

Selection of variables, interpreting the results of a regression

Source: D. Harrison and D.L. Rubinfeld (1978), "Hedonic Housing Prices and the Demand for Clean Air," *Journal of Environmental Economics and Management* 5, 81-102. (data Hprice2 in Wooldridge)
Unit of analysis census tract in the Boston area – Most data 1970 U.S. Census.

1. price	median housing price, \$
2. crime	crimes committed per capita
3. nox	nitrous oxide, parts per 100 million. (EPA standard 5.3)
4. rooms	avg number of rooms per house
5. dist	weighted dist. to 5 employ centers
6. stratio	average student-teacher ratio
7. radial	accessibiliy index to radial hghwys
8. proptax	property tax per \$1000
9. lowstat	% of people 'lower status'

Variable	Obs	Mean	Std. Dev.	Min	Max
price	506	22511.51	9208.856	5000	50001
nox	506	5.549783	1.158395	3.85	8.71
crime	506	3.611536	8.590247	.006	88.976
dist	506	3.795751	2.106137	1.13	12.13
rooms	506	6.284051	.7025938	3.56	8.78
stratio	506	18.45929	2.16582	12.6	22
radial	506	9.549407	8.707259	1	24
proptax	506	40.82372	16.85371	18.7	71.1
lowstat	506	12.70148	7.238066	1.73	39.07

1. Comparing the effect of different variables: the standardized coefficients

. reg price nox crime dist rooms stratio, beta

Source	SS	df	MS	Number of obs =	506
Model	2.7223e+10	5	5.4445e+09	F(5, 500) =	174.47
Residual	1.5603e+10	500	31205611.6	Prob > F =	0.0000
Total	4.2826e+10	505	84803032	R-squared =	0.6357
				Adj R-squared =	0.6320
				Root MSE =	5586.2

price	Coef.	Std. Err.	t	P> t	Beta
nox	-2706.433	354.0869	-7.64	0.000	-.340446
crime	-153.601	32.92883	-4.66	0.000	-.1432828
dist	-1026.806	188.1079	-5.46	0.000	-.2348385
rooms	6735.498	393.6037	17.11	0.000	.5138878
stratio	-1149.204	127.4287	-9.02	0.000	-.2702799
_cons	20871.13	5054.599	4.13	0.000	.

2. Functional forms for explanatory variables

Variables in logarithm ?

```
. reg lprice lnox lcrime ldlist rooms stratio
```

Source	SS	df	MS	Number of obs = 506		
Model	51.0873007	5	10.2174601	F(5, 500) = 152.52		
Residual	33.4949703	500	.066989941	Prob > F = 0.0000		
				R-squared = 0.6040		
				Adj R-squared = 0.6000		
Total	84.5822709	505	.167489645	Root MSE = .25882		

lprice	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnox	-.6291964	.1310502	-4.80	0.000	-.8866733	-.3717195
lcrime	-.0488715	.0097343	-5.02	0.000	-.0679967	-.0297462
ldlist	-.1662653	.0425758	-3.91	0.000	-.2499148	-.0826159
rooms	.2539682	.0180986	14.03	0.000	.2184094	.2895269
stratio	-.0423932	.0060981	-6.95	0.000	-.0543742	-.0304122
_cons	10.35239	.3431598	30.17	0.000	9.678178	11.0266

Using quadratic terms?

```
. g rooms2=rooms*rooms
. reg lprice lnox lcrime ldlist rooms rooms2 stratio
```

Source	SS	df	MS	Number of obs = 506		
Model	53.1773108	6	8.86288514	F(6, 499) = 140.82		
Residual	31.4049601	499	.062935792	Prob > F = 0.0000		
				R-squared = 0.6287		
				Adj R-squared = 0.6242		
Total	84.5822709	505	.167489645	Root MSE = .25087		

lprice	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnox	-.520841	.1284069	-4.06	0.000	-.7731258	-.2685561
lcrime	-.0561555	.0095195	-5.90	0.000	-.0748587	-.0374523
ldlist	-.1159846	.0421797	-2.75	0.006	-.1988562	-.033113
rooms	-.6715385	.1615584	-4.16	0.000	-.9889571	-.3541199
rooms2	.0720549	.0125037	5.76	0.000	.0474885	.0966212
stratio	-.0352685	.0060386	-5.84	0.000	-.0471327	-.0234043
_cons	12.90703	.5542136	23.29	0.000	11.81815	13.99591

3. Choosing among non-nested models: using ldlist or dist and dist2 ?

```
. g dist2=dist*dist
. reg lprice lnox lcrime dist dist2 rooms rooms2 stratio
```

Source	SS	df	MS	Number of obs = 506		
Model	53.6163991	7	7.65948558	F(7, 498) = 123.18		
Residual	30.9658719	498	.062180466	Prob > F = 0.0000		
				R-squared = 0.6339		
				Adj R-squared = 0.6288		
Total	84.5822709	505	.167489645	Root MSE = .24936		

lprice	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnox	-.5300139	.1297682	-4.08	0.000	-.7849745	-.2750533
lcrime	-.0539734	.0094575	-5.71	0.000	-.0725549	-.0353919
dist	-.0156409	.0303649	-0.52	0.607	-.0753001	.0440182
dist2	-.0016196	.0024896	-0.65	0.516	-.0065111	.0032718
rooms	-.7130894	.1606635	-4.44	0.000	-1.028751	-.3974277
rooms2	.0748772	.0124341	6.02	0.000	.0504475	.099307
stratio	-.0362217	.006024	-6.01	0.000	-.0480572	-.0243861
_cons	13.04218	.5581061	23.37	0.000	11.94565	14.13871