For Instructors

Solutions to End-of-Chapter Empirical Exercises

Chapter 3  
Review of Statistics

3.1 (a) Average Hourly Earnings, Nominal $’s

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | SE(Mean) | 95% Confidence Interval |
| *AHE*1992 | 11.63 | 0.064 | 11.50  11.75 |
| *AHE*2008 | 18.98 | 0.115 | 18.75  19.20 |
|  | Difference | SE(Difference) | 95% Confidence Interval |
| *AHE*2008  *AHE*1992 | 7.35 | 0.132 | 7.09  7.61 |

(b) Average Hourly Earnings, Real $2008

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | SE(Mean) | 95% Confidence Interval |
| *AHE*1992 | 17.83 | 0.099 | 17.63 – 18.03 |
| *AHE*2008 | 18.98 | 0.115 | 18.75 – 19.20 |
|  | Difference | SE(Difference) | 95% Confidence Interval |
| *AHE*2008 − *AHE*1992 | 1.14 | 0.152 | 0.85 – 1.44 |

(c) The results from part (b) adjust for changes in purchasing power. These results should be used.

(d) Average Hourly Earnings in 2008

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | SE(Mean) | 95% Confidence Interval |
| *High School* | 15.33 | 0.122 | 15.09 – 15.57 |
| *College* | 22.91 | 0.180 | 22.56 – 23.26 |
|  | Difference | SE(Difference) | 95% Confidence Interval |
| *College-High School* | 7.58 | 0.217 | 7.15 – 8.00 |

(e) Average Hourly Earnings in 1992 (in $2008)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | SE(Mean) | 95% Confidence Interval |
| *High School* | 15.31 | 0.103 | 15.11 – 15.52 |
| *College* | 21.78 | 0.171 | 21.45 – 22.12 |
|  | Difference | SE(Difference) | 95% Confidence Interval |
| *College-High School* | 6.47 | 0.200 | 6.08 – 6.86 |

(f) Average Hourly Earnings in 2008

|  |  |  |  |
| --- | --- | --- | --- |
|  | Mean | SE(Mean) | 95% Confidence Interval |
| *AHEHS*,2008  *AHEHS*,1992 | 0.02 | 0.160 | –0.29 – 0.33 |
| *AHECol*,2008  *AHECol*,1992 | 1.13 | 0.248 | 0.64 – 1.61 |
|  |  |  |  |
| *Col-HS Gap* (1992) | 6.47 | 0.200 | 6.08 – 6.86 |
| *Col-HS Gap* (2008) | 7.58 | 0.217 | 7.15 – 8.00 |
|  | Difference | SE(Difference) | 95% Confidence Interval |
| *Gap*2008 − *Gap*1992 | 1.11 | 0.295 | 0.53 – 1.69 |

Wages of high school graduates increased by an estimated 0.02 dollars per hour (with a 95% confidence interval of −0.29 to 0.33); Wages of college graduates increased by an estimated 1.13 dollars per hour (with a 95% confidence interval of 0.64 to 1.61). The College-High School increased by an estimated 1.11 dollars per hour.

(g) Gender Gap in Earnings for High School Graduates

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year |  | *sm* | *nm* |  | *sw* | *nw* | − | *SE*(−) | 95% CI |
| 1992 | 16.55 | 7.46 | 2769 | 13.48 | 5.96 | 1874 | 3.07 | 0.20 | 2.68 – 3.45 |
| 2008 | 16.59 | 8.16 | 2537 | 13.15 | 6.27 | 1465 | 3.43 | 0.23 | 2.98 – 3.89 |

There is a large and statistically significant gender gap in earnings for high school graduates. In 2008 the estimated gap was $3.43 per hour; in 1992 the estimated gap was $3.07 per hour (in $2008). The increase in the gender gap is somewhat smaller for high school graduates than it was for college graduates.

Chapter 4  
Linear Regression with One Regressor

4.1. (a)  1.08  0.60 × *Age*

Earnings increase, on average, by 0.60 dollars per hour when workers age by 1 year.

(b) Bob’s predicted earnings  1.08  (0.60 × 26)  $16.68

Alexis’s predicted earnings  1.08  (0.60 × 30)  $19.08

(c) The regression *R*2 is 0.03.This means that age explains a small fraction of the variability in earnings across individuals.

e42a4.2. (a)

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

(b)  4.00  0.133 × *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 × 0 × 0.789  4.00

Professor Stock’s predicted course evaluations  4.00  0.133 × 1 × 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 × 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.

4.3. (a)  13.96  0.073 × *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 × 2  13.81.

Bob’s predicted years of completed education if he was 10 miles from college  13.96   
0.073 × 1  13.89.

(c) The regression *R*2 is 0.007, so that distance explains only a very small fraction of years of completed education.

(d) SER  1.8 years.

4.4. (a)



Yes, there appears to be a weak positive relationship.

(b) Malta is the “outlying” observation with a trade share of 2.

(c)   0.64  2.31 × *Tradeshare*

Predicted growth (Trade Share  1)  0.64  2.31 × 1  2.95

Predicted growth (Trade Share  0.5)  0.64  2.31 × 0.50  1.80

(d)   0.96  1.68 × *Tradeshare*

Predicted growth (Trade Share  1)  0.96  1.68 × 1  2.64

Predicted growth (Trade Share  0.5)  0.96  1.68 × 0.50  1.80

(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 are immediately transported to other countries (as exports from Malta). Thus, Malta’s imports and exports are unlike the imports and exports of most other countries. Malta should not be included in the analysis.