Asset Market Participation
Dynamics and Political Economy

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Broad Motivation

Them's Fighting Words

- "us vs them"
- " rich vs. poor"
- "capitalists vs workers"
- Common themes of political debate over redistribution
  - often limit policy interventions
  - what will it take to overcome these barriers and focus the debate?
  - put us all on the same side

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Narrower Question

How does Endogenous Asset Market Participation Affect

- aggregate dynamics?
- social welfare?
- political economy of taxes and transfers?

What we do

- Version of Diamond OG
- heterogenous agents, distinguished by productivity
- costly participation in savings through capital (entrepreneurs)
- others just store (workers)
- three pillars of the analysis
  - endogenous asset market participation
  - curvature of labor tax function
  - complementarity between capital and labor

What we do

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- three pillars of the analysis
  - endogenous asset market participation
  - curvature of labor tax function
  - complementarity between capital and labor
- study capital dynamics and policy evaluation
- quantify these components of the political tensions

What we find

- Extensive Margin of Participation Enriches Dynamics
- Multiple Steady States Created
- Welfare Enhancing ITC can be supported
- Short term benefits to ITC through equilibrium selection

Literature

- Capital Dynamics : (Azariadis, Diamond , Hansen-Prescott)
- Political Economy : (Mattozzi, ...
- Household Finance : (Haliassos, ...)

Model

Overlapping generations

- **Households**
  - Investors & Workers
  - Workers employed in youth
  - Portfolio choice: capital investment or storage
  - No bequests
- **Firms**
  - hire workers and rent capital
  - CRS + perfect competition $\rightarrow$ boring
- **Government**
  - Collects labor taxes
  - Finances ITC
  - Cannot issue debt

Households: Overview

Structure

- Overlapping generations of households
- Work when young, consume when young and old

Heterogeneous Households

- Labor productivity: $\varepsilon \sim G(\varepsilon)$
- *Ex post* heterogeneity through portfolio

Choices

- Endogenous asset market participation $\Rightarrow$ investors and workers
- Portfolio allocation
- Savings and consumption

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Worker Problem

$$V^N(\varepsilon, \omega, R, \tau(\cdot)) = \max_s \; u(\omega\varepsilon(1-\tau(\omega\varepsilon)) - s) + v(rs) \qquad (1)$$

FOC:

$$u'(c^y) = v'(c^o)r. \qquad (2)$$

with:

- Productivity ε
- Invest in storage **s**
- Wage Rate ω
- Tax Function $\tau(\omega\varepsilon)$
- return **r**
- $u(\cdot), v(\cdot)$ strictly increasing and concave

Investor Problem

$$V^P(\varepsilon, \omega, R, \tau(\cdot)) = \max_k \; u(\omega\varepsilon(1-\tau(\omega\varepsilon)) - k - \Gamma) + v(Rk) \quad (3)$$

with :

- Invest in capital **k**
- Rental Rate **R**
- Participation Cost **Γ**

Decision Rule of Investor

- FOC implies

$$k_{t+1} = \phi(\omega_t, \varepsilon, R_{t+1}, \chi, \tau(\omega_t \varepsilon)). \tag{4}$$

- Substitution Effects Dominatte

Assumption

Savings by participants is increasing in the return.

- Using this assumption:

Lemma

Consumption in youth is lower for asset market participants than non-participants given ε.

Participation Decision

Households decide on **asset market participation**:

Proposition

There exists a $\varepsilon^*(\omega, R, \tau(\cdot))$ *such that households participate in the asset market iff* $\varepsilon \geq \varepsilon^*(\omega, R, \tau(\cdot))$*. Further,* $\varepsilon^*(\omega, R, \tau(\cdot))$ *is increasing in both* ω *and* R*.*

- cut-off rule
- distribution of ε impacts aggregate savings
- policy will impact participation choice directly and indirectly through (ω, R)

Firms : Standard

$$\max_{K,L} K^{\alpha} L^{1-\alpha} - wL - RK$$

$$F_L(K, L) = \omega, \tag{5}$$

$$F_K(K, L) = R. \tag{6}$$

Nothing Much Yet

- takes in tax revenues
- spends on separable public good

Capital Dynamics

- Difference Equattion

$$k_{t+1} = \int_{\varepsilon^*(\omega(k_t), R(k_{t+1})\tau(\cdot))} \phi(\omega(k_t), \varepsilon, R(k_{t+1}), \tau(\varepsilon\omega(k_t)))dG(\varepsilon). \tag{7}$$

- Equilibrium Defined

Definition

A equilibrium is a sequence of $\{k_t\}$ given k_1 solving (7).

- $H(\cdot)$!!

Lemma

The solution of (7) *can be represented as a difference equation,* $k_{t+1} = H(k_t)$.

Extended Example

Extended Example

- Households: Log Utility
- Technology

$$A\left(\alpha K^{\rho} + (1-\alpha)L^{\rho}\right)^{\frac{1}{\rho}} \tag{8}$$

- Tax Revenue

$$\int_{-\infty}^{\infty} w\varepsilon - \lambda(w\varepsilon)^{1-\tau_l} dG(\varepsilon) \tag{9}$$

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- $\rightarrow$ Participation

$$\varepsilon^* = \frac{1}{w}\left(\frac{\Gamma}{\lambda}\right)^{\tilde{\tau_l}}\left(\frac{R^{\tilde{\beta}}}{R^{\tilde{\beta}} - r^{\tilde{\beta}}}\right)^{\tilde{\tau_l}} \tag{10}$$

Key Pillars

- Participation : Γ
- Trickle Down : ρ
- Tax Progreessivity : τ

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- Participation : Γ
- Trickle Down : ρ
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Study

- how dynamics depend on these key parameters
- policy interventions
- how the interventions depend on these parameterrs

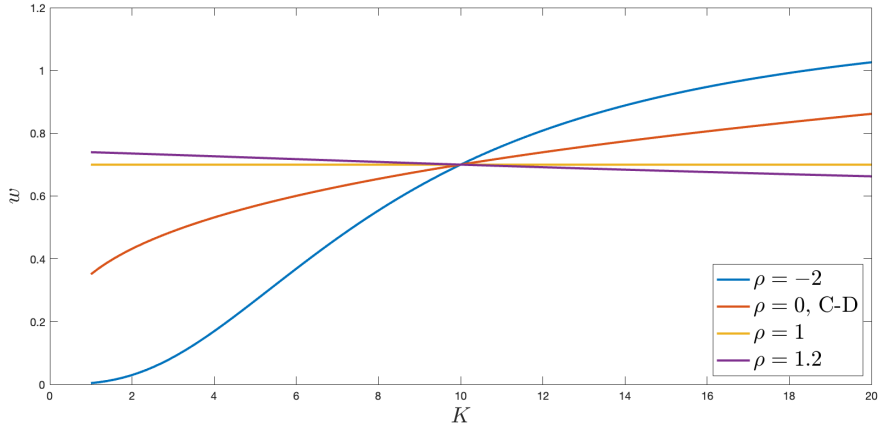
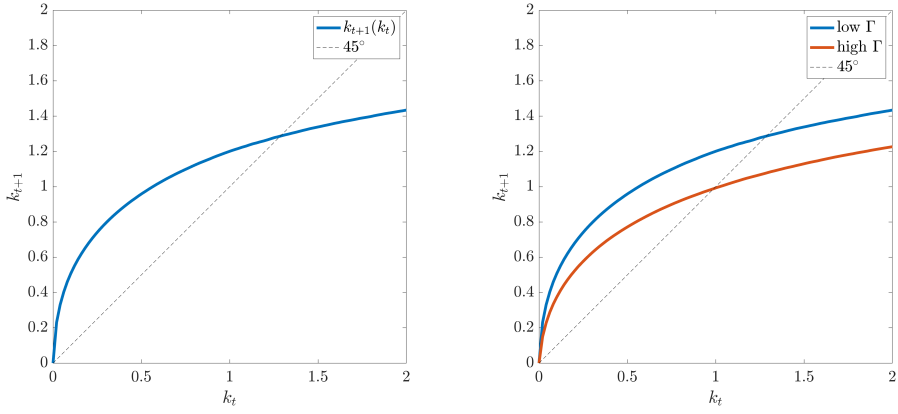


Figure 1: Relationship between wages and capital for different levels of ρ

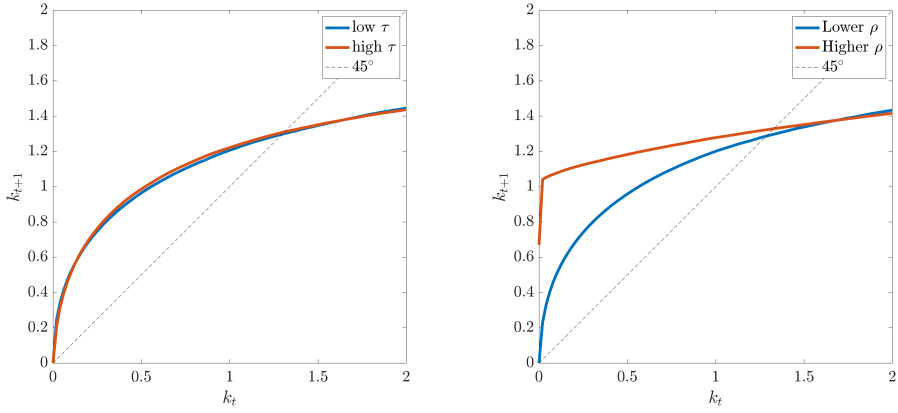
Parameter	Description	Value	Targets and Sources
Γ	Cost of Asset Mkt. Participation	0.434	50% particip. rate
σ_ε	Standard dev. $log(\varepsilon)$	0.8636	Income Q1-Q5 (Guvenen)
r	Return private storage technology	1	Normalization
α	Share parameter CES	0.33	standard
ρ	Substitution parameter	0.0	Cobb-Douglas
τ_l	Progressivity income tax	0.18	HSV

Table 1: Benchmark Calibration



(a) Baseline (b) Role of Γ

Figure 2: Capital Dynamics : Baseline and Participation Cost



(a) Role of τ (b) Role of ρ

Figure 3: Capital Dynamics : Progressivity and Factor Substitutability

ITC : Policy

Quantitative Analysis

- Build on Parameterized Example
- Study two Interventions
  - Investment Tax Credit χ
  - Participation subsidy for Γ
- Two Scenarios
  - Initially Unique Steady State : Support a Welfare Improvement
  - Policy as Equilibrium Selection w/ Multiple Steady States

Investment Tax Credit

- χ is the subsidy rate
- Household Problem

$$\max_{k} \; log\left(\lambda(w\varepsilon)^{1-\tau_l} - k(1-\chi) - \Gamma\right) + \beta log\left(Rk\right). \tag{11}$$

- Government Budget Constraint

$$\int_{\varepsilon^*(\cdot)}^{\infty} \chi\phi(\cdot)dG(\varepsilon) = \int_{-\infty}^{\infty} w\varepsilon - \lambda(w\varepsilon)^{1-\tau_l}dG(\varepsilon) \tag{12}$$

- Capital Dynamics

$$k_{t+1} = \frac{\tilde{\beta}}{(1-\chi)} \int_{\varepsilon^*(k_t,k_{t+1},\chi)} \left(\lambda(w(k_t)\varepsilon)^{1-\tau_l} - \Gamma\right) dG(\varepsilon) \tag{13}$$

ITC Intervention

- Surprise, Permanent
- set to maximize Steady State Welfare (expected utility)
- Evaluate Political Support Each Period : Majority Vote
- policy set to get at least 50% support
  - YES: continues until the next period
  - NO : ends , return to steady statee
- Key to political support was higher tax rate : τ increased from 18% to 22.4%

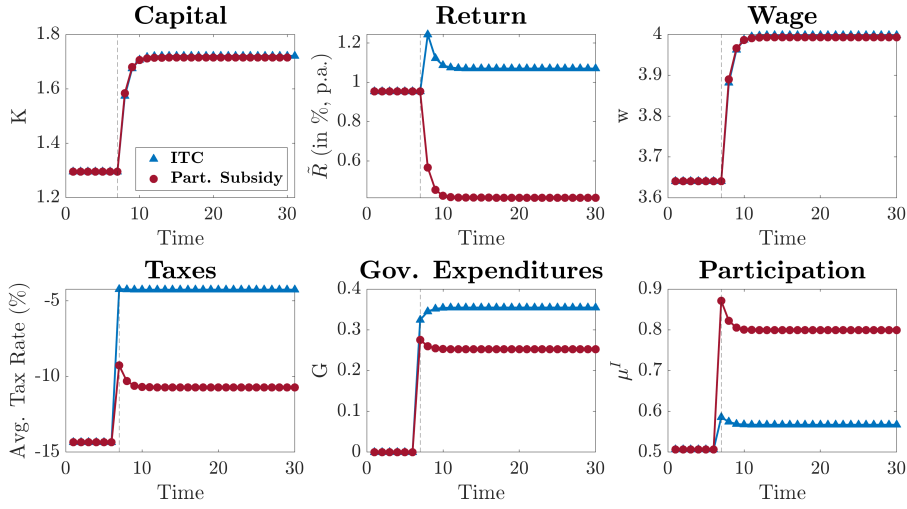


Figure 4: Aggregate Dynamics following Policy Interventions

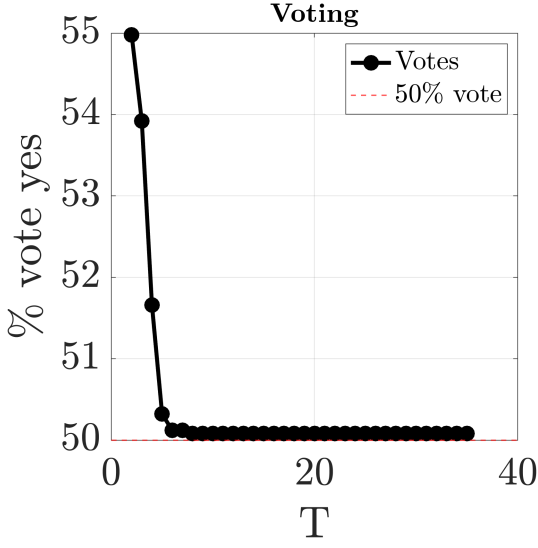


Figure 5: Investment Tax Credit: Voting Outcomes

Properties

- capital accumulates to new steady state
- higher return, including subsidy
- taxes are more progressive
- wages rise
- participation rises
- policy is supported in steady state and in transition

"Capitalists vs. Workers"

- Workers disposable income rises: Support the ITC
- Investors
  - get subsidy for investment
  - higher marginal tax rates
- short vs long run effects

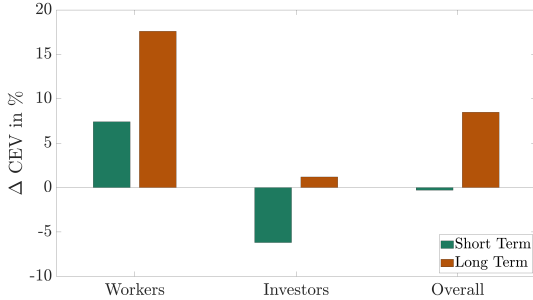
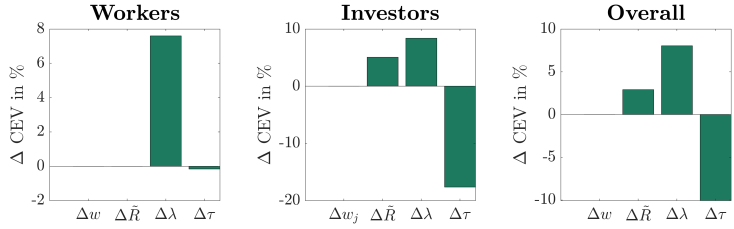
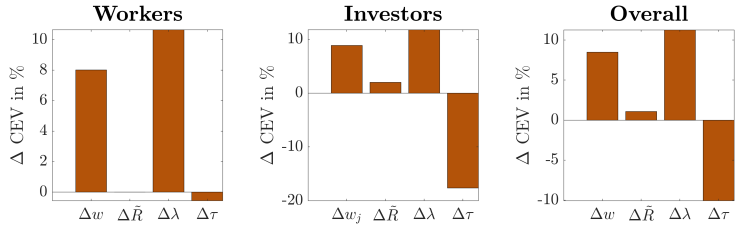


Figure 6: Investment Tax Credit: Welfare effects for different types of agents in the short- and long-term

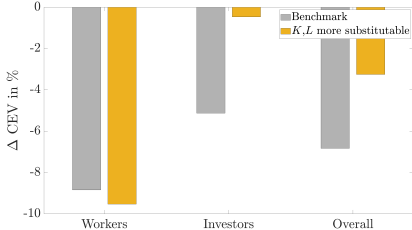


(a) Short Term



(b) Long Term

Figure 7: Investment Tax Credit: Decomposed Welfare Effects



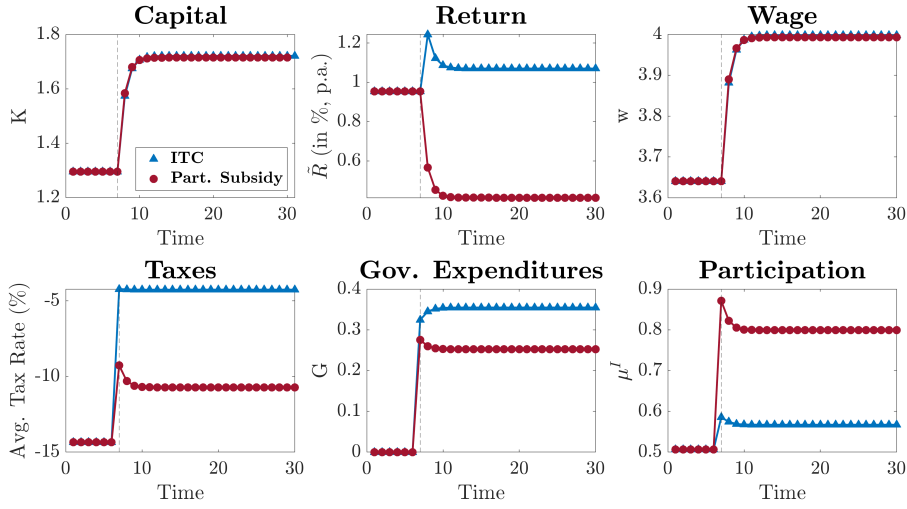
(a) Short Term

(b) Long Term

Figure 8: Investment Tax Credit: Sensitivity with respect to changes in ρ

Participation Subsidy

- Decrease in Γ
- financed by taxes
- aggregate effects
  - picked to match capital in new steady state
  - reduces returns
  - burst in participation
  - less costly for government
- distributional implications



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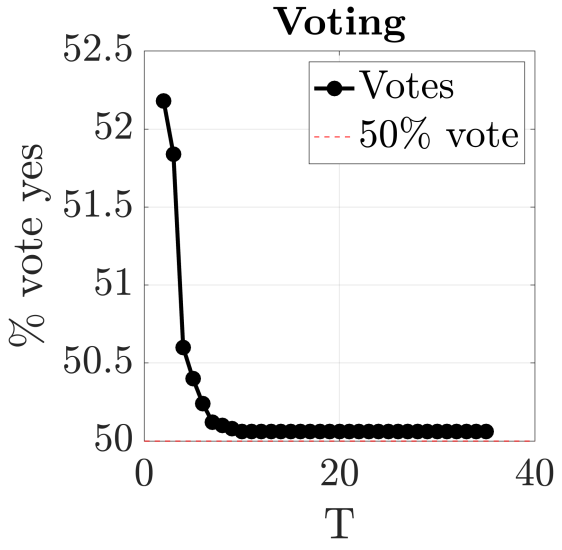


Figure 10: Asset Market Participation Subsidy: Voting Outcomes

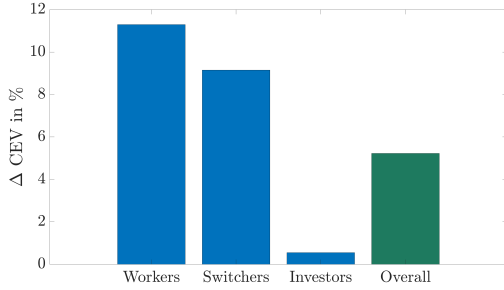
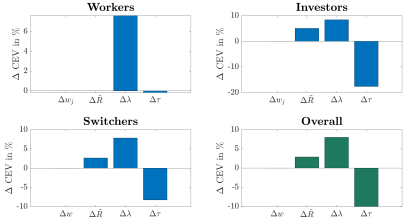
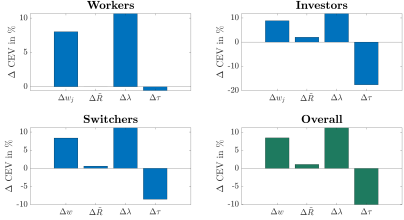


Figure 11: Asset Market Participation Subsidy: Steady State Welfare effects



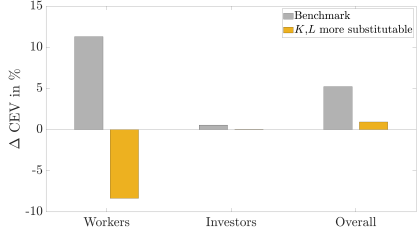
(a) Short Term



(b) Long Term

Figure 12: Asset Market Participation Subsidy: Welfare Effects

(a) Short Term



(b) Long Term

Figure 13: Asset Market Participation Subsidy: Sensitivity with respect to changes in ρ

Multiple Steady States

- complementarity in participation created through technology :
- $k \uparrow$ implies $\omega \uparrow$
- steady states are Pareto ordered
- could use policy to go to the basin of attraction of desired steady state

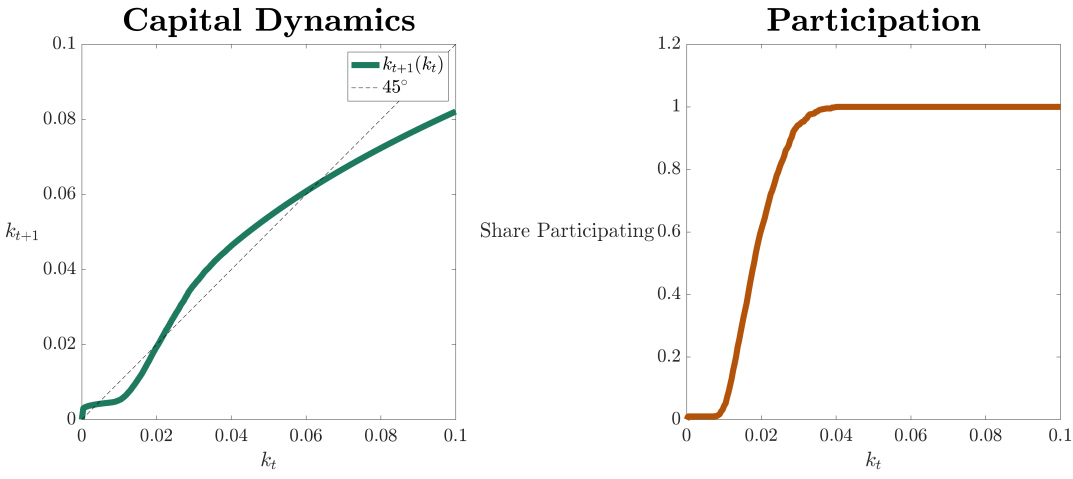


Figure 14: Capital Dynamics : Multiple Steady States

Policy

- potential for short run ITC to stimulate k into basin of attraction for higher activity equilibrium
- unable to find a politically successful intervention
- complementarity in production creates the multiplicity but limits intervention
- study of participation subsidy is in process

Findings

- Extensive Margin in Capital Dynamics
- Power of Trickle Down Economics and Tax Progressivity
- Role of Participation in Political Economy of Tax/Transfer
- Devised Welfare Enhancing Interventions

To Consider

- Participation Subsidy in Mult SS case
- role of debt
- bequests

Green and Brown Capital

- Add to this model
  - two capital types
  - pollution as a state impacted by brown capital
  - ITC for accumulation of green capital
  - debt, no bequests
- focus on dynamics and response to ITC
- losers include those in the brown industry
- find conditions for welfare maximizing policies