Linear Regression for Business Statistics

Hypothesis Testing in a regression context

- The t-cutoff approach
- The p-value approach
- *The confidence interval approach*

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Linear Regression for Business Statistics

The confidence interval approach to Hypothesis Testing

H_0: $\beta_2 = 500$
H_A: $\beta_2 \neq 500$

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The confidence interval approach to Hypothesis Testing

Step 1 **: Formulate Hypothesis**

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The confidence interval approach to Hypothesis Testing

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Step 2 **: Consider the 95% confidence interval for** β_2

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= [212.6, 1084.6]

Linear Regression for Business Statistics

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Conclusion:

- **Since 500 falls in the confidence interval, hence do not reject the Null hypothesis.**
- **We cannot reject the H_0 for any value that is in the confidence interval.**

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Perform the hypothesis test at an alpha level $\alpha = 0.01$

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Linear Regression for Business Statistics

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Linear Regression for Business Statistics

p-values and their importance in interpreting regression results

$$Sales = \beta_0 + \beta_1 Price + \beta_2 AdExp + \beta_3 PromExp$$

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ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	197798832.8	65932944	40.56262	1.0848E-08
Residual	20	32509212.11	1625461		
Total	23	230308045			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-25096.83	24859.61131	-1.009542	0.324773	-76953.0734	26759.408
Price ($)	-5055.27	526.3995537	-9.603484	6.22E-09	-6153.32009	-3957.22
Adexp ('000$)	648.61214	209.0048787	3.103335	0.005602	212.635603	1084.5887
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- **Failure to reject the hypothesis (a high p-value) implies an insignificant impact.**
- **Low p-values (*less than* α) are good.**

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- **Reject the Null hypothesis that $\beta_2 = 0$.**
- *Advertising expenditure is an important variable in explaining Sales.*

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