

Bad functional form or autocorrelation?

```
. clear
. set obs 100
obs was 0, now 100
. gen t = _n
. tsset t
    time variable: t, 1 to 100
    delta: 1 unit

. * Generate y using log(t)/2 + normal error
. drawnorm e
. gen lt = log(t)
. gen es = .1*e
. gen y = lt/2 + es
```

```
. * Regression with misspecified model
. reg y t
```

Source	SS	df	MS			
Model	17.4689561	1	17.4689561	Number of obs =	100	
Residual	5.22990842	98	.053366412	F( 1, 98) =	327.34	
Total	22.6988645	99	.229281459	Prob > F =	0.0000	
				R-squared =	0.7696	
				Adj R-squared =	0.7672	
				Root MSE =	.23101	

	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
y						
t	.0144792	.0008003	18.09	0.000	.0128911	.0160674
_cons	1.071645	.046551	23.02	0.000	.979266	1.164024

```
. predict uhat, res
. ac uhat
. predict yhat
(option xb assumed; fitted values)
```

```
. * AR(1) test
. bgodfrey
```

Breusch-Godfrey LM test for autocorrelation

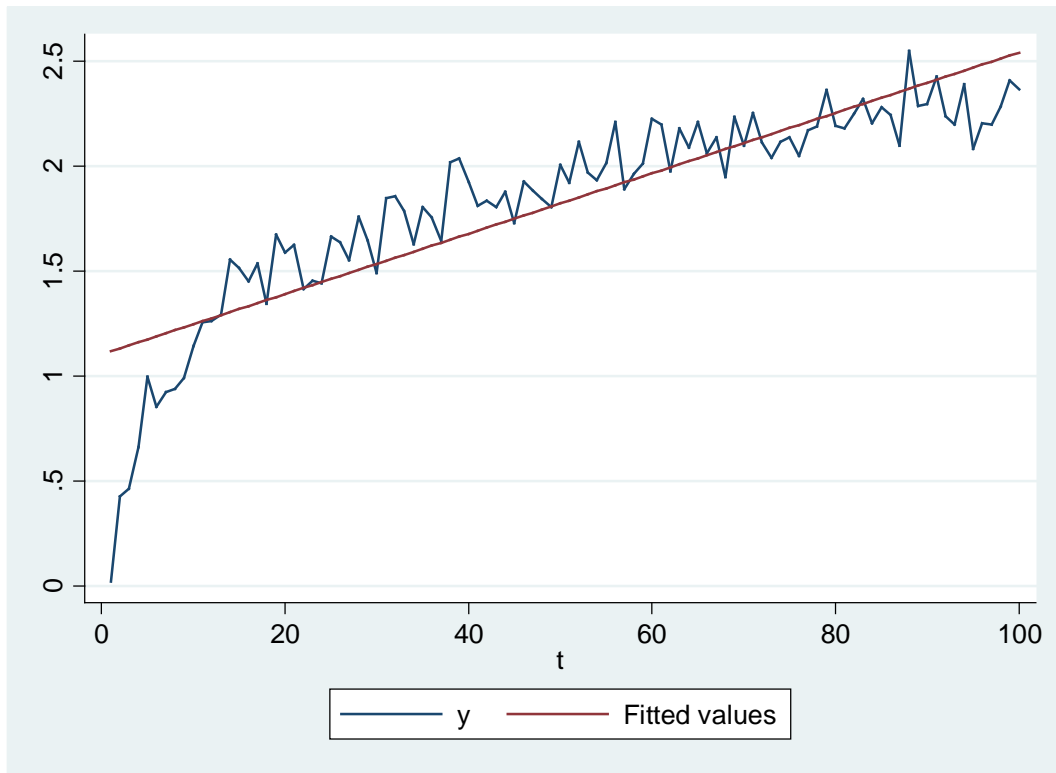
lags(p)	chi 2	df	Prob > chi 2
1	48.071	1	0.0000

H0: no serial correlation

```
. * RESET test for functional form
. ovtest
```

Ramsey RESET test using powers of the fitted values of y  
 Ho: model has no omitted variables  
 F(3, 95) = 104.74  
 Prob > F = 0.0000

```
. * Plots make the model appear autocorrelated  
. tsline y yhat
```



. \* Clearly, using HAC is not appropriate  
 . newey y t, lag(1)

Regression with Newey-West standard errors  
 maximum lag: 1

Number of obs = 100  
 F( 1, 98) = 101.44  
 Prob > F = 0.0000

y	Coef.	Newey-West Std. Err.	t	P> t	[95% Conf. Interval]	
t	.0144792	.0014376	10.07	0.000	.0116263	.0173322
_cons	1.071645	.093938	11.41	0.000	.8852281	1.258062

. reg y t

Source	SS	df	MS	Number of obs = 100		
Model	17.4689561	1	17.4689561	F( 1, 98) = 327.34		
Residual	5.22990842	98	.053366412	Prob > F = 0.0000		
Total	22.6988645	99	.229281459	R-squared = 0.7696		
				Adj R-squared = 0.7672		
				Root MSE = .23101		

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
t	.0144792	.0008003	18.09	0.000	.0128911	.0160674
_cons	1.071645	.046551	23.02	0.000	.979266	1.164024

. \* FGLS, this isn't right either  
 . prais y t, twostep

Iteration 0: rho = 0.0000  
 Iteration 1: rho = 0.6939

Prais-Winsten AR(1) regression -- twostep estimates

Source	SS	df	MS	Number of obs = 100		
Model	.833568537	1	.833568537	F( 1, 98) = 37.57		
Residual	2.17410464	98	.022184741	Prob > F = 0.0000		
Total	3.00767317	99	.030380537	R-squared = 0.2771		
				Adj R-squared = 0.2698		
				Root MSE = .14895		

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
t	.0156697	.0015774	9.93	0.000	.0125395	.0188
_cons	.9868478	.0927927	10.63	0.000	.8027038	1.170992
rho	.6939112					

Durbin-Watson statistic (original) 0.405044  
 Durbin-Watson statistic (transformed) 2.133055

. \* Correct specification  
 . reg y lt

Source	SS	df	MS	Number of obs =	100
Model	21.7715871	1	21.7715871	F( 1, 98) =	2300.95
Residual	.927277336	98	.009462014	Prob > F =	0.0000
Total	22.6988645	99	.229281459	R-squared =	0.9591
				Adj R-squared =	0.9587
				Root MSE =	.09727

y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lt	.5053061	.0105342	47.97	0.000	.4844014 .5262109
_cons	-.0351507	.0395324	-0.89	0.376	-.1136016 .0433001

. ovtest

Ramsey RESET test using powers of the fitted values of y  
 Ho: model has no omitted variables  
 F(3, 95) = 0.17  
 Prob > F = 0.9182

. bgodfrey

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi 2	df	Prob > chi 2
1	0.831	1	0.3619

H0: no serial correlation