Pork-Barrel Politics and Public-Private Partnerships in Infrastructure Investments

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Paris, May 30th 2011

Outline

Motivation

- Paper examining government choices to invest in infrastructure projects and how these are affected by Public-Private Partnerships (PPPs).
- Empirical evidence from European countries (Cadot et al. 2006, Solé-Ollé 2009) suggests investment choices depend on *political* as well as *economic* motives.
- Levels and locations of investment may then differ from the socially efficient choice.
- Change in standard ownership structures of infrastructure projects over last 20 years may have reduced this potential for government to use infrastructure investments in their favor.

Could public-private partnerships help protect the voter from Pork-barrel Politics?

Pork-barrel politics

- Empirical evidence from Italy, Spain, and France has shown that electoral motives influence the direction of government investment in infrastructure.
- Two contrasting theories are present :
  - governments target swing voters to maximize potential future vote.
  - governments reward core voters.
- Both result in the government investing in projects not to maximize social welfare, but maximize political popularity.
- The complexities of large-scale infrastructure mean the costs and benefits are hard for the voter to measure; such tactical redistribution can pass-by unnoticed.

Public-private partnerships

- A long term joint venture between the public authority and the private sector, typically with transfers of risk, complex finance agreements, bundled building and operation.
- Trend away from traditional projects in the transport sector into schooling, health care, prison systems, waste management.
- In Europe, the rise has been great ; 1.4 billion€ in 1990, 30 billion€ in 2007.
- Trend also seen in Latin America, USA. In Sub-Saharan Africa the trend has been later, but with 9 billion € in 2008.

Preview of Results

- Public provision of infrastructure projects results in tactical, as well as economic, investments.
- The introduction of Public-Private Partnerships has potential to reduce this wasteful expending.
- Only the strictest fixed-price contracting and user-fees can actually act to remove inefficient projects.
  - Such contracts are rarely possible, particularly in the "new" focus of PPPs - schooling, healthcare, prisons...
  - When renegotiations, complex auctioning and demand risk guarantees are introduced, the benefits of even these contracts are removed.
- Model paves way for empirical analysis into effects of PPPs on efficiency of project choice.
- Suggests regions with favored voters more likely to have projects under public provision or cost-plus/loosely contracted PPPs.

Consumers

- n_j consumers live in region $j \in \{1....J\}$, and in each region there is the possibility of one investment project. $\sum_j n_j = 1$
- Projects benefit the one region alone. There is no migration.
- Individuals have quasilinear preferences ω_j :

$$\omega_j = y_j(1-\tau) + \delta_j v(b)$$

Equal incomes $y_j = y$, τ gives the linear tax, b is the benefit reaped by the individual if the project in their region j goes ahead and δ_j is a binary variable equal to 1 if the project in region j goes ahead.

Investment projects

- There is one potential project for each region. This project has a cost c_j and a benefit b. This allows the net benefit to vary.
- Every project may include two types of potential risk:
  - demand risk, which is represented by uncertainty in the benefit of the project
  - construction/operation cost risk, which is represented by uncertainty in the costs of the project.
- Two-period investments, with no discounting:
  - first period the known and fixed investment cost $I_{j1} = I_1$ is realized if the project in region goes ahead.
  - second period, further costs are born, I_{j2}, interpreted as an operating cost.
  - $c_j = I_1 + I_{j2}$.

Investment projects

- The individual consumer cannot know the costs of the project.
- The government and private firms know the costs ex-ante with a probability x. The costs are unknown ex-ante with a probability $1 - x$.
- Costs are distributed according to a $f(c)$ over the support $[\underline{c}\,;\,\overline{c}]$
  - cumulative density $F(c)=\int_{\underline{c}}^{c} f(s)ds$.
  - expected cost of a project is therefore $E(c) = \hat{c} = \int_{\underline{c}}^{\overline{c}} sf(s)ds$.

Timing

1. Two political parties vie for election. They choose which infrastructure projects would go ahead, and, if necessary, contract with a private firm to enter into a Public-Private Partnership for each project.
2. The consumers vote on who should win the election. The winner's contracts are binding and their projects go ahead.
3. First period fixed costs I^1 are born.
4. Operating costs are then revealed.
5. Second period costs I_j^2 are born and benefits are realized.

Utilitarian Optimum

Maximize a benthamite welfare function, subject to the resource constraint.

$$max\, E(\sum_j n_j \omega_j) \;\; s.t.\, E(\sum_j \delta_j c_j) \leq ny$$

Ex-ante, given the expected cost of a project, the choice is made as to whether it should go ahead or not.

$\delta_j = 1 \iff n_j v(b) - E(c_j) \geq 0$

- With a probability x, costs are known ex-ante. The project should go ahead iff $c_j \leq n_j v(b)$.
- With probability $1 - x$, costs are unknown ex-ante. In this case, the project should go ahead iff $\hat{c} \leq n_j v(b)$.

Utilitarian Optimum

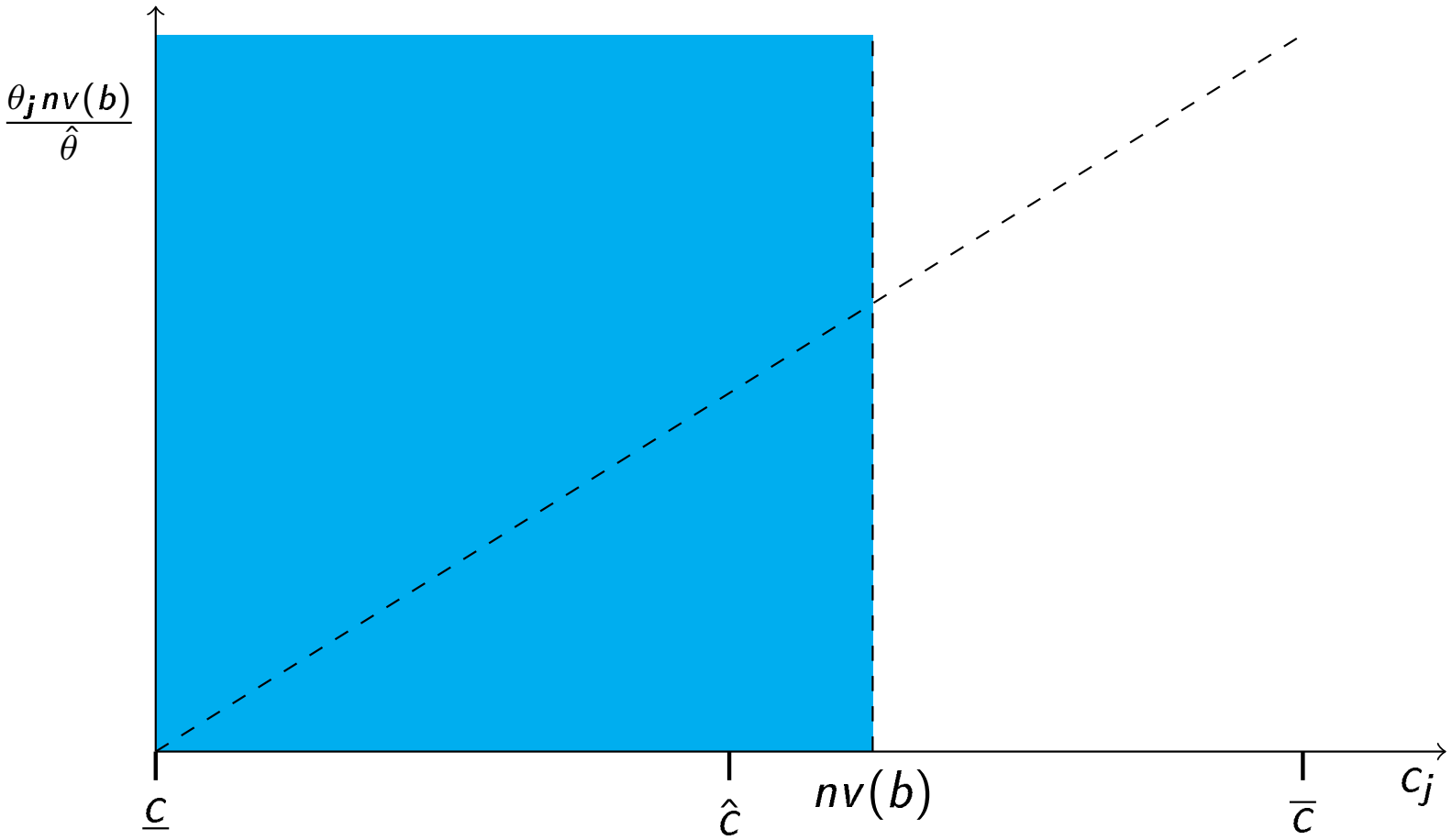


Figure: Known Costs

Utilitarian Optimum

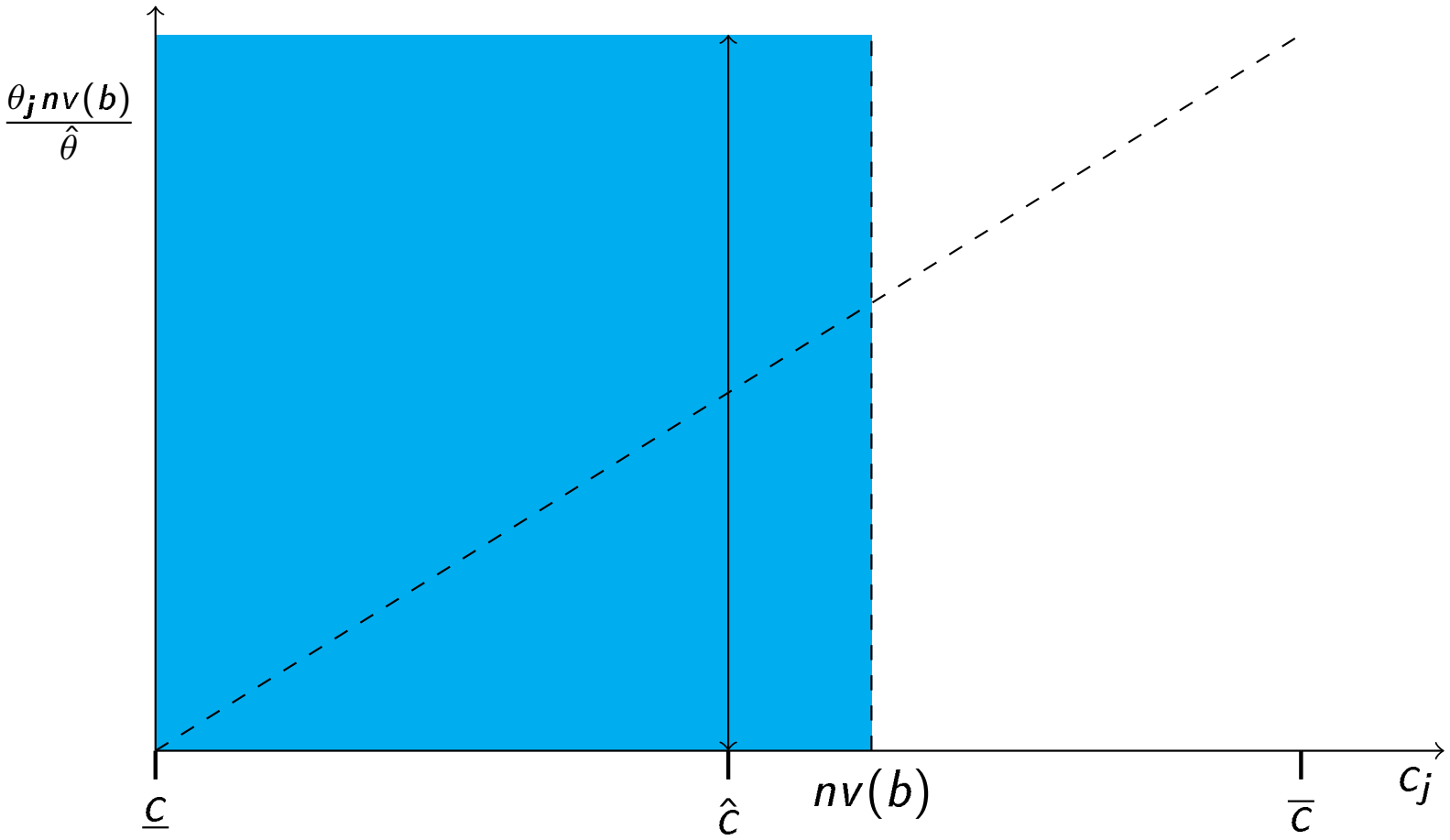


Figure: Unknown Costs

Public Provision

The government wants to maximize their probability of being elected π:

$$max_{\{\delta_j, \chi_j\}} \pi(\delta_1, ...\delta_J, \chi_1, ...\chi_J)$$

At the time of election, however, costs and benefits have yet to be realized. Therefore, the government uses accounting costs χ_j for each project.
The government has to have a balanced budget, giving:

$$\tau y = \sum_{i=1}^{J} \delta_i c_i$$

where τ is a linear tax applied equally across all regions and $y = \sum_j n_j y_j$ the total resources in the economy.

Voting

We use a probabilistic voting model.

- Two political parties, α and β are seeking votes at election.
- Substituting these into the expected utility function of the representative consumer in region j gives:

$$E(\omega_j \mid \alpha \textit{ elected}) = \omega_j^{\alpha} = y(1 - \frac{\sum_i \delta_i^{\alpha} \chi_i^{\alpha}}{y}) + \delta_j^{\alpha} v(b)$$

- Voters in region j are a continuum on an ideological space, with a voter located at X_{ij} having an ideological preference X_{ij} for party β.
- The agent will vote for party α over party β iff $\omega_{ij}^{\alpha} - \omega_{ij}^{\beta} > X_{ij}$
- In region j, $X_j = \omega_j^{\alpha} - \omega_j^{\beta}$ marks the cut-off point or the *marginal voter*.

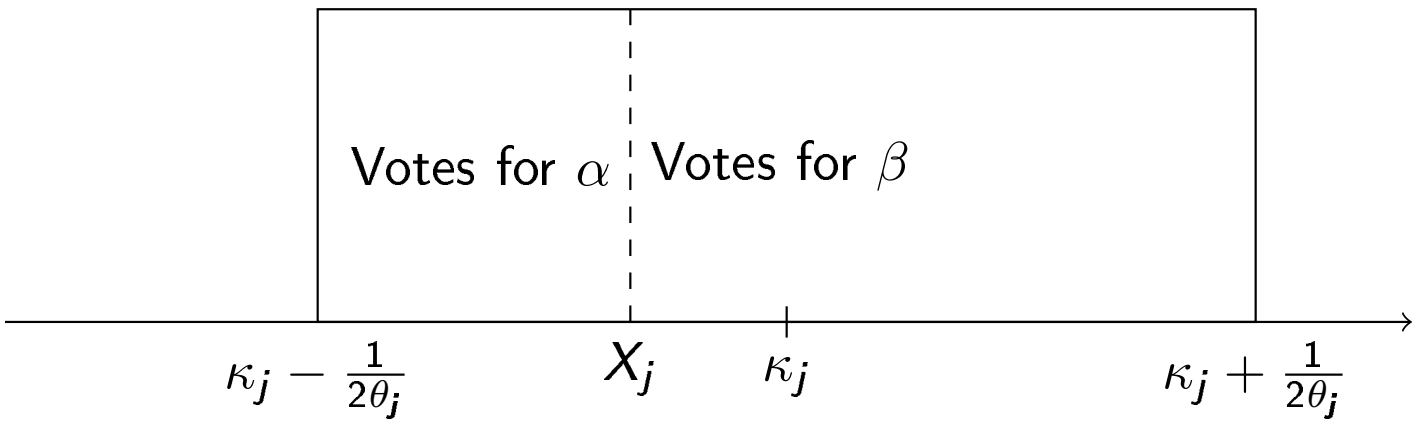
Uniform Distribution

Uniform: $X_{ij} \sim U\left[\kappa_j - \frac{1}{2\theta_j}, \kappa_j + \frac{1}{2\theta_j}\right]$, where $\kappa_j$is the ideological swing in the region j towards β and θ_j is the density; as the density increases, voters in the region become less ideological.

A change in the investment decision therefore has a larger effect on their voting decision.

Hence:

$$Prob(X_{ij} < X_j = \omega_j^{\alpha} - \omega_j^{\beta}) = \theta_j (X_j - \kappa_j) - \frac{1}{2}$$



Therefore the total number of votes received by α across all regions is:

$$\sum_j n_j \theta_j \left(\omega_j^\alpha - \omega_j^\beta - \kappa_j \right) - \frac{1}{2}$$

$$= \sum_j n_j \theta_j \left(y - \sum_i \delta_i^\alpha \chi_i^\alpha + \delta_j^\alpha v(b) - \omega_j^\beta - \kappa_j \right) - \frac{1}{2}$$

Party α maximizes this expression given $\{\delta_j^\beta, \chi_j^\beta\}$.
This implies that only the following projects will go ahead:

$$\chi_j^\alpha \leq \frac{n_j \theta_j v(b)}{\sum_{i=1}^J n_i \theta_i} \tag{1}$$

Accounting Costs

To maximize the probability of election, the government wants to minimize the costs the consumer expects to pay.

- If a project is of unknown cost, both the voters and the government will examine its expected cost. $\chi_j^\alpha = \hat{c}$
- If a project is of known cost, $c_j \leq \hat{c}$, then the government has no incentive to disguise the costs of the project. $\chi_j^\alpha = c_j$
- If a project is of known cost, $c_j \geq \hat{c}$, then the government is better off by disguising the project from the consumers as a project of unknown costs. $\chi_j^\alpha = \hat{c}$

Public Provision

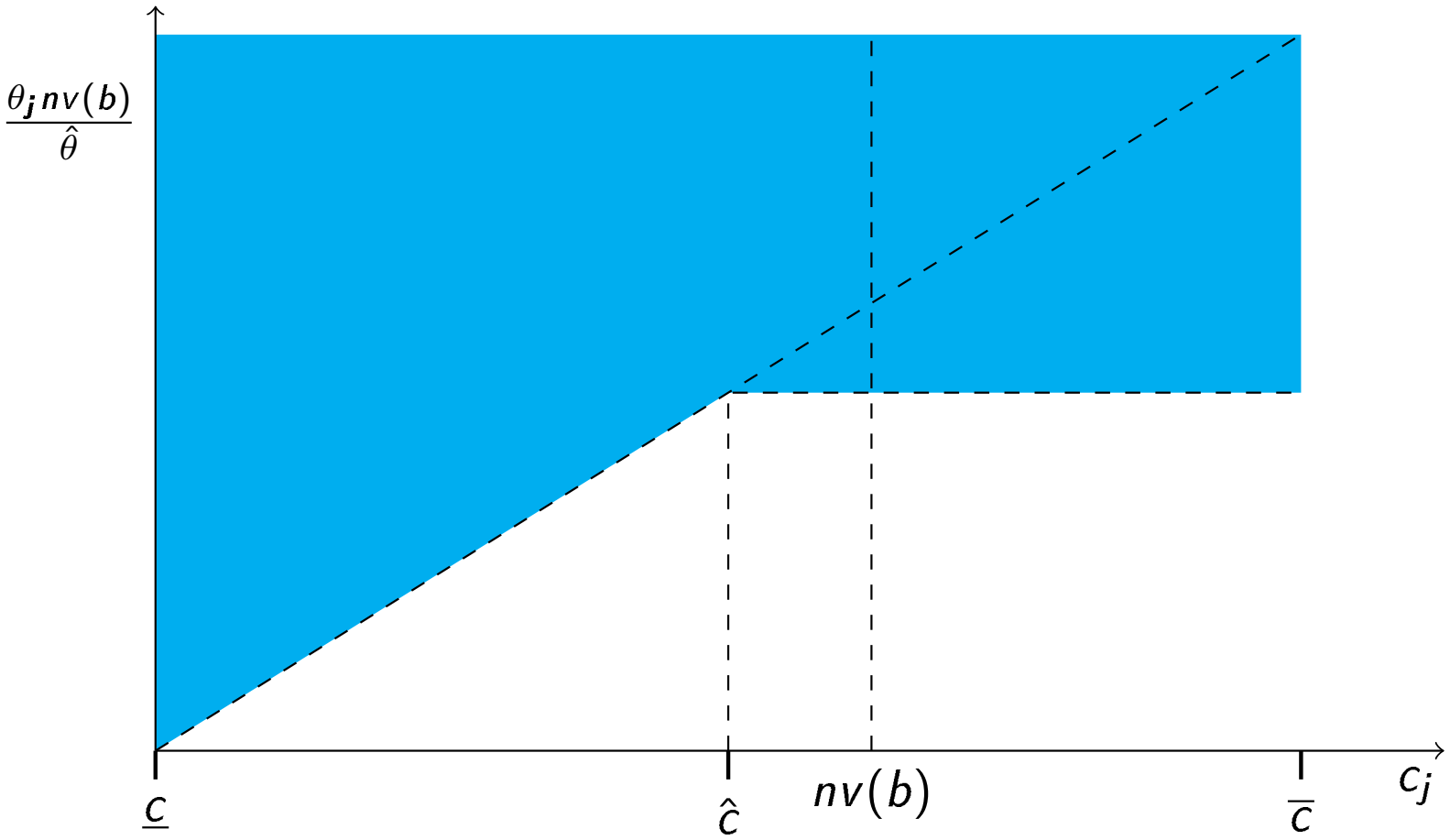


Figure: Public Provision

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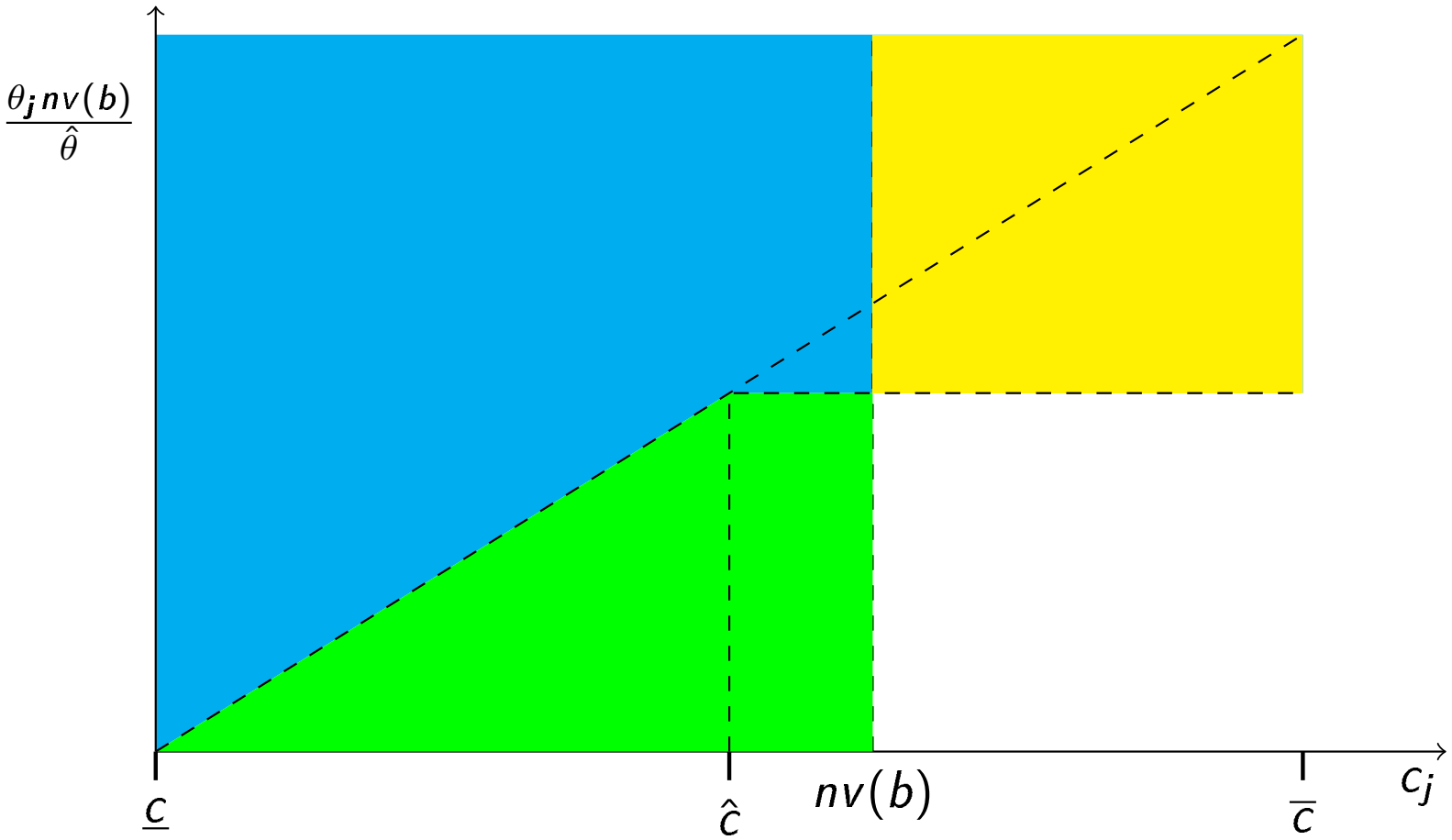

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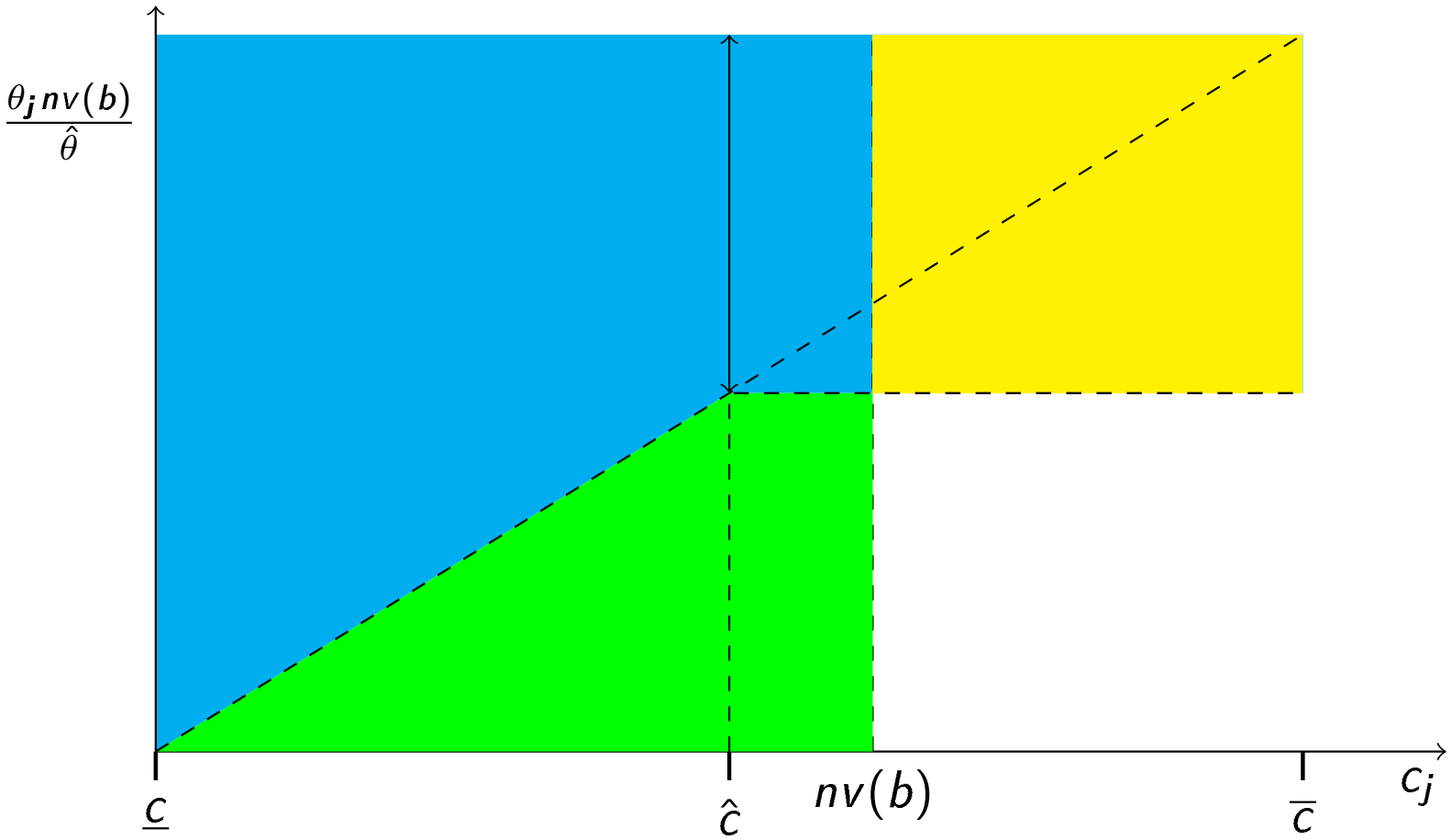


Figure: Public Provision

Public Provision

Public provision therefore has two effects leading us away from the socially optimal level of provision.

1. Firstly, the government wishes to disguise high cost projects, in all regions, leading to potentially inefficient projects going ahead.
2. Secondly, the government wishes to invest particularly in regions with large proportions of swing voters. Potentially beneficial projects may be ignored, whereas inefficient projects may go ahead.

The firm

- Firms face limited liability, so, given the scale of the infrastructure projects in question, need the government to cover some risk.
- They have access to the same information as the government.
- The two simplest types of contract available are fixed price and cost plus contracting.
- We begin by examining the outcomes under both of these types of contract, before extending the analysis to include user fees, conditioning on demand risk and renegotiations.
- We assume that each project is contracted separately.

Fixed Price

- With limited liability, the firm has to be guaranteed to receive their investment back from the government.
- The government can no longer hide costs.
- Therefore all known cost projects, if they go ahead, have their real cost equal to their accounting cost.
- When costs are unknown, the government can contract the project when they can guarantee all potential costs are covered. Therefore, their accounting cost $\chi_j = \overline{c}$, and only a project in a very large region, or a region with a very high proportion of swing voters, will go through.

$$\overline{c} \leq \frac{n_j \theta_j v(b)}{\sum_{i=1}^{J} n_i \theta_i}$$

Fixed Price

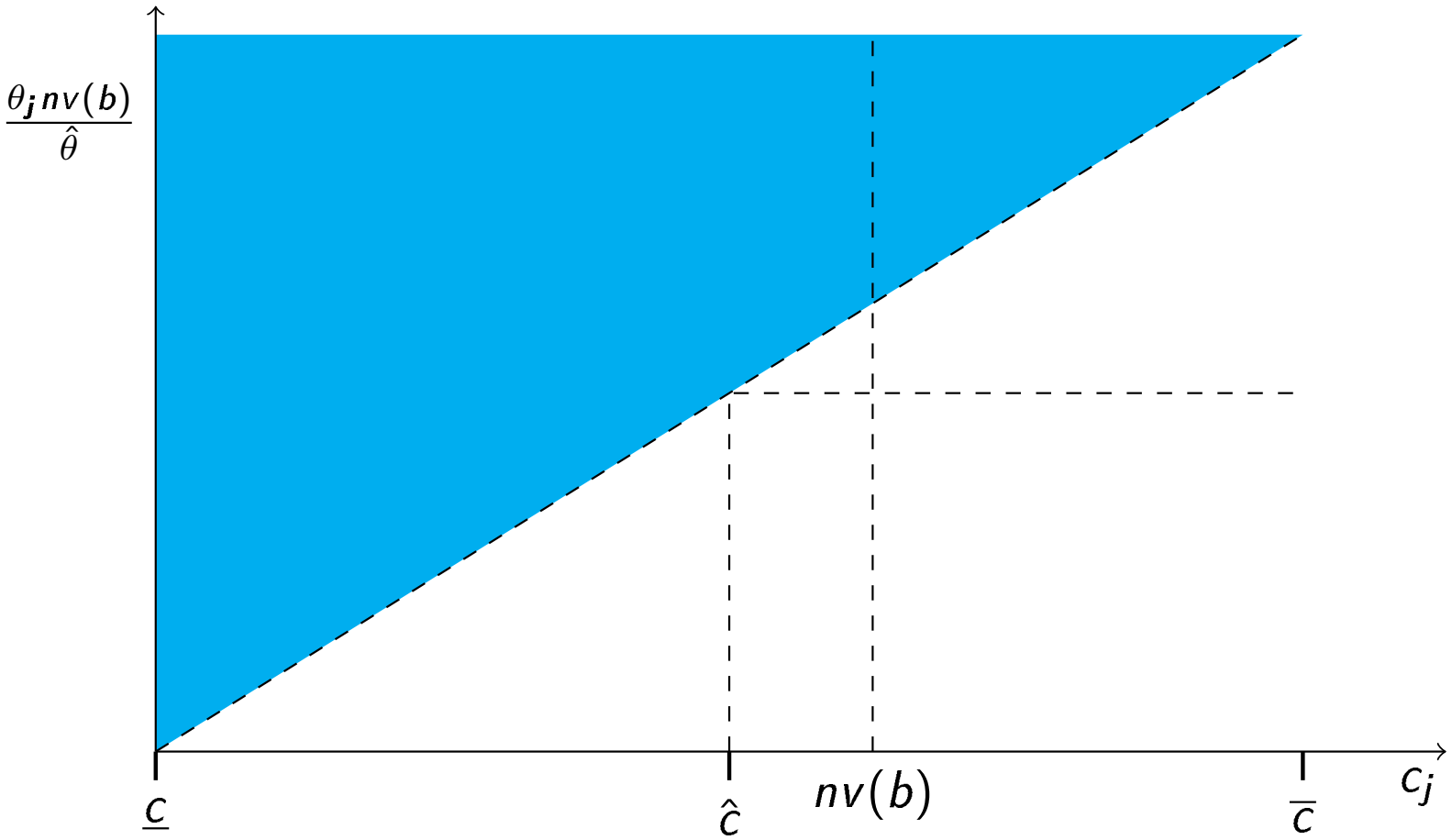
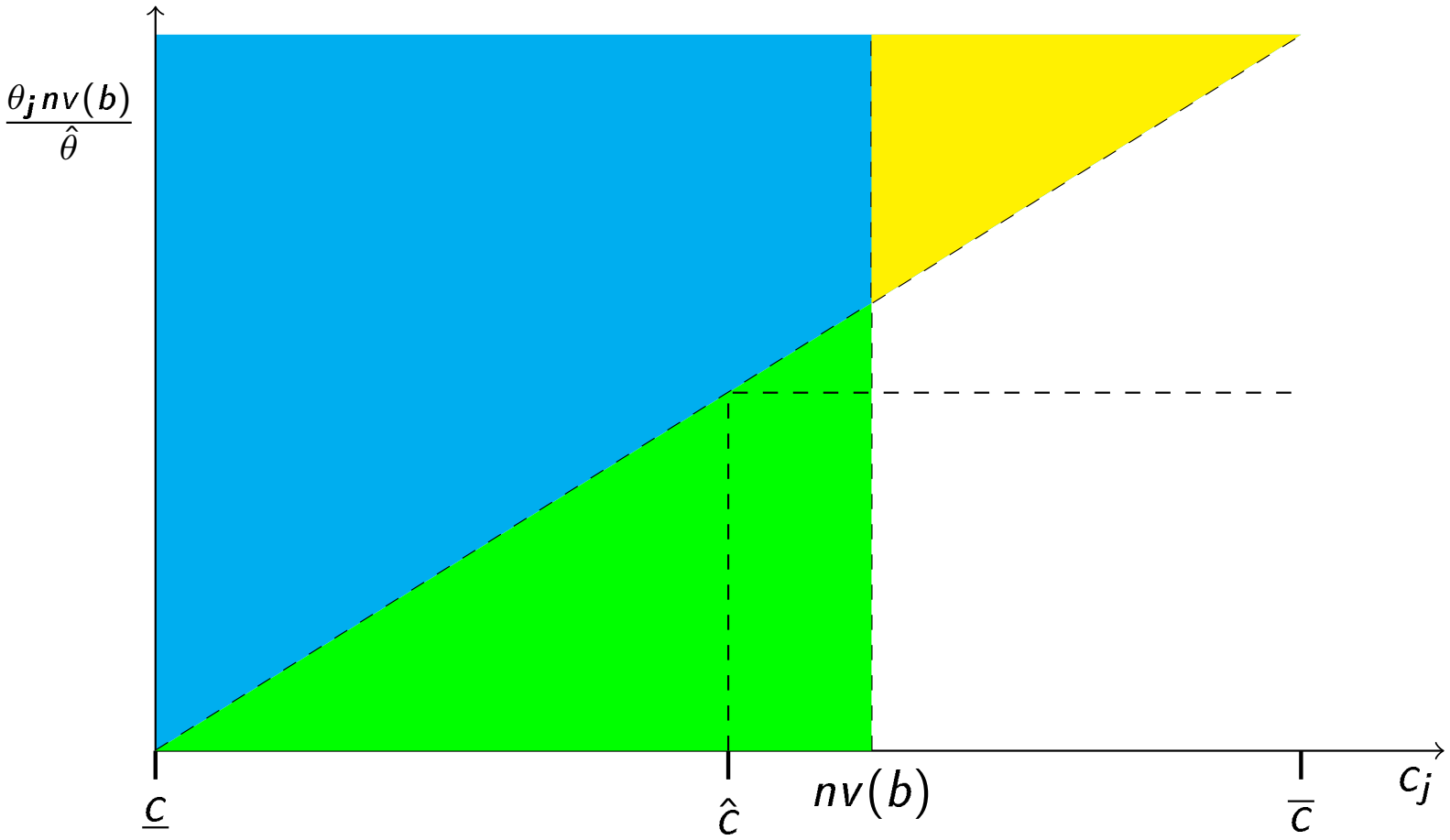


Figure: Fixed Price

Fixed Price



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Fixed Price

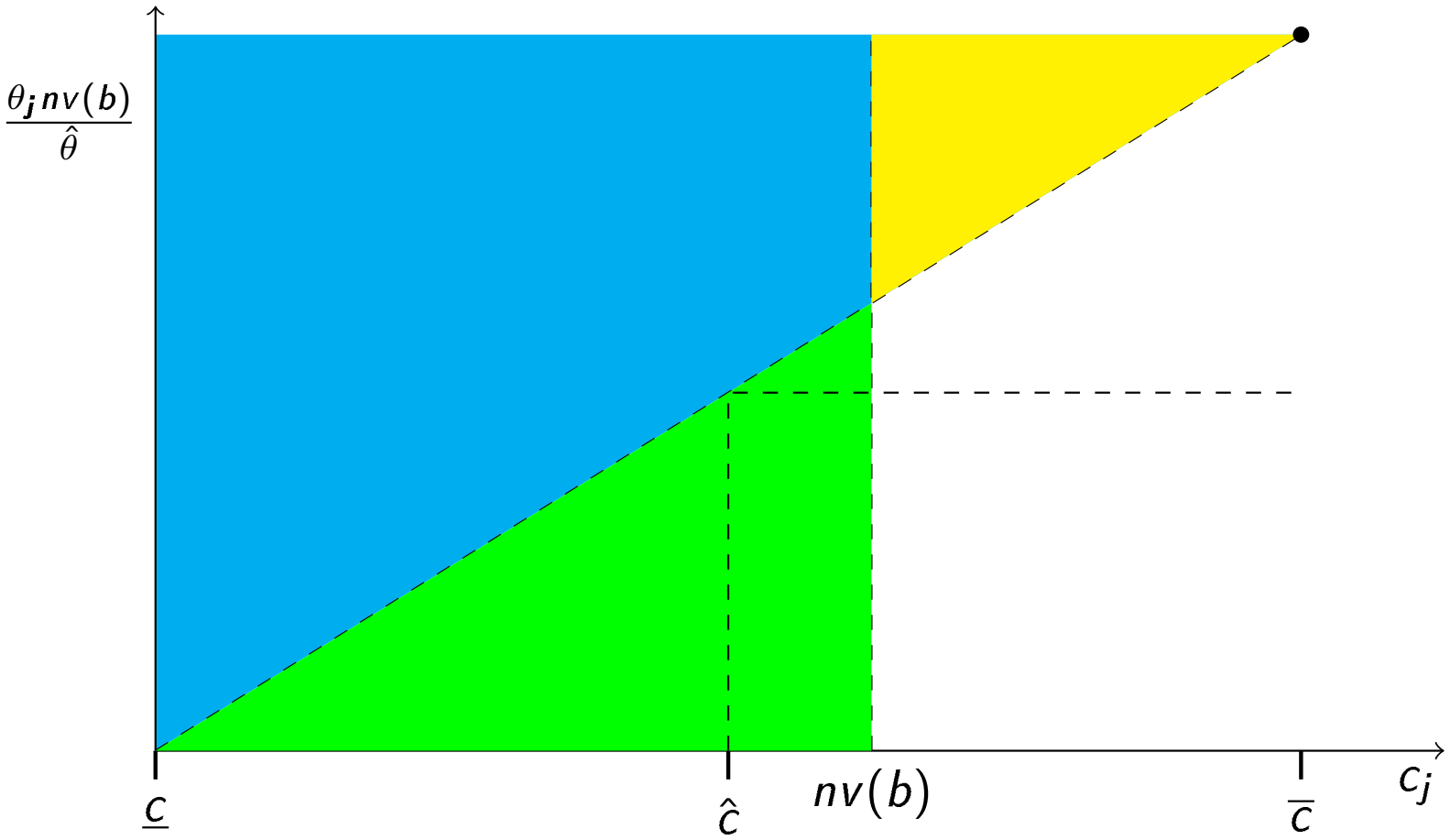

Figure: Fixed Price

Cost Plus

The contract stipulates that any construction costs born will be covered. This means that the firm with limited liability is assured by the government that their costs are covered at all times.

- When costs are known, and $c_j \leq \hat{c}$, iff the government's inequality (1) is satisfied, the project goes ahead.
- When costs are known, and $c_j \geq \hat{c}$, the government has two choices
  - they can disguise, through a cost-plus contract, the project as a project of unknown cost
  - or they can reveal the cost of the project. The latter will always results in a weakly lower probability of being elected.
- Therefore, if

$$\hat{c} \leq \frac{n_j \theta_j v(b)}{\sum_{i=1}^{J} n_i \theta_i}$$

the project will go ahead.

Cost Plus

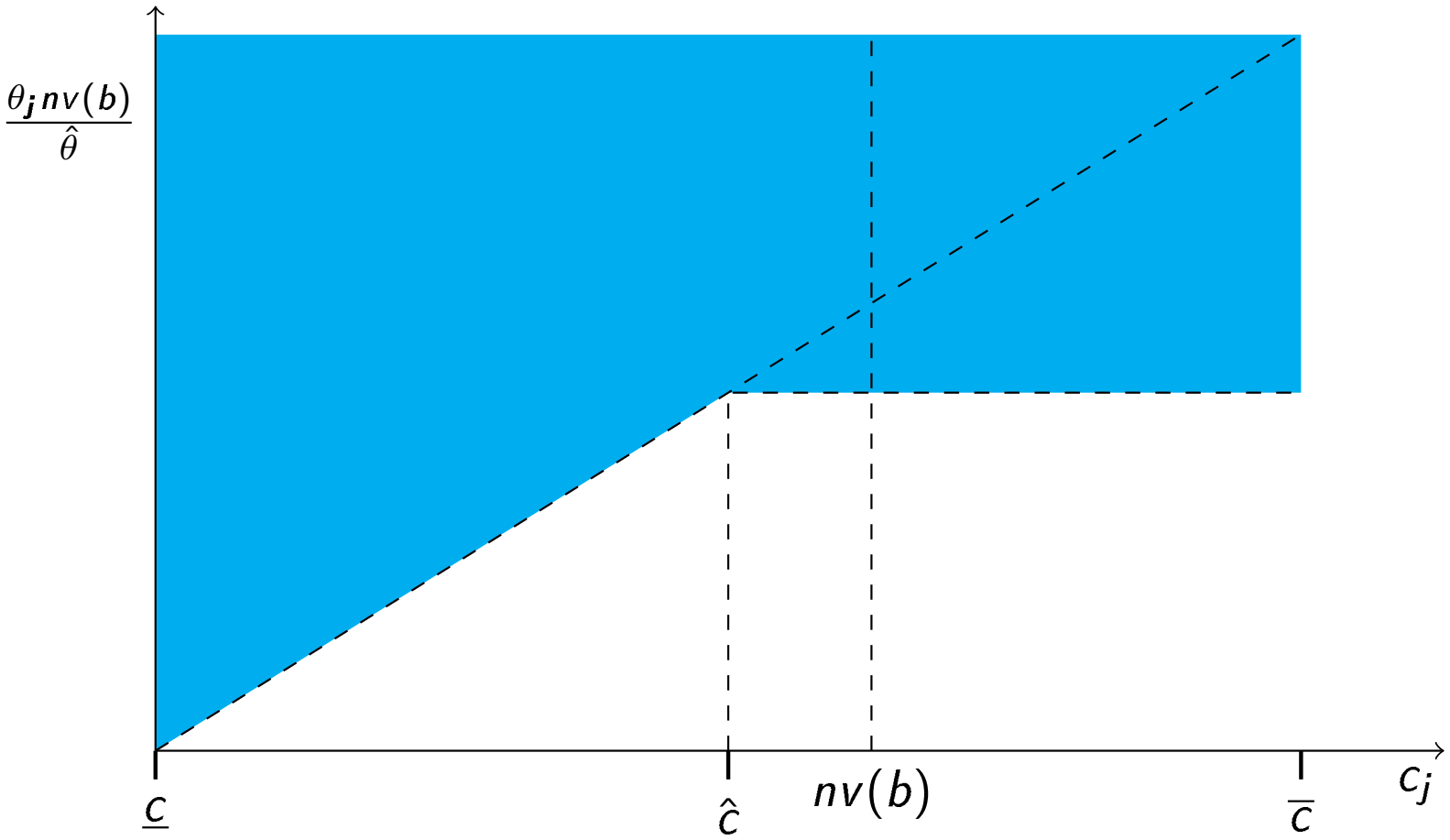

Figure: Cost Plus

User Fees

- Direct user fees - whereby private firm has to recover costs by charging the user, should result in socially optimal allocation of known cost projects.
- However, if projects of unknown costs are to go ahead, government must provide a revenue guarantee:
  - when costs are revealed greater than $\hat{c}$, this must be $c_j - n_j b$.
  - this must be paid for by taxes.

User Fees

- When is it optimal for government to offer this?
  - For unknown cost projects, only when θ_j is above a certain threshold.
  - For known cost projects, the government may have some projects, $c_j > \hat{c}$ which, given what the consumer expects to pay through taxes to cover guarantee, would be beneficial in terms of expected votes, for the government to disguise as unknown cost projects.
- Maths needs a bit more work....but
  - Would mean some inefficient projects still go ahead with government guarantees.
  - But benefit that all efficient projects should go ahead!
- Shadow User fees - not effective in the same way.

Empirical Strategy

- Empirical study.
  - Take into account political systems. Which voting models are relevant?
  - Endogeneity....
- Different regions, and voting systems - do we see this reflected in the choice of PPPs and particular contracts ?
  - Governments only allow efficient projects as PPPs.
  - Swing regions - in addition to more investment, do we see more cost plus contracting or public provision?

Conclusions

- Governments may redistribute away from the socially optimal using investment.
- Public-private partnerships of some forms will screen out the inefficient favored projects.
- Only fixed price and user fees really have this benefit:
  - Difficult to use in the "new" sectors of PPPs
  - Fixed price still ensures some potentially beneficial, but unfavored, projects are ignored.
- Need to explore endogeneity of PPP choice and contract type choice. Does this have implications in empirical analysis of the effects of PPPs on efficiency of project delivery?