Modelling the Economic Impacts of Inter-city Connectivity

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Structure of Presentation

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- New Economic Geography
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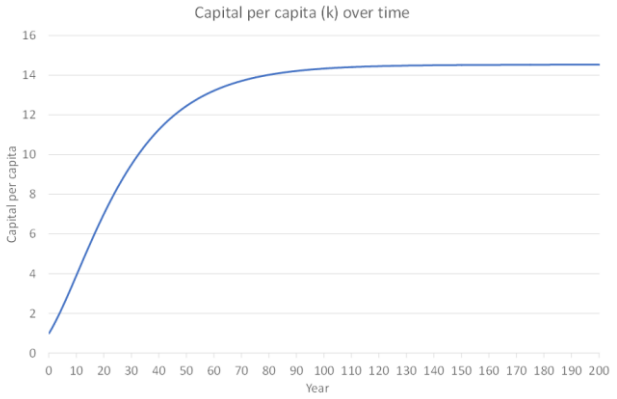
Research Background

- Current inter-city connectivity investment schemes:
  - Northern Transport Strategy, HS2, TEN-T, etc.
- Rationale is improved economic performance
- Appraisal methods focus on direct cost savings and urbanisation effects not trade and specialisation
- There is no complete method currently available for assessing inter-city connectivity benefits which potentially may be significant

Goods, Services, Labour, Investment, Ideas, etc.

Research Objectives

- 1. To develop an economic framework in which the economic impacts of improved inter-city connectivity can be seen through
- 2. To understand the dynamic processes of how inter-city connectivity impacts on economic activity
- 3. To understand the length of transition to a new steady state which inter-city connectivity may induce
- 4. To identify the level of additionality to transport user benefits in a cost benefit analysis that increased productivity through specialisation will have
- 5. To apply the model and new techniques to relevant case studies



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Ricardo's Theory of Comparative Advantage

Trade

New Economic Geography

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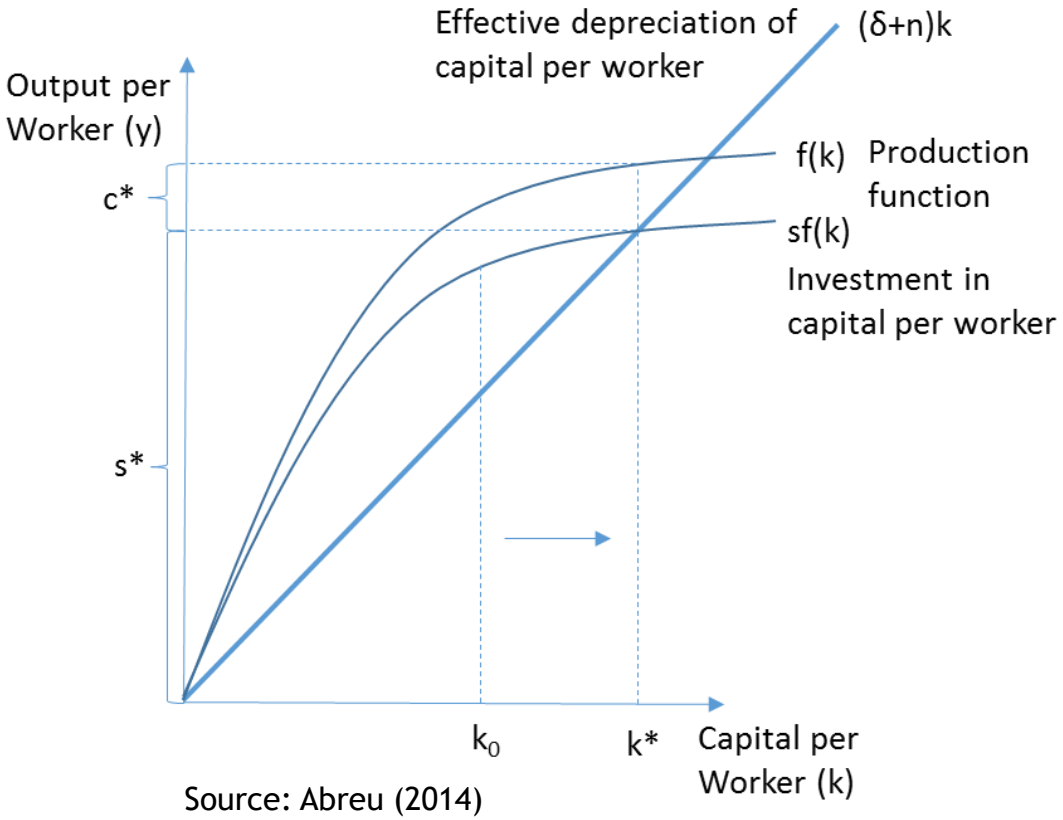
- Centripetal Forces
  - Market size effects
  - Thick labour markets
  - Pure External Economies
- Centrifugal Forces
  - Immobile factors
  - Land rents
  - Pure External Diseconomies

Source: Krugman (1998)

Long-run Economic Growth Models

- The Solow-Swan Model of economic growth was developed in the 1950s
- Production function in Cobb-Douglas form: $Y = AK^{\alpha}L^{1-\alpha}$
- Fundamental differential equation of model: $\dot{k} = sf(k) - (\delta + n)K$



Source: Abreu (2014)

System Dynamics Modelling

- System Dynamics representation of Solow-Swan model based on Kunte and Damani (2016), “Exploring Harrod-Domar and Solow Models of Economic Growth”
- Firm capital (*K*), Population (*N*) and household capital (*HC*) are represented as stocks in the system dynamics model as they can accumulate over time subject to inflows and outflows
- The net flow of each of these variables are expressed using the following formulas:

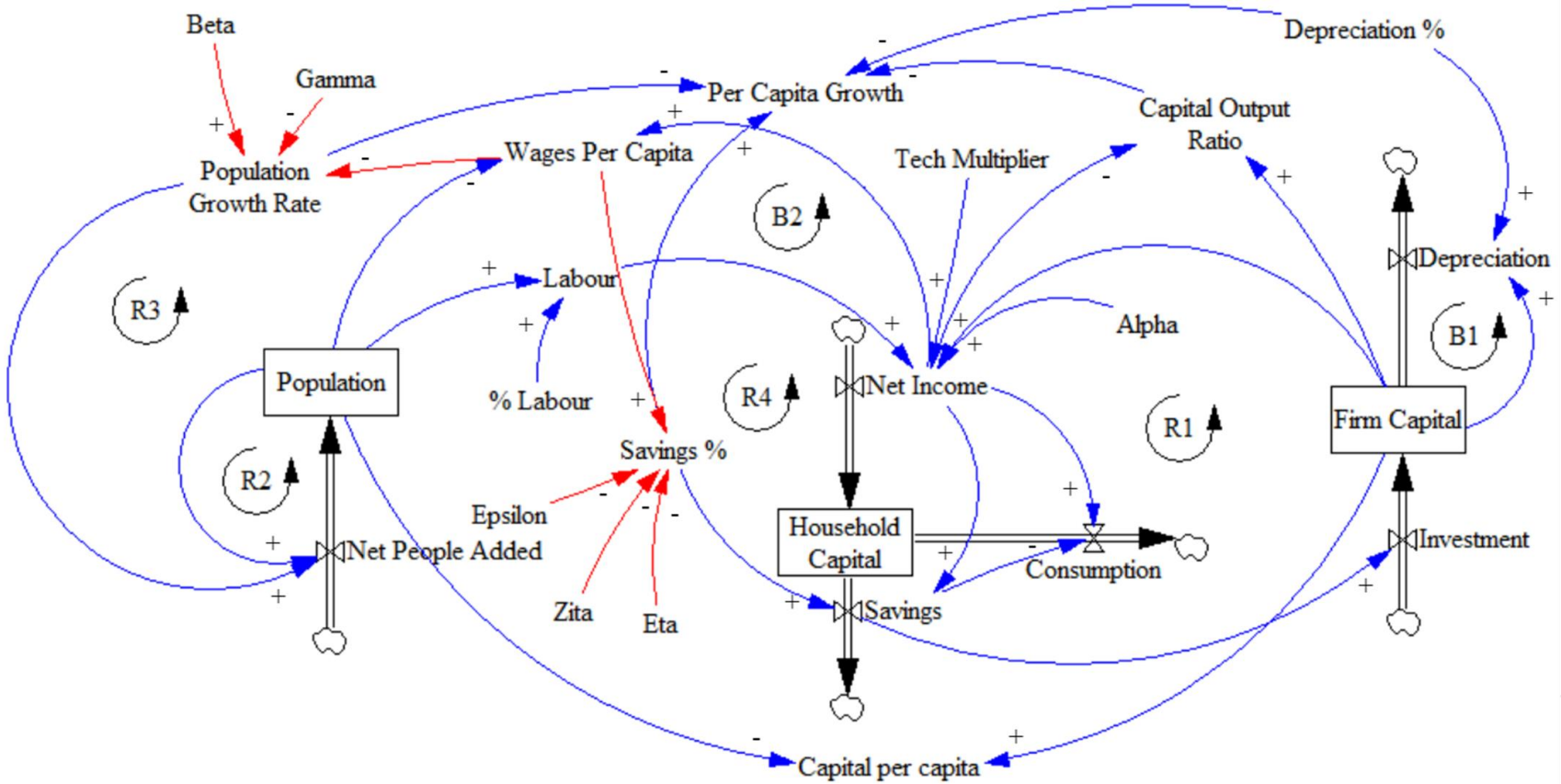
$$K(t) = \int_{t_0}^{t} [sY(s) - \delta K(s)]ds + K(t_0) \qquad (1)$$

$$HC(t) = \int_{t_0}^{t} [Y(s) - (c + s)Y(s)]ds + HC(t_0) \qquad (2)$$

$$N(t) = \int_{t_0}^{t} [nN(s)]ds + N(t_0) \qquad (3)$$

System Dynamics Modelling

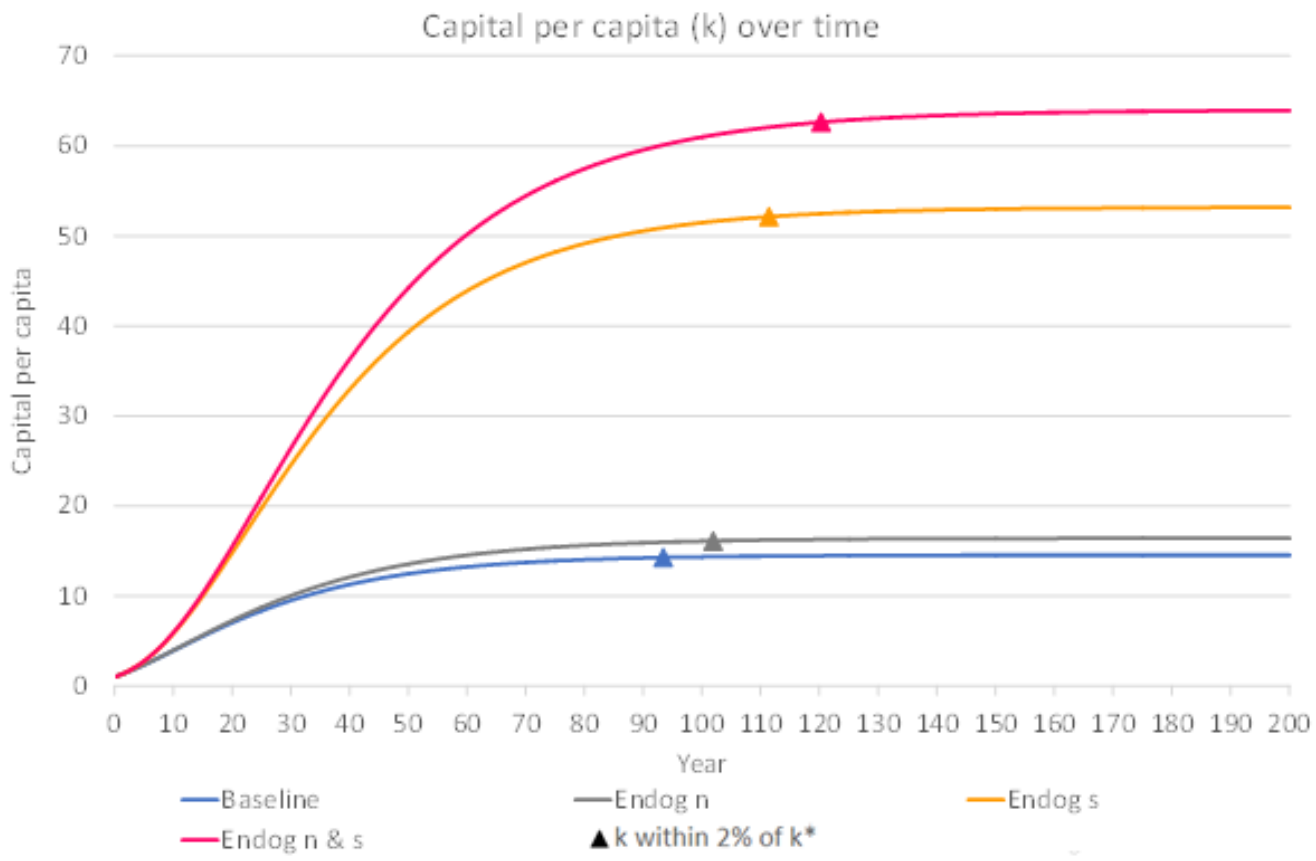
- Non-spatial Solow-Swan Economic Growth Model



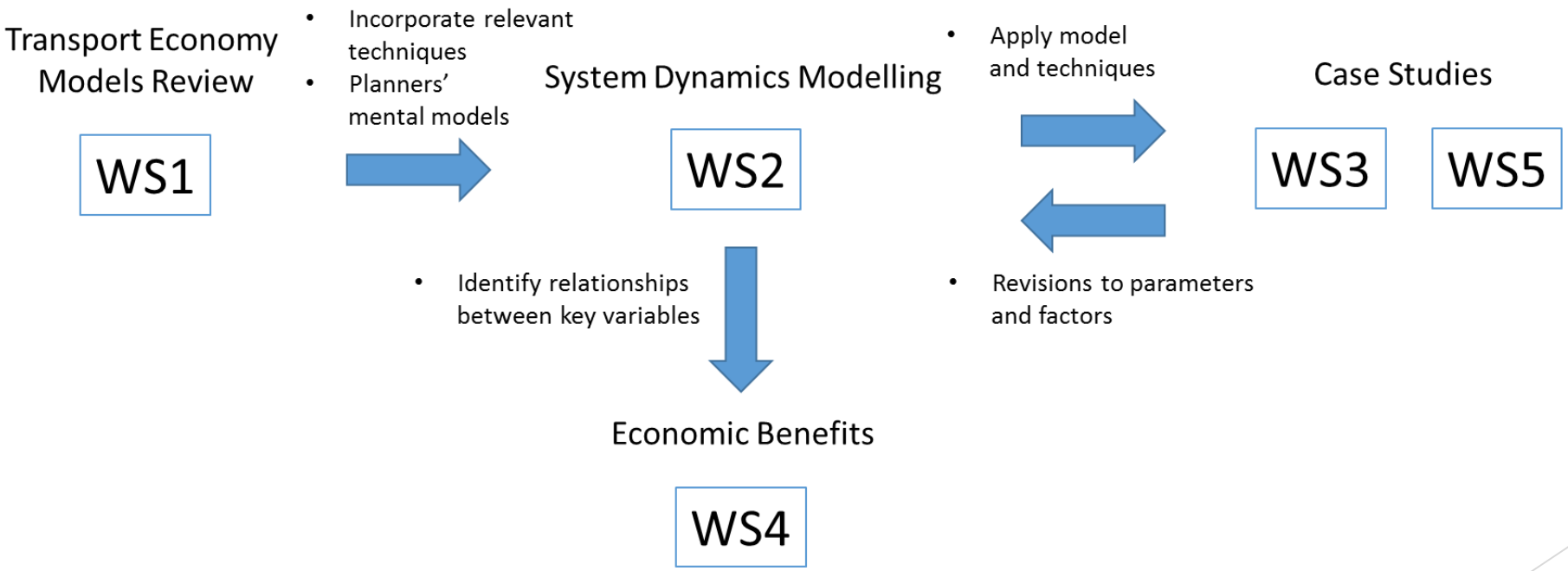
Based on Kunte and Damani (2016)

System Dynamics Modelling Results

- Non-spatial Solow-Swan Economic Growth Model



Research Work Programme



Thanks for Listening

- Any Questions?

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