

The following homework assignment is to be submitted via email to Dorothy Kemboi at [dck00004@mix.wvu.edu](mailto:dck00004@mix.wvu.edu) with a “cc” to me at [roger.congleton@mail.wvu.edu](mailto:roger.congleton@mail.wvu.edu). The answers are due before class time at on Thursday, November 2. The answers should be typed up and emailed to Dorothy (with a cc to me) in Word. Dorothy will grade them and return them within a week.

- (1)** Develop a time allocation model of criminal activity where a criminal (or potential criminal) has a utility function  $U=L^aY^b$ ,  $Y = aT^c$  and  $16=L+T^c$ .  $L$  is hours of leisure;  $T^c$  is hours of criminal activity and  $Y$  is personal income.

  - (a) Characterize the criminal’s equilibrium level of crime in the case where there is no law enforcement.
  - (b) Next extend the model so that the probability that a crime will be punished is taken into account. Suppose that that probability rises with  $T^c$  and with government expenditure,  $G$ , on law enforcement. Assume that the punishment is simply the confiscation of all criminal income.
  - (c) Show how the level of  $G$  affects the level of crime.
- (2)** (a) Use a general profit maximizing model of a firm to show how the probability of theft affects a firm’s production-output decision. Assume that there is positive probability that all of the firm’s output will be stolen before it is sold (b) Show how an increase in the probability of such a theft affects its output.
- (3)** Mancur Olson’s model of a stationary bandit assumes that such a ruler maximizes its net revenues from ruling. Suppose that the stationary bandit collects its revenues as taxes collected on every unit of output that a firm produces and that output falls as taxes rise. Suppose also that it can increase each firm’s output by spending on good  $G$  (perhaps law enforcement) but that this effect is subject to diminishing marginal returns. Assume there are  $M$  firms. (a) Write down the stationary bandit’s optimization problem. (b) Characterize its ideal tax and spending policies.
- (4)** Suppose electoral competition is sufficient that the strong version of the median voter model holds. Suppose also that the pivotal issue among the two candidates running for office is environmental regulation, and that as environmental regulation ( $R$ ) increases both average and median income fall—but that environmental quality increases. The median voter’s utility rises as his or her income increases and as environmental quality increases. (a) Write down a general model of the policy preference of a typical voter that values both his or her personal income and environmental quality. (b) Now write down a model in which the improving effect of the regulation varies with the weather, which is a

random variable. (c) How does the voter's preferred extent of environmental regulation change if the probability of the type of weather where the rules improve environmental quality increases? (Show this mathematically).