An empirical example for multiple regression

There might be omitted regressors in our previous regression that examined the relationship between tests scores and student- teacher ratios.

Candidates for regressors are:

(i) Percent of English learners (EL_PCT)
(ii) District average income (in $1,000's; AVG_INC)

Dependent Variable: TESTSCR
Method: Least Squares
Date: 10/05/15 Time: 11:12
Sample: 1 420
Included observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	686.0322	7.411312	92.56555	0.0000
STR	-1.101296	0.380278	-2.896026	0.0040
EL_PCT	-0.649777	0.039343	-16.51588	0.0000

R-squared	0.426431	Mean dependent var	654.1565
Adjusted R-squared	0.423680	S.D. dependent var	19.05335
S.E. of regression	14.46448	Akaike info criterion	8.188387
Sum squared resid	87245.29	Schwarz criterion	8.217246
Log likelihood	-1716.561	Hannan-Quinn criter.	8.199793
F-statistic	155.0136	Durbin-Watson stat	0.685575
Prob(F-statistic)	0.000000		

Questions:

(i) Is the new regressor statistically significant?

(ii) Does the coefficient estimate of student-teacher ratio change with the added regressor?

(iii) How did R-square change relative to the previous simple regression?

(iv) How did adjusted R-square change relative to the previous simple regression?

(v) What happened to the values of AIC and BIC with the new regressor?

Dependent Variable: TESTSCR
Method: Least Squares
Date: 10/05/15 Time: 11:20
Sample: 1 420
Included observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	638.7292	7.449077	85.74608	0.0000
STR	-0.648740	0.354405	-1.830505	0.0679
AVGINC	1.839112	0.092787	19.82083	0.0000

R-squared	0.511483	Mean dependent var	654.1565
Adjusted R-squared	0.509140	S.D. dependent var	19.05335
S.E. of regression	13.34904	Akaike info criterion	8.027883
Sum squared resid	74308.11	Schwarz criterion	8.056742
Log likelihood	-1682.856	Hannan-Quinn criter.	8.039290
F-statistic	218.3020	Durbin-Watson stat	0.642571
Prob(F-statistic)	0.000000		

Questions:

(i) Is the new regressor statistically significant?

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(iii) How did R-square change relative to the previous simple regression?

(iv) How did adjusted R-square change relative to the previous simple regression?

(v) What happened to the values of AIC and BIC with the new regressor?

Dependent Variable: TESTSCR
Method: Least Squares
Date: 10/05/15 Time: 11:23
Sample: 1 420
Included observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	640.3155	5.774885	110.8793	0.0000
STR	-0.068776	0.276908	-0.248370	0.8040
EL_PCT	-0.488267	0.029283	-16.67394	0.0000
AVGINC	1.494517	0.074833	19.97124	0.0000

R-squared	0.707180	Mean dependent var	654.1565
Adjusted R-squared	0.705068	S.D. dependent var	19.05335
S.E. of regression	10.34742	Akaike info criterion	7.520829
Sum squared resid	44540.73	Schwarz criterion	7.559308
Log likelihood	-1575.374	Hannan-Quinn criter.	7.536038
F-statistic	334.8893	Durbin-Watson stat	1.190046
Prob(F-statistic)	0.000000		

Questions:

(i) Are regressors statistically significant?
(ii) Does the coefficient estimate of student-teacher ratio change with the added regressors?
(iii) How did R-square change relative to the previous regressions?
(iv) How did adjusted R-square change relative to the previous regressions?
(v) What happened to the values of AIC and BIC with the new regressors?

Correlation coefficient matrix

	STR	EL_PCT	AVGINC
STR	1.000000	0.187642	-0.232194
EL_PCT	0.187642	1.000000	-0.307419
AVGINC	-0.232194	-0.307419	1.000000