

15.6 The file *mexican.dat* contains data collected in 2001 from the transactions of 754 Mexican sex workers. There is information on four transactions per worker.²⁰ The labels *ID* and *TRANS* are used to describe a particular woman and a particular transaction. There are three categories of variables.

1. Sex worker characteristics: (i) *AGE*, (ii) an indicator variable *ATTRACTIVE* equal to 1 if the worker is attractive, and (iii) an indicator variable *SCHOOL* if she has completed secondary school or higher.
 2. Client characteristics: (i) an indicator variable *REGULAR* equal to one if the client is a regular, (ii) an indicator variable *RICH* equal to one if the client is rich, and (iii) an indicator variable *ALCOHOL* if the client has consumed alcohol before the transaction.
 3. Transaction characteristics: (i) the log of the price of the transaction *LNPRICE*, (ii) an indicator variable *NOCONDOM* equal to one if a condom was not used, and (iii) two indicator variables for location, *BAR* equal to one if the transaction originated in a bar and *STREET* if the transaction originated in the street.
- (a) Estimate a fixed effects model with *LNPRICE* as the dependent variable, and as explanatory variables the client characteristics, and the remaining transaction characteristics.
- (i) Why did we omit the sex worker characteristics?
 - (ii) What coefficient estimates are significantly different from zero at a 5% level of significance?
 - (iii) Gertler, Shah, and Bertozzi argue that the coefficient of *NOCONDOM* is a risk premium. Some sex workers are willing to take the risk of having unprotected sex because of the extra price some clients are willing to pay to avoid using a condom. What is your estimate of the risk premium? Interpret each of the other coefficient estimates. How is the price affected when clients are rich, are regular, and have consumed alcohol? How does the location of the transaction influence the price?
- (b) Estimate the model assuming random effects and with the characteristics of the sex workers added to the model. Compare the estimates with those from fixed effects. How have the coefficients of the common variables changed? How do the sex worker characteristics affect the price of commercial sex? How much extra does a client have to pay to have unprotected sex with an attractive secondary-educated sex worker?

- (c) Using the t -test statistic in (15.37) and a 5% significance level, test whether there are any significant differences between the fixed effects and random effects estimates of the coefficients on *NOCONDOM*, *RICH*, *REGULAR*, *ALCOHOL*, *BAR*, and *STREET*. If there are significant differences between any of the coefficients, should we rely on the fixed effects estimates or on the random effects estimates? Explain your choice.
- (d) Reconsider the random effects model from part (b), but assume that *NOCONDOM* is correlated with the random effects. Why might there be such a correlation? Re-estimate the model using the Hausman-Taylor estimator with *NOCONDOM* treated as endogenous. Compare the results with those obtained in part (b). How much extra does a client have to pay to have unprotected sex with an attractive secondary-educated sex worker?

15.10 What is the relationship between crime and punishment? This important question has been examined by Cornwell and Trumbull²¹ using a panel of data from North Carolina. The cross sections are 90 counties, and the data are annual for the years 1981–1987. The data are in the file *crime.dat*. In these models the crime rate is explained by variables describing the deterrence effect of the legal system, wages in the private sector (which represents returns to legal activities), socioeconomic conditions such as population density and the percentage of young males in the population, and annual dummy variables to control for time effects. The authors argue that there may be heterogeneity across counties (unobservable county specific characteristics).

- (a) What do you expect will happen to the crime rate if (i) deterrence increases, (ii) wages in the private sector increase, (iii) population density increases, (iv) the percentage of young males increases?
- (b) Consider a model in which the crime rate (*LCRMRTE*) is a function of the probability of arrest (*LPRBARR*), the probability of conviction (*LPRB CONV*), the probability of a prison sentence (*LPRBPRIS*), the average prison sentence (*LAVGSEN*), and the average weekly wage in the manufacturing sector (*LWMFG*). Note that the logarithms of the variables are used in each case. Estimate this model by least squares. (i) Discuss the signs of the estimated coefficients and their significance. Are they as you expected? (ii) Interpret the coefficient on *LPRBARR*.

- (c) Estimate the model in (b) using a fixed effects estimator. (i) Discuss the signs of the estimated coefficients and their significance. Are they as you expected? (ii) Interpret the coefficient on *LPRBARR* and compare it to the estimate in (b). What do you conclude about the deterrent effect of the probability of arrest? (iii) Interpret the coefficient on *LAVGSEN*. What do you conclude about the severity of punishment as a deterrent?
- (d) In the fixed effects estimation from part (c), test whether the county level effects are all equal.
- (e) To the specification in part (b) add the population density (*LDENSITY*) and the percentage of young males (*LPCTYMLE*), as well as dummy variables for the years 1982–1987 (*D82–D87*). (i) Compare the results obtained by using least squares (with no county effects) and the fixed effects estimator. (ii) Test the joint significance of the year dummy variables. Does there appear to be a trend effect? (iii) Interpret the coefficient of *LWMFG* in both estimations.
- (f) Based on these results, what public policies would you advocate to deal with crime in the community?