Dynamic Inconsistency

Motivation

Considerations about future outcomes can distort decisions today

Healthcare.gov debacle

- GAO reports failure of oversight by Centers for Medicar & Medicade Services (CMS)
- Major problems with work by contractor (CGI Federal) in early 2013
- CMS forwent punitive actions in order to "better collaborate with CGI Federal in completing the work in order to meet the October 1, 2013 launch"

Look at a variety of examples of these dynamic distortions

Basic Idea

A benevolent government faces a commitment problem that leads to inefficiency

Government announces a Pareto improving policy that it plans to implement tomorrow

Anticipating the policy, people make decisions today that influence the socially optimal policy tomorrow

As a result, tomorrow, the still-benevolent government implements a different policy than previously announced

People were wrong to believe the initial promise and there is inefficiency

Examples

Final Exam

Extracting information

Monetary policy

A Model

There is a government and a continuum of consumers, each with 1 unit of a consumption good

1. Government announces a non-binding planned future tax rate on capital t_0.
2. Consumers each divide the good between consumption (c) and savings ($1 - c$). Savings earn a return $r > 1$.
3. Government collects revenues $tr(1 - c)$.
4. Government spends revenues on a public good

Technology

Total public good, given revenues of $tr(1-c)$, is

$$G = \gamma tr(1-c)$$

$\gamma > 1$ (i.e., public goods are worth more than the money spent on them)

$r - 1 < \gamma < r$ (i.e., the monetary return on private savings is larger than the monetary return on public goods investment, but not too much bigger).

Payoffs

A consumer's utility is given by:

$$\overbrace{c + (1-t)r(1-c)}^{\text{Consumption}} + \overbrace{2\sqrt{G}}^{\text{Public Goods}}$$

Government's payoff is the sum of the consumer payoffs

The Social Optimum

Money invested instead of consumed generates positive returns, so social optimum involves $c = 0$

Given this, what is the first-best tax rate?

$$\max_t 0 + (1 - t) \times r \times 1 + 2\sqrt{G}.$$

Substituting $G = \gamma t r (1 - c)$:

$$\max_t 0 + (1 - t)r + 2\sqrt{\gamma t r}$$

$$t^{FB} = \frac{\gamma}{r}.$$

Equilibrium: What will the government do?

Suppose that the government has made some promise, t_0, and the consumers have all made some choice c.

$$\max_t c + (1-t)r(1-c) + 2\sqrt{G}.$$

$$\max_t c + (1-t)r(1-c) + 2\sqrt{\gamma t r(1-c)}.$$

$$t^*(c) = \begin{cases} \frac{\gamma}{r(1-c)} & \text{if } c \leq 1 - \frac{\gamma}{r} \\ 1 & \text{if } c > 1 - \frac{\gamma}{r} \end{cases}$$

How much will a consumer consume?

Each consumer in this model is infinitesimally small, so an individual's consumption choice has zero impact on overall consumption (and, thus, taxes)

If consumer believes that overall consumption by the other consumer will be C, then solves:

$$\max_c c + (1 - t^*(C))r(1 - c) + 2\sqrt{\gamma t^*(C) r(1 - C)}.$$

$$\max_c c\left[1 - (1 - t^*(C))\, r\right] + (1 - t^*(C))r + 2\sqrt{\gamma t^*(C) r(1 - C)}.$$

Consumption, continued

$$\max_c c\left[1-(1-t^*(C))\,r\right]+(1-t^*(C))r+2\sqrt{\gamma t^*(C)r(1-C)}.$$

Consumer's payoff is strictly increasing in consumption if $t^*(C) > 1-\frac{1}{r}$ and strictly decreasing in consumption if $t^*(C) < 1-\frac{1}{r}$

$$\mathrm{BR}(C, t^*(\cdot)) = \begin{cases} c=0 & \text{if } t^*(C) < 1-\frac{1}{r} \\ \text{anything} & \text{if } t^*(C) = 1-\frac{1}{r} \\ c=1 & \text{if } t^*(C) > 1-\frac{1}{r}. \end{cases}$$

Low taxation is not time consistent

Suppose the government promises a tax rate of $t_0 < 1 - \frac{1}{r}$

- If the consumers believe that promise, then consume nothing in the first period ($c = 0$)
- Since $0 < 1 - \frac{\gamma}{r}$, this leads the government to choose $t^*(0) = \frac{\gamma}{r}$
- Since $\frac{\gamma}{r} > 1 - \frac{1}{r}$, the government is not keeping its promise to choose a tax rate $t_0 < 1 - \frac{1}{r}$

Consumers decide to save because of the low promised tax rate But the high savings rate then makes taxation appealing to the benevolent government because of public goods.

High taxation is time consistent

Suppose the government promises a tax rate of $t_0 > 1 - \frac{1}{r}$

- If the consumers believe the promise, then consume everything ($c = 1$)
- This makes any tax rate a best response by the government

Time Inconsistency and Inefficiency

In equilibrium there is high taxation and low savings

The government is benevolent and the social optimum calls for high savings and intermediate taxes

If savings are actually high, the government will (optimally) implement high taxes so as to provide lots of public good

Anticipating this, consumers don't save

Commitment problems on the part of the benevolent government prevent society from achieving the socially optimal savings rate

Time Inconsistency and Externalities

Consumer saving exerts positive externalities on other consumers because the tax revenues from savings provide public goods

The benevolent government chooses a tax rate internalizing those externalities

Individual consumers do not internalize externalities, so want to under save

When there is a lot of saving, the benevolent government wants to tax a lot, but strategic consumers seek to avoid this

Takeaways

Government announces a future policy and if the people make choices accordingly, then the government wants to implement a different policy.

Time inconsistency problems can create situations in which even a benevolent government is unable to implement a Pareto-efficient policy.

One way to think about time inconsistency problems is that governments face a commitment problem vis-a-vis announced policies.

The source of this commitment problem is typically that the government internalizes an externality that the individual people do not.

Power and Policy

Governments may pursue inefficient policies precisely because those policies preserve the power of some currently powerful group

Policies that appear to be socially beneficial may actually be socially harmful when one considers not just the direct economic consequences of the policy, but also the political consequences

- Another instance of the second best

The Model

Three players: a voter, a left-wing politician, a right-wing politician

Two periods

Prior to each period, voter elects a politician

During each period, there is a budget of size 1.

In period 1, politician in office can borrow $b \in (0, 1)$, which must be paid back in period 2

Policy

In each period, budget can be spent on right-wing agenda (R) or left-wing agenda (L)

In each period, one of these two agendas is more productive (this is observed before election)

Value to voter of money spent on the more productive agenda is $\lambda \in \left(\frac{1}{2}, 1\right)$, while value of money spent on less productive agenda is $1 - \lambda$

Politician always values money spent on her agenda at λ and other ideological agenda at $1 - \lambda$

Stakes

In period t, the stakes of public policy are α_t (equally likely to be any real number between 0 and 1)

The value of α_t is observed after the election, but before policy is set

Optimal Borrowing

If borrow, expected voter welfare is:

$$U_V(\text{borrow}|\alpha_1) = \overbrace{\alpha_1\lambda(1+b)}^{\text{1st Period Welfare}} + \overbrace{\frac{1}{2}\lambda(1-b)}^{\text{Expected 2nd Period Welfare}}$$

If don't borrow, expected voter welfare is:

$$U_V(\text{don't borrow}|\alpha_1) = \alpha_1\lambda + \frac{1}{2}\lambda$$

Voter welfare maximized by borrowing if

$$\alpha_1 > \frac{1}{2}$$

Equilibrium Borrowing

Politician's expected payoff if she borrows:

$$U_1(\text{borrow}|\alpha_1) = \alpha_1\lambda(1+b)+\frac{1}{2}\Big(p\lambda(1-b)+(1-p)(1-\lambda)(1-b)\Big)$$

Politician's expected payoff if she doesn't borrow:

$$U_1(\text{don't borrow}|\alpha_1) = \alpha_1\lambda + \frac{1}{2}\Big(p\lambda + (1-p)(1-\lambda)\Big)$$

Borrow in equilibrium if

$$\alpha_1 > \frac{p\lambda + (1-p)(1-\lambda)}{2\lambda}$$

Politicians borrow too much from future in equilibrium

Dynamics and Fiscal Distortions

Because of dynamic concerns, politicians over emphasize the present

This can be because of partisan issues (as in our model), various other kinds of risk, individual vs. party interests, etc.

Consider current underfunding of pensions

The Idea

Political power allows groups to extract benefits

Groups want to hold on to political power

Advocate for policies that retain group power, even if doing so is an inefficient way to achieve policy goal

Examples

Farm subsidies

Price supports and protectionism for manufacturing

Immigration restrictions

A Model

Population of size N divided into two generations

New generation has population share $0 < \delta < 1$

Old generation is divided into farmers $(1/2 < \lambda < 1)$ and manufacturers $(1 - \lambda)$

Old generation farmers are a majority of the old generation, but not of the overall population

$$(1 - \delta)\lambda < 1/2$$

The Game

Majority of old generation chooses a policy:

1. Tax manufacturers at rate t and redistribute to the existing farmers
2. Tax manufacturers at rate t to fund price supports for agriculture
3. Don't tax manufacturers

The new generation observes the policy choice and then chooses which industry to enter and first period production occurs

The new majority chooses a new tax policy

Second period production occurs and the game ends

Payoffs and Production

Each player has utility equal to sum of her individual production and transfers

Each farmer produces F

Each manufacturer produces $M > F$

It is only possible to tax the income from manufacturing

Utilitarian Optimum

Taxes are not assumed to be distortionary, so taxes and transfers do not directly affect utilitarian payoff

Utilitarian payoff is determined by amount produced

Manufacturing is more productive than farming, so utilitarian outcome/Pareto efficiency requires that new generation enters manufacturing

Any policy choice that leads new generation to become farmers is inefficient

Second Period Policy if New Generation Become Farmers

Farmers remain in majority

Implement tax t and redistribute proceeds to farmers (doesn't matter how)

$$T_F = \frac{t(1-\delta)(1-\lambda)M}{(1-\delta)\lambda + \delta}.$$

Second period payoff for farmers:

$$F + T_F$$

Second period payoff for manufacturer:

$$(1-t)M.$$

Second Period Policy if New Generation Become Manufacturers

Farmers lose majority

No redistribution, so second period payoffs are F and M

Following Lump Sum Transfers

Lifetime payoff to new generation if become farmer:

$$2F + T_F$$

Lifetime payoff to new generation if become manufacturer:

$$M(1-t) + M = M(2-t)$$

Farm if and only if:

$$2F + T_F \geq M(2-t)$$

Following Price Subsidies

Lifetime payoff to new generation if become farmer:

$$2\left(F + T_F\right).$$

Lifetime payoff to new generation if become manufacturer:

$$M(2 - t).$$

Farm if and only if:

$$2(F + T_F) \geq M(2 - t)$$

Following No Redistribution

Lifetime payoff to new generation if become farmer:

$$2F + T_F$$

Lifetime payoff to new generation if become manufacturer:

$$2M$$

Farm if and only if:

$$2F + T_F \geq 2M$$

Price Subsidies Encourage Farming

Redistribution:

$$2F + T_F \geq M(2 - t).$$

Price support:

$$2F + 2T_F \geq M(2 - t).$$

No redistribution:

$$2F + T_F - 2t \geq M(2 - t)$$

The Trade-Off

Always do some form of redistribution

Price supports make it more likely new generation become farmers, retaining future power

Transfers don't have to be shared with the new generation

Choose price supports if:

$$\frac{\delta}{(1-\delta)^2} \leq \lambda(1-\lambda)$$

Inefficiency and Commitment

Old farmers lose their redistribution if new generation don't become farmers

Hence, they want a policy that incentivizes farming, even though this is inefficient

If the new generation could commit to redistribution in second period, old generation would not choose price supports and we would get efficient sectoral sorting

Once the new generation chooses manufacturing, they want to get rid of redistribution to farmers

Take Aways

In dynamic settings, absence of enforceable contracts and shifting power gives rise to commitment problems

Inefficient behavior "up the tree"

Institutions for commitment

Contracts

Integration