

# **PARATAXI! THE POTENTIAL FOR FOCUSED TAXI SERVICES TO SATISFY NEW DEMANDS FOR TRAVEL**

**James M Cooper** ( TRi Taxi Studies Group, Napier University, Edinburgh)  
[Ja.Cooper@napier.ac.uk](mailto:Ja.Cooper@napier.ac.uk)

**John D Nelson, Steve Wright** (Centre for Transport Research, School of Geosciences, University of Aberdeen)

**Ursula Cooper** (T2E Transport to Employment)

## **Abstract**

The delivery of public transport to peripheral communities and at times of low demand represents a significant challenge to transport operator, local authority and user alike.

This paper develops the concept of alternative, taxi-based transport, collectively referred to as parataxi services, and focuses in on the Transport to Employment Service (T2E), a centrally co-ordinated shared taxi service, operating in the Highlands of Scotland, designed to bridge the gap between existing transport services, and those appropriate to access workplace, training and childcare in peripheral and remoter locations. The paper considers the alternatives available to individuals seeking to gain access to work, including the effect of limits to access imposed where traditional public transport options may be available in one direction alone.

The paper introduces the concept of, and methods by which mobility and inclusive access may be enhanced and in particular the experience of using taxi-based services in the T2E service, a specialist access to work programme which has successfully piloted and provided access to over 120 individuals to new work opportunities, while being able to reduce, over time, per capita travel costs and external support levels.

The paper concludes by presenting results of a detailed evaluation of T2E. The analysis gauging the effectiveness, acceptability and reliability of the concept, and setting out the effective costs of provision, social and economic impacts. The paper concludes that, in the case of Highland, measurable social benefits outweigh the investment by more than 3 to 1 for current usage patterns suggesting an effective method of delivering increased access and effective transport options beyond the reach of traditional public transport services, and with the potential to achieve longer term sustainability without continued reliance on high levels of external support.

**Keywords:**

Shared taxi, taxi DRT, peripheral locations, parataxi, access to work, Scotland

## **Introduction**

The provision of transport, its design and control, differs significantly between regions, locations, and between modes. These differences are manifest in the nature of regulation, ownership and responsibilities for provision. They do not, however, reduce the importance of the provision of transport, or change its fundamental role in providing access, contributing to individual and social mobility, or in the positive impacts that, properly designed, transport services can contribute. This paper looks at the provision of services by taxi, itself an under-recognised mode, and the contribution that particular novel approaches in the use of the mode (parataxi services) may make to the abilities of the individual to gain access, to increase employability, and to add to local economies, or indeed the significance of defining the mode itself. The paper defines an alternative approach to flexible supply of transport services using taxis, itself an extension of the definitions of Paratransit (beyond the US concept of services under the Americans with Disabilities Act – see Lave and Mathias, 2000) to a specific vehicle type in general or defined passenger use.

## **Exploring the impacts of local access deficiencies**

The positive impacts of well-planned transport services are widely reported and can include economic gain, social development, and influence business location decisions (McQuaid et al. 2004). Equally, an absence of transport impacts negatively on individuals and their communities, and is often reported in terms of transport poverty, and social exclusion. These are not simply the opposing arguments to the benefits of presence of transport, but represent a much more significant human impact of isolation. Indeed the impacts of a lack of transport can exist even in instances where transport services do operate or in car available households (Vance and Iovana, 2007), or are affected by third party influences, including gender roles, (Merissa, 2005) and the presence of children (Lenz and Nobis, 2007; Zwerts, 2007) suggesting a deeper issue in the use and appropriateness of services than their presence alone.

Access, rather than transport alone, is significant. Achieving appropriate accessibility, that being the ability to use transport to gain access to services, employment and welfare, is a key contributor to reducing poverty (Gannon and Lui, 1997) and can create further local economic gain. While positive, the concept of accessibility suffers (Hook, 1998) where ‘connections and interrelationships’ between poverty and transport are poorly understood - inappropriate transport provision may reduce access both in its own right, and by reducing the availability of support for

more appropriate alternatives. Poorly planned actions, even those intended to benefit access, may act to reduce an individual's ability to travel to work<sup>1</sup>. Indeed, the impacts of (a lack of) accessibility go far beyond those most often associated (Mitiric and Carruthers, 2005) 'to views of transport affordability and income'.

The significance of lack of transport, including inappropriate transport, is illustrated, in Scotland, in the case of access to work where both employers seeking workforce, and skilled potential employees seeking work in close proximity to each other, are prevented from working together (Cooper et al., 2006) as a result of the lack of access. Local access deficiencies reduce local economic activity, impact negatively on direct and indirect employment, and reinforce – even exaggerate – the significance of car ownership as a necessity.

### **Developing the Parataxi concept**

The effective supply of public transport<sup>2</sup> appropriate to need is a fundamental element to those without access to private transport. Within this, the timeliness, and choice of vehicle is also significant. Where public transport is required to meet the needs of geographically dispersed individuals seeking to travel at the same time its effectiveness is reduced. Changes in the wealth of a population, in the structure and aspirations of the individuals themselves have acted to reduce the effectiveness of public transport in some situations, while the move from supported 'service' to commercial ventures within the UK bus industry has increasingly led to a declining customer base facing a reducing service level. Private transport options may be increasingly available to an increased number of individuals as a result of increased incomes, but rising affluence places extremes of accessibility-related pressure on those who can not afford, are restricted or unable to identify alternatives to public transport away from major corridors.

Figure 1 illustrates the common issue in the use of public transport, decreasing availability with increased remoteness, but also highlights the significance of service level – journeys not being appropriate, as an increasing issue in urban and large city areas.

---

<sup>1</sup> The trade off between community and individual benefit may be illustrated in the case of measures intended to reduce car use, such as increasing fuel taxation, benefiting communities, but reducing the affordability of transport to an individual.

<sup>2</sup> The exact definition of public transport may itself contribute to an issue in the provision and understanding of services. The inclusion of *taxis* within the definition is piecemeal, and often overlooked; the Scottish Household Survey, for example, omits taxis and taxi-based transport from its definition of travel options, with many other reports (see Cooper, 2004) identify taxis in relation to licensing issues.

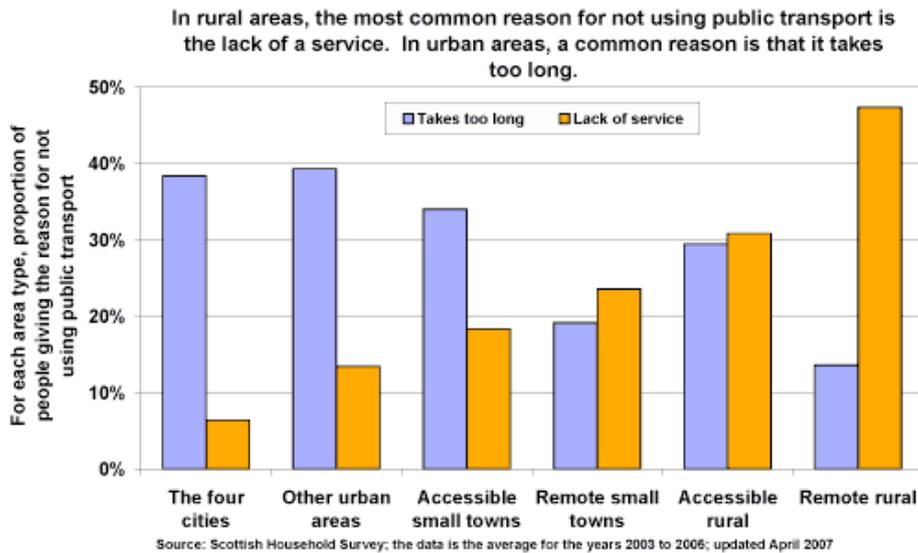


Figure 1: Reasons expressed for not using public transport: urban versus rural

Source: Scottish Household Survey

Traditional public transport services have, for their part, moved to address transport availability through a combination of measures including smaller vehicles operating more flexibly, evidenced in the growth of Demand Responsive Transport (DRT) schemes (see Brake et al, 2004), often prompted by local authority intervention, a current focus of Regional Transport Scottish Executive (RTP).

Few services in reality, however, fully explore all potential transport options, many services being limited to particular forms of bus-based service, many operating exclusively on the basis of variation to fixed route bus service, a practice (within the UK) previously encouraged by the nature of fuel duty rebates applied to fixed, rather than flexible route services, and maintained by increased complexities of rebates to DRT services.

The concept of parataxi seeks to move away from traditional public transport options, more fully recognise the potential of the role of the taxi in local transport (both flexible and fixed) and provide recognition of the effectiveness of using the taxi vehicle in instances where taxi-based DRT, Taxibus and taxi-based public transport options have been developed.

### *Definition of Parataxi services*

In its simplest form, parataxi services represent any transport services provided by taxi away from the traditional definitions of taxi services, itself a complicated issue of Hackney, Private Hire, Limousine and/or taxi bus services (see: DOE, 2006; Cooper, 2007). This may not, however, fully represent the opportunities of taxi use, and is complicated by differences in terminology and understanding of the taxi itself. Parataxis thus should include taxibus services<sup>3</sup>, as well as taxis providing general DRT and focused on demand services. Parataxi services might also logically extend to include park'n'taxi, Anruf Sammel Taxi, common in peripheral areas of some German Verkehrsverbunde, and in extended reach booked services operating in combination with other forms of public transport.

The definition is also significant in that it seeks to determine areas of operation not well suited to traditional regulatory control. The operation of taxis is well defined within licensing authority areas within the UK, but fails badly where journeys cross boundaries, both geographical and political. Boundaries of modal split are also challenged in the definition of a parataxis, many services operating across a mix of taxi, bus and community transport legislation<sup>4</sup>.

### *Potential for Parataxis*

Having identified parataxi as an intermediate mode, the greatest opportunity to develop and grow the mode may actually be distinct from the services from which it has evolved.

Developing from bus-based transit, the smaller vehicle provides opportunities where demand for collective transport is weaker, but still exists. Multiple occupancy of a smaller vehicle remains a proper market response to low levels of demand, either as a result of small communities, or through changes in the levels and use of other modes dispersing demand, as may be the case on the periphery of cities. Parataxis are thus key to developing low demand routes where bus services appear weak or are not provided. Indeed, the experience within the T2E pilots has been that multiple small vehicles may well be more effective than one large one, especially in instances of reducing service refusals since where one large vehicle is engaged, even by small numbers of passengers, in one part of a service area it becomes unavailable to service requests elsewhere. Moreover, while bus services imply expenditure on vehicle and maintenance infrastructure, the use

---

<sup>3</sup> Taxibus services, also known as Jitney, are relatively limited in the UK. Examples exist in Belfast (see: DOE, 2006; Scottish Executive, 2006).

<sup>4</sup> A detailed review of the differing forms of legislation applied to DRT in Scotland is set out in: Scottish Executive 2006.

of contracted taxis does not. Vehicles tend to be more readily available, and increase efficiency and environmental contribution by returning to other service uses beyond contracted supply.

At the other end of the definition, distinction of parataxis from the most common understanding of taxi services are also significant. Multiple occupancy vehicles offer the potential of lower costs per passengers but differ from the majority of users' experiences of taxi use.

This paper continues to concentrate on one specific example of parataxis provision - that of focused on demand access to employment, develops a method of analysis specific to the delivery of the service, and concludes on the impacts and potential of this form of transport.

### **T2E Transport to Employment - Parataxi to work**

Of all of the potential issues in lack of access, it is the relationship between accessibility and employment that offers the most significant challenges, both personal and to the community. Individual demands for consistent and reliable access is a challenge even to the most advanced public transport. Moreover, the additional uncertainty of booking dial-a-bus DRT, where service refusals may result from competing bookings, increase the challenge of service provision to work in instances of dispersed demand.

T2E provides a parataxi service focused on accessing workplace, training and childcare, see Figure 2. The service emerged as a method of closing the gap between employment opportunity and lack of transport (see McQuaid et al, 2004b), and has been operating in the Highlands of Scotland for three years. The T2E service is a prime example of the concept of parataxis, operating away from traditional markets, offering a planned service in instances where no other transport is available. Taxis are key to the delivery of the service with all supply being contracted from local taxi companies by the administrative centre.

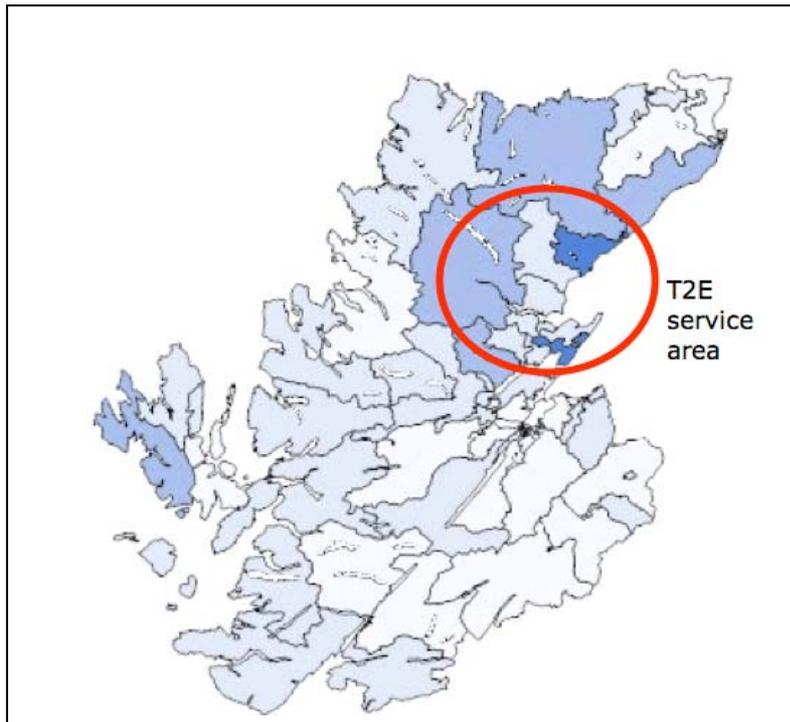


Figure 2: Primary service area included in the T2E evaluation

Source: Wright et al., 2008

The key tenets of the T2E service are the delivery of targeted access to employment in instances where no alternatives exist. The service does not seek to replace or compete with traditional public transport, and would decline requests in instances where realistic alternatives existed. The service is intended to provide support in accessing work, and has established a cost base whereby fares charged do not themselves become a barrier to the use of the service. The decision to use taxis was deliberate and reflects the needs of many small communities where numbers of travellers were felt to be unlikely to support big bus, even mini-bus operations, but are typified by demand for three, four or five individuals seeking access from similar origins to similar destinations in the same time frame.

The use of contracted taxi services further benefits both T2E and the service providers, by offering an efficient method of increasing travel at points of low demand for taxi, most T2E journeys occurring at times of early shift starts and late shift ends, rather than at peak points for either school or business journeys which are the mainstay of the taxi business in the areas served.

The T2E service takes responsibility for booking, planning centrally for shared services, and grouping individual requests into vehicles operating close to times required for access (in advance of shift start, and following shift ends). Risks are borne by the service itself, with operators being guaranteed a mileage-based payment, linked to but below that achieved using metered fares. Individual operators benefit from increased levels of contracted business, against a 'cost' of a lower per mile income.

## *Analysis and Evaluation*

Monitoring and evaluation of service provision were viewed as crucial to the longer-term success of the T2E service, with a detailed evaluation completed in the period from June 2006 to May 2007<sup>5</sup>.

The methodology employed in the evaluation consisted of a combination of surveys including structured questionnaires with users and providers (of employment and transport) and semi-structured interviews with key stakeholders to gauge the levels of effectiveness, acceptability and reliability of the service. High levels of satisfaction and acceptability were expressed. Additionally detailed analysis of the booking and invoicing data from 60 users on 20 routes provided cost of provision on a route-by-route basis highlighting relative effectiveness and level of sustainability of each route. A summary of the costs and benefits of providing the service follows.

Tariff negotiations completed between T2E and the taxi operators to minimise costs to the project of operating services established an agreed rate of £1.05 per mile regardless of the number of occupants, representing a 40% reduction on standard taxi tariff levels in the area. The average length of trip for T2E users is 11 miles.

For the first 4 months, users were expected to pay only a ‘nominal fare’ of £1 each way, since revised to a £2 flat fare, to encourage uptake of the service and not discourage potential users on the grounds of cost. After 4 months users were expected to pay a ‘cost-recovery fare’ roughly equivalent to bus fares charged in the area (approximately 35p per mile). Given that the average length of trip for T2E users is 11 miles (equating to a fare of approximately £4 each way for each passenger) and as the taxi suppliers charge £1.05 per mile (giving supply costs of approximately £12 each way), to achieve a sustainable service an average of 3 users are required on each route to cover the cost of supply (i.e. the taxi fare).

The detailed analysis of the booking and invoicing data for 60 users on the 20 main routes operating between June 2006 and May 2007 revealed that the average occupancy per route varied between 1.0 and 1.5. New routes were found to take a long time to become established with multiple occupancy passenger numbers and, as each passenger initially only pays a nominal fare, high levels of subsidy are required to support this. The break-even cost model of 3 full fare paying users per trip has not been achieved. Additionally, loss of established users (those who pay full fares) due to job moves, the purchase of a car etc has been experienced. As a result it is unlikely

---

<sup>5</sup> A detailed review of the T2E evaluation is contained in Wright et al. 2008

that any T2E routes will become fully self-supporting, requiring no subsidy. On average, the fare revenue generated was found to cover just over 20% of supplier costs and hence required 80% support through external subsidy payments. The total subsidy required to meet the supply costs of providing the 20 main routes was £68,000 per year. This is clearly not sustainable from a purely financial view considering cost of provision against revenue generated.

Although impacting on the level of subsidy required, it is suggested that the loss of T2E users is not necessarily detrimental in terms of ongoing benefits provided to society. Surveys revealed that a third of users who stop using the T2E service continue in their employment positions and either move closer to their place of work to access on foot or purchase a car in order to access work independently. T2E has been the catalyst which has facilitated this social mobility and freedom, empowering individuals with the financial security and stability to escape isolation and poverty. The on-going benefits to society for these past users need to be accounted for in any thorough cost benefit analysis.

It is also important to acknowledge that the value of a route can not be determined solely by its level of subsidy. One route, for instance, has an average subsidy level of 92% of supply costs which suggests a poorly performing route. On the other hand this route has provided transport for 7 separate users over the evaluation period and on certain runs has had up to 6 passengers travelling together, far more than any other route. The high levels of subsidy required can be explained by the fact that this route provides transport to employees who work split shifts - employees work morning and afternoon shifts on some days and afternoon and evening shifts on others. The transport is therefore required to operate at least 4 times daily to satisfy all these demands, often resulting in many single occupancy trips, especially the late evening returns.

As a result of the inconsistent and unsociable working hours this type of employment has been especially difficult to fill as it has traditionally excluded all applicants without private transport. Emphasising this point surveys conducted with over a third of the total number of users during the evaluation period revealed that  $\frac{3}{4}$  of respondents have had to turn down job opportunities in the past due to a lack of transport and that T2E has enabled over 95% of respondents to gain employment which, otherwise, they would have been unable to access. Furthermore the T2E service is providing transport access to employment for those members of society of working age who are often most socially excluded; 70% are female, 40% are under 20 years old and 25% are single young mothers.

All the above highlights the need for an alternative form of cost / benefit analysis which takes account of the social and economic benefits to individual users rather than simply assessing the sustainability of service routes based on the balance sheet of supplier costs and revenues generated. To gain some measure of these social benefits and economic benefits to individuals an assessment technique known as Social Return on Investment (SROI) analysis was applied to the T2E data.

SROI analysis developed from traditional cost-benefit analysis in the late 1990's (Emerson, 2000) and captures the economic value of social benefits by translating social objectives into financial measures of benefit. Comparing this value to the investment made produces an SROI ratio. Measured benefits arising from T2E include those to individual clients and to the State. A monetary value is established in relation to the social benefits of increased employment to the client (based upon net increased income, i.e. client's wages minus lost welfare benefits and increased taxes). The monetary value to the State is assessed in terms of the reduction in welfare payments offset against increased tax contribution. This social value created by T2E has been assessed against the project's investment - the grant funding (or sum of route subsidy payments plus management and booking office administration charges). The analysis has not attempted to measure other less tangible benefits to the individual such as increased life stability, though these undoubtedly result in personal benefit. Nor does it measure benefit to the local businesses (employers, taxi operators, childcare providers and stores in the area) or to the State through reduction in workload for administration staff in the benefits system. All of these impacts are potentially significant and so the results calculated in the analysis presented here will understate the true social value created by the T2E project.

For a full description of the SROI analysis performed on the T2E service with explanation of the parameter values used in the calculations the reader is referred to Wright et al (2008). In summary, the analysis used the booking and survey data from 60 users and 20 routes between June 2006 and May 2007 to provide evidence-based parameter values for use in the calculations. This revealed that the total Net Present Value of benefits was £658,014 calculated over a 5 year assessment period based on 3 years of current funding levels (£68,000 per annum) and applying the HM Treasury discount rate of 3.5% recommended for use in appraisal.

The value that the project has created through its activities is £658,014 – [3 x £68,000] (the difference between the NPV of benefits and the NPV of investment) giving a Value Added of £454,014. Given that this sum is generated from 100 clients using the service (40 clients benefiting

in the first year and a further additional 30 clients at both the start of year 2 and year 3) the Value Added per client = £4,540 calculated over a 5 year assessment period.

The 'SROI ratio', which measures the value of the benefits relative to the costs of achieving those benefits (the ratio between the NPV of benefits to the NPV of investment), is  $£658,014 \div £204,000 = 3.2$ . This means that for every £1 of investment, £3.20 worth of social benefit is generated; any SROI ratio above 1 is generally attractive from an investment viewpoint. Hence the measurable social benefits outweigh the investment by more than 3 to 1 for current usage patterns.

The above analysis assumes that the level of fare revenue generated continues at current levels. If the level of occupancy on routes increases and more users move to the higher 'full cost fare' from the 'nominal fare', the need for on-going investment to support routes at current levels will reduce resulting in even higher SROI ratios.

### **Potential for parataxis in the UK**

The operation of taxi-based T2E services has served to underline a number of key issues. Not least that the existing definitions of and frameworks for operation, regulation and control are limited in their ability to accommodate services beyond traditional and established transport services. Parataxis, as an intermediate mode, should not be restricted by the perceptions of existing modes or indeed by existing perceptions of what those modes can do.

It is a common and visible desire to equate the new with known and understood formats. Thus the T2E service is most commonly perceived as a taxi (private hire) vehicle, rather than the multiple occupancy service it seeks to be. Similar challenges face those seeking to develop taxis away from traditional usages, the bus replacement acts effectively as a bus but needs to achieve acceptance as such, Jitneys need to achieve understanding in their own right, it should not come as a surprise to the passenger that he/she will be travelling with others.

Despite these identified issues, the potential for parataxis is, on balance, significant indeed. The needs of a community, where neither traditional bus-based public transport nor more flexible bus-based DRT operations do not fully support access to work, provide an opportunity for the taxi as an alternative.

Issues surrounding egress from city centres at night, a traditional difficulty for the taxi industry, may also offer up opportunities for parataxi concepts, as may the park'n'taxi, rail'n'taxi or shared airport 'airporter' vehicles common in US rather than UK operation. Yet it is the potential for a service appropriate to increased economic activity, reduced individual isolation and community benefit that may actually provide an opportunity for parataxi development beyond the reach of existing public transport.

## **Conclusion**

There appears to be a strong case for setting an alternative definition of transit by smaller vehicles. An increased move to Demand Responsive Transport and community transport (as evidenced by recent examples from Scotland), has highlighted conflicts between regulations for differing vehicle types, and particularly in the case of taxi use in DRT, outwith traditional service areas, and in multiple occupancy use. On a wider scale, conflicting understandings of paratransit, which is used to mean differing things in differing locations, limits the potential for clarity, reducing the possibility of development.

Parataxis provide a clear definition of taxi vehicles used outwith their traditional fields of operation, for providing multiple occupancy, and entering into DRT markets. Moreover, the potential for development of the parataxi concept appears significant where dispersed and remote demand appears to be failed by more traditional service types. Rural transport, as well as peripheral city journeys may be poorly served, especially in the case of shift working with start or end times during anti-social hours. Transport for women left stranded as partners take a family car is also considered an appropriate and underserved area for investigation.

Without a clear definition and understanding of the potential role of parataxis, the ability of the mode to be fully exploited is severely reduced. This is not to say that the concept has not arisen, with well established examples in Belfast, and in the Highlands of Scotland providing an indication of the potential, but rather that these examples prompt and promote the question of a need to define, clarify legislative boundaries and barriers, and provide an opportunity for the development of parataxis to the advantage of the travelling public, and of course, the operator.

## References

Barter, A. R. P. (1998) Transport an urban poverty in Asia, a brief introduction to the key issues. Paper given at: UNCHS (Habitat) Regional symposium on urban poverty in Asia, Fukuoka, 27-29 October 1998

Brake, J., Nelson, J., and Wright, S. (2004) Demand responsive transport: towards the emergence of a new market segment. In *Journal of Transport Geography*, Volume 12, Issue 4, pp 323-337

Cooper, J. M., Nelson, J. D., and Wright, S. (2006) The delivery of rural flexible transport, experiences from Highland Scotland. In *Traffic and Transportation Studies* (Baohua Mao, Zongzhong Tian, Ziyong Gao, and Haijun Huang –Eds), The Science Press. Pp 156 - 163

Cooper, J. (2007) Taxi Licensing, regulation and control: an analysis of taxi supply in medium sized UK cities. Thesis document, Napier University (forthcoming)

DOE (2006) Department of the Environment for Northern Ireland, the regulation of taxis, and private hire vehicles: consultation report. DOE, Belfast

Emerson, J. (2000) Social return on Investment: Exploring Aspects of Value Creation in the Nonprofit Sector. *Social Purpose Enterprises and Venture Philanthropy in the New Millennium*, Volume 2. San Francisco: The Roberts Foundation, pp. 131-173.

Gannon, C. and Zhi Lui (1997) Poverty and Transport. World Bank Report TWU 30, World Bank, Washington

Lave, R., and Mathias, R. (2000) State of the Art of Paratransit. Presentation to the Transportation Research Board, A1E10: Committee on Paratransit, A1E10, available at:  
<http://onlinepubs.trb.org/onlinepubs/millennium/00107.pdf>

Lenz, B., and Nobis, C. (2007) Mobility patterns and car use of women depending on household structures. Presentation given at WG2 Madrid Meeting 11th – 18th May 2007. Available at:  
[http://cost355.inrets.fr/article.php3?id\\_article=223](http://cost355.inrets.fr/article.php3?id_article=223)

McQuaid, R. W., Greig, M., Smyth, A., and Cooper, J. M. (2004) The importance of transport in Business location decisions. Report to the Department for Transport, January 2004

McQuaid, R.W., Cooper, J. M., Lindsay, C., and Greig, M. (2004 b) EMIRES, matching job search and transport information in a rural area. Paper presented at the World Review of Science, Technology and Sustainable Development Conference, Edinburgh 8 – 10 November 2004

Merissa, R. (2005) The journey to Work: Car as the Mode Choice among working Single Mothers in the Greater Montreal Area. McGill University, Montreal, Quebec, Canada. Paper Apr. 13, 2005 , available at: [http://milute.mcgill.ca/Research/Students/Rahel\\_Equity%20Paper.pdf](http://milute.mcgill.ca/Research/Students/Rahel_Equity%20Paper.pdf)

Mitric, S., and Carruthers, R. (2005) The concept of affordability of urban public transport for low-income passengers.

Porter, G. (2007) Transport, (im)mobility and spatial poverty traps: issues for rural women and girl children in sub-Saharan Africa. Presentation to the Spatial Poverty Traps workshop, Cape Town, March 2007.

Pucher, J., and Renne, J. (2005) Rural mobility and mode choice: Evidence from the 2001 National Household Travel Survey. In *Transportation*, Volume 32, Number 2, pp. 165-186(22)

Rajé, F., Grieco, M., Hine, J. and Preston, J. (2003), Impacts of Road User Charging / Workplace Parking Levy on Social Inclusion / Exclusion: Gender, Ethnicity and Lifecycle Issues. Transport Studies Unit, Oxford University 2003

Scotland (2001) Poverty and Social Exclusion in rural Scotland. Report by the Rural Poverty and Inclusion working group. Scottish Executive, September 2001

Scottish Executive (2006) Review of demand responsive transport in Scotland. Completed by the Derek Halden Consultancy for Scottish Executive Social Research

Train, K. (1980) A Structured Logit Model of Auto Ownership and Mode Choice, in *The Review of Economic Studies*, Vol. 47, No. 2, pp. 357-370

Vance, C., and Iovanna, R. (2007) Gender and the Automobile: Analysis of Nonwork Service Trips. Paper presented to the Transportation Research Board, January 2007 (07-1563) - K6

World Bank (2002) Urban Transport and Poverty Reduction, (Chapter 3 of Cities on the move: a world bank urban transport strategy review), World Bank 2002

Wright, S., Nelson, J. D., Cooper, J. M. and Murphy, S. (2008) An economic analysis of the Transport to Employment (T2E) scheme in Highland Scotland using Social Return On Investment (SROI). Submitted to TRB 2008

Zwerts, E., Janssens, D., and Wets, G. (2007) How the presence of children affects parents' travel behavior. Paper presented to the Transportation Research Board, January 2007 (07-0904)