

<b>Institution:</b> University of Oxford		
<b>Unit of Assessment:</b> 16 – Economics and Econometrics		
<b>Title of case study:</b> Transforming the framework for evaluating transport investment: changing policy and practice.		
<b>Period when the underpinning research was undertaken:</b> 2007 - 2018		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b> Anthony Venables	<b>Role(s) (e.g. job title):</b> BP Professor of Economics and Director of OxCARRE, Department of Economics	<b>Period(s) employed by submitting HEI:</b> April 2007 – Dec. 2020
<b>Period when the claimed impact occurred:</b> December 2014 – 31 July 2020		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<b>1. Summary of the impact</b> (indicative maximum 100 words)		
<p>Research undertaken by Professor Tony Venables on identifying and evaluating the wider economic impacts of investment in transport infrastructure underpinned a major revision to the Department for Transport's (DfT) Transport Analysis Guidance (TAG) implemented in 2018. The TAG presents the DfT's current understanding of best practice in appraising the costs and benefits of transport projects, and sets out explicit guidance for the way such appraisals should be undertaken. All transport projects that seek UK government funding are required to use this guidance in developing the business case for the project; DfT capital procurement is currently running at approximately GBP14,000,000,000 per annum. Venables' research led to a major shift in DfT thinking and practice, resulting in the development of a new framework to appraise economic impacts.</p>		
<b>2. Underpinning research</b> (indicative maximum 500 words)		
<p>Venables' research in 'new economic geography' has greatly enhanced our understanding of the way in which changes in the cost of transacting across space can shape the location of economic activity and of prosperity. In a series of research papers, Venables has applied these ideas to different settings: to reductions in trade costs between countries, to 'place-based policies' in developing economies and to transport improvements within-country. His research on transport improvements highlights the importance of recasting the cost-benefit techniques used by transport authorities for <i>ex ante</i> project appraisal to capture the full effects on economic activity. Traditionally, the application of cost-benefit techniques to transport projects focused on the static effects that arise due to a reduction in travel times and costs, paying little or no attention to induced changes in private sector investment and firm location. Venables' approach broadens this to take account of the wider economic benefits that follow from changes in the attractiveness of places for investment and consequent changes in employment, productivity and incomes.</p> <p>Venables analyses the importance of agglomeration benefits – a positive relationship between employment density and productivity – for identifying and evaluating the wider economic effects of urban transport investment [R1]. In this setting, transport investment contributes to raising productivity by facilitating the expansion of urban employment. In subsequent research, the model was enriched to capture wider sectoral impacts [R2]. Transport improvements facilitate business links between places which allow firms in a given city to specialize and so realize the productivity gains from localization economies.</p> <p>The research identifies three main mechanisms by which transport investment drives wider economic benefits:</p> <ul style="list-style-type: none"> <li>• Transport improvements increase the 'effective density' of economic activity as firms are able to recruit from larger pools of labour and can reach larger markets. This can raise</li> </ul>		

productivity (over and above the direct cost savings of easier journeys) and arises because of the intense economic interaction that occurs in economically large and dense places.

- Transport improvements, other things equal, will make affected locations more attractive destinations for investment. User benefits are experienced by residents, workers and firms, and this may induce investment to occur, changing land use. Investments include residential development of land, the development of office centres or retail parks, or the redevelopment and regeneration of city centres. They may in turn generate agglomeration and productivity effects, and also have further value by changing the 'attractiveness' of affected places.
- Transport improvements impact the labour market, on both the supply and demand side. On the supply side, transport may enable labour-force participation. On the demand side, jobs will be created in some places and some activities, and possibly lost in others.

Incorporating these wider economic impacts into the traditional cost-benefit analysis (CBA) framework used for transport project appraisal poses challenges for policymakers. These are addressed in a 2014 research report (co-authored with Overman (LSE) and Laird (University of Leeds) commissioned by the UK Department for Transport which develops an analytical framework to capture and critically evaluate the wider economic impacts of transport investments [R3]. This framework is further developed and refined in R4 and R5. The analysis sets out the various causal mechanisms through which transport improvements can change GDP and economic welfare. It emphasizes the importance of establishing additionality, i.e. taking into account economy-wide general equilibrium effects under which a gain in one place may be offset by losses elsewhere. Further, it makes clear the distinction between (a) quantifying the effects of a transport improvement (including e.g. relocation of investment and jobs) and (b) attaching a value to any such changes. *The Transport Investment and Economic Performance (TIEP) report [R3]* concludes with a set of recommendations for policymakers on how to extend and improve current appraisal methods in order to more fully capture and critically evaluate the wider economic impacts of transport investments [R3, pp 4-7].

### 3. References to the research (indicative maximum of six references)

**R1.** Venables, A.J. (2007), 'Evaluating urban transport improvement: cost benefit analysis in the presence of agglomeration and income taxation' *Journal of Transport Economics and Policy*, 41(2), 173-188. Reprinted in R. Vickerman (ed) *Recent Developments in the Economics of Transport*, Edward Elgar (2012). Reprinted in C. Mulley (ed) *Urban form and transport accessibility*, Edward Elgar (2012) <https://www.jstor.org/stable/20054012> [output type D]

**R2.** Venables, A.J. (2017), 'Expanding cities and connecting cities: appraising the effects of transport improvements', *Journal of Transport Economics and Policy*, 51(1), 1-19. (First working paper version: Expanding cities and connecting cities: the wider benefits of better communications. Oxford, 2013) <https://www.jstor.org/stable/90003595> [output type D]

**R3.** Venables, A.J., H. Overman, and J.J. Laird (2014), *Transport Investment and Economic Performance: Implications for Project Appraisal*, December. Report and peer reviews: <https://www.gov.uk/government/publications/transport-investment-and-economic-performance-tiep-report> [output type N]

**R4.** Venables, A.J. (2016), 'Incorporating Wider Economic Impacts within Cost-benefit Appraisal' Discussion Paper 2016-05, (February) OECD International Transport Forum (Prepared for the Roundtable: Quantifying the Socio-Economic Benefits of Transport 9-10 November 2015, OECD, Paris). <https://www.itf-oecd.org/sites/default/files/docs/incorporating-wider-economic-impacts-cba.pdf> [output type E]

**R5.** Laird, J.J. and A.J. Venables, (2017), 'Transport investment and economic performance: a framework for project appraisal', *Transport Policy*, 56, 1-11. <http://doi.org/10.1016/j.tranpol.2017.02.006> [output type D]

**4. Details of the impact** (indicative maximum 750 words)

Research by Professor Tony Venables on the mechanisms that drive the wider economic impacts of investment in transport infrastructure and how these may be critically evaluated underpinned a major update of the Department for Transport's (DfT) Transport Analysis Guidance (TAG) which was fully implemented in 2018. *'Tony's research on economic geography over the years as well as his involvement in our Joint Analysis Development Panel and support in developing our Appraisal and Modelling Strategy has significantly shaped and continues to shape the Department's thinking on wider economic impacts'* DfT's Chief Analyst [E5].

The revisions to the TAG were driven by the key recommendations of Venables et al in the TIEP report [R3, pp.4-7] and designed to ensure a coherent and consistent approach to identifying and evaluating the wider economic impacts of an investment. The DfT describe the revisions to the TAG arising from this research as representing a *'major milestone in (their) analytical strategy'* [E1, Executive Summary, para 11].

**Enhancing the appraisal approach**

UK government decisions on investment in transport projects are informed by evidence set out in a business case developed in line with Treasury's framework for evidence-based decision-making, as set out in its Green Book [E2]. The Department for Transport's (DfT) Transport Analysis Guidance (TAG) provides tools and guidance for responsible bodies on the evidence required for the business case, and All transport projects that seek UK government funding are required to use this guidance. The TAG is essentially a guidebook setting out the Department's current understanding of how the costs and benefits of transport projects should be modelled and appraised. It includes advice on how to set objectives and identify problems, develop potential solutions, create a transport model for the appraisal of the alternative solutions, and how to conduct an appraisal which meets the Department of Transport's requirements. Transport projects that seek government funding are required to use this guidance in making their business case. The TAG is used not only by officials working for the DfT, but also by analysts in local authorities or other transport bodies such as Transport for London, and private consultancy firms, and is *'internationally respected as best practice'* [E3c, Executive Summary, para 1].

In 2013, the DfT set out its plans to develop its appraisal framework for transport projects, placing particular emphasis on the need to update its guidance in order to take better account of the potential wider economic impacts of major transport investment projects [E3a, para 4.5]. It was in this context that Venables, with Overman and Laird, was commissioned to develop a framework for appraising wider economic impacts in the light of recent theoretical developments, (including R1 and R2), and the latest empirical evidence. The specific remit of their commission was to *'provide recommendations on the scope for enhancing our current appraisal approach, while ensuring the evidence base remains robust'* [E3a, Executive Summary, para 3]. The DfT committed to update and restructure the guidance to improve the analysis and communication of wider economic impacts, based on the recommendations of the TIEP report [E3b, Executive Summary, para 6-7].

In Spring 2015, the DfT established the Joint Development Analysis Panel (JDAP) to provide strategic advice on developing its modelling, appraisal and evaluation guidance and methods, and more particularly, on updating the Department's TAG in line with the recommendations of the TIEP report. The panel consisted of six external experts, including Professor Venables, together with the Department's senior analysts. The JDAP reviewed the proposed changes to the TAG at its meeting in June 2016 [E4] and the detailed proposals were published for consultation in September 2016 [E1].

**Updating the TAG**

The updated guidance sought to implement the key recommendations of the TIEP [R3, pp.4-7] *'to improve the analysis and communication of wider economic impacts and ensure that the full*

range of material impacts re captured [E1, Executive Summary, para 7]: The main changes were:

- A new requirement to produce a context-specific economic narrative that establishes the transmission mechanisms through which transport investment will impact the economy and achieve the stated economic objectives.
- Greater clarity on the relationship between the measures of benefits used in appraisal (welfare) and economic metrics such as GDP and employment.
- A stronger focus on additionality and displacement in the analysis and reporting of economic impacts.
- Greater flexibility to use new modelling and valuation approaches to supplement standard appraisal methods.
- The integration of wider economic impacts including those arising from increasing economic interaction, moves to more productive jobs, productivity impacts, and changes in the location of economic activity.

The analysis developed by Venables *et al.* in *TIEP* was fundamental in shaping the revised guidance. In the words of the DfT's Chief Analyst:

*"The report shaped the structure of the Department's guidance and introduced key concepts that are now fundamental to how the Department undertakes appraisal. It highlighted the importance of understanding local context, and setting out a strong theory of change in an economic narrative. This guidance now underpins the development of transport business cases across the Department."* [E5].

Following a consultation period, the revised guidance was implemented in May 2018 with the addition of five new units within TAG, designed to support transport officials, project managers and appraisal practitioners to 'better communicate and to robustly appraise' transport projects. The five units cover [E6]:

- A2.1 Wider Economic Impacts Appraisal: sets out the overall framework underpinning the analysis of wider economic impacts;
- A2.2 Induced Investment: guidance on how to identify and value effects on the level or location of private investment;
- A2.3 Employment Effects: guidance on how to identify and value the employment effects;
- A2.4 Productivity Impacts: guidance on how to capture the productivity impacts associated with agglomeration economies;
- M5.3 Supplementary Economic Modelling: describes alternative modelling approaches for cases where there may be significant land use change.

The revised framework places the onus on those promoting a transport project to justify their appraisal approach. The revised TAG units provide descriptions of the different transmission mechanisms through which wider economic impacts may arise, and specify the types of evidence which would be required to justify the relevance of these impacts to any given business case.

Since its implementation, the revised guidance has provided the appraisal framework underpinning the business case for a number of major transport projects including: HS2 (Full Business Case, High Speed 2 Phase 1, April 2020) [E7]; Crossrail 2 (Business Case, July 2019); Northern Powerhouse Rail (Outline Business case, February 2019) [E8]; and West London Orbital (Strategic Outline Business Case, June 2019) [E9].

**5. Sources to corroborate the impact** (indicative maximum of 10 references)

- E1. Department for Transport, 'Understanding and Valuing Impacts of Transport Investment: Updating Wider Economic Impacts Guidance. Moving Britain Ahead (September 2016)  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/554783/transport-appraisal-guidance-webtag-consultation-document.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/554783/transport-appraisal-guidance-webtag-consultation-document.pdf)
- E2. HM Treasury, The Green Book: appraisal and evaluation in central government.  
<https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>
- E3. Department for Transport: Understanding and Valuing the Impacts of Transport Investment,  
<https://www.gov.uk/government/publications/transport-appraisal-in-investment-decisions-understanding-and-valuing-the-impacts-of-transport-investment> :
- a) 2013 Report
  - b) 2014 Progress Report
  - c) 2017 Progress Report
- E4. Department for Transport, Joint Analysis Development Panel Annual Report 2016-17, p 9-10.  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/919305/Joint-analysis-development-panel-annual-report-2016-2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/919305/Joint-analysis-development-panel-annual-report-2016-2017.pdf)
- E5. Letter from Chief Analyst, Analysis and Science Directorate, Department for Transport
- E6. Department for Transport, 'Transport Analysis Guidance: Guidance for Appraisal Practitioner, <https://www.gov.uk/guidance/transport-analysis-guidance-tag>
- E7. HS2, Full Business Case, High Speed 2 Phase 1, April 2020 (pp.8,44-45)  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/879445/full-business-case-hs2-phase-one.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879445/full-business-case-hs2-phase-one.pdf)
- E8. Transport for the North Strategic Transport Plan, February 2019 (pp.151, 180)  
<https://transportforthenorth.com/wp-content/uploads/Strategic-Transport-Plan-February-2019-Plain-Text-min.pdf>
- E9. West London Orbital Strategic Outline Business Case, June 2019 (pp.19 & 95)  
<http://content.tfl.gov.uk/west-london-orbital-strategic-outline-business-case.pdf>