squared: 0.0566 $T * R^2 = 28.56$ P-value: 0.0000096031.
Hypothesis: No serial correlation. $\chi^2_{0.99}(4) = 13.27$. Rejected at 1%.

c) Using a [5%-95%] interval and calculating both the Heterosticity-Robust Wald statistic and non-robust F statistic we get the following graph:



The sup Wald statistic for the non-robust method is 9.71 which is exactly equal to the 5% critical value for our case. The robust method doesn't even ever strike the 10% critical value.

d) The Bai(1994) OLS method dates the structural break by July of 1966.

We do not construct a confidence interval, since for the heteroscedasticity-robust estimates we don't have the break at all. The possible break occured very close to the edge of the interval. Reiterating the procedure on the after-break subsample clearly indicates no more breaks.

Most probably there weren't any breaks at all.