Socio-economic aspects of transport improvement

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Introduction and motivation

- Transport affects our every day lives
- And our every day lives affect the quantity and quality of transport on offer
- But sorting out cause and effect is often difficult
- Here we look at two aspects
  - The link to the wider economy in terms of economic performance and the structure of cities
  - The link to social change
- And ask how far our current ways of appraising investment in transport are fit for purpose
- Link this to evaluation of HS2
Transport and the economy

- The multiple nature of transport
  - Transport as a derived demand
  - Transport as a substitutable input
  - Transport as an engine of growth

- The role of accessibility and speed
  - Accessibility: distance, speed and frequency
  - External accessibility and the ‘two-way’ road
  - Internal accessibility and efficiency

- Accessibility, the cost of transport and economic growth
  - If transport costs are reduced industries become more competitive
  - Improved transport contributes to productivity growth.
  - Changes in the location of activities
  - Employment growth
The agglomeration issue

- From accessibility to agglomeration
  - Transport costs as determinant of the price of an urban location
  - And hence of the real wage
  - Thus going beyond the simple value of time savings as a transport benefit

- The theoretical basis of agglomeration
  - Increasing returns, transport costs and market size
  - Linkages in the local economy
  - The role of real wages in cumulative causation
  - Labour market impacts
Transport and society

- Transport essential for work (commuting) and leisure (including maintaining family ties)
- Journeys to work have got longer (urban sprawl) – but is this cause or effect?
- Families have spread, nationally and internationally - generating more and longer journeys
- The role of car ownership – the peak car question
- The rural bus problem
CBA: the standard approach
CBA: the standard approach

- But what are the assumptions lying behind this?
  - Perfect competition in the rest of the economy
  - No externalities
  - No returns to scale
  - Demand is only responsive to a change in price, not a change in supply (i.e. a fixed trip matrix)

- Suppose we change these assumptions
  - Imperfect competition
  - Increasing returns
  - Demand could shift in response to changing opportunities – behavioural changes
  - Agglomeration increases productivity and reduces costs
  - The outcome is not now so determinate
Implications for appraisal

● From theory to appraisal for individual projects
  • A theoretically correct CBA needs to recognise externalities and imperfect competition
  • But these are difficult to estimate for individual projects
  • Appropriate models and the scale of projects: what is the relevant study area for impact?
  • Link estimates and network effects

● Data requirements
  • Do we need evidence at more detailed level then typical in most transport models – and can we afford it
  • How does behaviour change with major projects?

● Scale factors
  • Agglomeration clear for major urban projects
  • But distance decay pronounced
  • Can inter-urban projects have agglomeration effects?
  • Are they always uni-directional?
Case study – HS2

- High-speed rail line London-Birmingham (with extensions northwards to Manchester and Leeds)
- Direct user benefits estimated sufficient to give positive BCR
- Wider benefits add to this, but relatively smaller than in an urban situation like Crossrail
- Have all the impacts been captured?
- Impacts on regional balance of national economy
- End points versus intermediate stations
### Table 1 – HS2 Y Network quantified costs and benefits (£ billions) of HS2 (2011 present value prices) and resulting BCR

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Business</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transport User Benefits</td>
<td>£34.3bn</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Other Quantifiable Benefits</td>
<td></td>
<td>£1.0bn</td>
</tr>
<tr>
<td>3</td>
<td>Loss to Government of Indirect Taxes</td>
<td></td>
<td>-£3.8bn</td>
</tr>
<tr>
<td>4</td>
<td><strong>Net Transport Benefits (PVB)</strong></td>
<td></td>
<td>£48.2bn</td>
</tr>
<tr>
<td>5</td>
<td>Wider Economic Impacts (WEIs)</td>
<td></td>
<td>£15.4bn</td>
</tr>
<tr>
<td>6</td>
<td><strong>Net Benefits including WEIs</strong></td>
<td></td>
<td>£63.6bn</td>
</tr>
<tr>
<td>7</td>
<td>Capital Costs</td>
<td></td>
<td>£36.4bn</td>
</tr>
<tr>
<td>8</td>
<td>Operating Costs</td>
<td></td>
<td>£22.3bn</td>
</tr>
<tr>
<td>9</td>
<td><strong>Total Costs (7+8)</strong></td>
<td></td>
<td>£58.7bn</td>
</tr>
<tr>
<td>10</td>
<td>Revenues</td>
<td></td>
<td>£32.9bn</td>
</tr>
<tr>
<td>11</td>
<td><strong>Net Costs to Government (PVC) = (9) – (10)</strong></td>
<td></td>
<td>£25.7bn</td>
</tr>
<tr>
<td>12</td>
<td>BCR without WEIs (ratio) = (4)/(11)</td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td>13</td>
<td>BCR with WEIs (ratio) = (6)/(11)</td>
<td></td>
<td>2.5</td>
</tr>
</tbody>
</table>
## Sources of benefits

Table 4 – Breakdown of benefits for lower bound estimate of the Y Network (£ millions 2011 PV/Prices)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Business</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journey Time Saving</td>
<td>18,700</td>
<td>5,800</td>
<td>24,500</td>
</tr>
<tr>
<td>Improved Reliability</td>
<td>4,100</td>
<td>1,100</td>
<td>5,200</td>
</tr>
<tr>
<td>Reduced Crowding</td>
<td>1,800</td>
<td>4,900</td>
<td>6,700</td>
</tr>
<tr>
<td>Other Rail User Impacts</td>
<td>2,900</td>
<td>2,600</td>
<td>5,500</td>
</tr>
<tr>
<td>Other Impacts</td>
<td>1,200</td>
<td>900</td>
<td>2,100</td>
</tr>
<tr>
<td><strong>Total Benefits</strong></td>
<td>28,800</td>
<td>15,300</td>
<td>44,100</td>
</tr>
</tbody>
</table>

*Source: HS2 Ltd*
### GDP Impact of connectivity

<table>
<thead>
<tr>
<th>Maximum estimated impacts</th>
<th>GDP impact per year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total impact for GB economy</td>
<td>£15 billion</td>
</tr>
<tr>
<td>Of which results from:</td>
<td></td>
</tr>
<tr>
<td>Rail connectivity to businesses</td>
<td>£13 billion</td>
</tr>
<tr>
<td>Rail connectivity to labour</td>
<td>£1 billion</td>
</tr>
<tr>
<td>Car connectivity (to labour and businesses)</td>
<td>£0.2 billion</td>
</tr>
</tbody>
</table>

*Note: totals may not sum due to rounding*

Source: HS2: Regional Economic Impact, 2013
Issues raised

- Forecasting long-distance trip making over long periods
  - Assumptions about economic growth
  - Assumptions about business travel behaviour
  - Assumptions about non-business travel behaviour
- Values of in-vehicle time savings – is business travel over-valued?
- Assumptions on fare structures and price elasticities
- Have we got the wider benefits right?
  - Is agglomeration different in an inter-urban context?
  - Effects of connecting cities
  - Skill specialisation
- Does the UK over-analyse?
  - Allowing for optimism bias
  - How much risk should be left in?
Concluding thoughts

- Analysis, risk and paralysis
- Realities and perception in the investment for growth argument
- So can transport rebalance the economy?
- But can the economy be rebalanced without investment in transport?
- What are the outstanding issues?
  - Competition
  - Accessibility
  - Clarity
  - Cities versus wider regions
  - How do people use transport?
- How do we compare local/regional improvements with major national multi-billion investments?