ECNS 316
State Preference Model

To-do list

- Optional reading for this week:

Alm, James and Benno Torgler. 2006. "Cultural Differences and Tax Morale in the United States and in Europe." *Journal of Economic Psychology*, 27: 224-246.

- No quiz or writing assignment due next Tuesday.
- Remaining lectures on theory of crime:
  - State preference model
  - Model neighborhood crime and self-enforcement
  - Game theoretic applications

- Midterm on March 7th

State Preference Model

- Shortcoming of model thus far is that criminal behavior is a binary choice.

- In practice, most offenders engage in a mixture of legal and illegal activity.
  - Drug dealers usually have day jobs (Reuter et al. 1990)
  - Shoplifters sometimes pay for merchandise
  - Tax evasion
    - Choice is the specific amount of evasion

Application of State Preference Model to Tax Evasion

- Choice between legal and illegal activity
- As before, illegal activity comes with probability of arrest, conviction, and sanction
- Modification to previous model: Specific amount of offending is a choice variable
- Evasion occurs when reported income is less than actual income
  - Two opportunities to evade:
    - 1.) Failure to report earned income or exaggeration of adjustments (so that adjusted gross income (AGI) reported is less than actual AGI)
    - 2.) Exaggeration of deductions from AGI so that taxable income (TI) reported is less than actual taxable income.
- In this model, income reported for tax purposes is a continuous variable with definite limits: zero and actual income.

Tax Evasion Model

- p_c: probability of conviction

- s: sanction (here, think of as a penalty tax rate that is proportional to income)

- I: actual taxable income

- R: income reported for tax purposes

- t: income tax rate.

- Taxation is proportional to income so that the full tax owed is tI, and the tax actually paid is tR.

- If all income is reported, $R = I$, the full tax is paid, the taxpayer has after-tax income equal to $(1 − t)I$ and is in no danger of sanction

- If there is underreporting, $R < I$, the taxpayer pays tax on reported income equal to tR and owes an additional amount, $s(I-R)$, if convicted.

- Q. What do we require regarding the relationship between s and t?

- Ans. $s > t$ is required or there is no sanction because the tax paid on income not reported would not be greater than tax paid on income reported

Tax Evasion Model

- There are two possible states of the world facing the individual: conviction and non-conviction.

- Income can either be I_C if convicted or I_N if not convicted.

- Q. What do our specific expressions for these two levels of income look like? That is, how do we write I_C and I_N as functions of actual income, reported income, the tax rate, and the sanction rate?

  - $I_C = (I - tR) - s(I - R)$
  - $I_N = (I - tR)$

[insert income possibilities frontier]

Tax Evasion Model

- Q. What aspect of behavior have we ignored thus far?
- Ans. Next step is to incorporate preferences.
- Taxpayer maximizes expected utility

$$u = p_c V(I_C) + (1 - p_c) V(I_N) \tag{1}$$

- To display taxpayer's preferences graphically, it is necessary to determine the tradeoff between I_C and I_N that holds expected utility constant (i.e., $\Delta u = 0$).

- Under constant utility and given equation (1), it follows that

$$0 = \Delta u = p_c (MU_C) \Delta I_C + (1 - p_c)(MU_N) \Delta I_N \tag{2}$$

where MU_C and MU_N are the marginal utilities of added income if convicted and not convicted, respectively.

Tax Evasion Model

- From (2), we can solve for an expression for the slope

$$\Delta I_N / \Delta I_C = -p_c(MU_C)/(1 - p_d)(MU_N) \qquad (3)$$

- Let's consider the risk-neutral taxpayer's decision problem...

[insert risk-neutral taxpayer's decision]

Tax Evasion Model

- Q. Are most taxpayers risk neutral?
- No, most are risk averse and their marginal utility of income decreases as income increases.
  - As I_C falls, MU_c rises (moving left from the certainty line)
  - As I_N rises, MU_N falls (moving up from the certainty line)
- Risk-averse taxpayer solves for the level of R that maximizes her expected utility by finding the income if not convicted, I_N^*, at the tangency point that maximizes utility.
  - Given I_N^*, she knows just how much income to report

$$I_N^* = I - tR^*$$
$$=> \quad R^* = (I_N^* - I)/t$$

[insert internal solution for a risk-averse taxpayer]

Tax Evasion Model

- Are corner solutions possible for the risk-averse taxpayer?
  - Recall, we solved for the slope of the IC

$$\Delta I_N / \Delta I_C = -p_c (MU_C) / (1 - p_c)(MU_N)$$

  - Also, recall that we solved for the slope of the IPF

$$-t/(s - t)$$

  - At the point of tangency, these two slopes are equal.
  - It is possible to have a corner solution at R=0 if p_c is sufficiently small or at R=I if p_c is sufficiently large
    - For large probability of conviction, the indifference curve can begin at the certainty line with a slope that is greater than the slope of the IPF and the taxpayer will choose to R = I
    - For small probability of conviction, the entire indifference curve may be flatter than the IPF, and the taxpayer reports R=0 taxable income

Tax Evasion Model

- Risk-seeking individuals have marginal utility of income that is increasing in income
  - Utility is always maximized at a corner solution.

  [insert graph for risk-seeking taxpayer]

- Risk seekers are difficult to deter from evasion
  - Imagine the case where the IPF is flatter than the indifference curves at the certainty line.
  - What do risk-averse and risk-neutral taxpayers do in this case (i.e., the case where $t/(s-t) < p_c/(1-p_c)$ at the certainty line)?
    - They will report all of their income.
  - But, for the risk seeker, it is still possible for them to set $R = 0$ in this case.

Behavioral Implications

- 1.) Suppose $t/(s - t) > p_c/(1 - p_c)$, which tends to occur either when t is almost as large as s or when the probability of conviction is quite small. (i.e., slope of IPF is steeper than slope of IC)
  - Here, regardless of risk preference, there will be some tax evasion by all types of taxpayers.
- 2.) Assuming they engage in some evasion, risk averse taxpayers will evade less than risk neutral taxpayers, whose evasion will be less than or equal to that of the risk seekers.
- 3.) An increase in probability of conviction makes the initial slope of the ICs for all risk types steeper at the certainty line and tends to reduce evasion
- 4.) An increase in the expected sanction, s, rotates the IPF counter clockwise about the point on the certainty line.
  - For all risk types, this flatter IPF lowers the incentive to underreport
  - An increase in t has the opposite effect

Policy Implications

- Model prediction is that evasion is more likely when the probability of conviction is low.
  - This has led to actions designed to increase p_c.
    - Targeting audits where rate of underreporting is highest
  - Relationship between risk seeking and evasion has been recognized.
    - Rewards for tax compliance (see subsequent slides on Bazart and Pickhardt (2011))

Effects of Rewards for Compliance

- Our model suggests that audits and sanctions are much more likely to secure compliance from risk averse taxpayers.

- To increase compliance, some have suggested a positive reward system that would raise compliance among risk seekers

- One proposed scheme is a lottery
  - Each return would entitle taxpayer to a place in a lottery.
  - Winners would then be audited
  - If audit is found full compliance, the taxpayer would get a reward
  - If audit indicated evasion, there would be sanctions and no reward

Effects of Rewards for Compliance

Bazart, Cecile and Michael Pickhardt. 2011. "Fighting Income Tax Evasion with Positive Rewards." *Public Finance Review*, 39(1): 124-149.

- Conducted lab experiments with participants from Germany and France

- Results showed that providing a lottery option for those who pass an audit raises compliance, especially among males.

- Of course, the lottery payouts reduce net tax revenue.
  - Experiment results indicate that, in areas where compliance is low, net tax receipts can be raised if the positive reward of a lottery is associated with filing of a tax return that can pass an audit test

- Male gender effect is consistent with prior expectations that the incentive effects should be largest among individuals who are risk seekers...lab experiments indicate that, on average, males are more risk seeking