**INTERNATIONAL WORKSHOP ON
MEASURING INVESTMENT IN TRANSPORT INFRASTRUCTURE
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CAN WE BETTER EVALUATE ASSETS?

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OUTLINE

- The economic importance of infrastructure

- Data demand depends on "asset" definition

  1. Investment (flow) figures are turned into stock figures

  2. Accumulated financial "assets" help funding

  3. "Assets" in a strictly economic sense help to decide where to invest

- Conclusions for statistics

THE *ECONOMIC* IMPORTANCE
OF TRANSPORT INFRASTRUCTURE

- Infrastructure services are an input into the production of transport services.

- Infrastructure services are provided by a fixed resource whose acquisition cost is largely sunk.

- Infrastructure services are complementary to services of other capital goods to produce transport services.

- There is an optimal ratio between these services, measured by traffic intensity or 'optimal congestion'.

THE *ECONOMIC* IMPORTANCE OF TRANSPORT INFRASTRUCTURE

- As transport service is a derived demand from other activities, "transport service" is not the ultimate output.

- The ultimate output is additional consumption in leisure time, additional factor use or productivity increases

    - and the joint production of a lot of "bads".

If the user of statistical data is a policy maker, she would want to know about the 'asset value' of accumulated investments in this sense.

THE *ECONOMIC* IMPORTANCE OF TRANSPORT INFRASTRUCTURE

- Due to the lack of even infrastructure stock figures investment data are abused as indicators of inputs into the production of transport services

  - Objectives are formulated as investment percentages in GDP.

  - Comparisons between jurisdictions are done by comparing investment volumes or ratios.

  - Unless the marginal productivity of capital stock is constant, investment does not even indicate additional capacity.

TRANSLATING INVESTMENT INTO CAPITAL STOCK

- Transport infrastructure stock figures are calculated by the Perpetual Inventory Method (PIM), based on

    - Long series of gross fixed capital formation in transport infrastructure
    - Price indexes
    - Assumption on service lives of the facilities
    - Survival functions
    - Depreciation patterns

TRANSLATING INVESTMENT INTO CAPITAL STOCK

$$K_t = K_{t-1} + I_t - D_t \qquad (1)$$

$$D_t = p(t)K_{t-1} \qquad (2)$$

$$K_t = I_t + (1 - p(t))K_{t-1} \qquad (3)$$

TRANSLATING INVESTMENT INTO CAPITAL STOCK

- Even simple versions depend on a number of assumptions

    – All figures should be real figures. The 'correct' deflators often don't exist. Are price indices for the construction industry available? Do they reflect monopoly rents?

TRANSLATING INVESTMENT INTO CAPITAL STOCK

– What is the relevant depreciation function?

• Physical wear and tear:

Engineering data are conventions concealing differences in

– Geo-climatic conditions
– Regulation of rolling stock (super trucks)
– Density of traffic etc.

• Maintenance:

Maintenance changes service lives of stocks. Can optimal maintenance (including major repair) lead to an infinite service life?

TRANSLATING INVESTMENT INTO CAPITAL STOCK

- Maintenance:

If underfunding of maintenance is a political economy problem, the depreciation function is even a function of local governance.

ACCUMULATING FINANCIAL ASSETS

- Formally identical to the perpetual inventory method, there seem to be important differences

    - Real values of investments as indicators of physical facilities or opportunity costs are less important.

    - Depreciation function is less an engineering function but rather a discounting function using relevant capital market rates.

    - Asset values have an instrumental value to raise capital, reminiscent of the regulatory concept of 'fair rates of return'.

        Risk-sharing or rent-distribution instrument

ASSET VALUE
AS THE NET BENEFIT POTENTIAL OF A FIXED RESOURCE

- An unused infrastructure facility that is not maintained, has no asset value. (or a negative one)

- Transport infrastructure (physical?) if coupled with other inputs produces benefits and costs.

- Immediate benefits are defined as 'accessibility', 'mobility' and lower transport costs.

- Lower transport costs are inputs into consumption (more leisure time) and production (trade gains, agglomeration benefits).

ASSET VALUE
AS THE NET BENEFIT POTENTIAL OF A FIXED RESOURCE

- The benefits and costs can only be estimated using different methods at different levels of information.

  – Macroeconomic estimates of TFP effects: Round Table

  – Computable General Equilibrium Models to capture transmission mechanisms of interregional trade and agglomeration economies.

  Amounts to a cost benefit analysis which allows for changes in relative prices on markets serves by the transport services.

ASSET VALUE
AS THE NET BENEFIT POTENTIAL OF A FIXED RESOURCE

- Big However: The combination of transport infrastructure services with other inputs, in particular the use of fossil fuels, generates 'bads' or negative benefits
  - Time losses in congestion
  - Transport safety risks
  - Health costs from local air pollution
  - Noise
  - Damages from climate change due to higher GHG concentrations in the atmosphere

ASSET VALUE

AS THE NET BENEFIT POTENTIAL OF A FIXED RESOURCE

- The relationship between infrastructure investment and additional asset value in the economic sense is not linear. (Canning et al.)

- The additional NPV created by one unit of additional investment follows an inverted u-shaped function depending on the level of development (of the infrastructure system).

- Could we identify this function policy makers could follow the rule "Invest where I/NPV is smallest".

CONCLUSIONS

- Asset value definitions differ with analytical purposes.

- The ideal asset value for decision makers may be difficult and costly to construct.

- The identification of data needs should follow the perspective of what is useful for policymakers but be practical and affordable.

- The identification of capital stock by using the perpetual inventory method would help to evaluate assets.

- It should be expanded by defining environmental value added in line with the work on environmental accounting.

Thank you!