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# **Public Capital, Growth and Welfare**

**Pierre-Richard Agénor**

University of Manchester  
Centre for Growth and Business Cycle Research

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Analytical Foundations for Public Policy

Pierre-Richard Agénor

University of Manchester

Centre for Growth and Business Cycle Research

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- Public capital = core public infrastructure assets.
- Public capital stock:

$$K(t+1) = (1 - \delta)K(t) + I(t)$$

- $\delta \in (0,1)$ : depreciation rate.

$$K(t+1) = (1 - \delta)K(t) + \alpha I(t)$$

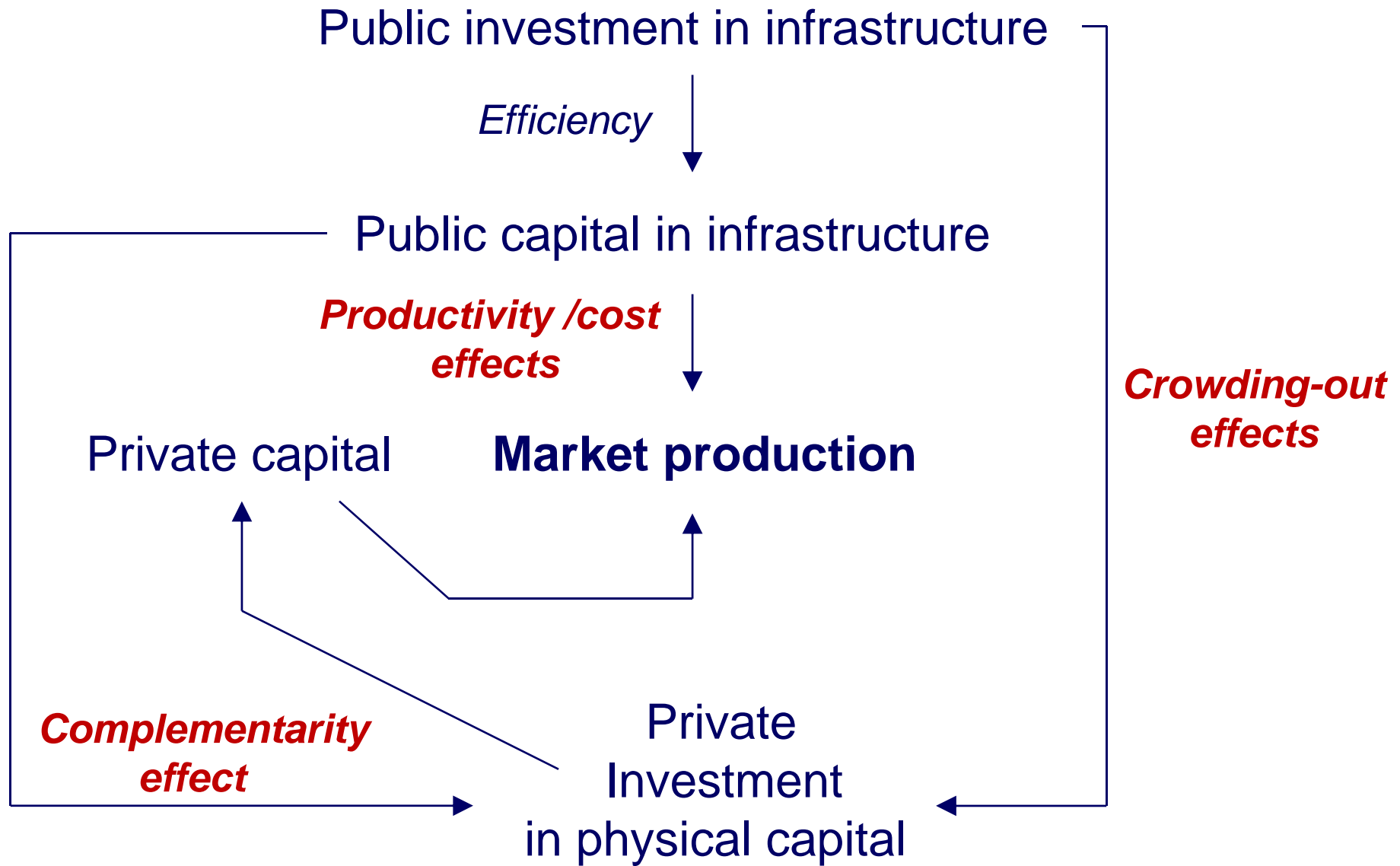
- $\alpha \in (0,1)$ : efficiency/governance indicator.



- What matters is the **flow** of services produced by the **stock** of public capital...
- ...not the flow of investment itself.
- Issue further discussed below.



# Conventional Channels





# **New Channels**



- Book: provides an overview, with new results.  
Theoretical and empirical contributions scattered in professional journals...
- ...and official publications (World Bank, UN, etc.).
- All these channels were not “suddenly” discovered; for some of them, strong **micro evidence** has been available for quite some time.
- Macroeconomists have only recently started to integrate them systematically in their theoretical and applied models.



Public investment in infrastructure

*Efficiency*

Public capital  
in infrastructure

*Network effects*

Production of  
education services

Production  
of Health services

Rate of time  
preference

Effective labor

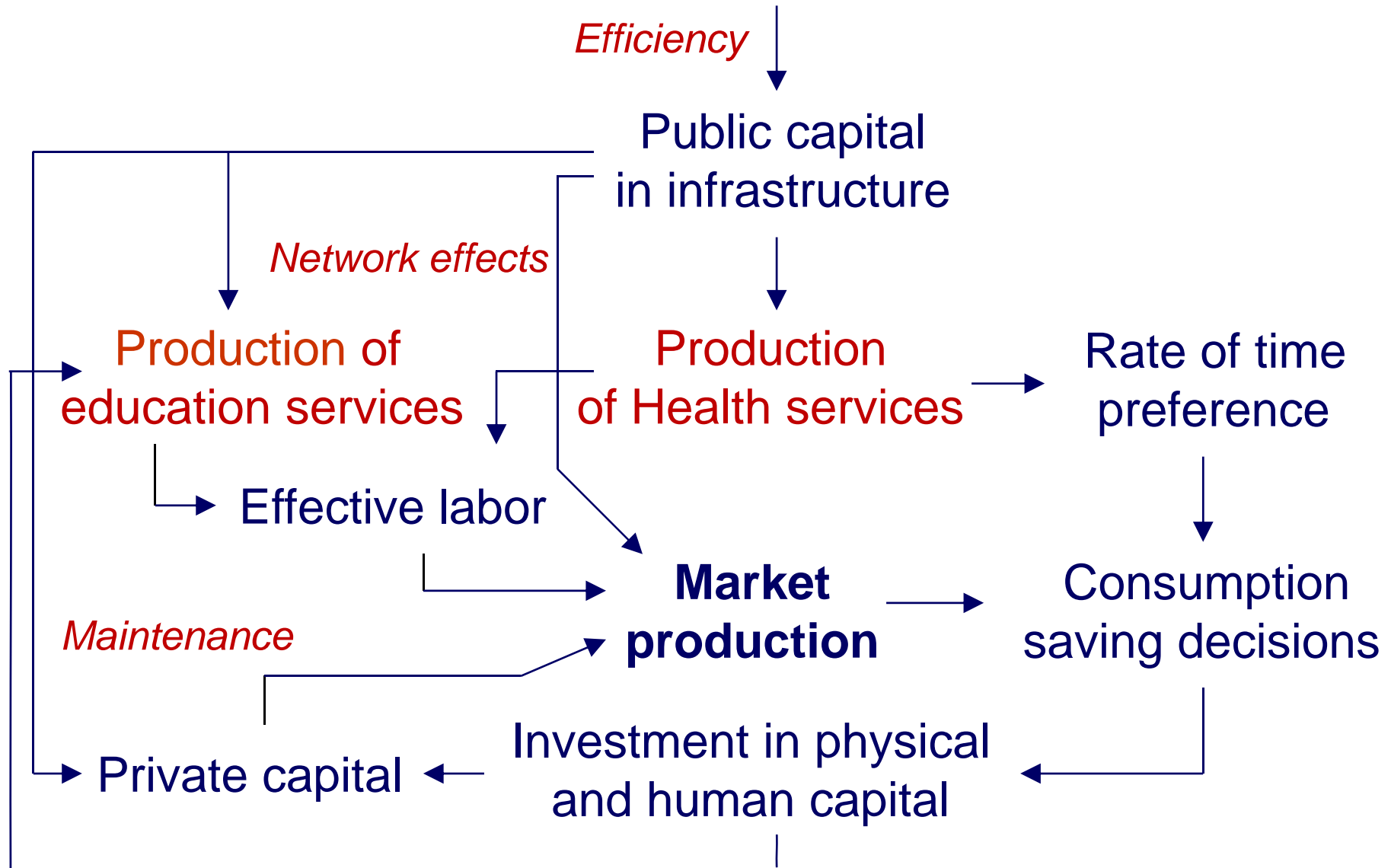
**Market  
production**

Consumption  
saving decisions

*Maintenance*

Private capital

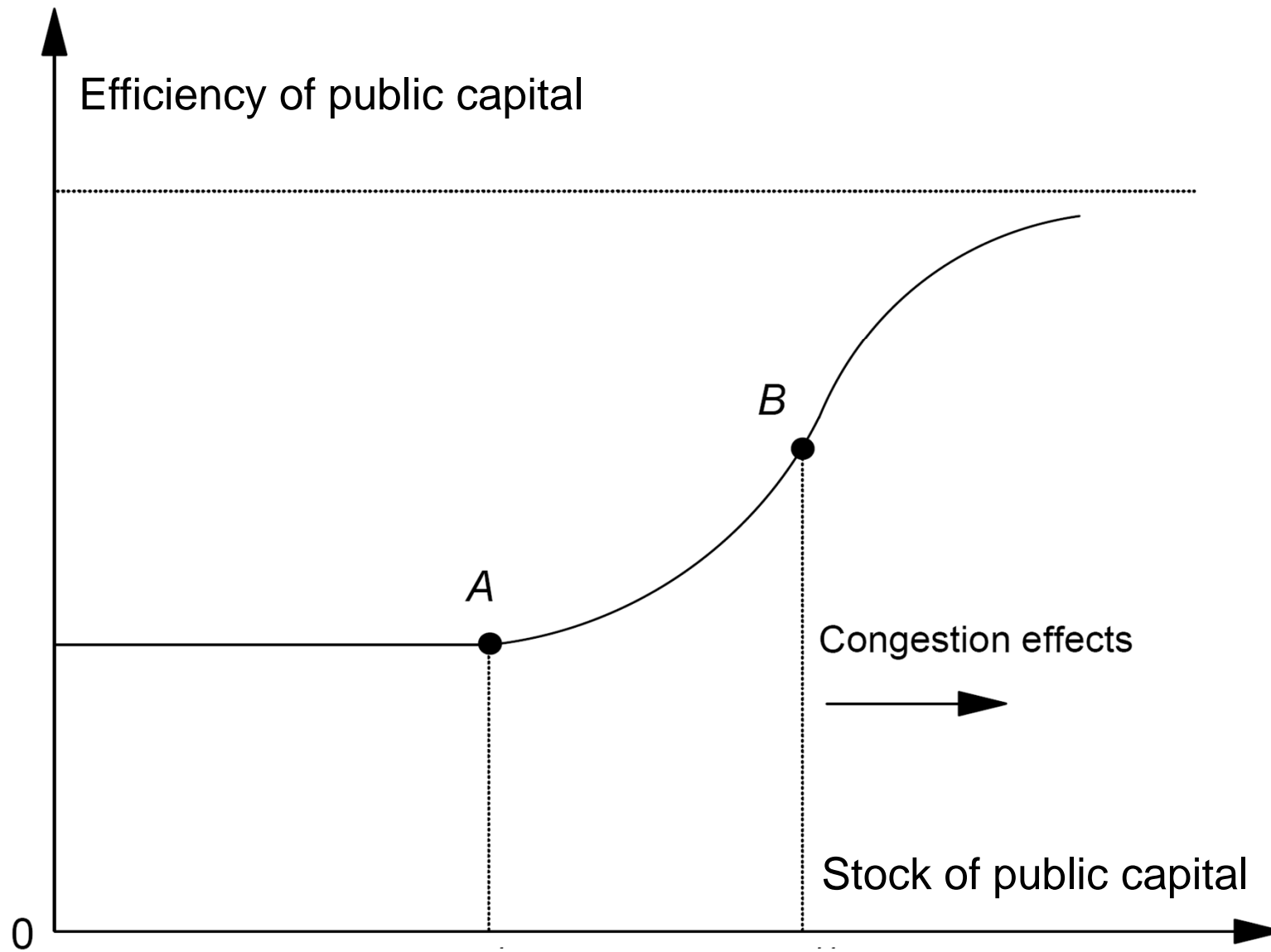
Investment in physical  
and human capital



- Examples of impact on education and health:
- 1. Water and sanitation—increase in enrolment rates (especially for girls, rural areas).
- 2. Electricity—allows hospitals and schools to function properly.
- 3. Roads—easier for patients/students, and teachers/medical workers to get to school/medical facilities.



## Stylized View of Network Effects



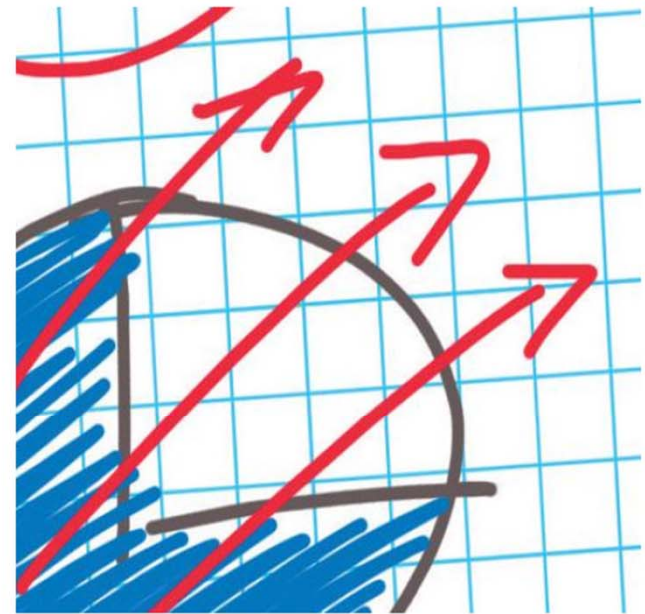
- Impact on **innovation** (both ability to innovate and diffusion of innovations).
- Role of public capital in the transition from **imitation** (adaptation of existing products or ideas)...
- to **true innovation** (creation of new products).
- Requires shift from “basic” infrastructure (roads, fixed and mobile phones) to broadband.
- Generation/distribution of information and ideas.



## Ministerial report on the OECD Innovation Strategy

*Innovation to strengthen growth and  
address global and social challenges*

## Key Findings



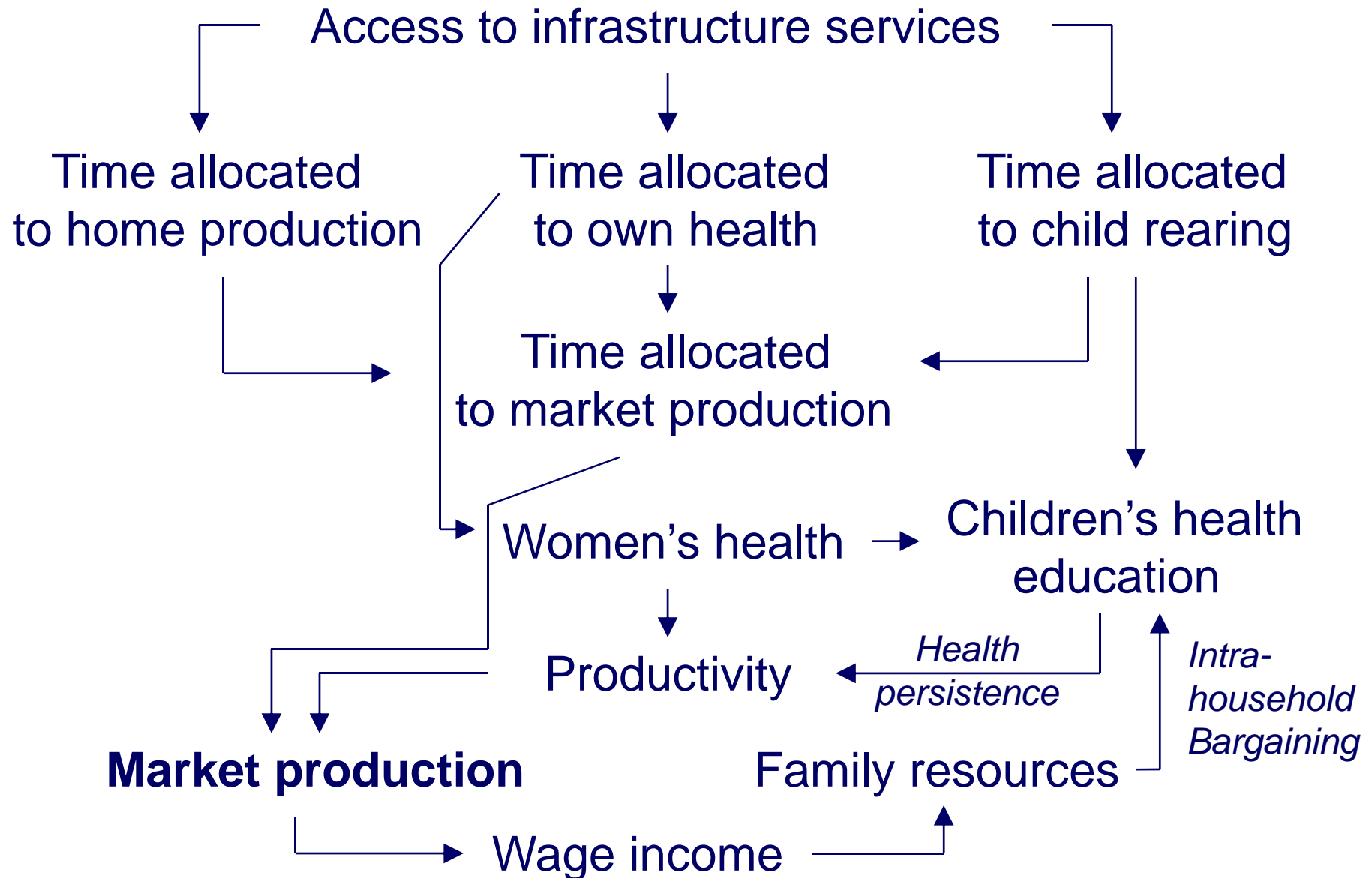
May 2010

- Impact on **income distribution**. Improved access to infrastructure may reduce inequality.
- Possible reason: improved access benefits the poor more than proportionally; if inequality is bad for growth (e.g., due to credit market imperfections), then indirect effect on growth.
- However, causality can go both ways.
- More research is needed.



- Impact on **women's time allocation**.
- Women bear the brunt of domestic tasks in many developing countries.
- Improved access to infrastructure allows them to reallocate their time to other activities—market work, but also taking better care of themselves and their children.
- With health persistence: the latter can be productive and growth promoting.

# Gender Dimension of Infrastructure





- **Negative externalities.**
- Environmental damage, pollution.
- Negative effect on growth, both directly (loss of physical assets important for production) or indirectly (adverse effect of pollution on health and labor productivity).
- Creates trade-off for infrastructure investment...
- ...which must be internalized.



# **Policy Implications**



- 1. Investment spending is a **poor proxy** for the accumulation of public productive assets.
- Possible to have at the same time negative impact of the flow (crowding-out effect), and positive impact of the stock, on growth...
- ...important for assessing the fiscal stance (size of deficits/debt sustainability).
- 2. Accounting for **quality** of stocks and **congestion effects** is important.



- Inverse correlation between investment efficiency/ quality of infrastructure and level of corruption.
- Scaling-up of public investment must be accompanied by improvements in **selection**, implementation, and monitoring of investment projects.
- Need to go beyond discussions of spending levels and address issues of the broad **institutional framework** underpinning provision of investment.



- **3.** Beyond productivity/cost effects: critical to capture the various externalities associated with public capital...
- ...including **network externalities** and **threshold effects** in elaborating investment programs.
- Also important in current debate about fiscal consolidation in both industrial and developing countries.
- **4.** Account for both “old” and “new” channels in applied macro models.



- **5.** Investing in infrastructure is as much about promoting markets as it is about achieving health/education targets and empowering women.
- Implication for public expenditure allocation; best way to improve education/health outcomes could be to spend more on infrastructure.
- This is not to deny the importance of challenges specific to these sectors.
- Implication for the **selection of infrastructure projects**; in addition to IRRs, account for benefits in terms of health/education.