

Econometrics II - Problem Set 5

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Question 1

Item 1.

The gradient is:

$$E\left[\begin{pmatrix} -\frac{1}{\lambda^2} & -2\frac{X}{\lambda^2} \end{pmatrix}'\right]$$
$$\left(\begin{pmatrix} -\frac{1}{\lambda^2} & -2\frac{E[X]}{\lambda^2} \end{pmatrix}'\right)$$

Item 2.

The results can be seen below:

Table 1:

	term	estimate	std.error	statistic	p.value
1	Lambda	4.970	Inf	0	1

Question 2

Item 1.

We can see that the exogeneity assumption does not hold, $E[Y_{t-1}U_t] \neq 0$:

$$E[Y_{t-1}U_t] = E[(\phi_1 Y_{t-2} + U_{t-1})U_t] = E[(\phi_1^2 Y_{t-3} + \phi_1 U_{t-2} + U_{t-1})U_t]$$
$$E[Y_{t-1}U_t] = \theta_2(\phi_1 + \theta_1) + \theta_1 \neq 0$$

Item 2.

We can see that the exogeneity assumption does not hold, $E[Y_{t-2}U_t] \neq 0$:

$$E[Y_{t-2}U_t] = E[(\phi_1 Y_{t-3} + \epsilon_{t-2} + \theta_1 \epsilon_{t-3} + \theta_2 \epsilon_{t-4})(\theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2})] = \theta_2 \neq 0$$

Item 4.

The results can be seen below:

Table 2:

	term	estimate	std.error	statistic	p.value
1	(Intercept)	0.00521	0.00359	1.450	0.146
2	Lag 1	0.19254	0.02034	9.464	2.950e-21

Question 3

Item 1., 2., and 3.

In the code.

Item 4.

The results can be seen below:

Table 3:

	term	estimate	std.error	statistic	p.value
1	ABEV3 (Intercept)	-0.001634	0.00141	-1.1522	0.249
2	BBDC3 (Intercept)	0.001402	0.00120	1.1646	0.244
3	ITUB3 (Intercept)	0.000173	0.00134	0.1285	0.897
4	ABEV3 BVSP	0.851	0.0796	10.691	1.118e-26
5	BBDC3 BVSP	1.130	0.0598	18.885	1.488e-79
6	ITUB3 BVSP	1.066	0.1078	9.8919	4.509e-23

Item 5.

The joint hypothesis is every intercept having a null value of 0 de DFs are (244, 3). The results are as below:

Table 4:

	term	null.value	estimate	std.error	statistic	p.value
1	ABEV3 (Intercept)	0	-0.00163	0.00141	2.983	0.394
2	BBDC3 (Intercept)	0	0.00140	0.00120	2.983	0.394
3	ITUB3 (Intercept)	0	0.00017	0.00134	2.983	0.394

With the p-value of 0.394, we do not reject the null.