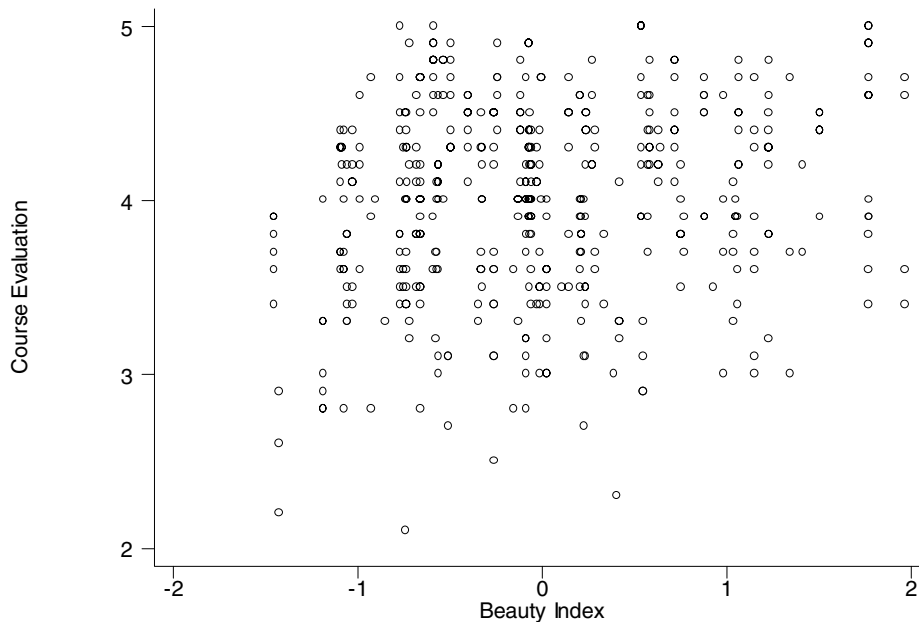


Chapter 4

Linear Regression with One Regressor

■ Solutions to Empirical Exercises

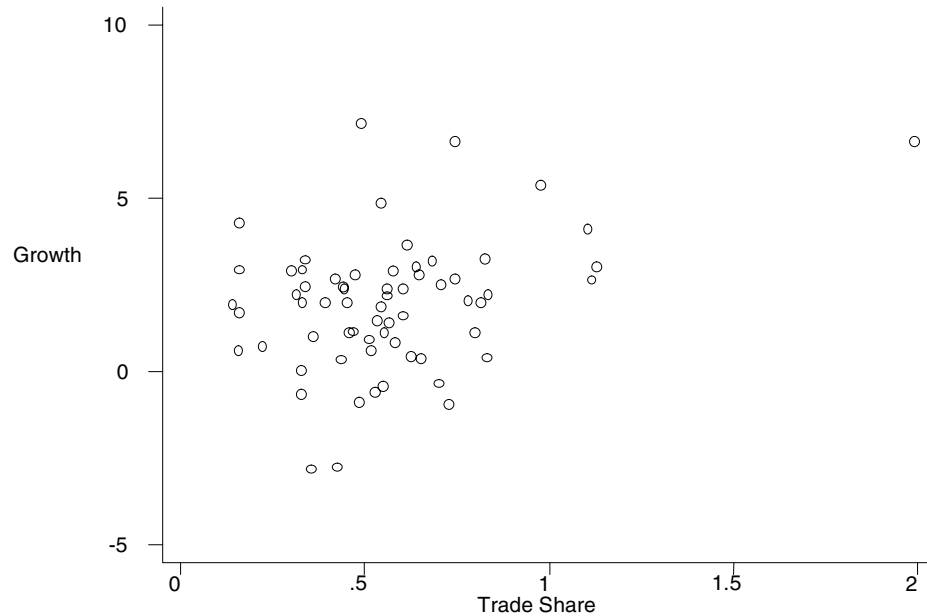
1. (a) $\widehat{AHE} = 3.32 + 0.45 \times Age$
Earnings increase, on average, by 0.45 dollars per hour when workers age by 1 year.
 - (b) Bob's predicted earnings = $3.32 + 0.45 \times 26 = \11.70
Alexis's predicted earnings = $3.32 + 0.45 \times 30 = \13.70
 - (c) The R^2 is 0.02. This means that age explains a small fraction of the variability in earnings across individuals.
2. (a)



There appears to be a weak positive relationship between course evaluation and the beauty index.

- (b) $\widehat{Course_Eval} = 4.00 + 0.133 \times Beauty$. The variable *Beauty* has a mean that is equal to 0; the estimated intercept is the mean of the dependent variable (*Course_Eval*) minus the estimated slope (0.133) times the mean of the regressor (*Beauty*). Thus, the estimated intercept is equal to the mean of *Course_Eval*.
- (c) The standard deviation of *Beauty* is 0.789. Thus
Professor Watson's predicted course evaluations = $4.00 + 0.133 \times 0 \times 0.789 = 4.00$
Professor Stock's predicted course evaluations = $4.00 + 0.133 \times 1 \times 0.789 = 4.105$

- (d) The standard deviation of course evaluations is 0.55 and the standard deviation of beauty is 0.789. A one standard deviation increase in beauty is expected to increase course evaluation by $0.133 \times 0.789 = 0.105$, or $1/5$ of a standard deviation of course evaluations. The effect is small.
- (e) The regression R^2 is 0.036, so that *Beauty* explains only 3.6% of the variance in course evaluations.
3. (a) $\widehat{Ed} = 13.96 - 0.073 \times Dist$. The regression predicts that if colleges are built 10 miles closer to where students go to high school, average years of college will increase by 0.073 years.
- (b) Bob's predicted years of completed education = $13.96 - 0.073 \times 2 = 13.81$
 Bob's predicted years of completed education if he was 10 miles from college = $13.96 - 0.073 \times 1 = 13.89$
- (c) The regression R^2 is 0.0074, so that distance explains only a very small fraction of years of completed education.
- (d) SER = 1.8074 years.
4. (a)



Yes, there appears to be a weak positive relationship.

- (b) Malta is the “outlying” observation with a trade share of 2.
- (c) $\widehat{Growth} = 0.64 + 2.31 \times Tradeshare$
 Predicted growth = $0.64 + 2.31 \times 1 = 2.95$
- (d) $\widehat{Growth} = 0.96 + 1.68 \times Tradeshare$
 Predicted growth = $0.96 + 1.68 \times 1 = 2.74$
- (e) Malta is an island nation in the Mediterranean Sea, south of Sicily. Malta is a freight transport site, which explains its large “trade share”. Many goods coming into Malta (imports into Malta) and immediately transported to other countries (as exports from Malta). Thus, Malta’s imports and exports and unlike the imports and exports of most other countries. Malta should not be included in the analysis.