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Economic principles for infrastructure provision

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Content

- Infrastructure and the role of government
- Pricing and investment
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- Conclusions

Infrastructure and the role of government

- What, where and when to invest (planning)
- Evaluation to select the best options
- Contract design for the construction, maintenance and operation
- Regulation, monitoring, and conflict resolution

Infrastructure and the role of government

There is an overwhelming body of evidence of government failure to deal with these problems (Engel et al.,2014)

- Wasteful investment
- Inefficient pricing
- Poor regulation
- Poorly designed private participation

Infrastructure and the role of government

We need public planning and independent economic evaluation with the emphasis on:

- pricing and investment in the planning phase
- investment decisions with different levels of government
- Warning: the costs of a piecemeal of options instead of a broad strategy

Alternative infrastructure networks

- Large transport infrastructure projects presents a high component of fixed costs. The irreversibility of investment explains why suboptimal technological options can displace better alternatives.
- The economic planning of infrastructure and the evaluation of projects need to look carefully to the dynamic process associated with the initial decisions.
- This is the case of investing in HSR infrastructure to attend medium distance intercity mobility (in low demand corridors) when air transport is a superior alternative or rail infrastructure when buses solve the problem more efficiently.

The economic analysis of large infrastructure

The common view:

- Short-run marginal social cost pricing is the optimal policy
- $NPV > 0$
- Ramsey pricing with budget constraints
- Long-run marginal social cost pricing is a kind of inefficient average cost pricing
- Massive subsidization of railways is justified
- Taxes are mere transfers
- Railways are environmentally friendly

BUT:

- The old pricing tradition ignores the asymmetries of information (price caps vs cost-plus)
- Confusion between price differentiation (peak, off-peak) and price discrimination (Ramsey pricing)
- $NPV > 0$ is not sufficient, (not only “option value”) optimal pricing and intermodal competition (de Rus & Socorro, 2019)

Harold Hotelling at the meeting of the Econometric Society

Atlantic City, December 28, 1937

- “The optimum of the general welfare corresponds to the sale of everything at marginal cost”.
- “The efficient way to operate a bridge-and the same applies to a railroad or a factory (...) is to make it free to the public, so long at least as the use of it does not increase to a state of overcrowding”

The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates. *Econometrica*, Vol. 6, No. 3, (Jul., 1938), pp. 242-.269

Price equal to SRMC

Harold Hotelling at the meeting of the Econometric Society at Atlantic City, December 28, 1937

- “The common assumption, so often accepted uncritically.... that the products of every industry must be sold at prices so high as to cover not only marginal costs but also all the fixed costs, including interest on irrevocable and often hypothetical investments, will thus be seen to be inconsistent with the maximum of social efficiency”.
- “These are the pertinent considerations if the bridge is already in existence, or its construction definitely decided.

CBA *ex ante*

Harold Hotelling at the meeting of the Econometric Society at Atlantic City, December 28, 1937:

- IX. CRITERION AS TO WHAT INVESTMENTS ARE SOCIALLY WORTH WHILE
- **“When the question arises of building new railroads, or new major industries of any kind, or of scrapping the old, we shall face, not a historical, but a mathematical and economic problem.** The question then will be whether the aggregate of the generalized surpluses ... is likely to be great enough to cover the anticipated cost of the new investment. This will call for a study of demand and cost functions by economists, statisticians, and engineers, and perhaps for a certain amount of large-scale experimentation for the sake of gaining information about these functions. The amount of such experiment and research which could easily be paid for out of the savings resulting from operation of industry in the public interest is very large indeed. Perhaps this is the way in which we shall ultimately get the materials for a scientific economics”.

Pricing and investment

- Pricing and investment are interconnected and cannot be treated independently. Investment in capacity requires forecasting demand, which is sensitive to the level and structure of charges.
- Moreover the substitutability and complementarity of some infrastructures are additional reasons for addressing the pricing-investment decisions jointly, which also have significant long-term consequences.

MSC pricing?

There are several reasons to depart from MSC pricing (Laffont and Tirole, 1993):

- MC pricing, deficits and the shadow price of public funds
- MC pricing and the aggregate user willingness to pay for capacity
- the external financing of fixed costs reduces the incentive for cost reduction

Plus:

- Intermodal competition

Pricing and investment

Who should pay the fixed costs of public infrastructure?

- Price=marginal cost leads to a loss equal to the fixed costs
- Who should pay the fixed costs? taxpayers, or users?

Pricing and investment with alternative networks

- The existence of multiple equilibria in the long-run.
- The inadequacy of dealing with a project in isolation, disregarding relevant interactions with other markets and the dynamic process during the lifespan of the project.

Pricing and investment in alternative transport networks

- Before deciding whether it is socially worthwhile to invest in a project, the government needs to be clear about the charging scheme that will be applied and its financial and economic consequences.
- A particular charging scheme may favor the creation of a particular transport infrastructure network, leading to irreversible long-term equilibria that would not be optimal under other charging schemes.

Governance and incentives

- In Paris, December 1999, Jean-Jacques Laffont presented his report on the pathway to the modern state to the French Council of Economic Analysis.
- The response? The report was considered heretical by the audience of senior officials, academics, and politicians.
- The criticism went from he had understood nothing to he was likely to corrupt French youth.
- What the report say?

Jean Tirole (2017). *Economics for the common good*. Princeton University Press.

Governance and incentives

- In a conference on CBA held at the University of Chicago in September 1999 Gary Becker concluded...

“CBA has a strong and clear place in a social planner model of political choices. But the model is of little value in explaining actual regulations, taxes and subsidies. Yet, even when political decisions result from competition among interest groups, benefits and costs help explain which policies are adopted. Moreover, information about the true benefits and costs of different programs sometimes determines whether policies muster enough political support”

Governance and incentives

- The benevolent planner assumption is harmless when deriving the methodology for the economic evaluation of projects, but it turns out to be inadequate when we move from theory to the practical application of these rules.
- One crucial and mostly neglected issue in cost-benefit analysis is the explicit consideration of the institutional design.

Governance and incentives

- Engel, Fisher and Galetovic (2014) provide a proposal to change the institutional design for the common case of infrastructure provision with private participation:
- Separation of project planning, design and delivery from the economic evaluation of projects in independent units.
- Separation of the unit awarding the contracts for the construction and operation of the project and the unit supervising the compliance with these contracts. Another unit addresses renegotiation and conflict resolution.
- Independent agency conducting cost-benefit analysis sheltered from political interference.

Different levels of government and incentives

- A related issue concerning institutional design is the presence of various levels of government.
- Projects are evaluated in a context in which different governments are implied and where the objectives of the agents involved are not usually aligned.
- This separation between who promotes and who pays affects also the decisions on infrastructure capacity and technology.
- This is probably one of the main issues concerning the practical application of cost-benefit analysis at present.

Conclusions

- The provision of public infrastructure requires planning, evaluation, private participation, and regulation in a broad sense (from price and quality regulation to contract enforcement).
- Planning key infrastructures is the responsibility of the public sector for different reasons such as network design, to avoid duplication, or to ensure the construction of segments that are socially necessary but not profitable for private firms.
- The public sector does not have to be directly responsible for the construction, maintenance and/or operation of the infrastructure.
- The evidence shows that public intervention is far from being optimal (Engel et al., 2014). Wasteful investment, inefficient pricing, poor regulation and a poorly designed private participation in the construction and operation phases of infrastructure provision have been common features in many countries all over the world.

Conclusions

- The common institutional design of the ministry of public works in many countries, with a separation in different general directorates, contributes to the explanation of why transport networks, for example, are developed today in the way they do.
- The evaluation of projects and the regulation of private participation and prices should be performed by independent agencies.
- Then, private participation must be based on auctions, and contracts designed in accordance with economic theory and best international practice. The objective is to maximize social welfare, by reducing the political interference in the technical phase of the project evaluation, and by guaranteeing the selection of good projects and its implementation by the most efficient firms.
- The independent agencies must operate with total autonomy and independence with respect to firms and government, if we do not want them to become useless bureaucracies.

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