SO FAR...

$$\hat{y}_i = b_0 + b_1 x_i$$

SO FAR...

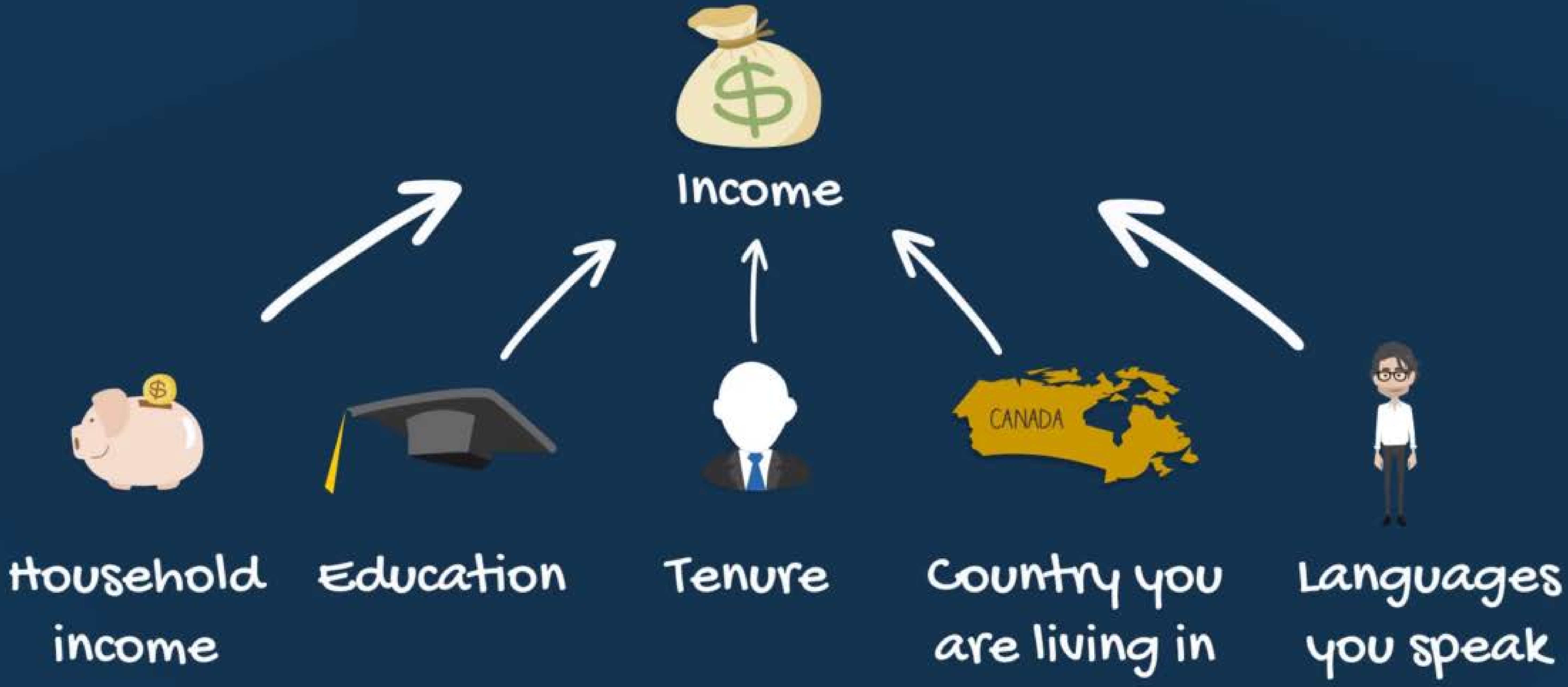
$$\hat{y}_i = b_0 + b_1 x_i$$

dependent variable

single regressor

Income


Income
Education


Income
CANADA
Household income
Education
Tenure
Country you are living in
Languages you speak

House price


House price
Size


House price
calendar
Location
Size
Year

$$\text{College GPA} = 0.275 + 0.0017 * \text{SAT}$$

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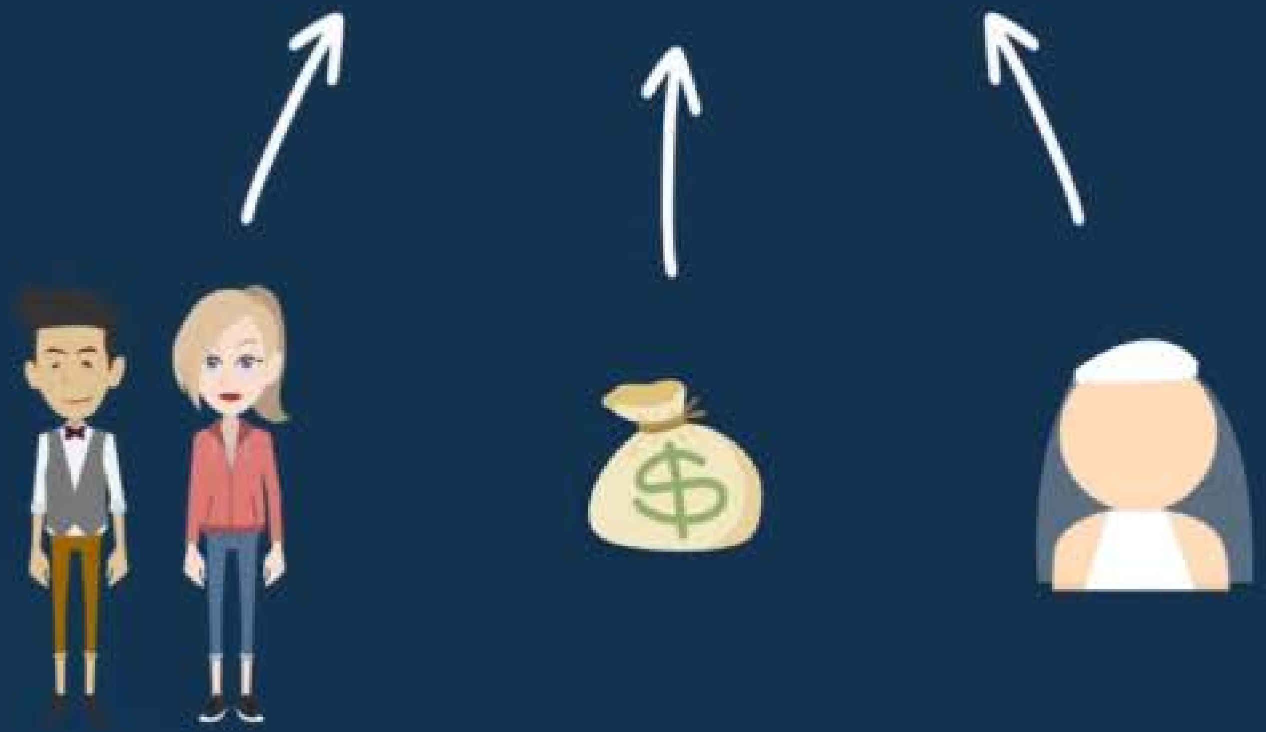

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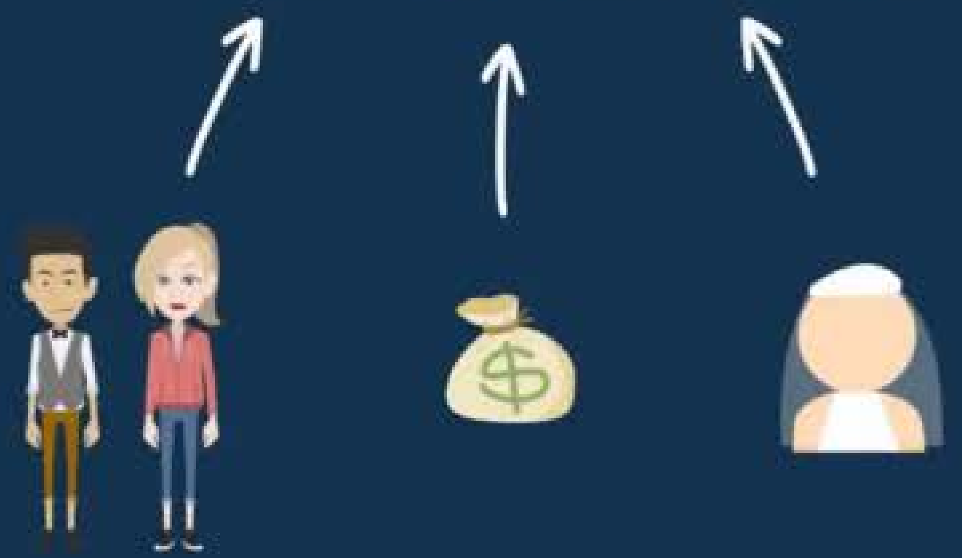

Good models require multiple regressions, in order to address the higher complexity of problems

College GPA = 0.275+0.0017*SAT

POPULATION MODEL

$$\gamma = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

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$$\gamma = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

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MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

inferred value

intercept

MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \cdots + b_kx_k$$

independent variable

independent variable

independent variable

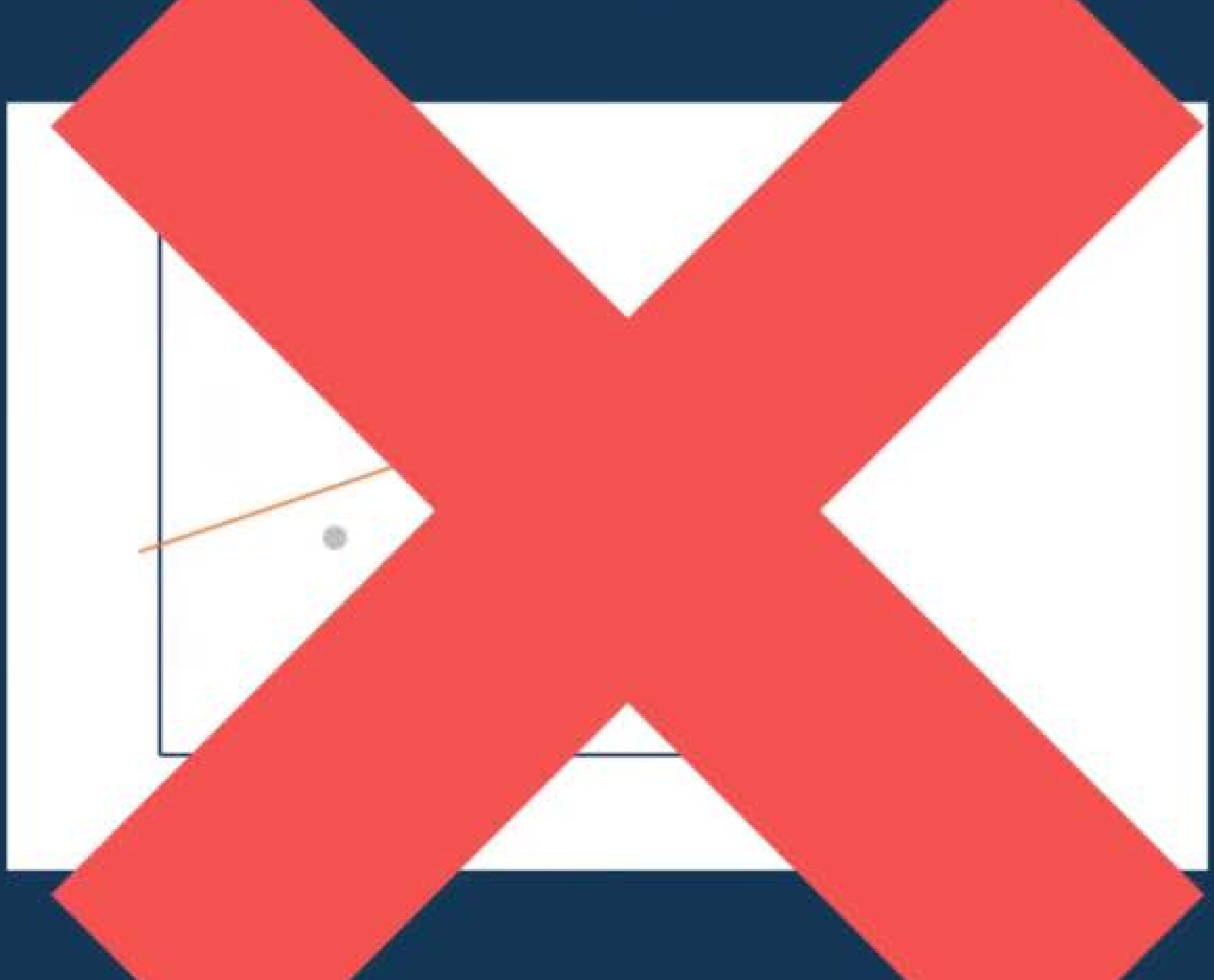
MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

coefficient coefficient coefficient

MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$



MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

After 3 dimensions, there is no visual way to represent the data

MULTIPLE REGRESSION EQUATION

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IT'S ABOUT THE BEST FITTING

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$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \cdots + b_kx_k$$

IT'S ABOUT THE BEST FITTING MODEL

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MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

min **SSE**

MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

min SSE

SSE

SSR

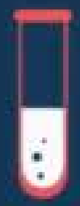
MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

min **SSE**

SSE $\downarrow$

SSR $\uparrow$



MULTIPLE REGRESSION EQUATION

$$\hat{y} = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$$

min **SSE**

SSE $\downarrow$ **SSR** $\uparrow$