

Comments at the Conference on “Fiscal Policy, Equity, and Long- Term Growth in Developing Countries”

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Infrastructure and Economic Growth

- **The question addressed in much of the early literature is whether infrastructure investment is an important source of economic growth.**
 - **Aschauer and others found large effects**
- **Infrastructure systems are essential for the functioning of any modern society.**
- **Does “essential” on average necessarily imply “essential” at the margin?**

**The more important question:
under what conditions does
infrastructure investment
stimulate economic growth?**

- **In some cases, it can lead growth (the explosive growth mentioned by Hirschman)**
- **In other cases, it accommodates growth led by other factors**
- **In still other cases, it has little effect on growth**

Infrastructure is different from other types of capital (Hirschman's SOC vs DPA)

- **Networks of interlocking investments**
- **Joint use facilities (“clubs”)**
- **Capital intensive and “lumpy”**
- **Complex systems that are difficult to manage**

Networks

- **Network systems are built up over time by a series of interconnected investments**
 - **Early links in the system tend to be complements, with potentially high contributions to network productivity**
 - **Later links in the system tend to be substitutes or weak complements, with lower contributions to network productivity**
 - **Some links may not have any productivity effect**
 - **Braess's Paradox**

Networks as “Clubs”

- **Joint use facilities that can accommodate multiple users simultaneously**
 - Source of difference between SOC and DPA
- **The amount of services depends on the**
 - Total size of the club
 - Its configuration
 - Number of users and *degree of congestion*
- **The marginal product of an investment will depend on the degree of congestion**
- **Size of the infrastructure network harder to adjust than number of users**
 - Build capacity in advance of need (lumpiness)
 - Investment in management efficiency to control congestion

Management Efficiency

- **Infrastructure network clubs are complex systems that are challenging to manage**
 - Operational efficiency
 - Maintenance of capacity
- **The services (productivity plus consumption) depend on quantity and efficiency**
- **Empirical evidence**
 - Urban Institute study of U.S. infrastructure pre-Aschauer - deferred maintenance
 - World Development Report 1994
 - *“How Well You Use it May Be More Important than How Much You Have.”* NBER WP 5847

Some Implications of Complexity

- **Complexity is hard to model in macro-growth equations; doesn't pin down question of the conditions under which infrastructure leads growth or accommodates it**
 - The aggregate production function approach is oriented to DPA “K”, not SOC “K”
 - Marginal product highly endogenous
 - Can't use conventional PIM to measure “K”
- **Infrastructure Policy:**
 - Avoid “spending bias”, more focus on efficiency
 - Primacy of micro project analyses over macro
 - Use the macro approach to correct for systems effects and economic spillovers