Financial data

Time-series analysis

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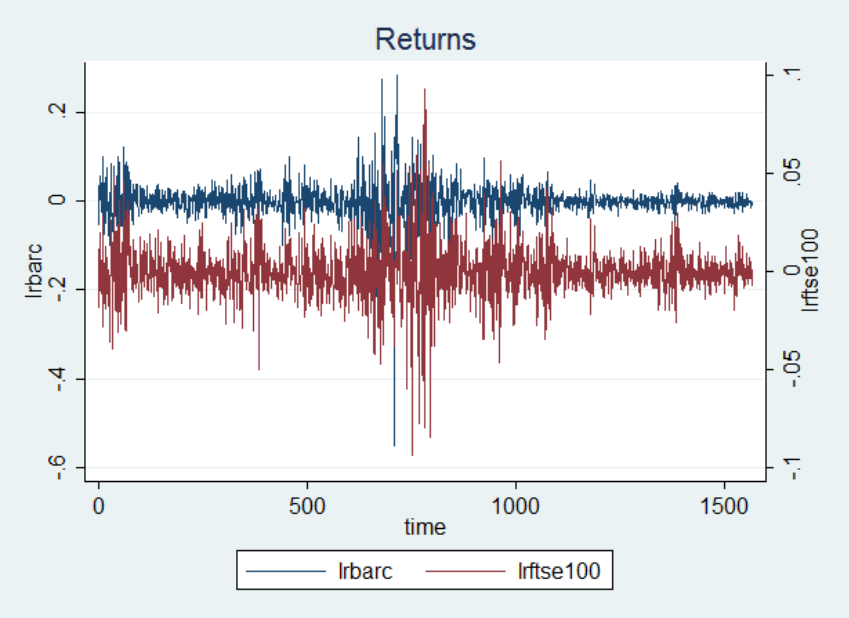
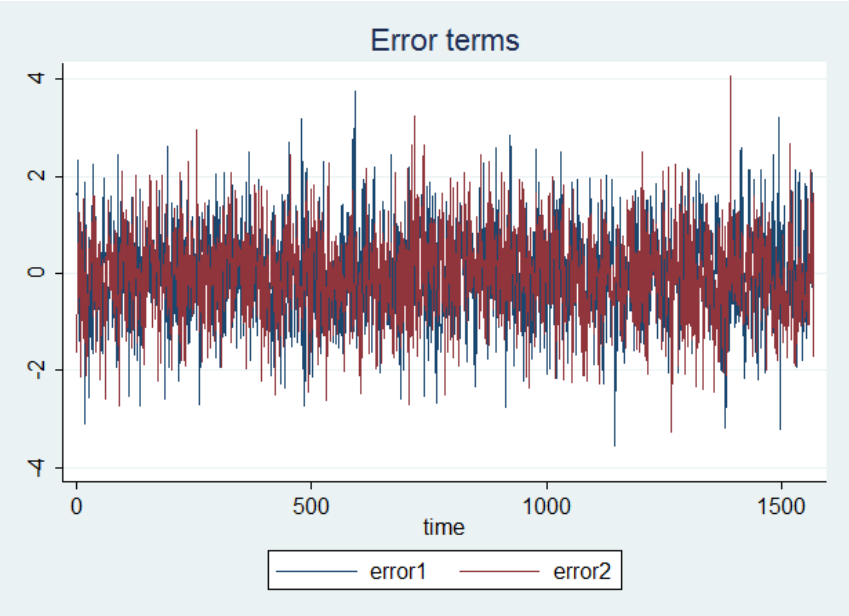
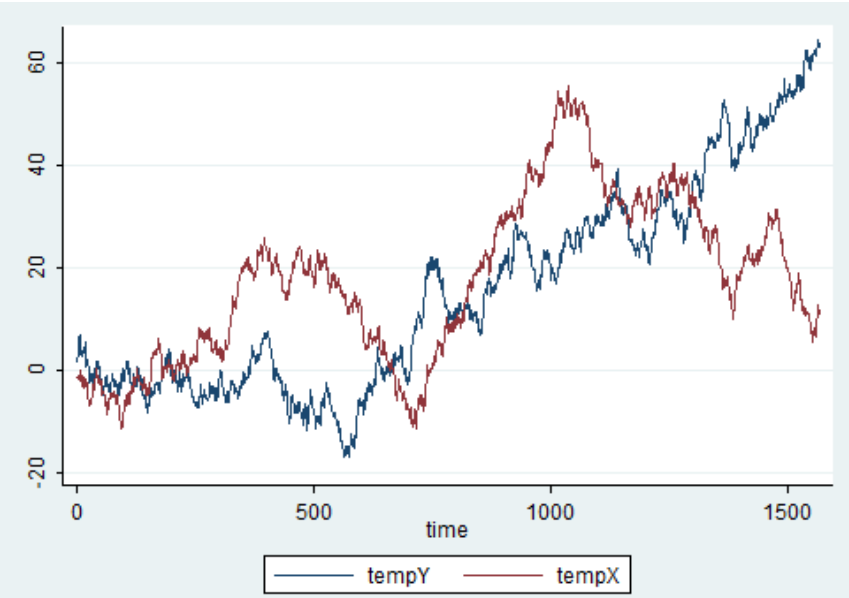
Outline

Plotting data



Spurious results





Spurious results (cont)

```
. reg tempY tempX
```

Source	SS	df	MS		
Model	152070.026	1	152070.026	Number of obs	= 1568
Residual	492262.652	1566	314.343967	F(1, 1566)	= 483.77
				Prob > F	= 0.0000
				R-squared	= 0.2360
				Adj R-squared	= 0.2355
Total	644332.677	1567	411.18869	Root MSE	= 17.73

tempY	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
tempX	.6227384	.028313	21.99	0.000	.567203	.6782739
_cons	4.302305	.674427	6.38	0.000	2.97943	5.62518

```
. reg tempDiffY tempDiffX
```

Source	SS	df	MS		
Model	.040345936	1	.040345936	Number of obs	= 1567
Residual	1641.61427	1565	1.04895481	F(1, 1565)	= 0.04
				Prob > F	= 0.8445
				R-squared	= 0.0000
				Adj R-squared	= -0.0006
Total	1641.65462	1566	1.04831074	Root MSE	= 1.0242

tempDiffY	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
tempDiffX	.0052752	.026898	0.20	0.845	-.0474847	.0580352
_cons	.0398369	.0258738	1.54	0.124	-.0109141	.0905878

Unit-root test

- Dickey–Fuller test is used to test for unit-roots.
- Critical values vary for different specifications (inclusion of trend or drift parameters).
- Inclusion of lagged values leads to the augmented version of the test.
- Testing is done under the null hypothesis of a unit-root and it is one sided. Therefore significantly negative values are need to reject the null hypothesis of non-stationary.

Definition

$$\triangle y_t = \sigma y_{t-1} + \varepsilon_t$$

drift: $\triangle y_t = \beta_0 + \sigma y_{t-1} + \varepsilon_t$

drift + trend: $\triangle y_t = \beta_0 + \beta_1 t + \sigma y_{t-1} + \varepsilon_t$

Serial correlation test

- Breusch–Godfrey test is used in STATA to test for serial correlation in the model with critical values from x^2distribution.
- Test is run after performing a regression.
- If model errors are serially correlated, your estimates are inconsistent.

Heteroskedasticity

- Breusch-Pagan test is used to test for heteroskedasticity.
- Heteroskedasticity implies that your data is not identically distributed.

Specification test

- There is always uncertainty if your model is correctly specified.
- Ramsey RESET test is used test for higher order polynomial transformation significance in the model.
- Rejection of null hypothesis indicates that there are possible omitted variables.

Jarque - Berra test

- For inference to be valid in the model, residuals should be normally distributed.
- Jarque - Berra test can be applied on the residuals of the model to test for the normality of the residuals distribution.

Specifying hypothesis

- Finding appropriate variables to test your hypothesis is an art form.
- It is possible to test only positive hypothesis.

Example

H_0 : Asset price returns follow CAPM model

Testing

- T- test is used to test single parameter significance.
- Overall significance and multiple restrictions are tested using F- test.
- R^2 gives you information how better is your model compared with no model.