Taxation Without Commitment

1 Motivation

• have already discussed time inconsistency problem with capital taxation
• but could also emerge with labor taxation
• deviation from promised plan due to
  – ex post Pareto improvement (particularly strong incentive to deviate)
  – gains from redistribution
• horizon
  – finite: bad outcomes
  – infinite: reputation mechanisms (trigger strategies), better outcomes
• concepts
  – equilibrium without commitment (more complicated)
  – at a given date, if we could commit from now on, would there be an incentive to deviate from the original plan? (easier)
• $U_{\text{no commitment}} \leq U_{\text{commitment}}$

2 General Policy Game

• Ljungqvist/Sargent (2004), chapter 22
• government chooses action $y \in Y$ (e.g. tax rate)
• households choose action $\xi \in X$, e.g. output, capital
• average level of $\xi$ in the economy is $x \in X$
• household utility is $u(\xi, x, y)$
• consumers are small, non-strategic, take, \( y, x \) as given, solve

\[
\max_{\xi} u(\xi, x, y)
\]

with solution \( \xi = f(x, y) \)

• households are identical, hence symmetric equilibrium

\[
x = f(x, y)
\]

with solution \( x = h(y) \)

• this captures the idea of a competitive equilibrium

• the set of competitive equilibria is given by

\[
C \equiv \{(x, y) \in X \times Y | x = h(y)\}
\]

• benevolent government with preferences \( R(x, y) \equiv u(x, x, y) \)

3 Ramsey versus Nash in the Static Game

• Ramsey problem (full commitment)

• timing

1. government chooses \( y \)
2. households respond

\[
\max_y R(h(y), y)
\]

with solutions \( y^R \) and \( x^R \equiv h(y^R) \)

• note that

\[
V^R \equiv R(x^R, y^R) = \max_{(x, y) \in C} u(x, x, y) \leq \max_{x, y} u(x, x, y),
\]

which would be the first best outcome. This is due to the constraint that the allocation must be a competitive equilibrium, i.e. \( x = h(y) \)

• now suppose timing is reversed (no commitment)
• given \( x \), government solves

\[
\max_y R(x, y)
\]

with solution (best response) \( H(x) \)

• even if households chose \( x^R \), government will not choose \( y^R \) but deviate

• Nash equilibrium \((x^N, y^N)\)
  1. \((x^N, y^N) \in C\), i.e. \( x^N = h(y^N) \)
  2. given \( x^N \), \( R(x^N, y^N) = \max_y R(x^N, y) \), i.e. \( y^N = H(x^N) \)

pair of best responses

• solve \( y^N = H(h(y^N)) \) and \( x^N = h(H(x^N)) \) and define \( V^N = R(x^N, y^N) \)

• note that

\[
V^N \leq \max_{\{ (x,y)|x=h(y),y=H(x) \}} R(x,y) \leq \max_{\{ (x,y)|x=h(y) \}} R(x,y) = V^R
\]

• lack of commitment (weakly) reduces welfare

• this generalizes from the one-shot example to any finite horizon

• government behaves opportunistically in the last period \( \rightarrow \) Nash equilibrium in the last period

• by backwards induction, play Nash equilibrium in each period

4 Reputational Mechanisms with Infinite Horizon

4.1 Setup

• infinitely repeated policy game

• let households still be non-strategic, i.e. play static best response as before

• government

\[
V = \sum_{t=0}^{\infty} \beta^t R(x_t, y_t)
\]
• full commitment timing \( y_t, x_t, y_{t+1}, x_{t+1}, \ldots \) (but consumers do not take \( y_{t+1} \) into account when playing their static optimum (e.g. new cohort every period))

• optimum: repeat Ramsey outcome for all \( t \): \( x_t^* = x^R, y_t^* = y^R \)

• no commitment timing \( x_t, y_t, x_{t+1}, y_{t+1}, \ldots \)

• one equilibrium: \( x_t = x^N, y_t = y^N \), just repeat static Nash outcome \( \forall t \) (no reputation)

• can we sustain better equilibria (e.g. the Ramsey outcome) as SPE using reputational mechanisms?

• Abreu/Pierce/Stacchetti (Ecta 1990)

• strategy profile
  \[ \sigma_t = (\sigma_t^h, \sigma_t^\delta) : X^{t-1} \times Y^{t-1} \to X \times Y \]

• \( \sigma \) is a SPE if and only if \( \forall t, \forall (x^{t-1}, x'^{t-1}) \in X^{t-1} \times Y^{t-1} \)
  1. \( x_t = \sigma_t^h(x^{t-1}, y^{t-1}) \) is consistent with \( C \) when \( y_t = \sigma_t^\delta(x^{t-1}, y^{t-1}) \)
  2. \( R(x_t, y_t) + \beta V(\sigma |(x_t, y_t)) \geq R(x_t, \eta) + \beta V(\sigma |(x_t, y^{t-1}, \eta)) \forall \eta \)

• example: trigger strategies. Play \((h(y), y)\) until someone deviates, then play \((x^N, y^N)\) forever

• for this to be a SPE, need
  \[ V = R(h(y), y) + \beta V(\sigma |(x_t, y_t)) \geq R(h(y), H(h(y))) + \beta V^N, \]
  where now \( V^N = R(x^N, y^N) / (1 - \beta) \)

• use Nash equilibrium as the punishment for a deviation

• the best such SPE solves
  \[ \max_y R(h(y), y) \text{ s.t. } \frac{1}{1 - \beta} R(h(y), y) \geq R(h(y), H(h(y))) + \beta V^N \quad (1) \]

• this may or may not allow us to enforce the Ramsey outcome

• if not, can we do even better than this?
• key insight: to implement better SPE outcome, want to relax constraint in (1), i.e. try to find worse punishment than the Nash outcome

• always punish maximally, even minimal deviations \(\rightarrow\) optimal punishment does not depend on the deviation (this may be different with uncertainty/unobservability)

• to determine the highest SPE value \(\bar{V}\), need to find the worst SPE value \(V \leq V^N\)

### 4.2 Computing \(\underline{V}\) and \(\overline{V}\)

• worst SPE \(\underline{V}\) is self-enforcing: punishment is to restart the worst equilibrium

\[
\underline{V} = \min_{y, \tilde{V}} R(h(y), y) + \beta \tilde{V}
\]

s.t.

\[
R(h(y), y) + \beta \tilde{V} \geq R(h(y), H(h(y))) + \beta \underline{V}
\]

and \(y \in Y, \tilde{V} \in [\underline{V}, \overline{V}]\)

• note: APS (1990) show that set of SPE values is indeed such an interval, take for granted here

• by construction, \(\tilde{V} \geq \underline{V}\)

• if stick to the worst equilibrium, get something better (\(\tilde{V}\)). Otherwise, deviate to \(H(h(y))\) and get punished with worst SPE \(\underline{V}\).

• at the solution, set \(\tilde{V}\) as small as possible such that the constraint just binds

• denote solution by \(\underline{y}\), so

\[
\underline{V} = R(h(\underline{y}), H(h(\underline{y}))) + \beta \underline{V}
\]

and thus

\[
\underline{V} = \frac{1}{1 - \beta} R(h(\underline{y}), H(h(\underline{y})))
\]

• promise the worst action \(\underline{y}\) but then deviate to \(H(h(\underline{y}))\) each period

• problem: this assumes that the required \(\tilde{V}\) is s.t. \(\tilde{V} \leq \overline{V}\)

• Procedure:
1. try

\[
V = \min_y \frac{1}{1-\beta} R(h(y), H(h(y)))
\]

\[
= \min_x \max_\eta \frac{1}{1-\beta} R(x, \eta)
\]

\[
= \min_x \max_\eta \frac{1}{1-\beta} R(x, \eta),
\]

where the first equality uses the definition of the best response function \(H(x)\) and the second assumes that \(h(.)\) has full range. This is why the worst equilibrium is also sometimes referred to as the min-max-equilibrium.

2. given the resulting \(V\) and \(y\), solve for \(\bar{V}\) using

\[
R(h(y), y) + \beta \bar{V} = R(h(y), H(h(y))) + \beta V = \frac{1}{1-\beta} V
\]

3. moreover, given the worst SPE \(V\), solve for the best SPE \(\bar{V}\) from

\[
\bar{V} = \max_y \frac{1}{1-\beta} R(h(y), y)
\]

s.t.

\[
\frac{1}{1-\beta} R(h(y), y) \geq R(h(y), H(h(y))) + \beta \bar{V}
\]

4. check whether \(\bar{V} \leq V\). If yes, we’re done. Otherwise, need to solve for \(V\) and \(\bar{V}\) simultaneously.

5. in particular, need to set \(\bar{V} = V\) (“stick and carrot:” use best SPE as reward for sticking to worst SPE) and solve

\[
\bar{V} = \max_y \frac{1}{1-\beta} R(h(y), y) \text{ s.t. } \frac{1}{1-\beta} R(h(y), y) \geq R(h(y), H(h(y))) + \beta \bar{V}
\]

and

\[
V = \min_y R(h(y), y) + \beta V \text{ s.t. } R(h(y), y) + \beta V \geq R(h(y), H(h(y))) + \beta V
\]

simultaneously for a fixed point. Solve system of 4 equations in 4 unknowns \(V, \bar{V}, \underline{y}, \bar{y}\)

\[
V = \frac{1}{1-\beta} R(h(y), \bar{y})
\]
\[ \bar{V} = R(h, H(h)) + \beta \bar{V} \]
\[ V = \frac{1}{1-\beta} R(h, H(h)) \]
\[ R(h, y) + \beta \bar{V} = R(h, H(h)) + \beta V \]

- see problem set for an example

5 Applications

5.1 Ramsey Capital Taxation without Commitment

- Chamley-Judd framework but without commitment
- Benhabib/Rusticchini (JET 1997), Phelan/Stacchetti (Ecta 2001)
- actions of government: \((\tau_k^t, \tau_l^t)\)
- actions of consumers: \((c_t, l_t, K_t, b_t)\)
- consumers take taxes as given, optimize non-strategically given current tax policy (e.g. do not strategically punish the government for deviations), government is the only strategic player
- pure strategies for simplicity
- consumers:
  \[ \max_{c_t, l_t, K_t+1, b_t+1} \mathbb{E} \sum_{t=0}^{\infty} \beta^t u(c_t, l_t) \]
  s.t.
  \[ c_t + k_{t+1} + q_t b_{t+1} \leq (1 - \tau_l^t) w_t l_t + (1 - \tau_k^t) r_t k_t + b_t \]
- consumers’ behavior can be condensed to a sequence of implementability constraints
  \[ u_c(t)c_t + u_l(t)l_t + \beta u_c(t)(K_{t+1} + b_{t+1}) = u_c(t-1)(k_t + b_t) \] (2)
- firms: \(w_t = F_l(t), r_t = F_k(t)\)
- market clearing (feasibility)
  \[ c_t + g_t + k_{t+1} \leq F(k_t, l_t) + (1 - \delta)k_t \] (3)
• government does not want to deviate at any point in time:

\[
\sum_{s=t}^{\infty} \beta^{s-t} u(c_s, l_s) \geq V^D(K_t, b_t) \forall t, \tag{4}
\]

where \( V^D(K_t, b_t) \) is the value to the government from a deviation

• problem for best SPE becomes

\[
\max_{c_t, l_t, K_{t+1}, b_{t+1}} \mathbb{E} \sum_{t=0}^{\infty} \beta^t u(c_t, l_t) \]

s.t. (2), (3) and (4)

• same as Ramsey problem with full commitment, but with additional constraint (4) → lower welfare

• recursive formulation, defining

\[a_{t+1} \equiv u_c(t)(K_{t+1} + b_{t+1})\]

is given by

\[W(k, a) = \max_{c, l, k', a'} \{ u(c, l) + \beta W(k', a') \}\]

s.t.

\[u_c c + u_l l + \beta a' = a\]

\[c + g + k' = F(k, l) + (1 - \delta)k\]

\[W(k', a') \geq V^D(k', a')\]

and \( V^D(k', a') \) is the value from the best one-shot deviation plus \( \beta \) times the value from the worst SPE

• same structure as discussed above: best SPE depends on worst SPE and vice versa

• Benhabib/Rusticchini (JET 1997) assume no government debt \( b_t = 0 \) for all \( t \) to get rid of \( a \) as state variable and use a special production function so that worst SPE can be derived analytically (does not depend on best SPE): It is given by zero savings. Then the value from a deviation is easy to determine: high \( \tau^k \) in first period of deviation, after that no savings and thus only labor taxes.
• find that both \( \tau^k > 0 \) and \( \tau^k < 0 \) can be sustained in the steady state of the best SPE (but not \( \tau^k = 0 \))

• idea: distorting capital subsidy \( \tau_k < 0 \) inflates the capital stock and therefore makes deviating (which would lead to zero saving from then on) very costly

• Phelan/Stacchetti (Ecta 2001) also assume no government debt and use APS-methodology discussed above to numerically solve for fixed point of best and worst SPE

• find that, in steady state of best SPE, \( \tau^k > 0 \) (see graph)

• Reis (2006) allows for government debt, but assumes possibility of default on debt in case of deviation \( \rightarrow \) value of deviation \( V^D(k', a') \) is in fact independent of \( a' \) since, in case of deviation, default is optimal, so level of debt does not matter

• shows that, in the steady state of the best SPE, \( \tau_k = 0 \) as in Chamley/Judd

• idea: government accumulates so much assets over time that it does not use any taxes in the steady state, no distortions even without commitment

• formally, the FOCs from the recursive problem above are:

\[
\begin{align*}
[k'] & \quad \beta W_k(k', a') = \lambda - \eta \left( W_k(k', a') - V^D_k(k') \right) \\
[a'] & \quad \beta W_a(k', a') = -\beta \mu - \eta W_a(k', a')
\end{align*}
\]

and the envelope conditions are

\[
\begin{align*}
[a] & \quad W_a(k, a) = -\mu \\
[k] & \quad W_k(k, a) = \lambda (1 + F_k - \delta).
\end{align*}
\]

• this implies

\[
W_a(k', a') = W_a(k, a) - \frac{\eta}{\beta} W_a(k', a') \geq W_a(k, a)
\]

since \( \eta \geq 0 \), \( W_a < 0 \) (conditional on \( K \), increasing \( b \) reduces welfare)

• \( W_a(k, a) \) is increasing over time unless \( \eta \to 0 \)

• for steady state, Reis (2006) shows that \( \eta_t \to 0 \) as \( t \to \infty \)
• combining FOCs and envelope conditions for $\eta = 0$ yields

$$\beta (1 + F_k - \delta) = 1$$

and hence a zero capital tax in the steady state.

### 5.2 Dynamic Mirrlees Taxation without Commitment

#### 5.2.1 Finite Horizon

• Farhi et al. (2012)

• start with 2 period model $t = 0, 1$

• ex ante heterogeneity $\theta$

• individuals consume and work in $t = 0$, only consume in $t = 1$

• preferences

$$u(c_0(\theta)) - h(y(\theta)/\theta) + \beta u(c_1(\theta))$$

• linear technology, so aggregate resource constraints

$$\int c_0(\theta)dF(\theta) + K_1 \leq \int y(\theta)dF(\theta) + RK_0$$

$$\int c_1(\theta)dF(\theta) \leq RK_1$$

• combine to intertemporal resource constraint

$$\int c_0(\theta)dF(\theta) + \frac{1}{R} \int c_1(\theta)dF(\theta) \leq \int y(\theta)dF(\theta) + RK_0 \quad (5)$$

• incentive constraints

$$u(c_0(\theta)) - h(y(\theta)/\theta) + \beta u(c_1(\theta)) \geq u(c_0(\theta')) - h(y(\theta')/\theta') + \beta u(c_1(\theta')) \quad \forall \theta, \theta' \quad (6)$$

• consider utilitarian government with full commitment

• in period 0, propose

$$\max_{c_0(\theta), c_1(\theta), y(\theta)} \int (u(c_0(\theta)) + \beta u(c_1(\theta)) - h(y(\theta)/\theta)) dF(\theta)$$
s.t. (5) and (6)
• preferences over consumption in both periods \((c_0, c_1)\) are separable from work effort, so Atkinson/Stiglitz (1976) applies: no capital taxation

• now consider lack of commitment. In particular, suppose in period 1, the government can reform the tax system at some resource cost \(\kappa\)

• faces resource constraint

\[
\int c_1(\theta) dF(\theta) \leq R_k - \kappa
\]

(7)

• since it is utilitarian, it maximizes in period 1

\[
\max_{c_1(\theta)} \int u(c_1(\theta)) dF(\theta)
\]

s.t. (7)

• idea: in \(t = 0\), promise to use \(c_1\) in addition to \(c_0\) to provide additional incentives for effort in \(t = 0\). But then once we are in \(t = 1\), effort is sunk so this is not optimal anymore.

• if a reform takes place, consumption will be equalized across all types and thus

\[
c_1(\theta) = R_k - \kappa \quad \forall \theta
\]

• lack of commitment arises here due to gains from redistribution rather than an ex post Pareto improvement

• it is always in the interest of the government to propose a policy in period \(t = 0\) that will not be reformed in \(t = 1\). Otherwise, the government could have done better by offering an allocation that offers the same constant allocation for consumption in \(t = 1\), which would have saved the fixed cost \(\kappa\)

• reform can be avoided if

\[
\int u(c_1(\theta)) dF(\theta) \geq u(R_k - \kappa)
\]

• \(\kappa = \infty \rightarrow\) full commitment, \(\kappa = 0 \rightarrow\) no commitment, intermediate cases with limited commitment (\(\kappa\) will be endogenized with infinite horizon)
• planning problem in $t = 0$ with limited commitment becomes

$$
\max_{c_0(\theta), c_1(\theta), y(\theta)} \int (c_0(\theta)) + \beta u(c_1(\theta)) - h(y(\theta) / \theta)) dF(\theta)
$$

s.t. (5) and (6) and the credibility constraint

$$
\int u(c_1(\theta))dF(\theta) \geq u \left( \int c_1(\theta)dF(\theta) - \kappa \right), \quad (8)
$$

which rules out a reform in $t = 1$

• dual

$$
\min_{c_0(\theta), c_1(\theta), y(\theta)} \int \left( c_0(\theta) + \frac{1}{R} c_1(\theta) - y(\theta) \right) dF(\theta)
$$

s.t.

$$
\int (u(c_0(\theta)) + \beta u(c_1(\theta)) - h(y(\theta) / \theta)) dF(\theta) \geq V, \quad (9)
$$

(6) and (8)

• multiplier $\eta \geq 0$ on the credibility constraint (8) to form Lagrangian

$$
\min_{c_0(\theta), c_1(\theta), y(\theta)} \int \left( c_0(\theta) + \frac{1}{R} c_1(\theta) - \eta u(c_1(\theta)) - y(\theta) \right) dF(\theta) + \eta u \left( \int c_1(\theta)dF(\theta) - \kappa \right)
$$

s.t. (6) and (9)

• in both constraints, $c_0(\theta)$ and $c_1(\theta)$ enter through the total consumption utility $U(\theta) \equiv u(c_0(\theta)) + \beta u(c_1(\theta))$. Hence, any solution must solve the subproblem of minimizing (10) s.t. $u(c_0(\theta)) + \beta u(c_1(\theta)) = U(\theta) \forall \theta$ (inverse Euler variation).

• FOCs

$$
[c_0(\theta)]
$$

$$
1 = \lambda(\theta)u'(c_0(\theta))
$$

$$
[c_1(\theta)]
$$

$$
\frac{1}{R} + \eta \left( u'(RK_1 - \kappa) - u'(c_1(\theta)) \right) = \lambda(\theta)\beta u'(c_1(\theta))
$$

• combining

$$
u'(c_0(\theta)) = \beta R \frac{1}{1 + R\eta (u'(RK_1 - \kappa) - u'(c_1(\theta)))} u'(c_1(\theta))$$
hence, the marginal tax rate on capital satisfies
\[ 1 - T_k'(Rk_1(\theta)) = \frac{1}{1 + R\eta(u'(RK_1 - \kappa) - u'(c_1(\theta)))}. \]

progressive capital taxation since \( T_k'(Rk_1(\theta)) \) is increasing in \( c_1(\theta) \)

in fact, \( T_k' > 0 \) at the top since
\[ RK_1 - \kappa = \int c_1(\theta)dF(\theta) - \kappa < \max_\theta c_1(\theta) \]
and \( T_k' < 0 \) at the bottom since
\[ \min_\theta c_1(\theta) < RK_1 - \kappa \]
whenever the credibility constraint is binding

idea: \( u'(RK_1 - \kappa) - u'(c_1(\theta)) \) determines whether an additional unit of capital saved by type \( \theta \) tightens or loosens the credibility constraint. Increasing \( K_1 \) raises the LHS of (8) since it increases individual consumption, but it also increases the RHS, the value of reform. For high \( \theta \) agents, the increase in the LHS is smaller than the increase in the RHS due to their low marginal utility, and vice versa for low \( \theta \) agents. Thus, saving by high \( \theta \) agents tightens the credibility constraint, whereas it relaxes it for low \( \theta \) agents. The optimal progressive capital tax makes them internalize this effect of their savings behavior on the future commitment problem.

5.2.2 Infinite Horizon

iid idiosyncratic shocks \( \theta_t \), preferences
\[ V_t = \mathbb{E}_{t-1}\sum_{s=0}^{\infty}\beta^s(u(c_{t+s}) - \theta_{t+s}h(y_{t+s})) \]

allocation \( \{c_t(\theta^t), y_t(\theta^t), K_t\} \)

reporting strategy \( \sigma_t(\theta^t) \) with truth-telling \( \sigma_t^*(\theta^t) = \theta_t \ \forall \theta^t \). Induced history of reports \( \sigma^t(\theta^t) \).
utility from a reporting strategy \( \sigma \) and allocation \( \{c_t, y_t\} \) is

\[
U(\{c_t, y_t\}, \sigma) = \sum_{t, \theta^t} \beta^t \left( u(c_t(\sigma^t(\theta^t))) - \theta_t h(y_t(\sigma^t(\theta^t))) \right) Pr(\theta^t)
\]

- incentive compatibility

\[
U(\{c_t, y_t\}, \sigma^*) \geq U(\{c_t, y_t\}, \sigma) \quad \forall \sigma
\]  \hspace{1cm} (11)

- aggregate resource constraint

\[
\sum_{\theta^t} c_t(\theta^t) Pr(\theta^t) + K_{t+1} \leq F \left( K_t, \sum_{\theta^t} y_t(\theta^t) Pr(\theta^t) \right) \hspace{1cm} (12)
\]

\( F \) incorporates \( (1 - \delta)K_t \)

- an allocation is credible if the government does not have an incentive to deviate, i.e.

\[
U(\{c_{t+s}, y_{t+s}\}_{s \geq 0}, \sigma^*) \geq \hat{W}(K_t, \{y_t(\theta^t)\}) \quad \forall t
\]  \hspace{1cm} (13)

where \( \hat{W} \) is the value that the government derives from its best one shot deviation followed by the worst SPE value:

\[
\hat{W}(K_t, \{y_t(\theta^t)\}) \equiv \max_{K'} \left\{ u \left( F \left( K_t, \sum_{\theta^t} y_t(\theta^t) Pr(\theta^t) \right) - K' \right) - \sum_{\theta^t} \theta_t h(y_t(\theta^t)) Pr(\theta^t) + \beta \hat{W}(K') \right\} \hspace{1cm} (14)
\]

and \( W(K) \) is the value from the worst SPE.

- value from deviation now depends on distribution of outputs \( \{y_t(\theta^t)\} \) in current cross-section

- show that worst SPE with value \( W(K) \) takes simple min-max-structure

- putting multipliers \( \beta^t \mu_t \) on (12) and \( \beta^t \eta_t \) on (13) yields modified inverse Euler equation

\[
\frac{1}{u'(c_t)} = \mathbb{E}_t \left[ \frac{1}{u'(c_{t+1})} \right] - \frac{\eta_{t+1}}{\mu_{t+1}} \beta \hat{W}_K(K_{t+1}, \{y_{t+1}\}) \hspace{1cm} (15)
\]
- collapses to standard inverse Euler equation if credibility constraints don’t bind so that $\eta_t = 0$

- what savings distortions does the modified inverse Euler equation (15) imply?

- use tax implementation by Kocherlakota (2005) with state-dependent linear capital taxes so that

$$1 - \tau^k_t(\theta^t) = \frac{u'(c_{t-1}(\theta^{t-1}))}{\beta R_{t-1,1}u'(c_t(\theta^t))}$$

- then can show that average capital tax is

$$\bar{\tau}^k_t(\theta^t) = E_t \tau^k_{t+1}(\theta^{t+1}) = \frac{\beta \hat{\psi}_K(K_{t+1}, \{y_{t+1}(\theta^{t+1})\}) - u'(c_t(\theta^t)) \eta_{t+1}}{\beta F_K(K_{t+1}, \sum_{\theta^{t+1}} \eta_{t+1}(\theta^{t+1}) \Pr(\theta^{t+1})) \mu_{t+1}}$$

- get back result from standard dynamic Mirrlees model with full commitment that $\bar{\tau}^k_t(\theta^t) = 0$ if credibility constraints don’t bind, i.e. $\eta_t = 0$

- otherwise, progressivity result from finite horizon goes through: average capital tax rate is increasing in consumption

- idea is very similar to finite horizon intuition: The severity of the commitment problem in the future depends on how much capital is accumulated

  1. the higher $K_{t+1}$, the higher the utility achieved under the worst credible allocation, and the tighter the credibility constraint. To reduce capital accumulation, this pushes towards positive capital taxes and is reflected in the positive term $\hat{\psi}_K(K_{t+1}, \{y_{t+1}(\theta^{t+1})\})$.

  2. On the other hand, agents don’t internalize the fact that by saving more, they increase average future welfare and loosen the credibility constraints (reduce likelihood of reform). A Pigouvian tax correction makes them internalize this externality as reflected in the term $-u'(c_t(\theta^t))$. This latter term depends on the marginal utility of each individual and therefore gives rise to the capital tax progressivity, just as in the finite horizon case.