Retrospective Voting

(cf. *Persson and Tabellini*, pp. 77 – 81)

$$W = y - t + H(g) \tag{1}$$

y : income (same for every voter)
t : taxes (same for every voter)
$H(g)$: total benefits from the public sector, with $H'(g) > 0$ and $H''(g) < 0$.
cost of a unit of the public sector is θ
so that the total cost of the public sector is θg

efficient quantity of the public output

efficient quantity of the public output is $g^*(\theta)$, where

$$H'[g^*(\theta)] = \theta \tag{2}$$

politicians

politician seeks to maximize the expected utility

$$u = \gamma r + p_I R \tag{3}$$

p_I : the probability of reelection
r : amount of revenue diverted
R : the value to the politician of being reelected
γ measures the ease with which the politician can divert tax revenue without facing any criminal sanctions :
$0 < \gamma < 1$, with a higher value for γ meaning that it is easier for a politician to divert funds to her own benefit, or to a project which gives her ego rents.

budget constraint

$$t = \theta g + r \tag{4}$$

observation and punishment

(for a while) voters know θ, and know their own taxes, so they can observe r
(Equation 4 implies that $r = t - \theta g$.)

observe politician's behaviour **after** it happens

so theft cannot be prevented, but it can be punished

trigger strategy

trigger strategy : voters re–elect any politician if and only if the politician provides voters with a level of well–being of $\bar{\omega}$ or more

$\bar{\omega}$ is chosen by the voters

politicians know $\bar{\omega}$ in advance

so they know that they will be re–elected if and only if they choose a public output level g and a level of fund diversion r such that the resulting level of voters' well–being is $\bar{\omega}$ or more

From equations 1 and 4, $W \geq \bar{\omega}$ if and only if $r \leq \hat{r}(\theta, g, \bar{\omega})$, where

$$\hat{r}(\theta, g, \bar{\omega}) = y - \bar{\omega} + H(g) - \theta g \tag{5}$$

the maximum diversion consistent with re–election

if the politician decides that it is worthwhile to seek reelection, she wants $\gamma r + R$ to be as large as possible, subject to the constraint $r \leq \hat{r}(\theta, g, \bar{\omega})$

solution : choose a level of public expenditure g^* such that $H'(g) = \theta$

if $H'(g) > \theta$ then a small increase in g would increase W, enabling the politician to increase r slightly and still have $r > \hat{r}(\theta, g, \bar{\omega})$

definition

$$\tilde{r}(\theta, \bar{\omega}) \equiv = y - \bar{\omega} + H[g^*(\theta)] - \theta g^*(\theta) \qquad (6)$$

For future reference, note that

$$\frac{\partial \tilde{r}}{\partial \theta} = -g^*(\theta) < 0 \qquad (7)$$

The politician will get re–elected, as long as she provides a level of well–being of $\bar{\omega}$ or more
— equivalently, as long as she steals no more than $\tilde{r}(\theta, \bar{\omega})$

is re–election worth it?

If the politician wants to get re–elected, the previous slide shows that she should divert $\tilde{r}(\theta, \bar{\omega})$, leaving her with utility

$$u^E = \gamma \tilde{r}(\theta, \bar{\omega}) + R \tag{8}$$

if she diverts any more funds than $\tilde{r}(\theta, \bar{\omega})$, then she won't be re–elected

she might as well divert as much as she can, since she is certain to lose the election anyway

the most the politician can steal

if she doesn't care about re–election
is y
no point then in providing g, so the politician's utility is

$$u^{NE} = \gamma y \tag{9}$$

worth getting re–elected?

politician will find it worthwhile to do enough to get re–elected if (and only if) $u^E > U^{NE}$
or

$$\tilde{r}(\theta, \bar{\omega}) \geq y - \frac{R}{\gamma} \tag{10}$$

the left side of inequality (10) decreases with the voters' required level of well–being $\bar{\omega}$

the optimal threshold

voters' problem :
Although raising $\bar{\omega}$ decreases the amount of diversion $\tilde{r}(\theta, \bar{\omega})$ —
should the politician try and seek re–election —
it also makes the politician less eager to seek re–election
too high a standard ($\bar{\omega}$) leads to big–time theft (of all their *y*)

voters

should pick the highest threshold level of well–being which still satisfies (10)

so pick $\bar{\omega}$ such that $\tilde{r}(\theta, \bar{\omega}) = r^*$, where

$$r^* \equiv y - \frac{R}{\gamma} \tag{11}$$

(assuming that the right side of equation 11 is non–negative)

comparative statics

From equation 11, r^* is
increasing in the maximum amount of revenue which can feasibly be diverted, y,
decreasing in the benefit R the politician attaches to being re–elected
increasing in the ease γ with which the politician can divert revenue.

The actual level of utility which voters get, $\bar{\omega}$ is

$$\bar{\omega} = W(\theta) = y + H[g^*(\theta)] - \theta g^*(\theta) - r^* \qquad (12)$$

which decreases with the cost θ of the public output

varying public sector costs

now : the cost of the public output θ cannot be observed directly by voters

but the politician can observe θ

voters just know that the costs of public output provision may vary, with the actual [unobservable] cost being some random draw from a distribution $F(\theta)$ of possible costs.

if voters know θ was known, they can figure out how much money r had been diverted by the politician, just from observing the level g of the public output, and the level t of taxes (using equation (4))

high costs or theft?

with θ unobservable, voters can't tell if their high tax bill is due to theft by the politician, or to bad luck — a high value for the cost parameter θ

voters must choose their threshold level of well–being $\bar{\omega}$ without knowing θ

Instead of choosing a different value of $\bar{\omega}$ for each value of θ (as in equation (12)), they choose a single $\bar{\omega}$, which they use as a voting rule no matter what is the unit cost of the public output.

politicians' decisions

Politicians still can observe the cost parameter θ.
So for a given threshold $\bar{\omega}$, their decision on how much to divert (should they choose to seek re–election) varies with θ.
Equation (7) shows that they take advantage of low costs for the public sector by choosing to divert more funds.

also.... the choice of whether or not to seek election now depends on the cost parameter θ. The lower is θ, the higher is $\tilde{r}(\theta, \bar{\omega})$, and the more attractive it is to try and get re–elected.

steal more when costs are high

there is now a threshold level for the **cost parameter** θ, θ^*

if $\theta < \theta^*$, then the politician diverts $\tilde{r}(\theta, \bar{\omega})$, and is re–elected

but if $\theta > \theta^*$, then the politician chooses not to get re–elected, and diverts the maximum amount possible y

If $\theta < \theta^*$, now the amount diverted is larger, the lower are costs. A cheap public sector enables the politician to divert more funds, and still provide voters with enough well–being for them to vote for her re–election.

politician's choice

if the cost is θ, and if the politician chooses to get reelected, then the amount $\tilde{r}(\theta, \bar{\omega})$ which the politician diverts is determined by the condition

$$y - \tilde{r}(\theta, \bar{\omega}) - \theta g^*(\theta) + H[g^*(\theta)] = \bar{\omega} \quad (13)$$

[why? it's always smart for the politician to provide the efficient level $g^*(\theta)$ of the public ouput ; and if she provides $g^*(\theta)$, and diverts r, the taxes will be $r + \theta g^*(\theta)$, which means that the left side of equation (13) is the utility of voters, and the right side is the lowest possible level of utility consistent with re–electing the politician] differentiating equation (13),

$$\frac{\partial \tilde{r}}{\partial \theta} = -g^*(\theta) < 0 \tag{14}$$

so that the higher are costs, the less the politician can divert — if the politician wants to be re–elected
the threshhold value for the cost parameter, θ^*, which determines whether or not the politician tries to get re–elected, is defined by

$$\gamma \tilde{r}(\theta^*, \bar{\omega}) + R = \gamma y \tag{15}$$

for a given trigger $\bar{\omega}$

the voters will get utility $\bar{\omega}$ if $\theta \leq \theta^*$, and utility of 0 if $\theta > \theta^*$
now notice that the politician's decision (choice of θ^*) implies that

$$W(\theta^*) = \bar{\omega} \tag{16}$$

where $W(\theta)$, defined in equation (12) above, is the utility voters would get if they set their trigger strategy optimally, when they could actually **observe** θ

and note that $W'(\theta) = -g^*(\theta) < 0$, when there is full information so suppose that — when they **can't observe** θ — voters choose some trigger level $\bar{\omega}$

if θ turns out to exceed θ^*, then they'll wind up with utility 0 and if θ is less than (or equal to) θ^*, then voters get utility

$$\bar{\omega} = W(\theta^*) \leq W(\theta)$$

meaning : voters always do **strictly worse** when there is asymmetric information, except in the (not very likely case) that the actual value of θ happens to equal the θ^* corresponding to the trigger $\bar{\omega}$ they have chosen, in which case they get exactly the same utility as in the case of symmetric information

voters' choice of threshold

note that, for the voters, choosing a trigger level of utility $\bar{\omega}$ is the same as choosing a threshold level θ^* for the cost function (since θ^* is a monotonically decreasing function of the required level of utility $\bar{\omega}$)
a higher threshold level $\bar{\omega}$ means that the politician will divert less money when costs are low

but the higher threshold level also lowers θ^*, leading to the politician being more likely to forget about her re–election chances, and plunder the treasury.

for a given θ^*, voters get utility $W(\theta^*)$ if $\theta \leq \theta^*$, and utility of 0 if $\theta > \theta^*$
so that their expected utility is

$$EU = F(\theta^*)W(\theta^*) \tag{17}$$

where $F(\cdot)$ is the distribution function for the cost of the public output
and the first–order condition for the voters' choice of their best θ^* satisfies

$$f(\theta^*)W(\theta^*) - F(\theta^*)g^*(\theta^*) = 0 \tag{18}$$

(where $f(\cdot)$ is the density function for the cost of the public output)
or

$$\frac{g^*(\theta^*)}{H[g^*(\theta^*)] - \theta^* g^*(\theta^*) + \frac{R}{\gamma}} = \frac{f(\theta^*)}{F(\theta^*)} \tag{19}$$