

TRAVEL BUDGETING

The New Incentive-led Approach to an
Integrated System of Travel Taxation



TPS Bursary Paper

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1. Introduction

In spite of the broad advocacy of transport planners, economists and academics alike, road-user charging (RUC) has proven to be one of the greatest policy enigmas in Britain's distinguished transportation history. A scheme rooted in robust, welfare-orientated economics, yet one that has continually failed to overcome the chief hurdle of public and political acceptability required for its implementation (Dieplinger and Fürst, 2014; Gaunt *et al.*, 2007; Gonzales, 2015; Ison, 2004; Jaensirisak *et al.*, 2002; 2005).

A brief conceptual and political history

Some of the earliest examples of RUCs were charges levied on specific pieces of infrastructure designed to cover the costs of construction (Wærsted, 2005). In this way, their purpose was inherently revenue raising.

While the application of such charges carried economic justification, they were narrow in focus. The work of Arthur Pigou – through his 1920 publication of *The Economics of Welfare* – proved instrumental in shaping future conception of RUC (Gaunt *et al.*, 2007; Ieromonachou *et al.*, 2006, 2007; Rietveld, 2001). Pigou's work sought to define the concept of externality and where negative he proposed that effects should be internalised to the market by means of taxation. Hereby, taxes designed for market correction became known as *Pigouvian taxes*. An RUC is a classic example of such as a tax.

Unfortunately for its advocates, the near century-long association between RUC and welfare economics has led to relatively little progress in actual policy terms – at least not at the scale or for the intentions originally conceived (Dieplinger and Fürst, 2014; Ieromonachou *et al.*, 2006; Nash, 2007). This is in spite of the long production line of government-commissioned reports and initiatives in the UK including the Smeed Report, A New Deal for Transport: Better for Everyone, the 2000 Transport Act, the Transport Innovation Fund (TIF) and the Eddington Report which have all either explicitly favoured or sympathised with the application of comprehensive, welfare-orientated RUC dating back to the early 1960s (Ison and Rye, 2003; Prud'homme and Bocarejo, 2005). Further or more comprehensive applications such as national RUC (NRUC), have almost always fallen foul on acceptability grounds.

Despite much work having been undertaken by government into the possibility of implementing a NRUC in the UK, it would now seem that the issue is wholly off the political agenda. In an

address to the Transport Planning Society (TPS) in September 2015¹, DfT's Acting Director for Roads and Local Group, John Dowie declared that for the first time in a long time, the DfT was no longer working on a national road pricing initiative. He went on to suggest that this was very much a good thing, not necessarily because he did not support the scheme, but instead because so much Departmental resource had been invested in something that had continually proved, in his opinion, politically impossible. He further explained that the magnitude of public disapproval with RUC was so decisive and hardwearing that it led him to suspect that there must be something inherently flawed about the proposition.

Scope of the paper

The failure of comprehensive RUC schemes to become mainstream policy can be described as a policy-particular form of economic paradox which, as Gaunt *et al* (2007) suggests, is certainly not unique to the UK.

While concerted efforts have undoubtedly led to enhancements in the understanding of acceptability issues pertinent to RUC, they have thus far failed to lead to the redesign of schemes as sufficient to overcome the principal barrier of acceptability. With this in mind, it is difficult to envisage a situation where comprehensive RUC schemes can become implementable in their current guise without the coalescence of special political circumstances; such as those that can be argued to have occurred in the cases of Singapore and London.

Existing efforts to enhance public acceptability have centred largely on strengthening the delivery mechanisms of the conventional model with the model itself remaining steadfastly aligned to the economics upon which it was conceived. As such, this paper explores the possibility of diverging from the conventional model with the objective of designing a more acceptable and implementable solution.

Hereby, the paper provides an outline concept for a new model of RUC, called 'Travel Budgeting' (TB). This new concept is presented in the context of a national system and is outlined, in detail, in Chapter 3.

¹ Dowie (2015). See 'References' for full reference.

2. The Case for Reforming Motoring Taxation

The current system of motoring taxation – a combination of vehicle excise duty (VED) and fuel duty (FD)² – can be traced back to the origins of the motoring revolution and has remained relatively unchanged ever since (IPPR, 2014). While subtle tweaks and alterations have been made over time – especially recently – it cannot be considered a progressive system as it does not adequately discriminate on grounds of usage and is ineffectual in mitigating externality. It is instead primarily revenue-raising in focus (IPPR, 2014).

The dependence on motoring tax receipts

Tax collected from the UK motorist is big business. According to IPPR (2014), motoring tax receipts for the 2012/13 fiscal year were forecasted to reach almost twice the DfT's annual budget. Hereby, motoring is an activity upon which the national finances are dependent and it would appear that the revenues accrued through motoring taxation are used to subsidise other areas of the economy. However, the combination of parallel legislation and the competitive interests of industry have dictated that motor vehicles have become increasingly fuel efficient over time – a trend that is set to continue. As motoring taxation is largely pegged to fuel consumption, this ensures that, *ceteris paribus*, long-run tax receipts are set to decline.

Moreover, the Exchequer cannot rely on increased motoring activity to stabilise this revenue stream. While the recent recession caused some to suggest that a 'peak car' phenomenon had arrived, the recovery in motoring post-recession indicates that the UK has not reached this point yet. However, with congestion levels as they are on the network, with young people increasingly priced out of the market by insurance companies, and with an overall policy approach to manage existing demand, peak car cannot be too far away³. Rectifying this worrying financial situation involves migrating the basis of taxation away from fuel consumption, directly onto activity itself (IPPR, 2014). This is the primary financial argument in favour of NRUC.

Developing a progressive system of motoring taxation

There are two features necessary for any system of motoring taxation to be considered truly progressive. Firstly, the charge must be administered at the point of use meaning that the charge is incurred at the instance that motoring takes place. This

² Value-added tax (VAT) is also levied on FD.

³ Under a philosophy of Transport Demand Management (TDM), achieving peak car could be suggested to be an implicit intention.

ensures that the motorist is able to create the most accurate link possible between the nature and the cost of their motoring activity. Secondly, the charge must vary in accordance with the marginal social cost of motoring (Ieromonachou *et al.*, 2006). Doing so ensures that the motorist pays a representative sum based on the social costs attributed to the externalities that they generate; while recognising that the volume of social cost as a proportion of the full cost of motoring varies based on factors relating to time and place. Any change to the existing system, should, insofar as possible, aim to achieve these ends.

Indeed FD – levied on top of the cost of fuel – displays many facets of productivity. For instance, fuel consumption is proportional to distance travelled, while it is also linked to the efficiency of the vehicle being driven and to driving style. Moreover, in instances of congestion, the efficiency at which a vehicle processes fuel decreases and thus motorists who regularly encounter congestion are likely to require more fuel per distance travelled. However, FD is not levied at the point of use. Where a motorist undertakes a long-distance trip that requires a full tank of fuel, the cost is easy to perceive; however, for shorter trips such as commuting or the school run that form the bulk of trips undertaken and where numerous trips can be achieved on a single tank, cost is difficult to perceive on a disaggregated trip-by-trip basis.

By contrast, VED – an annually-administered upfront charge applied per vehicle for the right for that vehicle to be operated on the public highway – is in no way progressive. In fact, it actually induces motoring activity as consumers seek to spread their overhead across the period of charge in order to maximise their perceived value-for-money from car use. VED chiefly highlights the counter-productive nature of clearly segregating the point at which the charge is administered from the consumption of motoring activity.

Issues with national road-user charging

NRUC is widely seen as the ‘first-best’ system of motoring taxation due to its capability to charge at the point of use and to vary the charging level by the marginal social cost of motoring. However, it remains a theoretical construct and the design and management of a NRUC system in practice is incredibly complex. In fact, to design it in a way that totally reflects the economic theory could be argued to be impossible⁴ (Ison and Rye, 2003).

⁴ Designing NRUC to the maximisation of economic objectives is hereafter referred to as the ‘purists’ model’.

While the purists' model of RUC steadfastly follows economic principles in order to fulfil economic objectives, it does not necessarily comply with public expectations of 'good policy'. Hereby, when designing a NRUC scheme, there is a clear need to establish some basis for compromise reconciling issues of economic purity and policy reality (Levinson, 2010). Economists may argue that any divergence from the purists' model is inherently a 'second-best' solution; however, it may simply be that in reforming the system, the aim is to devise the best 'second-best' solution.

Cost and technology aside, there are three key issues relating specifically to the design of NRUC, as explained below:

Setting the charge:

While the majority of the private costs of motoring come directly in monetised form, establishing the value of the social cost to inform the level of charge requires the monetisation of variables that are not easily quantified⁵. Moreover, establishing the appropriate charge requires an understanding on the extent of any interrelationship between externalities considered within the system. However, if policy-makers cannot precisely quantify the effect of externalities, how can they justify their charging regime, and how can society accept this as being fair?

Equity:

The private car is no longer a luxury good but is now, for many, a necessity for participation in everyday life. Where historically a strong correlation between income and motoring consumption existed, this is no longer the case (Bonsall and Kelly, 2005; IPPR, 2014). In part, this is the consequence of the motoring revolution itself and government's response to it where systemic underinvestment in public transport and resulting car-orientated land-use changes have led to the development of a highly car-dependent economy.

Resultantly, there is now a group in society best described as 'car-dependent low earners' and they set to lose out from any NRUC scheme that fails to give explicit consideration to their needs (Bonsall and Kelly, 2005). Failure to do so will ensure that they become priced off the network ahead of any marginal trips. By contrast, high earners are likely to have sufficient slack in their personal budgets to allow them to absorb any personal cost increases attributed to a NRUC scheme; hence, their travel behaviour will remain relatively unchanged. As recognised by

⁵ Further to this, IPPR (2014) argues that government's current techniques for quantifying the externalities of motoring are outdated.

Levinson (2010), low earners have a higher marginal utility of money meaning that they are more sensitive to the effects of charges.

Additionally, where car-dependent low earners are most sensitive, they are more likely to require some certainty as to the cost of a given trip prior to embarking on it in order to allow some measure of budgeting to take place. However, this contradicts the purists' ideal of real-time variations in the level of charge necessary to capture the full marginal social cost. In order to recognise the needs of such groups, any basis for spatio-temporal charging variations becomes restricted to a semi-responsive system e.g. a peak/off-peak system.

Complexity:

While studies have shown the public to be quite accepting of the rationale for reforming motoring taxation, in order for them to buy into any new system, they require it to be simple and easy to understand. For several reasons, the public cannot be expected to absorb and then remember vast quantities of information necessary to understand a new system. Furthermore, a complex NRUC system will likely generate anxiety for the motorist through a fear that they have not fully understood the system and that they may be exposing themselves to higher charges than they are willing or able to accommodate⁶.

However, by developing a system low in complexity as necessary for public comprehension and ultimately public acceptability, the capability of the system to fulfil the economic objectives of marginal social cost pricing and externality internalisation are significantly compromised. Inherently, maximising such ends requires the system to possess a large degree of complexity. Any future system must trade off these competing issues.

Who supports national road-user charging?

While a NRUC system is undoubtedly more progressive than the existing system of motoring taxation, there are still issues which cause the public to remain sceptical of its implementation. Where the level of the charge invokes concerns over trust and motive which are difficult to allay, issues of equity ensure that

⁶ There are many examples in public life where the public have been sold a proposition on the basis of it being simple, but where in practice it has turned out to possess hidden complexity. Taxes and charges levied by low-cost airlines on top of standard airfares are perhaps the most pertinent example to transport. The mobile phone industry is another classic offender.

some groups face greater risks attributed to the uncertainties of change in comparison to others. Meanwhile, complexity fuels anxiety and serves as a barrier to comprehension. Additional considerations of technology invoke concerns of feasibility and privacy, while cost remains a matter of omnipresent importance.

However, the real barrier to implementing RUC may be that it cannot claim to possess a core audience amongst the electorate. In heavily simplified terms, high earners would be unlikely to support a NRUC system because they would expect to lose out financially from the charge. Similarly, low earners would be unlikely to support it because the risk of incurring increased motoring costs outweighs the benefit of any potential saving from being charged less. This is particularly true of low-income car dependents but potentially also for non-motorists who aspire to be motorists in the future. Meanwhile, for middle-income groups, the outcomes are uncertain ensuring that they will likely opt for the status quo. No single group really has any obvious personal gain attributed to migrating to a NRUC system.

The notion of a lack of core audience was arguably evidenced by the RUC referendum held in Edinburgh in 2005. The outcome of which would suggest strong opposition amongst those who turned out to vote, while the low overall turnout would indicate that RUC was somewhat of a non-issue for the remainder of Dunedians.

In truth, the main advocates of NRUC would appear to be industry. The policy enjoys the support of transport economists, transport planners and many leading academics as well as a whole host of industry bodies including the Chartered Institution of Highways & Transportation (CIHT), the Institution of Civil Engineers (ICE), the Transport Planning Society (TPS) and the Royal Town Planning Institute (RTPI) (CIHT, 2012; ICE, 2008; RTPI and TPS, 2010). However, industry cannot cast a vote at a referendum nor at a general election.

3. Travel Budgeting

The model of TB is a variation on conventional RUC. Through the concept design, it aims to address some of the aforementioned issues and establish an in-built mechanism to deliver hard financial benefit to those who participate in more sustainable travel behaviour. This combined approach seeks to enhance the acceptability of the scheme to the degree necessary for implementation.

In addition, TB is encompassing of all modes. This is in recognition that travel behaviour is a function of many decisions, one of which relates to mode choice. As society moves along a path of deeper integration, citizens continually desire solutions that make travel increasingly seamless. While traditional transport policy has (and continues to) discriminate by mode, this is not reflective of the reality of travel choices which are the output of decisions that consider all modes and mode combinations available for a given trip.

In light of this, TB represents more of a 'travel charge' than a 'road-user charge' per se. However, importantly, it is not called thus. Use of the term 'charge' or 'pricing' (as in 'road pricing') invokes unnecessary public scepticism. By contrast, the term 'budget' implies tangibility and personal control.

The concept

TB works by assigning each individual an annual quota of credits which are then consumed in proportion to travel activity. Ceteris paribus, trips undertaken using more sustainable modes consume fewer credits than those of less sustainable modes. At any point, individuals can trade credits with one another at a market price. This ensures that those displaying less sustainable travel behaviour pay for the increased social cost associated with their travel activity, while individuals who opt to travel more sustainably can benefit from a tax rebate of kind⁷. If there is a surplus of buyers in the market, further credits can be generated by the Exchequer and marketed at a premium price or if surplus sellers exist, they can be sold back to the government for a discount price. Such revenue proceeds should then be hypothecated for reinvestment in sustainable transport to redress the failure in the market⁸.

⁷ Cycling should be excluded as it is not always practical; walking trips should not consume any credits but should influence the credit consumption of other modes where viable.

⁸ Market failure as defined by surplus demand for motoring versus the credit allocation.

The number of credits consumed for a given trip is dependent upon the distance travelled, the mode of travel and the relative sustainability of the chosen mode in comparison to alternative modes available for that trip. The extent to which other modes are considered as 'alternatives' is dependent upon the travel time differential in absolute terms between modes between given origin-destination (O-D) pairs. This relationship is expressed through an algorithm. O-D pairs are defined through a high-resolution O-D matrix database.

The variables within the algorithm should be updated periodically to account for changes to road infrastructure, public transport services and timetables and travel times to ensure the information in the database is fair and kept up-to-date⁹.

Features of the system

Trading system:

TB is a trading system which is quite different to the incumbent model of taxation or that proposed under a conventional NRUC of a standard tax. Trading systems – also known as ‘cap-and-trade’ – are sometimes criticised by economists as being inferior solutions in their capability to realise economic objectives. However, in an environment where the so-called first-best economic solution has proven politically unacceptable, the capability of the trading approach in terms of giving citizens a stake in the system through ownership of their budget – a concept that individuals are highly familiar with – and the potential for financial gain provides for a significant advantage in canvassing public support. Under a trading system individuals have influence over their taxation output which provides the possibility to ‘win at the game’. A trading approach is hereby a wholly less toxic proposition.

Variables:

Importantly, and in contrast to the conventional model of RUC, the proposition outlined in this paper does not vary the charge by time or location, but is instead a wholly distance-based charge. This is out of recognition that congestion generated at peak times within peak locations is largely commuter-related and such trips are often inflexible. Levying premium charges to such trips is blunt insofar as these trips have limited scope for reassignment and thus particularly target low income car-dependents. Instead,

⁹ Ideally, off-peak travel times should be used for a neutral day of the week, while weekdays and weekends should not be discriminated between for simplicity.

measures that directly target the employer, such as workplace parking levies (WPL) or travel plans, are more progressive in combating peak time congestion. Where reassignment is possible, the presence of congestion is usually sufficient for this to be left to market forces¹⁰. Where routes are congested outside of peak hours, this should be resolved by other means as it indicates an inadequacy in the existing transport environment¹¹.

Factoring the availability of modes into the algorithm is crucial to ensure that those who are truly car dependent are not excluded from society and to avoid the consequences that Verhoef *et al.*, (2003) describes as a “big bang” transition. It must be recognised that the UK has become a heavily car-dependent nation with land uses having been reshaped accordingly. Thus, any mechanism that levies charges on car users who do not have access to alternatives somewhat contradicts welfare objectives. Equally, where good alternative modes are available for trips, car use should be heavily penalised¹². This in turn helps to increase the commercial viability of public transport services. Targeting car dependents may raise additional revenue, but it does nothing to achieve the welfare benefits associated with mode shift which must be the priority in reforming the system, nor does it help to increase acceptability. Preserving existing revenue streams is a key consideration of any reform, but of secondary concern to the realisation of policy outcomes.

Of great importance is the definition of the ‘relative modal sustainability’ of each mode. Establishing this definition requires careful consideration as to which externalities should be internalised within the system. Externalities such as congestion, air pollution and infrastructural wear and tear should be accounted for, while others may be more appropriately mitigated through other means than a national tax system. Congestion, for instance, could be measured in terms of vehicle passenger car units (PCU) or some equivalent measure of land take, while air pollution could be measured in a whole manner of different ways. Relative sustainability needs to be defined and fed into the algorithm. If for instance, the bus is deemed to be eight times more sustainable than the car, then a trip by car consumes eight times the number of credits as a baseline consumption than a

¹⁰ Increasing instances of working from home and flexible working hours are evidence of the market working to alleviate peak-time congestion.

¹¹ For instance, increased public transport provision and/or service frequency, or pinch-point remediation as dependent upon the context of the particular case.

¹² Clearly, there is a need to define what a “good alternative” actually is. For example, is a bus service at an hourly frequency considered a “good alternative”?

trip by bus. However, where the two modes compete on a given route, the cost of a trip by car will increase by an amount dependent on the extent to which the bus represents a viable alternative.

Hypothecation:

Hypothecating revenue for reinvestment in the system is often cited as being a means of boosting acceptability for RUC initiatives (Jaensirisak *et al.*, 2005). However, the benefits to users from hypothecation become less transparent with increases in the scale of any scheme. For instance in Nottingham, the revenues from the WPL were used to finance the city's tram system. More or less everybody who commutes in and out of Nottingham either uses or witnesses the tram in action and thus is appreciative of where the proceeds have been spent. In a national context, an individual might be paying into a road pricing initiative from one location, but the hypothecated revenues are being reinvested elsewhere in the country.

Wherever the propensity lies for the dissemination of hypothecated revenues to be disproportionately higher in one area versus another, the free-rider effect is felt. In light of this, decisions on reinvestment from hypothecated funds for national schemes require a solid system of appraisal. This could be achieved by analysing the data obtained from the output of the TB system and using it to target improvements on specific routes, for instance, with high O-D frequencies but poor alternative mode provision. Hypothecating revenues for a national scheme is no less important than for a local scheme, but the acceptability benefits from doing so are likely to be less pronounced.

Encouraging active travel:

Some exponents of conventional NRUC advocate that charges be increased in summer to encourage more active travel at that time of year. This is aimed at mitigating some of the adverse health effects associated with vehicular travel including stress and weight gain. However, administering this through a standard tax adds complexity to the system because charges are varied – not only by time and place and combinations thereof – but also by a seasonality aspect. This complexity will count against the acceptability of any such system. Moreover, the varied British climate ensures that determining a fixed period to administer such an increase is extremely dangerous, while the use of variable periods responsive to clement conditions will inevitably become known as the “summer tax hike”!

By contrast, the use of a trading system allows this incentive to be captured within the system in a far more discreet way. By setting

the year-end budget period to late summer or early autumn, individuals will be encouraged to walk or cycle more in the run-up to this period to avoid having to purchase additional credits. In doing so, they manage their travel activity at their own discretion rather than through the diktat of government.

How might Travel Budgeting work in practice?

The figures overleaf show a route from Loughborough University to Sainsbury's supermarket in Loughborough by car and by foot respectively. Meanwhile, the red route between the two (visible in both figures) illustrates the presence of the University shuttle bus service which provides frequent and direct access between the two locations.

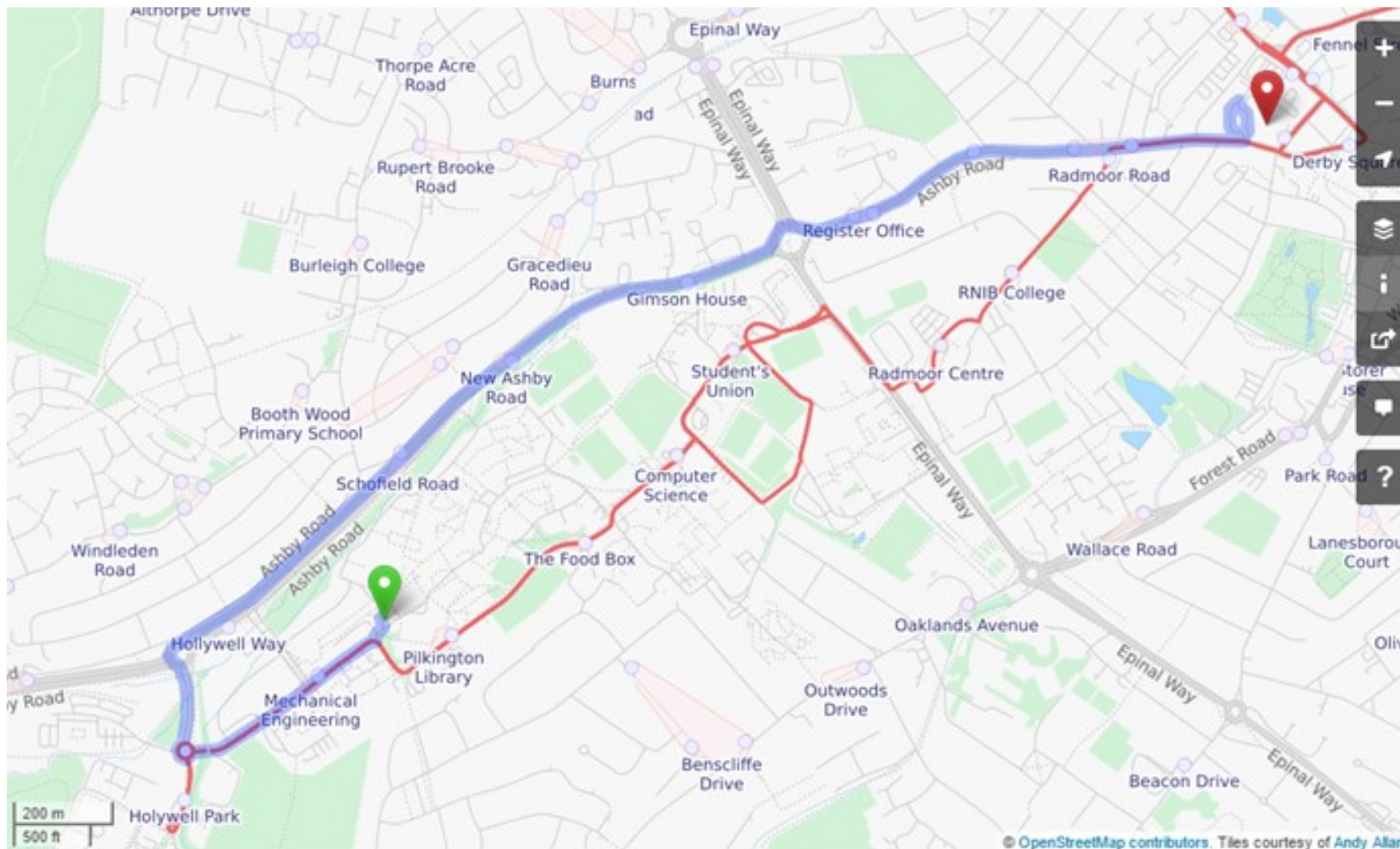
According to Google Maps, the travel time between this O-D pair, segregated by mode is as follows:

- Car – 8.5mins
- Train – N/A
- Bus – 14mins
- Foot – 29mins

On this particular route, the bus and walking both represent viable alternatives to taking the car. The presence of two viable alternatives as well as the high frequency of the bus service ensures that credit consumption for this trip by car should be extremely high relative to making the trip by bus¹³.

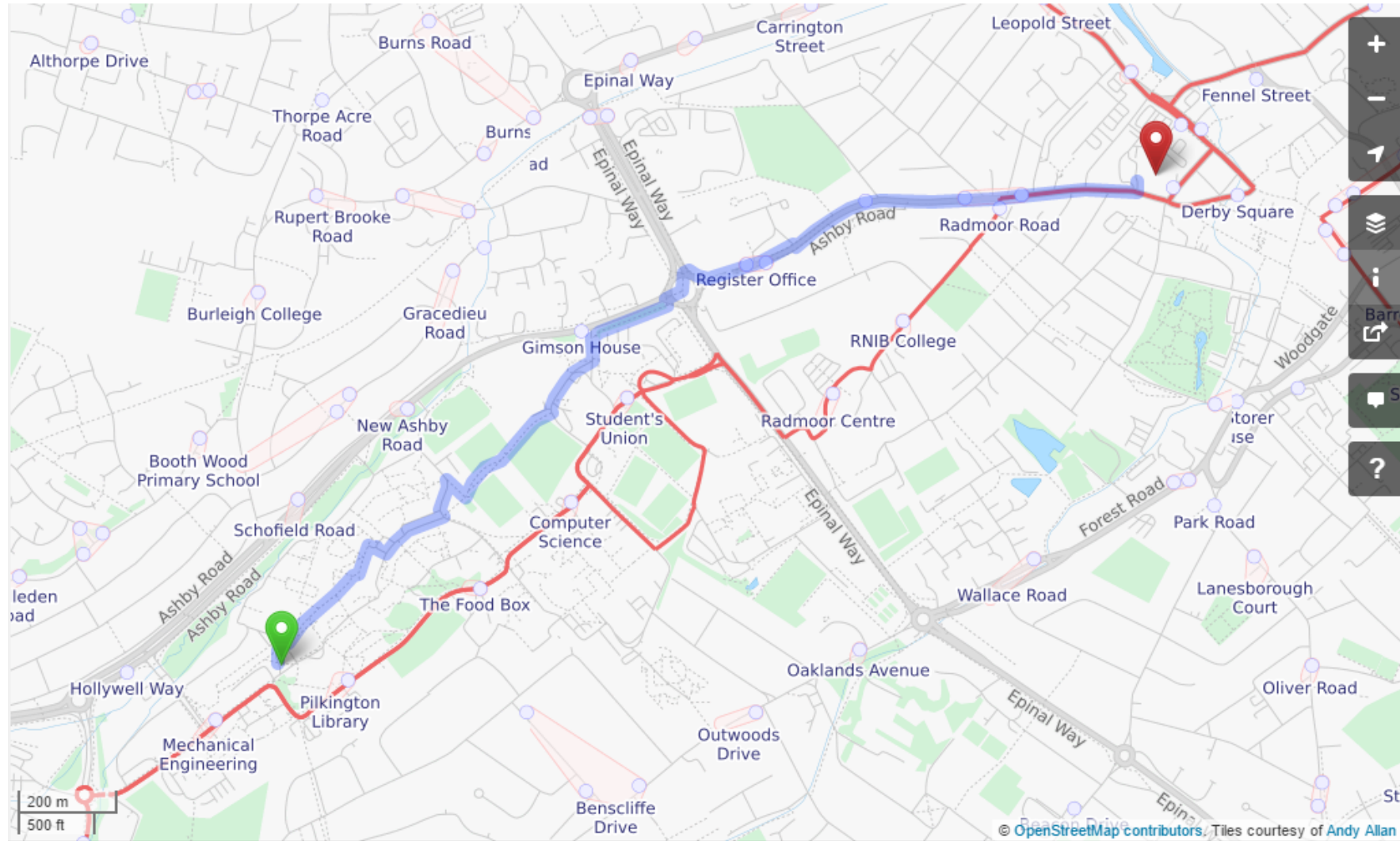
¹³ Note that the system would not consider trips between these two points directly as this is impractical, but instead between the respective centroids of the high-resolution grid squares that they fall into in the O-D matrix. This would enable GPS technology to be used as the governor of the charge.

Figure 1: Car route from Loughborough University to Sainsbury's, Loughborough



Source: OpenStreetMap

Figure 1: Pedestrian route from Loughborough University to Sainsbury's, Loughborough



Source: OpenStreetMap

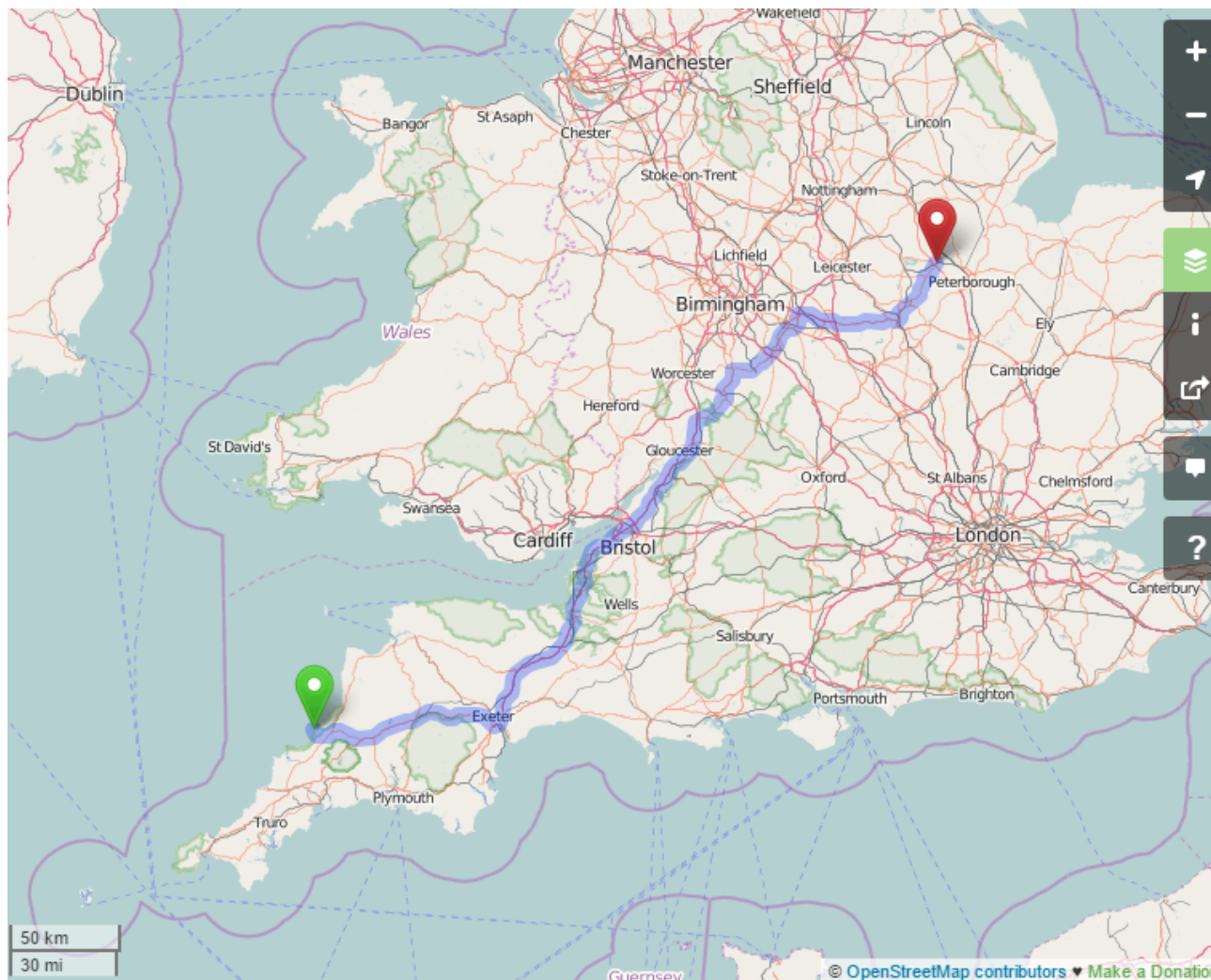
Similarly, Figure 3 overleaf shows a route from Tintagel, Cornwall to Stamford, Lincolnshire.

According to Google Maps, the travel time between this O-D pair, segregated by mode is as follows:

- Car - 5h 20mins
- Train – 8h 59mins
- Bus – N/A
- Foot – N/A

On this route, there is a 3h 39min travel time differential between the car and the train, hereby rendering the car the only real viable option. For this reason, the differential between the number of credits consumed in percentage terms between the car and the train should rest at the baseline sustainability differential and thus should not be nearly as high as that for the previous example contrasting the car and the bus as there is limited scope for mode shift. However, due to the significant distance involved, this trip should prove far more credit intensive than taking the car in the Loughborough example.

Figure 1: Car route from Tintagel to Stamford

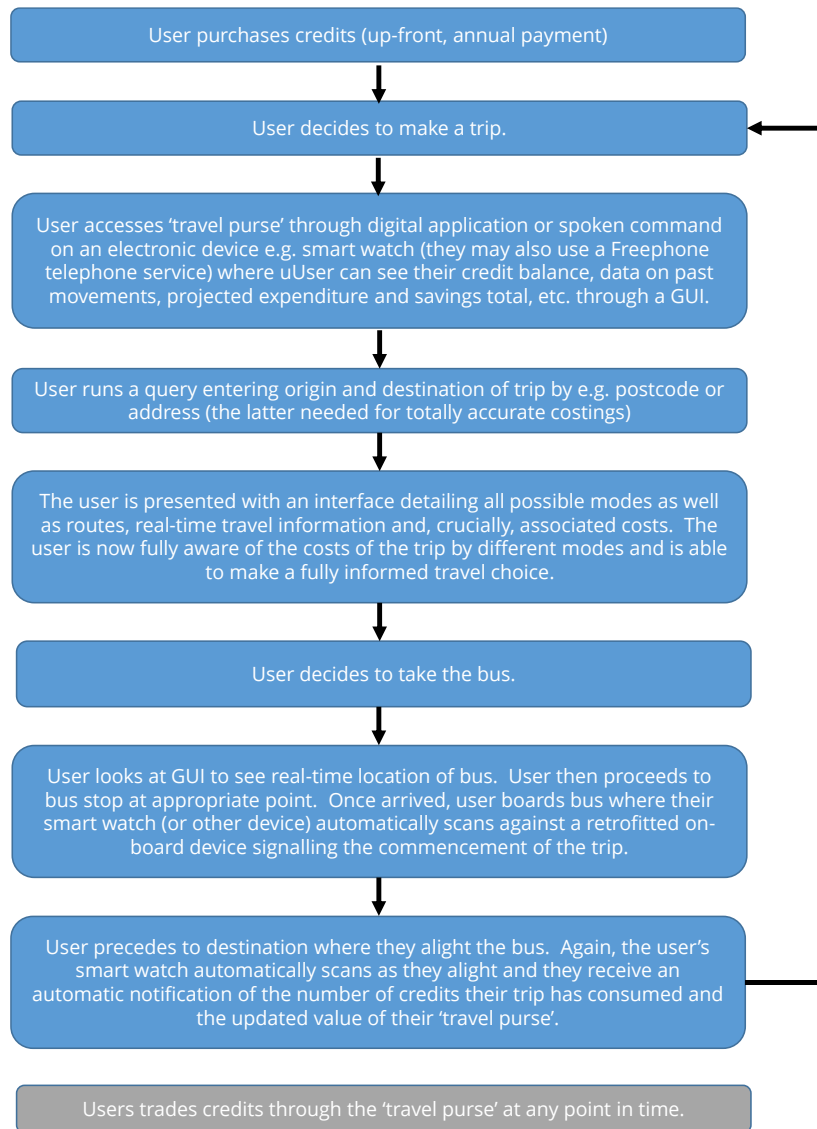


Source: OpenStreetMap

The overriding objective of TB is to encourage modal shift at instances where mode shift is feasible – which is often suggested to be around 30% of all trips. If a sufficient portion of this 30% can be realised then the economic and environmental gains to the economy could be significant especially given that in urban locations where much of the traffic congestion occurs, viable alternatives often exist. As individuals learn the system, and learn how they can be rewarded by it, habitual travel patterns will begin to change. This targeted focus is in contrast to conventional NRUC which follows economic objectives of trying to capture externality for all trips irrespective of geography. However, this is counterproductive and somewhat futile from an acceptability standpoint. Charging a premium to car-dependents simply creates an additional revenue stream from externality generation rather than mitigating the problem. Such instances do nothing to avert public concern that the objective of any such reform is primarily revenue raising.

The following flow-diagram explains the users' interaction with the TB system:

Figure 4: User interaction with Travel Budgeting system



It is recommended that in implementing TB, VED be totally scrapped as it is not progressive and self-defeating in its capacity for solidifying the mode share of the car. The future of FD would also require consideration. While at the very least, there is a necessity to scale it back to decrease the government's reliance on the proceeds of fuel consumption, there may well be benefit in retaining it in some form. In either case, proposing a decrease in the cost of fuel at the pumps would present a significant motive for people to accept TB or any associated tax reform.

4. Conclusion

There can be little doubt that conventional NRUC possesses significant advantages over the existing system of motoring taxation for its propensity to administer the charge at the point of use and its capability in capturing the social cost of motoring and internalising it to the market. Equally, its enabling of a shift in the basis of taxation away from fuel consumption and onto motoring activity itself is important in preserving the longevity of the revenue stream that motoring taxation provides.

However, in order to maximise its capability in achieving the above, the system requires a level of complexity, amongst other factors and concerns, which the public are unwilling to accept. Additionally, the model is largely insensitive to the structural changes undergone by the UK economy throughout the course of the motoring revolution which have led to the development of a highly car-dependent society. As such, conventional NRUC exposes a minority of societal groups to equity issues that may cause significant losers from the system, while there is a distinct absence of clear winners amongst the electorate. Where NRUC is a good system, it is by no means a perfect system.

Resultantly, and as a function of the continued failure of comprehensive RUC schemes to engender public support necessary for implementation, this paper has presented an outline concept for a new model of motoring taxation, called Travel Budgeting, which is encompassing of all modes. This aims to address some the shortcomings explained above, while maintaining the welfare benefits of the conventional model.

TB is a trading based system with the objective of shifting the focus away from the realisation of economic outcomes to the benefit of realising policy outcomes. It seeks to reward sustainable travel behaviour by providing individuals with a stake in the system and a sense that they can 'win at the game'. This helps to create core support groups within society in favour of reform which is currently lacking for the conventional approach to NRUC. Moreover, TB is designed in such a way so to possess all of the sophistication of a highly-complex NRUC but with a very simple level of interaction required by the user, where all knowledge and associated costs are known prior to undertaking a trip.

While the issue of system reform appears to be off the table for now, it will inevitably resurface in the future as falling tax receipts threaten the capability of motoring taxes to support the economy in the way they currently do. As such, it is hoped that this paper has provided a positive contribution to the reform debate, has

developed thinking on the nature of some of the issues of NRUC and has highlighted practical ways in which some of the many challenges can be overcome. System reform remains necessary to ensure the progressivity and equitability of the UK transport network for generations to come.

References

- Bonsall, P., and Kelly, C., 2005. Road user charging and social exclusion: The impact of congestion charges on at-risk groups. *Transport Policy*, **12** (5), pp.406-418.
- Chartered Institution of Highways & Transportation (CIHT), 2012. *CIHT on Road Pricing* [online]. Available at: <URL:<http://www.ciht.org.uk/en/media-centre/news/index.cfm/ciht-on-road-pricing-2012>> [Accessed: 26 December 2015].
- Dieplinger, M., and Fürst, E., 2014. The acceptability of road pricing: Evidence from two studies in Vienna and four other European cities. *Transport Policy*, **36**, pp.10-18.
- Dowie, J., 2015. *Agenda for Change, presentation to the Transport Planning Society*, 10th September.
- Gaunt, M., Rye, T., and Allen, S., 2007. Public Acceptability of Road User Charging: The Case of Edinburgh and the 2005 Referendum. *Transport Reviews*, **27**(1), pp.85-102.
- Gonzales, E. J., 2015. Coordinated pricing for cars and transit in cities with hypercongestion. *Economics of Transportation*, **4**, pp.64-81.
- Ieromonachou, P., Potter, S., and Warren, J. P., 2006. Evaluation of the implementation process of urban road pricing schemes in the United Kingdom and Italy. *European Transport (Trasporti Europei)*, **32**, pp.49-68.
- Ieromonachou, P., Potter, S., and Warren, J. P., 2007. A Strategic Niche Analysis of Urban Road Pricing in the UK and Norway. *European Journal of Transport and Infrastructure Research*, **7**(1), pp.15-38.
- Institute of Public Policy Research (IPPR), 2014. *The Long Road to Ruin: Why the UK Needs to Reform Motoring Taxes*. Available at: <URL:http://www.ippr.org/files/publications/pdf/The-long-road-to-ruin_May2014.pdf?noredirect=1> [Accessed: 14th September 2015].
- Institution of Civil Engineers (ICE), 2008. *Road Pricing, Policy position statement* [online]. Available at: <URL:<http://test2.ice.org.uk/getattachment/ba28be16-c9f5-4198-9a4a-ec56ee7b8909/Road-pricing---policy-position-statement.aspx>> [Accessed: 26 December 2015].
- Ison, S., 2004. *Road User Charging: Issues and Policies*. Ashgate: Aldershot.

Ison, S., and Rye, T., 2003. Lessons from travel planning and road-user charging for policy-making: through imperfection to implementation. *Transport Policy*, **10**, pp.223-233.

Jaensirisak, S., May, A. D., and Wardman, M., 2002. *Acceptability and Effectiveness of Road User Charging*. Association for European Transport. Available at: <URL:abstracts.aetransport.org/paper/download/id/1491> [Accessed: 25th August 2015].

Jaensirisak, S., Wardman, M., and May, A. D., 2005. Explaining variations in public acceptability of road pricing schemes. *Journal of Transport Economics and Policy*, **39**, pp.127-154.

Levinson, D., 2010. Equity Effects of Road Pricing: A Review. *Transport Reviews*, **30**(1), pp.33-57.

Nash, C., 2007. Road pricing in Britain. *Journal of Transport Economics and Policy*, **41**(1), pp.135-147.

Prud'homme, R., and Bocarejo, J-P., 2005. The London Congestion Charge: A Tentative Economic Appraisal. *PAIRC Seminar on Road Pricing with emphasis on Financing, Regulation and Equity*. Cancun, Mexico, 2005, April 11-13.

RAC Foundation, 2011. *The Acceptability of Road Pricing* [online]. Available at: <URL:http://www.racfoundation.org/assets/rac_foundation/content/downloadables/acceptability_of_road_pricing-walker-2011.pdf> [Accessed: 25 August 2015].

Rietveld, P., 2001. Pricing Mobility – Experiences in the Netherlands. *European Journal of Transport and Infrastructure Research*, **1**(1), pp.45-60.

Royal Town Planning Institute (RTPI), and Transport Planning Society (TPS), 2010. *Transport and the Economy, RTPI and TPS evidence to the House of Commons Transport Select Committee Inquiry, 22 September* [online]. Available at: <URL:http://www.rtpi.org.uk/media/5560/DfT-SC-Transport-the-Economy-Inquiry-RTPI-TPS-Evidence-22-09-10.pdf> [Accessed: 26 December 2015].

Verhoef, E. T., Niskanen, S., Proost, S., and Rouwendal, J., 2003. *Phasing and Packaging of Pricing Reform: The MC-ICAM approach, prepared for the fourth seminar of the IMPRINT-EUROPE Thematic Network: Implementing Pricing Policies in Transport: Phasing and Packaging, Brussels, 13-14 May*. Available at: <URL:https://www.researchgate.net/publication/237811157_Phasing_and_Packaging_of_Pricing_Reform_The_MC-ICAM_approach> [Accessed: 13th December 2015].

Wærsted, K., 2005. Urban Tolling in Norway – Practical Experiences, Social and Environmental Impacts and Plans for Future Systems [online]. *Paper presented at PIARC's Seminar on Road Pricing with Emphasis on Financing, Regulation and Equity, April 11-13, Cancun, Mexico*. Available at:
<URL:<http://www.piarc.org/ressources/documents/281,2.1-Waersted-0405C11.pdf>> [Accessed: 7th December 2015].