

Simple Linear Regression Analysis is used to

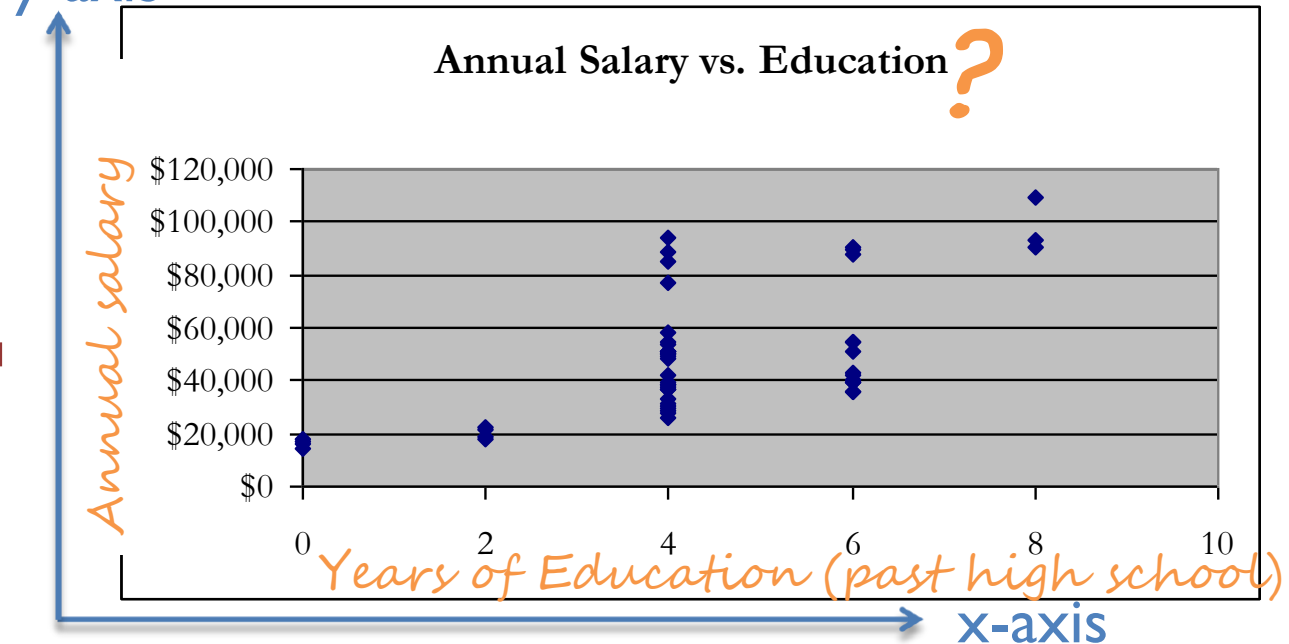
- Explain the impact of one variable on another

*changes in
independent*

y-axis

Dependent variable

the variable you wish to explain



Independent variable:

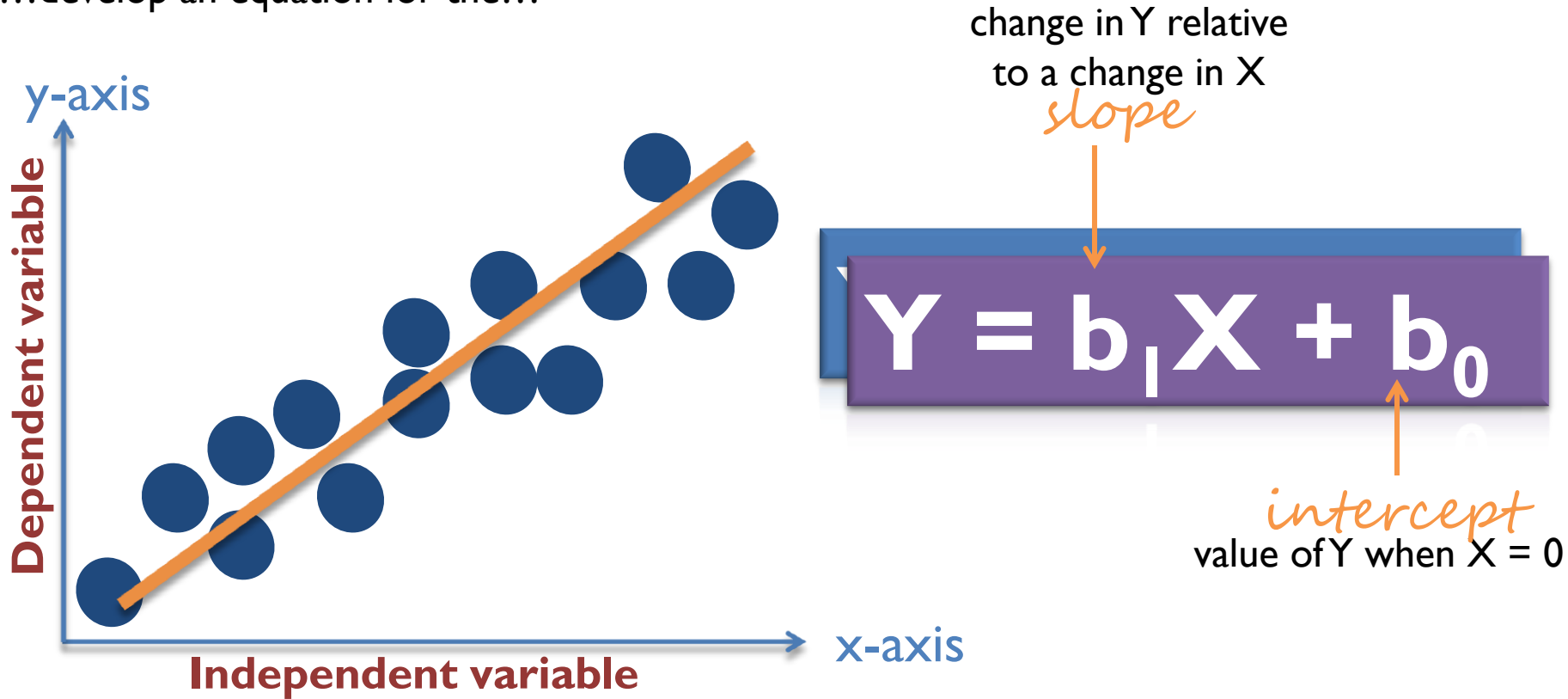
the variable used to explain the dependent variable

Simple Linear

Regression Analysis *is also used to*

► *Quantify linear relationships*

...develop an equation for the...



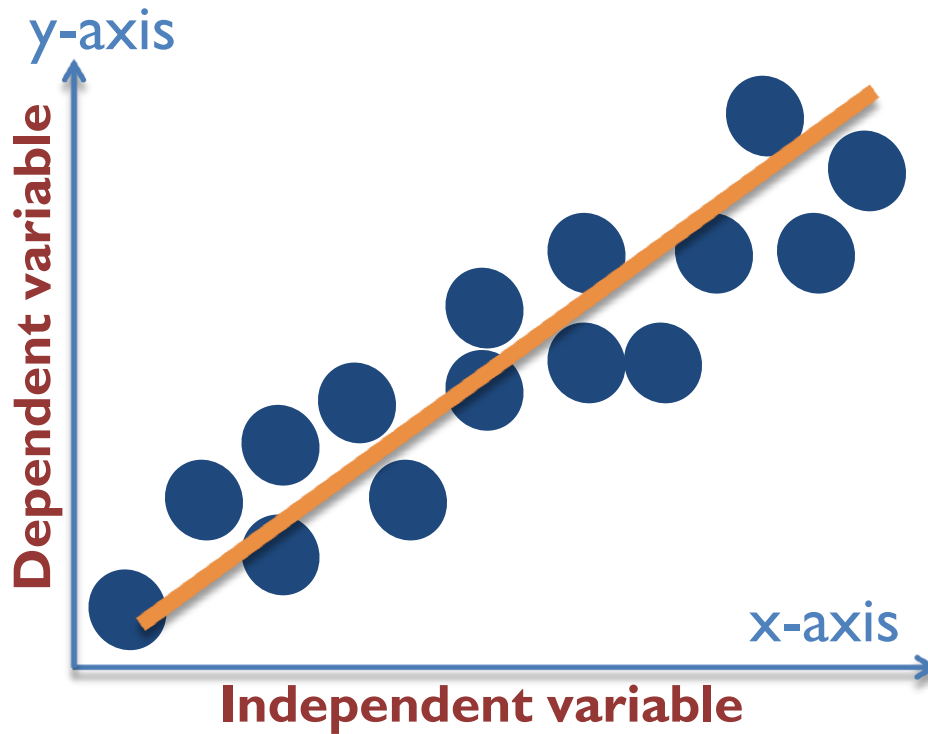
The purpose of regression analysis is calculate estimates of the slope and intercept.

Simple Linear

Regression Analysis *is also used to*

► *Quantify linear relationships*

...develop an equation for the...



=SLOPE(y-range, x-range)

change in Y relative
to a change in X

slope

$$Y = b_1 X + b_0$$

intercept

value of Y when X = 0

=INTERCEPT(y-range, x-range)

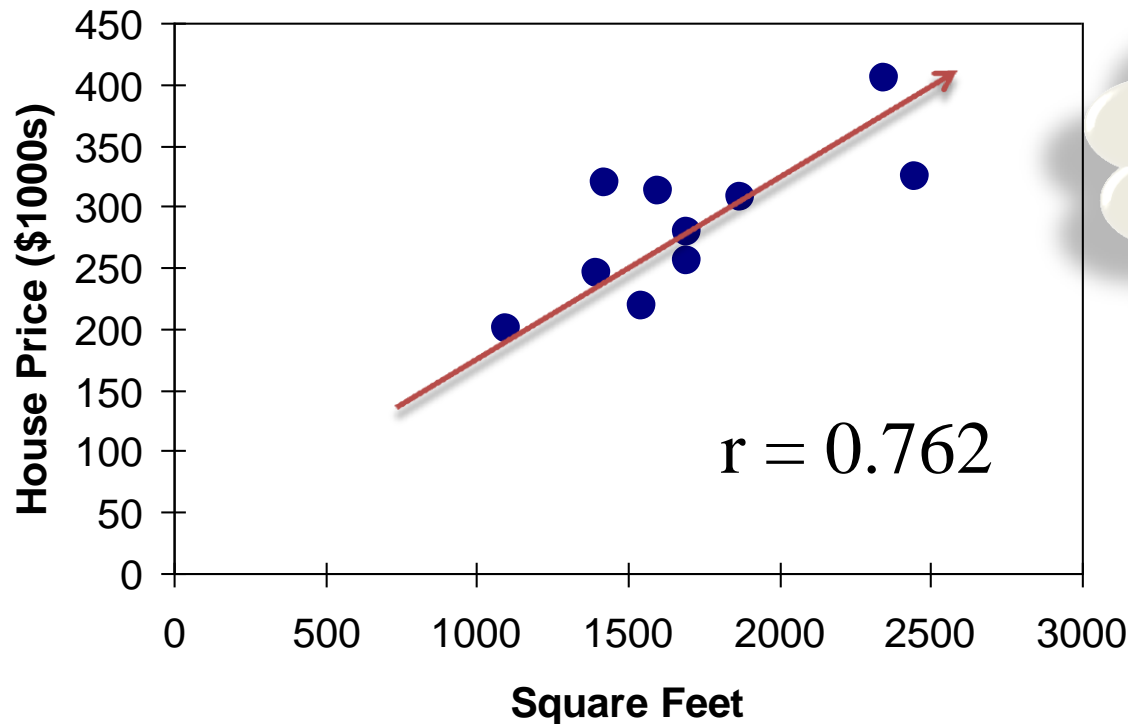
The purpose of regression analysis is calculate estimates of the slope and intercept.

► using LEAST SQUARES ESTIMATION

Linear Regression Example

Scatterplot

► House price model: scatter plot



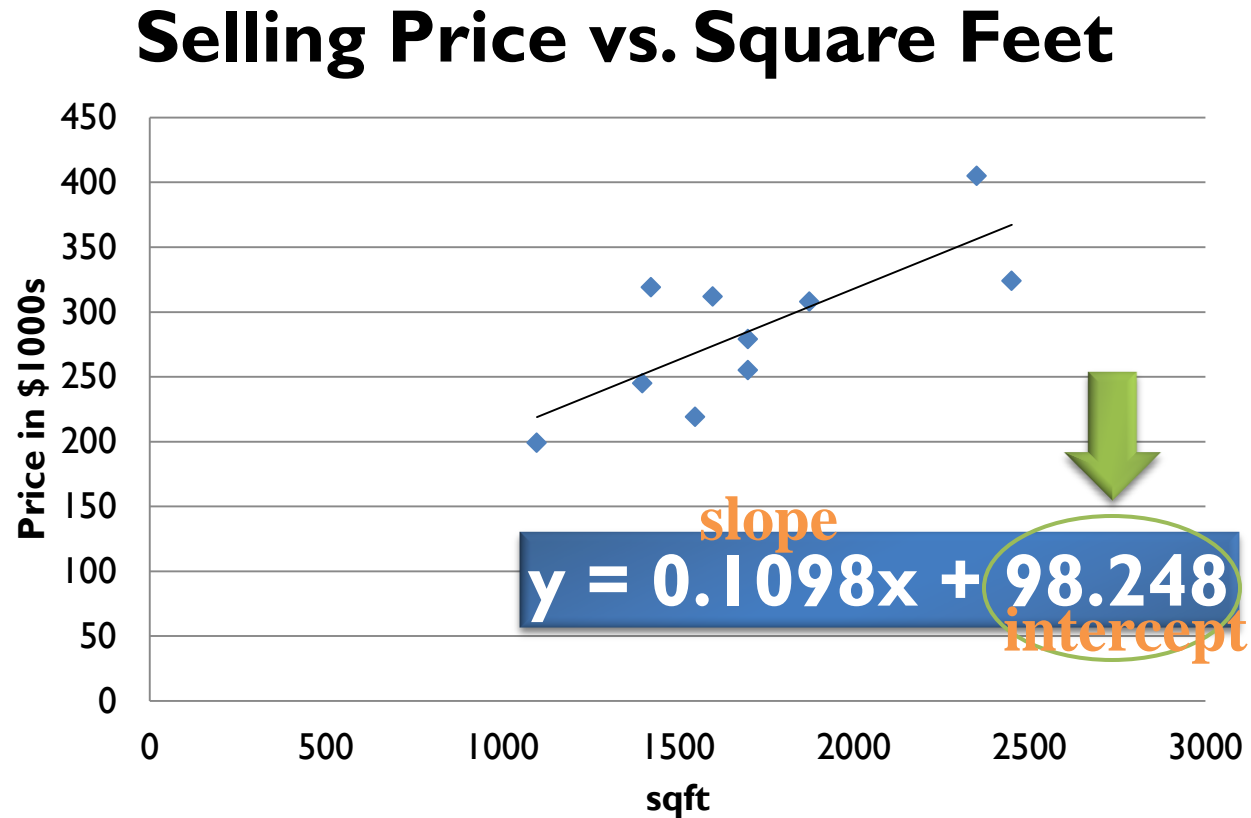
*(1) Describe
the
relationship...*

► House price model: scatter plot and regression line *trendline*

- b_0 is the estimated mean value of Y when the value of X is 0

(if $X = 0$ is in the range of observed X values)

Because the square footage of the house cannot be 0, the Y intercept has no practical application.



(2) Model the Data...

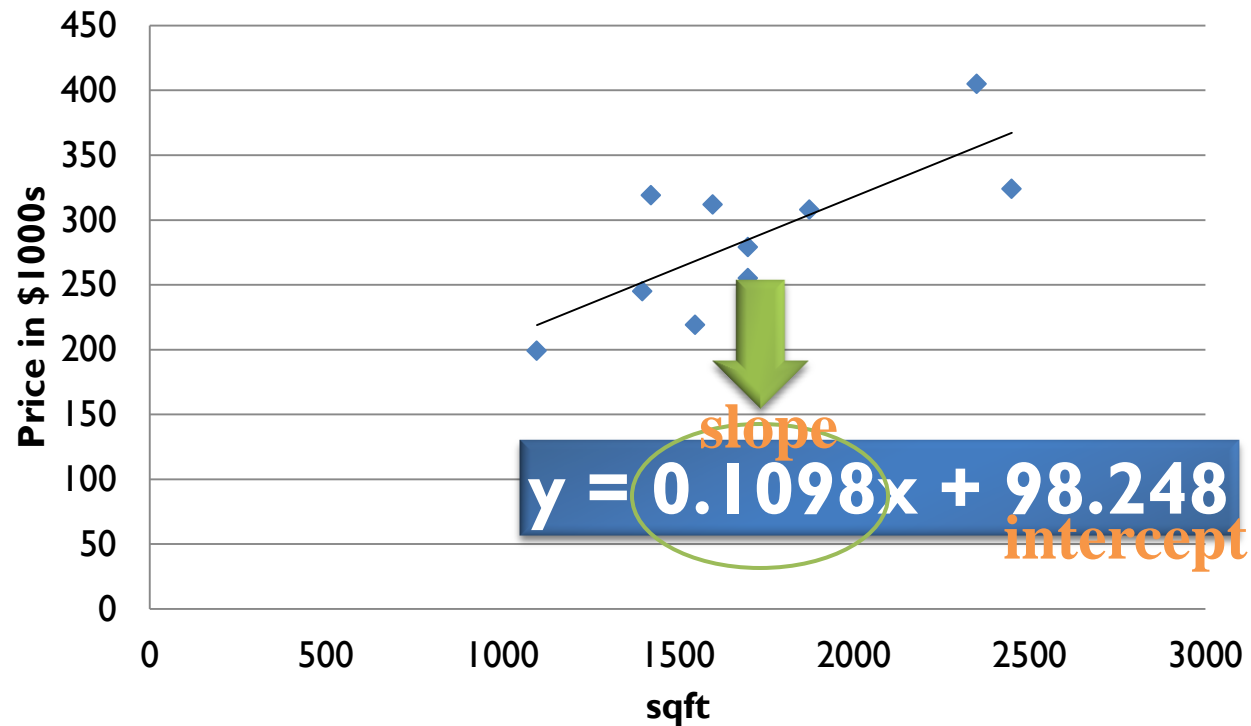
and interpret
Calculate the regression coefficients

- ▶ House price model: scatter plot and regression line *trendline*

- ▶ b_1 measures the mean change in the average value of Y as a result of a one-unit change in X

The mean value of a house increases by $0.1098(\$1000) = \109.80 , on average, for each additional one square foot of size

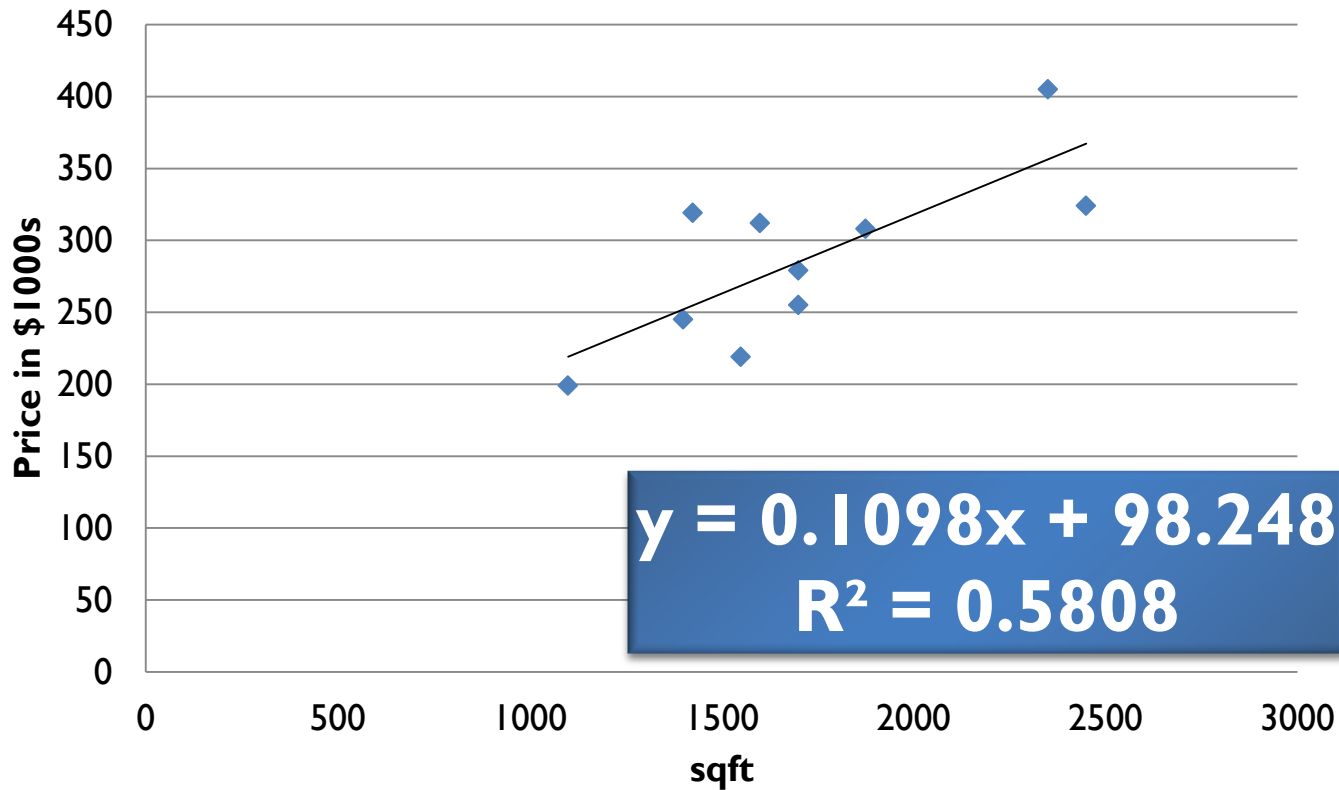
Selling Price vs. Square Feet



(2) Model
the Data...

and interpret
Calculate the regression coefficients

Selling Price vs. Square Feet



58% of the variability in the PRICE of a home is explained by using the SIZE of the home.

(3) Evaluate the Model...

Calculate R^2

Standard Error of Estimate

- ▶ The standard deviation of the observations around the regression line.

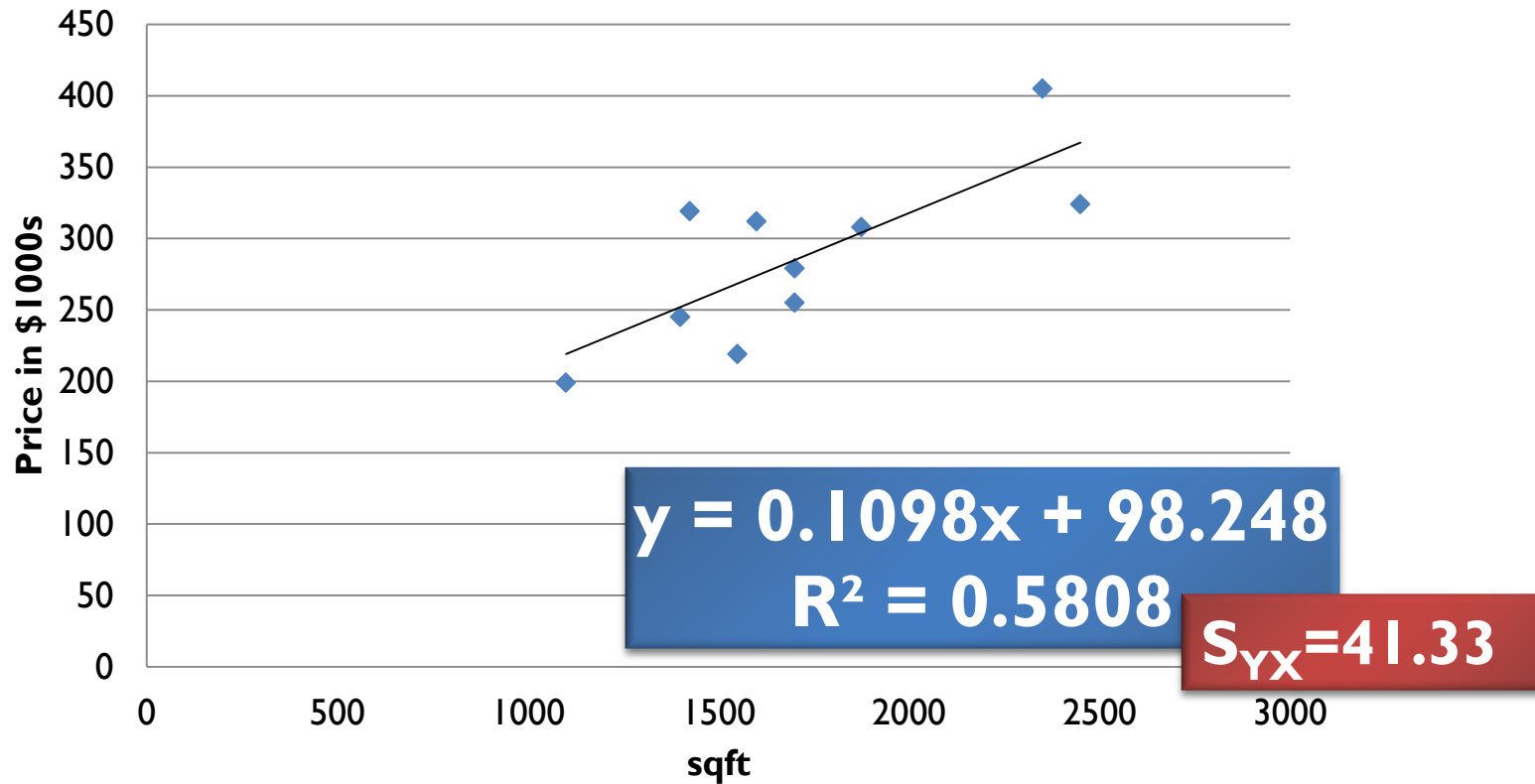
When predicting, this is the stdev of the predictions

	A	B	C
1	House Price in \$1000s	Square Feet	
2	(Y)	(X)	
3	245	1400	
4	312	1600	
5	279	1700	
6	308	1875	
7	199	1100	
8	219	1550	
9	405	2350	
10	324	2450	
11	319	1425	
12	255	1700	
13			
14	SLOPE	0.109768	
15	INTERCEPT	98.248330	
16			
17	R ²	0.580817	
18	STEYX	=STEYX(A3:A12,B3:B12)	
19		STEYX(known_y's, known_x's)	

(3) Evaluate the Model...

Calculate R² and std error

Selling Price vs. Square Feet



**(3) Evaluate
the Model...**

Calculate R^2 and std error