

Institution: Edinburgh Napier University
Unit of Assessment: 14 Civil & Construction Engineering
Title of case study: Enhancing taxi transport policy and practice in the UK and internationally
<p>1. Summary of the impact</p> <p>The Transport Research Institute at Edinburgh Napier University (TRI) recognises the importance of taxi research, developing a series of models since 2002. Parallel pressures within the regulation of the mode, and disruptive forms of access, necessitate measurable and repeatable analysis. Beneficiaries include the travelling public, as regulations are developed and applied, regulators, informing policy direction; operators and drivers as the market for services changes.</p> <p>TRI models provide detailed analysis of the market. The market-model, with its economic, cost and operational sub-models, has developed to support live issues, and is applied in the UK, EU and North America.</p>
<p>2. Underpinning research</p> <p>Taxis as a mode of transport fall between mass transit on the one hand and private car use on the other and have received comparatively little attention from transport researchers. Taxi fleets make a significant contribution to the regional economy with taxis representing the largest single-use vehicle in many cities. A changing market for taxis, resulting from modal split evolution, and the emergence of mobile phone 'apps' for accessing taxis, points to the need for fit-for-purpose regulatory structures and research into these in order to reflect and catch up with these marketplace changes. Creating a robust research base is a first step to underpinning policy development, as has already happened for other transport modes.</p> <p>TRI has undertaken taxi research, led by Cooper, since 2002. Recognising the lack of a rigorous basis for analysis, initial work focused on regulation in medium-sized UK cities and presented a new approach to taxi modeling, which was subsequently extended to many North American and other developed world cities. Existing taxi models both as applied to quantity regulation and cost modeling approaches have provided an effective method of determining supply and tariff in isolation. This does not however account for the presence of links between the individual modeling elements. The identification and consideration of impacts in other regulatory domains on the operation of the cost model is significant, as it permits calculation of effects of external impacts with a direct impact on operational cost. The development of taxi models, as with the wider use of models in transportation, can be significant in determining the most appropriate forms of supply and in informing policies applied to the mode.</p> <p>In collaboration with the International Association of Transport Regulators, the Transportation Research Board, the Taxi, Limousine and Paratransit Association and the International Road Union and others, new applications have been developed to overcome: 1) incomplete or unverifiable data, not accounting for new sources; and 2) concentration on single issues in isolation created misleading analysis. Research has focused on the enhancement of this base, its refinement reflecting socio-economic and spatial features of cities, and increased availability of data and processing power. Examples of model application include:</p> <ul style="list-style-type: none"> • Glasgow (from 2003): use of cross-market indicators in demand analysis allowing localised demand testing. • UK Department for Transport (2005): temporal differences in market responses, use of taxis in the night-time economy, with spatial, temporal and full market analysis subsequently applied to Atlanta, Nashville, Boston. • Aberdeen (2011): geographical Information System interface developed to include physical taxi stand locations, also applied in Perth, Belfast, Dublin (and 7 Irish cities/towns). • Seattle (2013): 'app' development with the model enhanced to include rideshare and new

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modes.

- Boston (2013), San Diego (2013), Chicago (2013): cost model developments to reflect specific issues arising from disputes over driver income, and a common fare policy.

3. References to the research

- Cooper, J., R. Mundy and J. Nelson (2010) Taxi! Urban Economies and the Social and Transport Impacts of the Taxicab. Ashgate Publishing. [REF1/2 Cooper output #2]
- Cooper J (2005) Policy and planning for city centre evening nighttime and weekend economies, entertainment and transport needs, DfT London
- Cooper, J. and R. Darbera (2012) The APPEal of technologies: opportunities and threats. Presentation to the International Road Union Meeting, Cologne, Germany
- Cooper, J., and Yuchen Erin YAN (2012) Can Taxi Models actually benefit the measurement and delivery of taxi services? A comparison, development and proposal for integrated rate and license modelling. Presentation to International Association of Transportation Regulators, Washington DC
- Cooper, J., S. Farrell, and P. Simpson (2010) Identifying demand and optimal location for Taxi Ranks in a liberalised market. Presentation to the Transportation Research Board, Washington DC
- Cooper, J. M., Claywell, R., McCleery, A., Carreno, M., and McKay, S. (2004) Taxicab, specialized mode or the key to integrated transit? In Traffic and Transportation Studies (4) pp28-35 The Science Press

Key research contracts

- Metropolitan Transport System (2013) San Diego, Economic Impact analysis, taxi fare reform. Contract value \$100,000. August 2013 – March 2014. Taxi Research Partners, TRI & Nelson Nygaard
- City of Chicago, Economic impact analysis, taxi fare review. Contract value \$60,000. February 2013 – November 2013, Taxi Research Partners, TRI & Nelson Nygaard
- City of Boston, Taxi Market Reform Review. Contract value \$90,000. March 2013 – October 2013, Taxi Research Partners, TRI & Nelson Nygaard
- City of Seattle, WA (2013) Taxi market analysis review. Contract Value US\$95,000, January 2013 – September 2013. Taxi Research Partners, TRI & TTLF
- City of Toronto (2013) Taxi Supply Analysis, Market Model Application, contract value: \$65,000. November 2012 – October 2013. Taxi Research Partners, TRP Ontario and TRI
- City of Atlanta (2012) Econometric Modelling and market model application, contract value \$250,000. Nelson Nygaard associates and TRI
- Metro Nashville (2011) Taxi modelling review, contract value \$180,000. Nelson Nygaard associates and TRI
- Department of the Environment Northern Ireland (2011) Review of taxi fares & taxi fare structure, contract value £60,000. PA Consulting and TRI
- Department of the Environment Northern Ireland (2011) Review of taxi ranks and the introduction of rank exclusion zones, contract value £35,000. TRI
- National Transport Authority Republic of Ireland (2009 - 2013) Research Framework, taxi rank market analysis, contract value EUR450,000. Waterman Boreham and TRI

4. Details of the impact

Taxi models enhance the quality of information to guide regulatory policy decision-making. Direct impacts include service enhancement, infrastructure improvement and economic control, examples of which are described below.

Impact may be controversial when a regulator intervenes in a market to restrain numbers of licenses issued. The development of the market model provides a more thorough test of the impacts than had been in place previously, creating a stronger justification for policy decisions. The

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TRI model is widely applied in the UK, such as Glasgow, Perth, Aberdeen, West Dunbartonshire and Stirling, and internationally, particularly in the USA and Canada.

The Toronto model was developed with a specific view to identify impacts of introducing accessible vehicles to the taxi fleet, a relatively rare occurrence in North America. The Toronto model developed an enhanced cost model to identify driver cost impacts, and demand model reflecting changes in the market. The City's Taxicab Industry Review made use of the model outputs to support a reform of the licensing law to include accessibility, set out on the city's website. As a result disability access compliant vehicles are available within the standard 'on-demand' taxi fleet, enhancing quality of life for mobility-impaired clients. The model identified impacts of growth scenarios and led to the City committing in 2013 to double the number of accessible vehicles in time for the Para-Pan-American games being held in 2015. Furthermore a long-term requirement for full accessibility was identified by the TRI model based on predicted annual costs to the trade and benefits to the public.

The Seattle study was commissioned following the launch of mobile phone apps providing access to taxi market services. The city and its hinterland had been concerned with the declining levels of taxi services, which was confirmed by TRI investigation research. Outcomes of the work included defining a new market equilibrium to increase the taxi service levels to meet changing urban and rural demand. The integration, within the TRI taxi model, of quantity, quality and economic analysis also allowed for enhanced service levels using a combination of measures. The initial outcomes of Seattle indicated a need to combine quantity and quality controls.

By contrast with Seattle, a focus on economic controls and combinations of economic and quantity regulations were required by Boston, Chicago, and San Diego. The San Diego project is ongoing and is expected to provide a standardized fare allowing reduction in the number of excess fares being charged, a practice known locally as fare gouging. The Boston analysis focused on the measurement of driver income, a contentious issue in the city, with a number of claims being put forward in the Boston Globe newspaper suggesting that drivers were receiving third world wages. The TRI research identified a measure of driver income and economic rent charged in the industry, contributing to the Boston Police Department's review of market controls. Other similar benefits arise in the application of the model in Chicago, identifying actual driver income as an element in determining fare policy, and are repeated in San Diego. Finally, meter rate structures that encourage use, and are achieved without resulting in excess costs, impacts beneficially on the taxi-using public.

Stand location models developed for Northern Ireland, the Republic of Ireland, Aberdeen and Perth allow the location of taxi-stands to be determined by actual demand, rather than historic decisions. On-the-ground issues included the location of stands that are difficult of access, physically inappropriate to wheelchair users, or not served by the trade. While incorporation of information about stand location contributes directly to the wider demand model it is also appropriate in fine-tuning infrastructure. The stand location model, which particularly benefits wheelchair users, has been applied in Glasgow, in relation to traffic signal timings at the Central Station taxi stand, across the cities of Belfast and other Irish cities, Aberdeen and Perth, and is in development for San Diego. The model benefits wheelchair users, and the wider public.

5. Sources to corroborate the impact

- [5.1] Market model application city reviews: <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=2a277729050f0410VgnVCM10000071d60f89RCRD>
- [5.2] Framework for change report citing TRI model: <http://www.toronto.ca/legdocs/mmis/2013/ls/bgrd/backgroundfile-59689.pdf>
- [5.3] Evidence to City Council: <http://www.seattlechannel.org/videos/watchVideos.asp?program=Taxi>
- [5.4] Application of model outputs to taxi rank development: <http://committees.aberdeencity.gov.uk/documents/s28367/Final%20Report%20Taxi%20Demand%20Survey%20-%20Rank%20Sp>

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[ecific%20Recommendations.pdf](#)

- [5.5] Aberdeen city council summary: <http://committees.aberdeencity.gov.uk/mgConvert2PDF.aspx?ID=17071> and <http://committees.aberdeencity.gov.uk/mgConvert2PDF.aspx?ID=19762>
- [5.6] Cooper, City of Boston Taxi Study (Contact: Principal, Nelson Nygaard Consulting Associates)
- [5.7] Cooper, City of Seattle (Contact: Principal, Tennessee Transportation and Logistics Foundation)
- [5.8] Cooper, City of Toronto (Contact: Project Manager Taxi Review, City of Toronto, Municipal Licensing & Standards)
- [5.9] Cooper, City of Aberdeen (Contact: Legal Manager, City of Aberdeen, Legal and Democratic Services, Corporate Governance, Aberdeen City Council)