

```
. sysuse auto
(1978 Automobile Data)

.
. ** We're going to explain price of automobiles using mileage, headroom, weight,
. ** length, turning ability, displacement (engine size), and gear ratio (speed).
.
. reg price mpg headroom weight length turn displacement gear_ratio, vce(robust)
```

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Linear regression               Number of obs   =          74
                               F(7, 66)         =           6.58
                               Prob > F          =          0.0000
                               R-squared          =          0.4709
                               Root MSE       =         2256.3
```

price	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
mpg	-108.6086	93.04892	-1.17	0.247	-294.3867	77.16957
headroom	-583.8815	298.1224	-1.96	0.054	-1179.102	11.33912
weight	4.782347	2.066109	2.31	0.024	.6572272	8.907467
length	-67.11675	56.22181	-1.19	0.237	-179.3672	45.13371
turn	-314.0295	152.188	-2.06	0.043	-617.8826	-10.17627
displacement	12.08319	6.766538	1.79	0.079	-1.426637	25.59302
gear_ratio	2284.028	1010.053	2.26	0.027	267.3925	4300.663
_cons	11580.16	8035.355	1.44	0.154	-4462.939	27623.27

```
.
. ** By default Stata will test for overall significance. That is,
. ** H0: all regressor betas are zero
. ** Ha: at least one regressor beta is not zero
.
. ** Stata output shows a p-value of Prob > F = 0.0000.
. ** So we reject the null and conclude that at least one beta is nonzero.
. ** In words, we conclude that the combination of regressors does explain
. ** price at any conventional significance level.
.
. ** We could also compare the F-statistic of F(7,66) = 6.58 to the critical
. ** value. Find the critical value using the invFtail command.
.
. di invFtail(7,66,0.05)
2.1518392
.
. ** This gives a critical value of 2.1518392. The F-statistic exceeds the
. ** critical value, so we reach the same conclusion. Note that the number
. ** 7 is the number of regressors being tested, and 66 is the number of
. ** observations minus the number of things being estimated (74 - 8).
.
. ** Notice that headroom and displacement are both individually statistically
. ** insignificant at 5%. In words, headroom and displacement don't explain price
. ** when considered in isolation at 5% significance. It is possible that they
. ** do explain price when their explanatory power is combined, however.
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. ** Let's test that.
.
. test headroom displacement

( 1) headroom = 0
( 2) displacement = 0

      F( 2, 66) = 3.24
      Prob > F = 0.0455

.
. ** H0: the beta for headroom and the beta for displacement are both zero
. ** Ha: the beta for headroom or the beta for displacement is nonzero
.
. ** This gives a p-value of Prob > F = 0.0455. So even though headroom and
. ** displacement have no explanatory power individually at 5% significance, they
. ** have combined (i.e. joint) explanatory power at 5% significance.
.
. ** We could also compare the F-statistic of F(2,66) = 3.24 to the critical
. ** value. Find the critical value using the invFtail command.
.
. di invFtail(2,66,0.05)
3.1359179

.
. ** This gives a critical value of 3.1359179. The F-statistic exceeds the
. ** critical value, so we reach the same conclusion. Note that the number
. ** 2 is the number of regressors being tested, and 66 is the number of
. ** observations minus the number of things being estimated (74 - 8).

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