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
  – “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