ECON 4730/5730

Data, Econometrics & Forecasting

College of Business
Department of Economics

Data, Econometrics & Forecasting

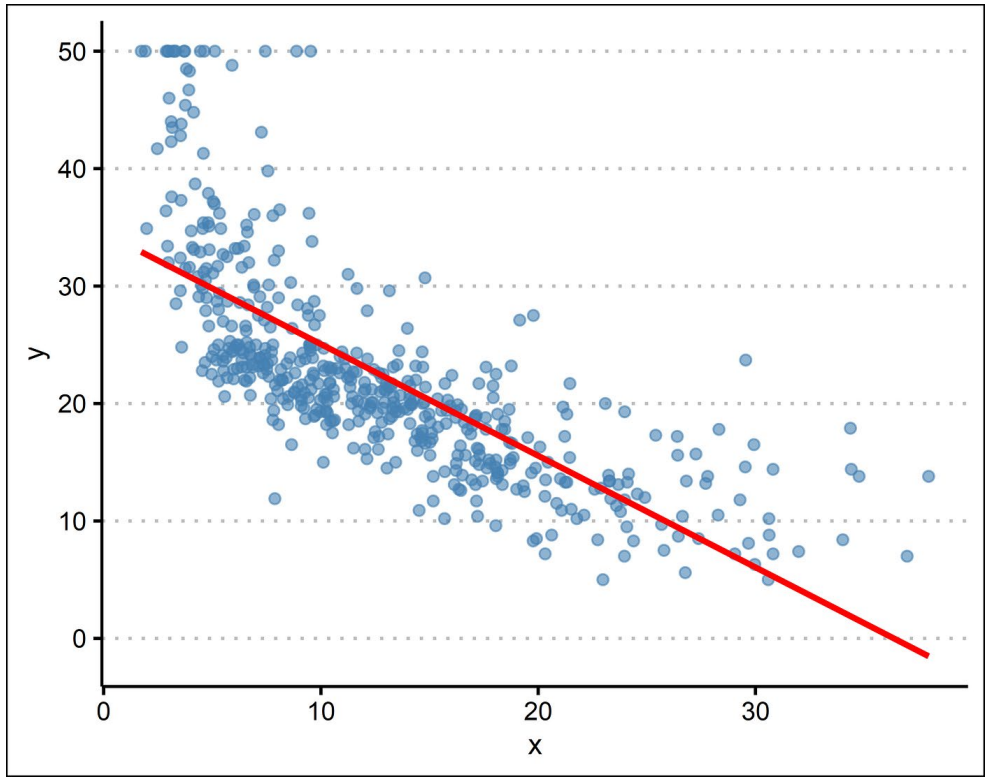
- Data Sources (National)
  - Bureau of Economic Analysis (BEA)
  - Bureau of Labor Statistics (BLS)
  - Federal Reserve Economic Database (FRED)
- Data Sources (Wyoming)
  - Economic Analysis Department (EAD)
  - Wyoming Geospatial Hub (WYGISC)

Data, Econometrics & Forecasting

- Subscriptions and Software Programs
  - IMPLAN
  - Regional Economic Model Inc. (REMI)
  - Dun & Bradstreet (D&B)
  - Moody's Analytics
  - Qualtrics
  - Lightcast & Alumni Pathways

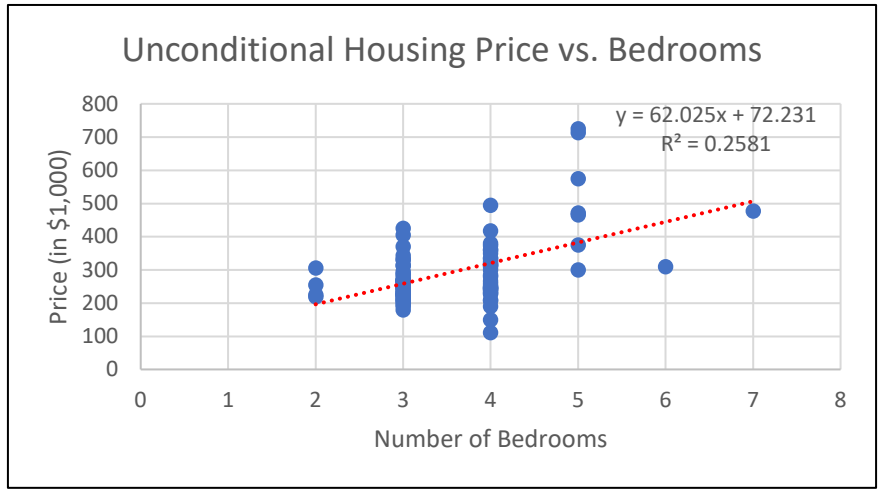
Data, Econometrics & Forecasting

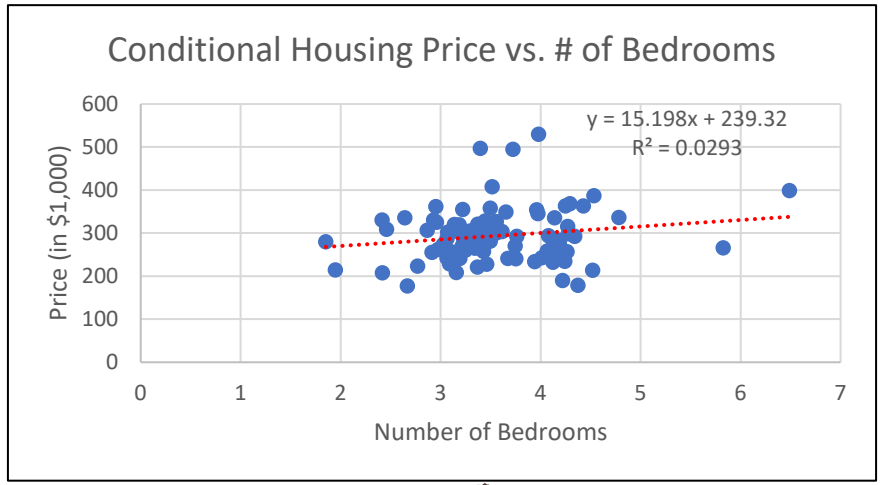
- Econometrics
  - Data types: cross sectional, time series, panel (longitudinal)
  - Regression: $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$, where $i = 1, \ldots, n$
  - β_0 is the intercept
  - β_1 is the slope
  - Goodness of fit: How much variation in y is explained by x?
  - Coefficient of determination: $0 \leq R^2 = \frac{ESS}{TSS} \leq 1$



Data, Econometrics & Forecasting

- Econometrics (continued)
  - Multivariate regressions can replicate a controlled experiment
  - Housing price hedonics: $P_i = \beta_0 + \beta_1 SQFT_i + \beta_2 BDRM_i + \varepsilon_i$
  - $\beta_2 = \frac{\partial P_i}{\partial BDRM_i} > 0 \; or \; \beta_2 = \frac{\partial P_i}{\partial BDRM_i} < 0$?
  - Remember, β_2 is a partial derivative so $SQFT_i$ is held constant.
  - Bedroom value (β_2) depends on the preference of the buyer.
  - Application: Business Council grants.





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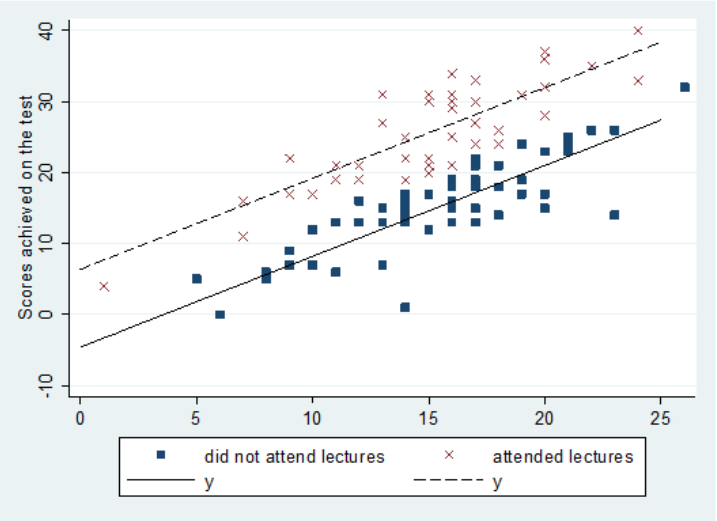
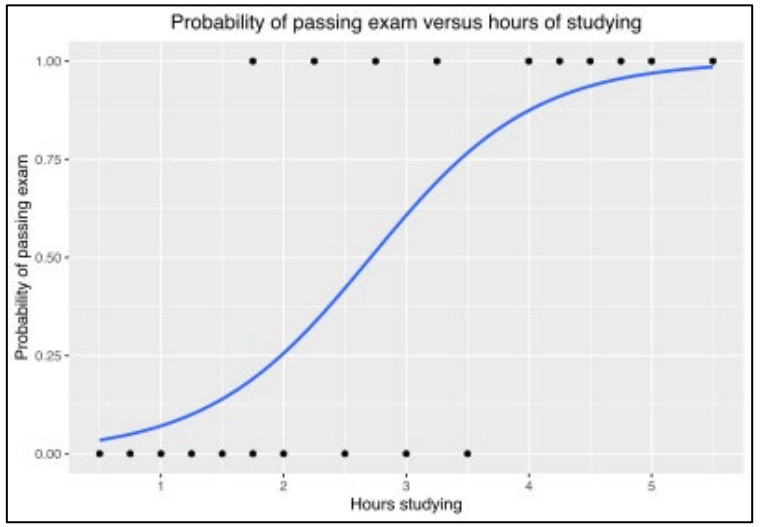
- Econometrics (continued)
  - Some explanatory variables are binary rather
  - $P_i = \beta_0 + \beta_1 SQFT_i + \beta_2 BDRM_i + \beta_3 POOL_i + \varepsilon_i$
  - $POOL_i = 0 \; or \; 1$
  - β_3 is the premium for a pool, all else equal
  - Some dependent variables are binary
  - Typically estimated with a logit or probit model





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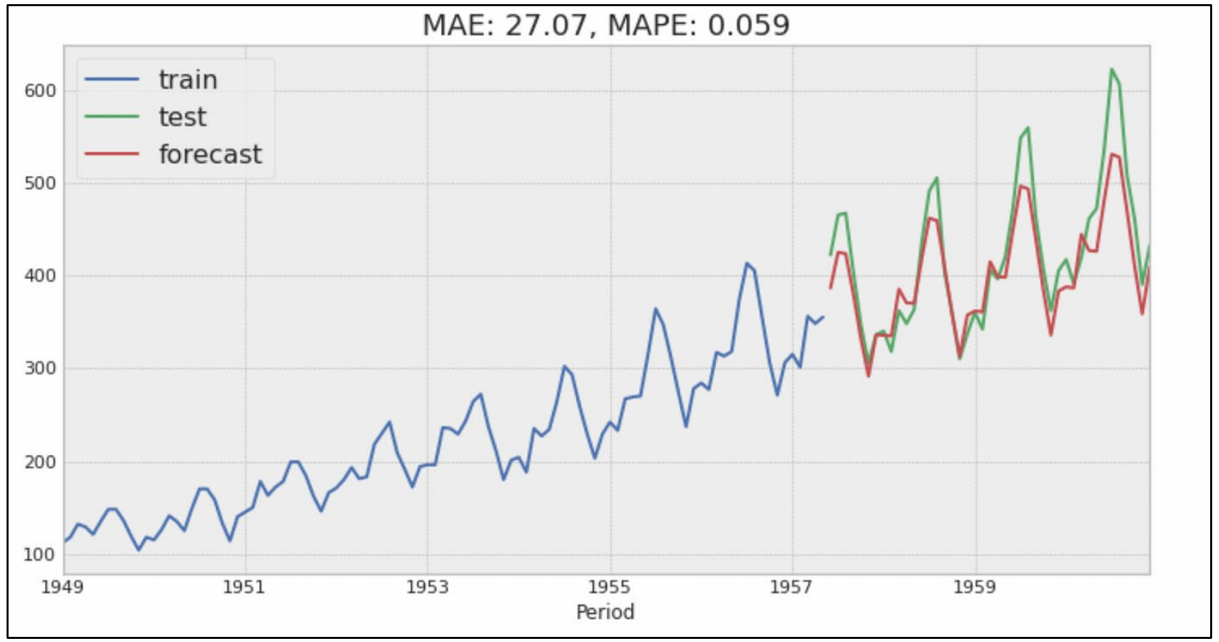
- Time Series Forecasting
  - Methods: Regression, Exponential Smoothing, ARIMA
  - Forecasting Steps:
    - Define the problem
    - Gather information
    - Preliminary exploratory analysis
    - Choose and fit models
    - Evaluate forecasting model
  - Training and Test Datasets



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- ARIMA model: $y'_t = c + \phi_1 y'_{t-1} + \cdots + \phi_p y'_{t-p} + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \cdots + \theta_q \varepsilon_{t-q}$
- ARIMA spreadsheet for AR(2) and MA(2)
- Application: ARIMA forecasting for Black Hills Energy Corp.