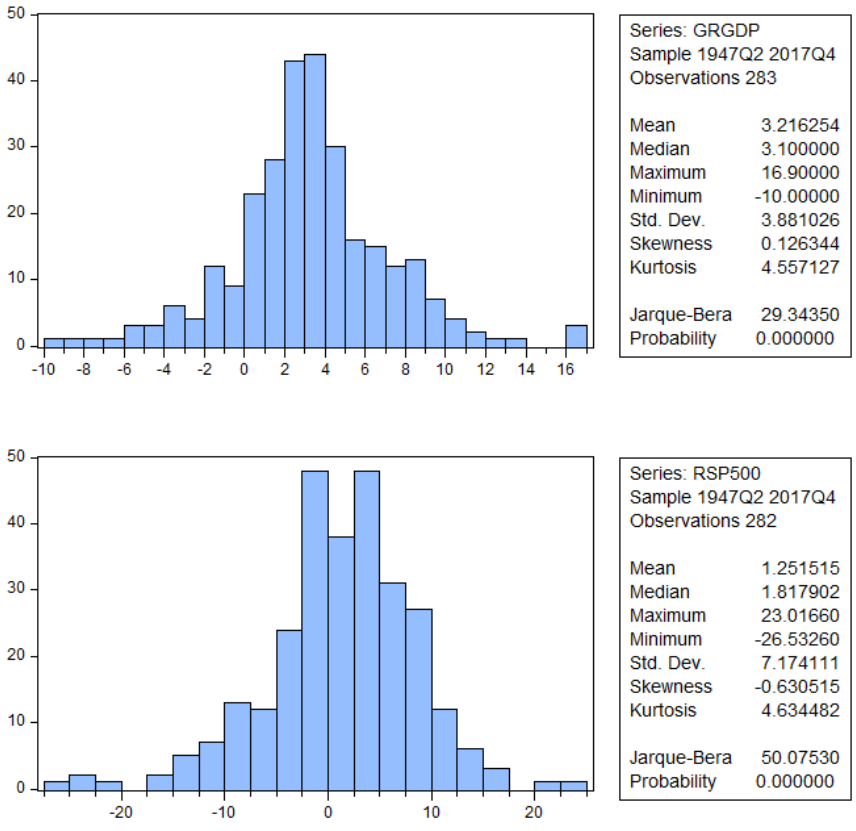
Homework 1

Eco 4306 Economic and Business Forecasting
Spring 2018
Due: Thursday, February 1, before the class

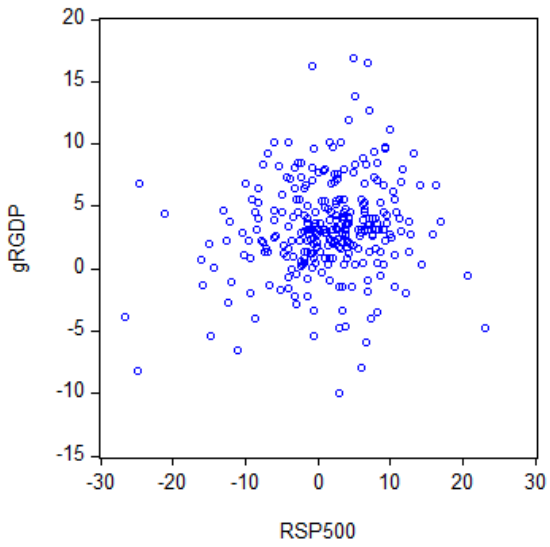
Problem 1 (50 points)

(b) (30 points) Figure below shows the descriptive statistics for the two time series for the sample 1947Q2-2017Q4.



(c) (10 points) The high Jarque-Bera statistics and the associated p-value which are essentially zero imply that these two time series are not normally distributed.

(d) (10 points) The scatter plot below suggests that there is only very weak contemporaneous correlation in the 1947Q2-2017Q4 sample, which is confirmed by calculating the correlation coefficient, $corr(gRGDP_t, rSP500_t) = 0.1505$.



Problem 2 (50 points)

Below are the results for the four models. Comparing their adjusted R^2, we can see that model contemporaneous correlation in (a) explains only a tiny fraction of the overall variation in the GDP growth rate, adjusted R^2 is 0.022. Using lagged terms instead increases the adjusted R^2 to 0.082, 0.199 and 0.246 in parts (b), (c), (d) respectively.

(a) (12.5 points) contemporaneous correlation model:
$gRGDP_t = 3.127 + 0.081 rSP500_t + \varepsilon_t$

Dependent Variable: GRGDP
Method: Least Squares
Date: 01/31/18 Time: 20:51
Sample (adjusted): 1947Q3 2017Q4
Included observations: 282 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.127142	0.232408	13.45539	0.0000
RSP500	0.081450	0.031968	2.547827	0.0114

R-squared	0.022658	Mean dependent var	3.229078
Adjusted R-squared	0.019168	S.D. dependent var	3.881914
S.E. of regression	3.844530	Akaike info criterion	5.538247
Sum squared resid	4138.516	Schwarz criterion	5.564076
Log likelihood	-778.8928	Hannan-Quinn criter.	5.548605
F-statistic	6.491422	Durbin-Watson stat	1.325090
Prob(F-statistic)	0.011374		

(b) (12.5 points) one-quarter leading indicator model:
$gRGDP_t = 3.050 + 0.155rSP500_{t-1} + \varepsilon_t$

Dependent Variable: GRGDP
Method: Least Squares
Date: 01/31/18 Time: 20:51
Sample (adjusted): 1947Q4 2017Q4
Included observations: 281 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.050790	0.225487	13.52977	0.0000
RSP500(-1)	0.155570	0.031021	5.014971	0.0000

R-squared	0.082689	Mean dependent var	3.241993
Adjusted R-squared	0.079401	S.D. dependent var	3.882766
S.E. of regression	3.725430	Akaike info criterion	5.475334
Sum squared resid	3872.193	Schwarz criterion	5.501229
Log likelihood	-767.2844	Hannan-Quinn criter.	5.485719
F-statistic	25.14994	Durbin-Watson stat	1.451265
Prob(F-statistic)	0.000001		

(c) (12.5 points) four-quarter leading indicator model:
$gRGDP_t = 2.691 + 0.139rSP500_{t-1} + 0.148rSP500_{t-2} + 0.063rSP500_{t-3} + 0.060rSP500_{t-4} + \varepsilon_t$

Dependent Variable: GRGDP
Method: Least Squares
Date: 01/31/18 Time: 20:51
Sample (adjusted): 1948Q3 2017Q4
Included observations: 278 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.691137	0.220725	12.19227	0.0000
RSP500(-1)	0.139882	0.029581	4.728831	0.0000
RSP500(-2)	0.148419	0.029852	4.971747	0.0000
RSP500(-3)	0.063726	0.029852	2.134726	0.0337
RSP500(-4)	0.060068	0.029530	2.034116	0.0429

R-squared	0.199123	Mean dependent var	3.208273
Adjusted R-squared	0.187389	S.D. dependent var	3.889907
S.E. of regression	3.506554	Akaike info criterion	5.364967
Sum squared resid	3356.787	Schwarz criterion	5.430212
Log likelihood	-740.7304	Hannan-Quinn criter.	5.391143
F-statistic	16.96911	Durbin-Watson stat	1.517981
Prob(F-statistic)	0.000000		

(d) (12.5 points) four-quarter indicator model with GDP inertia:
$gRGDP_t = 2.034 + 0.123rSP500_{t-1} + 0.117rSP500_{t-2} + 0.028rSP500_{t-3} + 0.043rSP500_{t-4} + 0.243gRGDP_{t-1} + \varepsilon_t$

Dependent Variable: GRGDP
Method: Least Squares
Date: 01/31/18 Time: 20:51
Sample (adjusted): 1948Q3 2017Q4
Included observations: 278 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.034055	0.266881	7.621585	0.0000
RSP500(-1)	0.123265	0.029024	4.247068	0.0000
RSP500(-2)	0.117161	0.029976	3.908501	0.0001
RSP500(-3)	0.027693	0.030287	0.914363	0.3613
RSP500(-4)	0.042970	0.028991	1.482178	0.1395
GRGDP(-1)	0.242958	0.058722	4.137426	0.0000

R-squared	0.246542	Mean dependent var	3.208273
Adjusted R-squared	0.232692	S.D. dependent var	3.889907
S.E. of regression	3.407408	Akaike info criterion	5.311127
Sum squared resid	3158.037	Schwarz criterion	5.389421
Log likelihood	-732.2467	Hannan-Quinn criter.	5.342538
F-statistic	17.80045	Durbin-Watson stat	2.032066
Prob(F-statistic)	0.000000		