**SOAL BASIC ECONOMETRICS**

7.16 The demand for roses. \* Table 7.6 gives quarterly data on these variables :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TABLE 7.6** |  |  |  |  |  |
|  |  |  |  |  |  |
| Year | Y | X2 | X3 | X4 | X5 |
| and Quarter |   |   |   |   |   |
|  |  |  |  |  |  |
| 1971-III | 11,484 | 2.26 | 3.49 | 158.11 | 1 |
|  -IV | 9,348 | 2.54 | 2.85 | 173.36 | 2 |
| 1972-I | 8,429 | 3.07 | 4.06 | 165.26 | 3 |
|  -II | 10,079 | 2.91 | 3.64 | 172.92 | 4 |
|  -III | 9,240 | 2.73 | 3.21 | 178.46 | 5 |
|  -IV | 8,862 | 2.77 | 3.66 | 198.62 | 6 |
| 1973 -I | 6,216 | 3.59 | 3.76 | 186.28 | 7 |
|  -II | 8,253 | 3.23 | 3.49 | 188.98 | 8 |
|  -III | 8,038 | 2.60 | 3.13 | 180.49 | 9 |
|  -IV | 7,476 | 2.89 | 3.20 | 183.33 | 10 |
| 1974-I | 5,911 | 3.77 | 3.65 | 181.87 | 11 |
|  -II | 7,950 | 3.64 | 3.60 | 185.00 | 12 |
|  -III | 6,134 | 2.82 | 2.94 | 184.00 | 13 |
|  -IV | 5,868 | 2.96 | 3.12 | 182.20 | 14 |
| 1975-I | 3,160 | 4.24 | 3.58 | 175.67 | 15 |
|  -II | 5,872 | 3.69 | 3.53 | 188.00 | 16 |

 Y = quantity of roses sold, dozens

 X2 = average wholesale price of roses, $ dozen

 X3 = average wholesale price of carnations, $ dozen

 X4 = average weekly family disposable income, $ dozen

 X5 = the trend variable taking values of 1, 2 and so on, for the period 1971-III to 1975-II in the Detroit metropolitan area

 You are asked to consider the following demand functions :

 Yt = α1 + α2X2t + α3X3t + α4X4t + α5X5t + Ut

 In Yt = β1 + β2 In X2t + β3 In X3t + β4 In X4t + β5 X5t + U1

1. Estimate the parameters of the linear model and interpret the results.
2. Estimate the parameters of the log-linear model and interpret the results.

7.18 U.S. defense budget-outlays, 1962-1981. In order to explain the U.S. defense budget, you are asked to consider the following model :

Y t = β1 + β2X2t + β3X3t + β4 X4t + β5X5t + Ut

 Where Y t = defense budget-outlay for year t, $ billions

 X2t = GNP for year t, $ billions

 X3t = U.S. military sales/assistance in year t, $ billions

 X4t = aerospace industry sales, $ billions

 X5t = military conflicts involving more than 100,000 troops. This variable takes

 a value of 1 when 100,000 or more troops are involved but is equal to zero

 when that number is under 100,000.

 To test this model, you are given the data in Table 7.8.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | Defense |   | U.S. Military | Aerospace |   |
|   | budget |   | sales/  | industry | Conflicts |
|   | outlays | GNP | assistance, | sales, | 100,000+, |
| Year | Y | X2 | X3 | X4 | X5 |
|   |   |   |   |   |   |
| 1632 | 51.1 | 560.3 | 0.6 | 16.0 | 0 |
| 1963 | 52.3 | 590.5 | 0.9 | 16.4 | 0 |
| 1964 | 53.6 | 632.4 | 1.1 | 16.7 | 0 |
| 1965 | 49.6 | 684.9 | 1.4 | 17.0 | 1 |
| 1966 | 56.8 | 749.9 | 1.6 | 20.2 | 1 |
| 1967 | 70.1 | 793.9 | 1.0 | 23.4 | 1 |
| 1968 | 80.5 | 865.0 | 0.8 | 25.6 | 1 |
| 1969 | 81.2 | 931.4 | 1.5 | 24.6 | 1 |
| 1970 | 80.3 | 992.7 | 1.0 | 24.8 | 1 |
| 1971 | 77.7 | 1,077.6 | 1.5 | 21.7 | 1 |
| 1972 | 78.3 | 1,185.9 | 2.95 | 21.5 | 1 |
| 1973 | 74.5 | 1,326.4 | 4.8 | 24.3 | 0 |
| 1974 | 77.8 | 1,434.2 | 10.3 | 26.8 | 0 |
| 1975 | 85.6 | 1,549.2 | 16.0 | 29.5 | 0 |
| 1976 | 89.4 | 1,718.0 | 14.7 | 30.4 | 0 |
| 1977 | 97.5 | 1,918.3 | 8.3 | 33.3 | 0 |
| 1978 | 105.2 | 2,163.9 | 11.0 | 38.0 | 0 |
| 1979 | 117.7 | 2,417.8 | 13.0 | 46.2 | 0 |
| 1980 | 135.9 | 2,663.1 | 15.3 | 57.6 | 0 |
| 1981 | 162.1 | 2,937.7 | 18.0 | 68.9 | 0 |

1. Estimate the parameters of this model and their standard errors and obtain R2, modified R2, and R2.
2. Comment on the results, taking into account any prior expectation you have about the relationship between Y and the various X variables.
3. What other variable(s) might you want to include in the model and why?

7.19 The demand for chicken in the United States, 1960-1982. To study the per capita consumption of chicken in the United States, you are given the data in Table 7.9,

 Where Y = per capita consumption of chicken, lb

 X2 = real disposable income per capita, $

 X3 = real retail price of chicken per lb, ¢

 X4 = real retail price of pork per lb, ¢

 X5 = real retail price of beef per lb, ¢

 X6 = composite real price of chicken substitutes per lb, ¢, which is beef,

 the Weights being the relative consumptions of beef and pork in total

 beef and pork consumption

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 7.9** |  |  |  |  |  |  |
| **Year** | **Y** | **X2** | **X3** | **X4** | **X5** | **X6** |
| 1960 | 27.8 | 397.5 | 42.2 | 50.7 | 78.3 | 65.8 |
| 1961 | 29.9 | 413.3 | 38.1 | 52.0 | 79.2 | 66.9 |
| 1962 | 29.8 | 439.2 | 40.3 | 54.0 | 79.2 | 67.8 |
| 1963 | 30.8 | 459.7 | 39.5 | 55.3 | 79.2 | 69.6 |
| 1964 | 31.2 | 492.9 | 37.3 | 54.7 | 77.4 | 68.7 |
| 1965 | 33.3 | 528.6 | 38.1 | 63.7 | 80.2 | 73.6 |
| 1966 | 35.6 | 560.3 | 39.3 | 69.8 | 80.4 | 76.3 |
| 1967 | 36.4 | 624.6 | 37.8 | 65.9 | 83.9 | 77.2 |
| 1968 | 36.7 | 666.4 | 38.4 | 64.5 | 85.5 | 78.1 |
| 1969 | 38.4 | 717.8 | 40.1 | 70.0 | 93.7 | 54.7 |
| 1970 | 40.4 | 768.2 | 38.6 | 73.2 | 106.1 | 93.3 |
| 1971 | 40.3 | 843.3 | 39.8 | 67.8 | 104.8 | 89.7 |
| 1972 | 41.8 | 911.6 | 39.7 | 79.1 | 114.0 | 100.7 |
| 1973 | 40.4 | 931.1 | 52.1 | 95.4 | 124.1 | 113.5 |
| 1974 | 40.7 | 1,021.5 | 48.9 | 94.2 | 127.6 | 115.3 |
| 1975 | 40.1 | 1,165.9 | 58.3 | 123.5 | 142.9 | 136.7 |
| 1976 | 42.7 | 1,349.6 | 57.9 | 129.9 | 143.6 | 139.2 |
| 1977 | 44.1 | 1,449.4 | 56.5 | 117.6 | 139.2 | 132.0 |
| 1978 | 46.7 | 1,575.5 | 63.7 | 130.9 | 165.5 | 132.1 |
| 1979 | 50.6 | 1,759.1 | 61.6 | 129.8 | 203.3 | 154.4 |
| 1980 | 50.1 | 1,994.2 | 58.9 | 128.0 | 219.6 | 174.9 |
| 1981 | 51.7 | 2,258.1 | 66.4 | 141.0 | 221.6 | 180.8 |
| 1982 | 52.9 | 2,478.7 | 70.4 | 168.2 | 232.6 | 189.4 |

10.27 Table 10.12 gives data on imports, GDP, and the Consumer Price Index (CPI) for the United States over the period 1970-1998. You are asked to consider the following model :

 In Importst = β1 + β2 In GDP1 + β3 In CPI1 + Ut

1. Estimate the parameters of this model using the data given in the table
2. Do you suspect that there is multicollinearity in the data?