Econ232C Homework #2 Anton Cheremukhin, Christoph Bertsch and Martin Szydlowski

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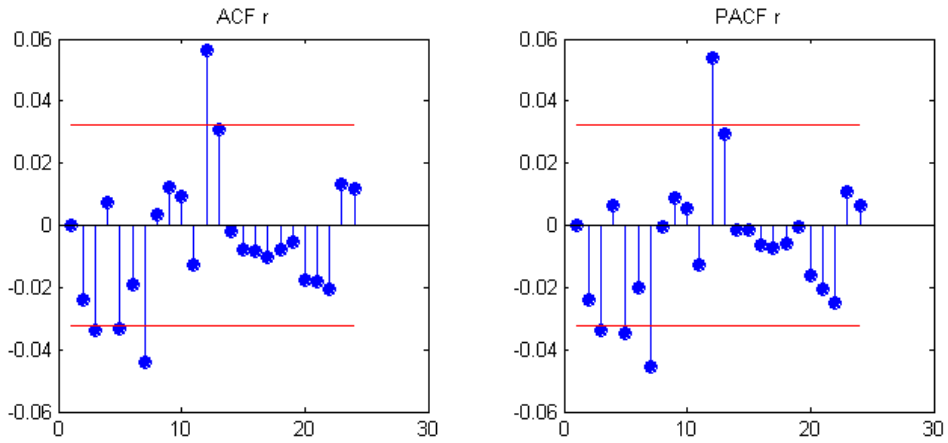
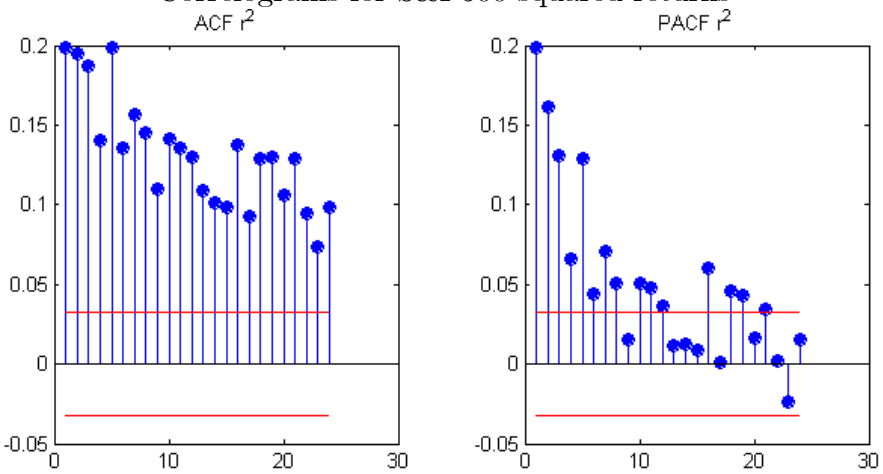
Exercise 1

a) Correlograms for S&P500 returns



Correlograms for S&P500 squared returns



b) ARCH-test: $\varepsilon_t^2 = c + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 \varepsilon_{t-2}^2 + \gamma_3 \varepsilon_{t-3}^2 + \gamma_4 \varepsilon_{t-4}^2$

	c	γ_1	γ_2	γ_3	γ_4
beta	-0.0004	2.4544	-0.3525	0.1180	1.2002
st.er.	0.0002	0.6867	0.6881	0.6881	0.6867
t-stat.	-1.7913	3.5741	-0.5123	0.1715	1.7478
p-value	0.0733	0.0004	0.6085	0.8639	0.0806

R-squared: 0.0050 $T * R^2 = 19.2220$ P-value: 0.00071082.
Hypothesis: No serial correlation. Rejected at 1%.
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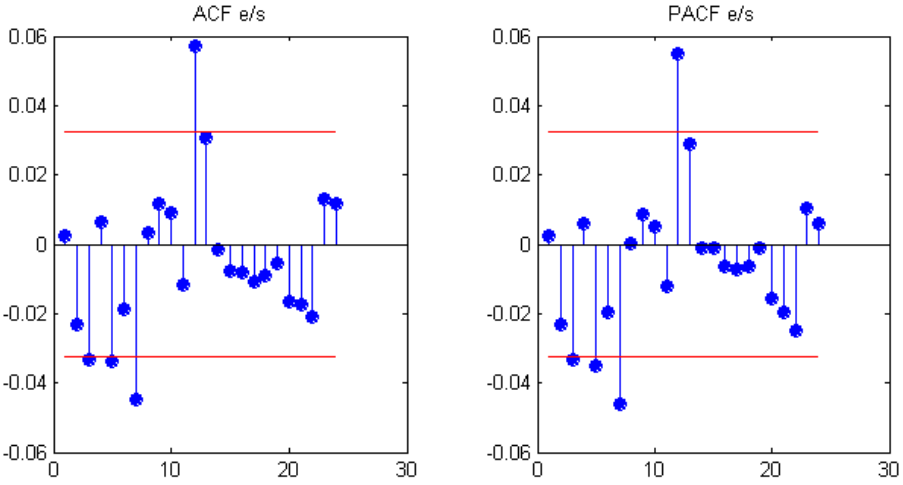
c) GARCH(1,1): $\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2$ by Maximum Likelihood
Normal distribution: ω =0.0056 α =0.5498 β =0.4502
Student(ν) distribution: ω =0.0057 α =0.5522 β =0.4478 ν =100
The two methods give the same result: ν hits the upper bound.

Correlograms for standartized residuals



ARCH-test for standartized residuals: $\varepsilon_t^2 = c + \gamma_1\varepsilon_{t-1}^2 + \gamma_2\varepsilon_{t-2}^2 + \gamma_3\varepsilon_{t-3}^2 + \gamma_4\varepsilon_{t-4}^2$
R-squared: 0.0043 $T * R^2 = 16.2124$ P-value: 0.002747.
Hypothesis: No serial correlation. Rejected at 1%. A bad model.
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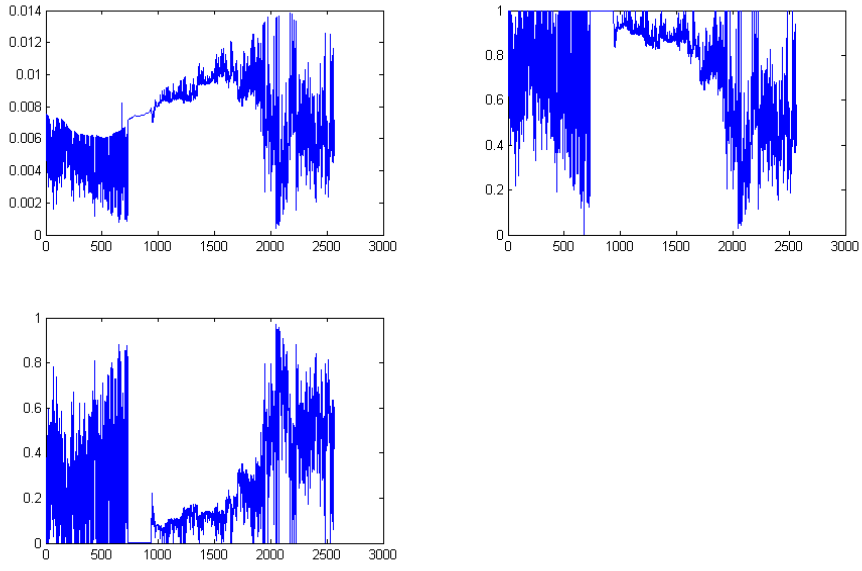
d) Estimates of (ω, α, β) for a rolling window: coefficients very unstable. The model is wrong.

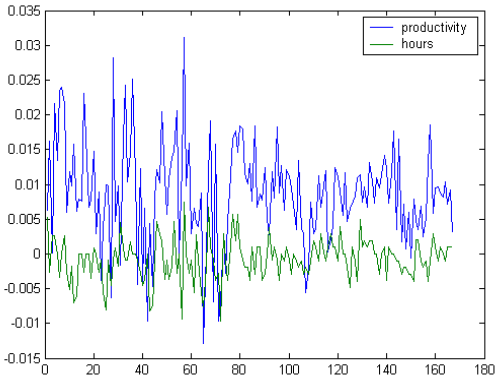


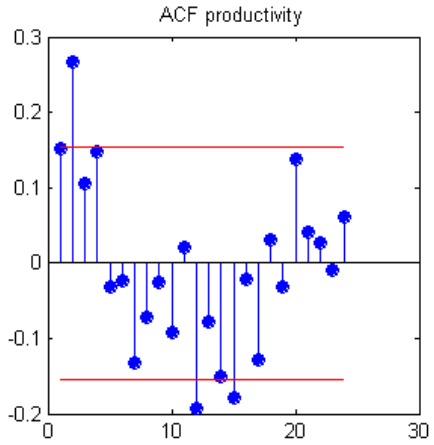
Exercise 2

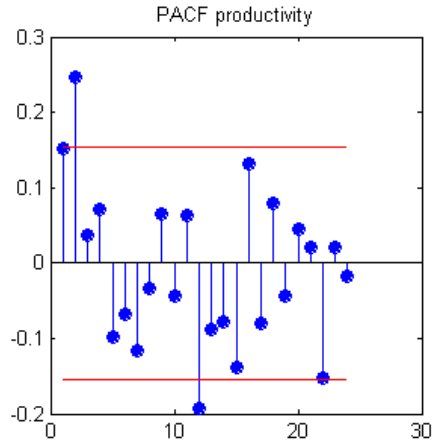
a) SVAR(2) model: $A_0 y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + u_t \qquad y_t = [productivity, hours]$

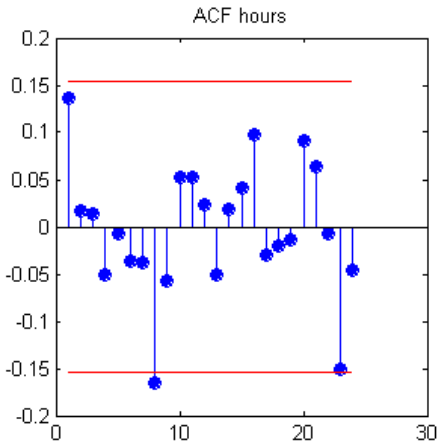
Estimated with a long-run restriction, that shocks to technology only affect productivity. Confidence intervals for IRFs and bias-correction using bootstrap.

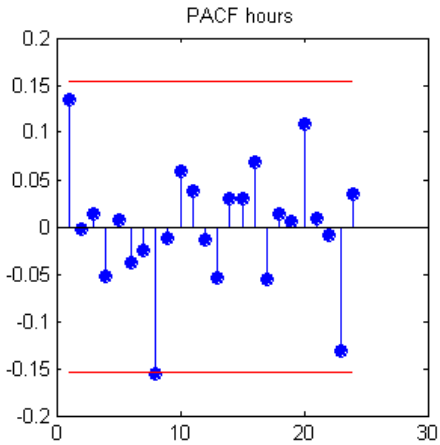
$$\begin{bmatrix} 123.3 & 7.9 \\ 21.3 & 385.9 \end{bmatrix} y_t = \begin{bmatrix} 0.67 \\ -0.78 \end{bmatrix} + \begin{bmatrix} 10.2 & 43.3 \\ 40.9 & 61.3 \end{bmatrix} y_{t-1} + \begin{bmatrix} 26.1 & 29.6 \\ -19.7 & 0.24 \end{bmatrix} y_{t-2}$$

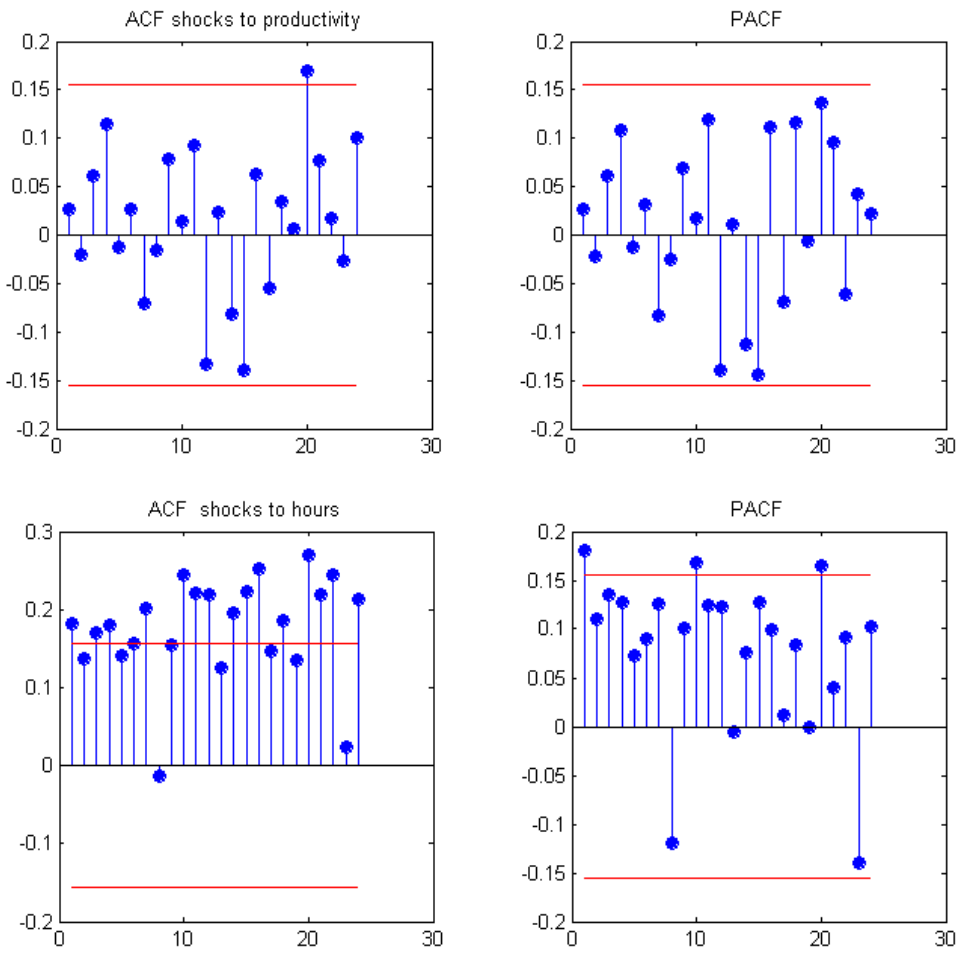






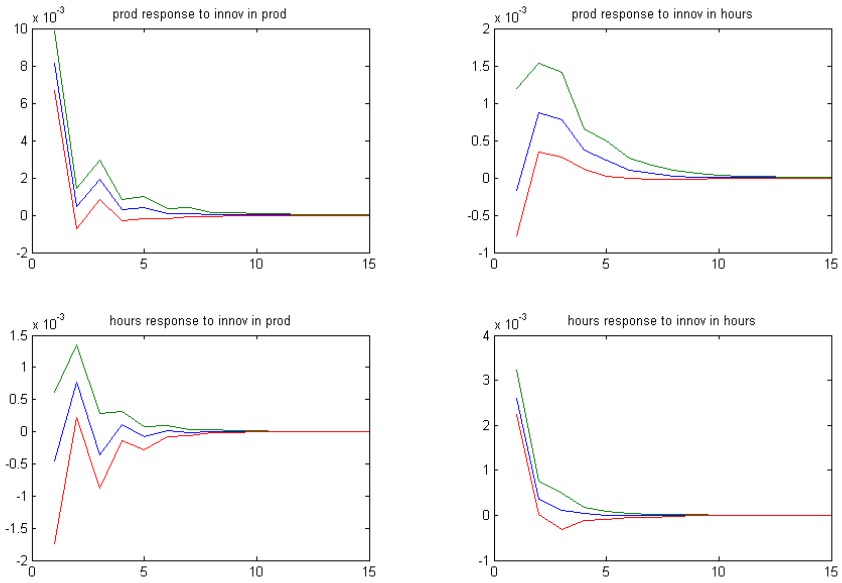






b) Breusch-Godfrey Test: orthogonalized shocks to productivity
R-squared: 0.0147 $T * R^2 = 2.42$ P-value: 0.65871.
Hypothesis: No serial correlation. Not rejected even at 10%.
.
Breusch-Godfrey Test: orthogonalized shocks to hours
R-squared: 0.0132 $T * R^2 = 2.17$ P-value: 0.70406.
Hypothesis: No serial correlation. Not rejected even at 10%.

Impulse Responses and Confidence Intervals



c) Overall the procedure is reasonable, it relies on a solid economic intuition that technology should not affect hours worked in the long run. This allows to identify all the impulse responses. However the results are partly similar to Gali (1999), implying positive responses of productivity to shocks in the labor market, which contradicts the RBC logic. However the response of hours to technological shocks, unlike in the paper, is positive, which conforms with RBC theory.