Road pricing and effect on urban freight

T. H. Zunder\textsuperscript{1} & J. N. Ibáñez\textsuperscript{2}
\textsuperscript{1}University of Newcastle upon Tyne, UK
\textsuperscript{2}University of Seville, Spain

Abstract

Traffic congestion across European cities is a serious problem that is very unlikely to be solved by adding more road capacity. Following the shifting focus from the supply side to the demand side, the present paper introduces congestion charging as an efficient measure to improve urban mobility and reduce transport emissions through an adequate management of the available capacity. The theoretical foundation of the pricing mechanism involved and the relations with the EU transport and energy policy guidelines and directives are reviewed. Several trends are analysed in detail to support the need for an efficient and major policy as congestion charging, among them the following: the still growing EU urban population which is expected to make passenger transport demand grow until more than 40% above the 1990 levels, the estimations by the UK government of almost 90% of the road congestion costs due to urban traffic whilst only representing 20% of the total vehicles-km travelled, and finally, the 40 million people residing in EU cities suffering significant poor air quality. In the second part of the paper we review BESTUFS research on the state of implementation of this measure across EU member states, making clear that there exist currently different applications based on differing conceptual bases; demand management, revenue generation, emission control etc. The paper details the varied political and business controversy following the measure. Special attention is paid to the UK case, where the initial successful implementation of London Congestion Charging has led the government to consider a national charging strategy. Finally, conclusions about the need of a steady vision on the measure are reached, making clear that any money collected from the roads will have to be used for the benefit of road traffic in the urban environment and therefore for the cities as a whole.

Keywords: traffic, transportation, environment, policy, congestion, charging, urban, pricing, economic, emissions.
1 Road pricing and effect on urban freight

1.1 Introduction

“A spectre is haunting Europe - the spectre of roadpricing.”

To plagiarise Karl Marx, there is a transport policy lurking at the periphery of European politics; a policy that lurks in the shadows like a feared but known ghost. Whilst the concept of road tolling isn’t new, a convergence of mature technology, excessive transport growth, the European Single Market and the Kyoto Treaty have raised the somewhat Orwellian vision of paying for something we regarded as free. It is still possible that the perception of roadpricing as political suicide may kill the emergent policy tool. For example it has been declared as ‘completely at odds with the Spanish mentality’ [1], but in certain key countries it is moving forward to trial and implementation. In November 2001 in Genoa, the thematic network BESTUFS held a 2-day workshop on the subject, looking at how urban freight may be affected by roadpricing. This paper is built upon that workshop with additional work.

1.2 The problem, perceived or otherwise

Traffic in Europe is growing at a rate that most political observers regard as untenable. From 1990 to 2010 goods transport is estimated to grow in billion tonnes/km by 38%, passenger transport by 24%, and heavy goods traffic on roads by 50% [2]. In the UK it clear that light goods vehicles (LGV) are growing both absolutely and as a proportion of the freight fleet, growing 13% from 1992 to 2000, compared to HGV growth of 2.4% over the same time frame [3]. In distance travelled LGV growth has been double that of heavy goods vehicles. LGVs are often used in urban environments and therefore in a city it may be LGVs, lightly laden, that will represent a significant growth in freight traffic, with HGVs growing on the periphery and inter-urban routes. Congestion is growing across Europe, especially in urban areas. Traffic jams are infuriating and expensive in direct economic cost. Currently 10% of the EU road network suffers congestion daily. Idling in a queue costs fuel, roughly 6% of annual EU consumption according to the Commission, and the associated external costs amount to 0.5% of Community GDP, forecast to rise to 1% by 2010 [4].

The focus of the EU is on sustainable development, on reducing greenhouse gas emissions and reducing pollution. This means that the growth of road transport and urban transport in particular is a key area of interest for the Commission and member states, all committed to Kyoto treaty deliverables. Lorries are just 2% of all road vehicles, yet they cause 24% of carbon dioxide emissions generated by road traffic [5]. Emissions from transport are a significant part of all emissions. NOVEM [6] identified 47% of all energy use in a typical household as being transport related. 84% of CO2 emissions from all transport is attributable to road traffic, and urban transport accounts for 40% of CO2 emissions. Since these are set to grow by 50% between 1990 and 2010,
measures to reduce transport growth has to be a priority for the EU and member states.

One solution to excess demand is for supply to be increased, this isn’t happening. Only 25% of the road network identified in 1996 as crucial to meeting increased demand has actually been built [7]. EU governments are falling behind in meeting the needs for future infrastructure, exacerbating the problem. The euro stability pact restricts the fiscal freedom of countries, reducing the ability of finance ministers to release large scale capital investment. At a recent conference [8] the difficulty of funding future transport networks led inexorably to the concept of charging for infrastructure to generate revenue to invest in capital projects.

The free market economics argument for road pricing is based on the precept that roads are a limited resource, best provided for using the price mechanism. They are a good that is a rival for use with other modes, and can be excluded completely with costs expressed through the price mechanism. To that end roads are not being sold in a monopolistic or oligopolistic market and as such would be best sold, bought, allocated and invested in through normal market mechanisms [9]. This argument, whilst popular in the deregulatory corridors of Brussels, may need reconsidering for urban freight where there may well be no alternative mode, and pricing in purely economic theory may well be monopolistic and distorting.

1.3 Internalising externalities

The economic argument for the use of market mechanisms runs parallel with the idea that the ‘user should pay’ principle. In other words those users of the road infrastructure should pay the full cost of the system. This is a contentious issue, since whilst it is clear that in the USA in the 1990s road users only contributed 20-50% of road provision, in some countries such as the Netherlands and France an argument can be made that road users contribute more than their proportional share [10]. Trade associations often employ this counter argument, one that becomes unclear as the issues of fuel tax, excise duties, road taxes and other fiscal measures begin to be added to the equation. What is clear is that there is a body of costs that have not traditionally been considered before, those of external costs. These are the costs generated by a mode of transport that affect others than the users of the mode, but generate a cost to society. These are usually listed as congestion, accidents, noise, air pollution and other emissions. Various work has been done trying to agree a costing structure for such externalities, let alone actual costs. Some of the estimates vary by 100% for the same base data [10].

The economic costs of externalities have been estimated as 4.1% of GDP [11], and that these costs are under recovered substantially for cars and light delivery vehicles (LDV). Since LDVs or LGVs dominate urban freight traffic the externalities of small vehicle urban freight are only partially being met. Urban areas generate far congestion related externalities than rural or arterial routes. Any scheme that recovers external costs therefore needs to be able to differentiate between location and probably time, given the nature of traffic.
Those who promote the use of marginal social cost pricing (MSCP) do so on the basis of efficient pricing, that in certain conditions, a price mechanism based on marginal social cost will match supply and demand so as to optimise marginal social benefits. On this model prices would be charged in real-time based on congestion, pollution levels and accident rates, a price displayed on overhead signs or direct to an onboard unit. Users would change their routes or plans as the pricing signals flashed up on their screens. Since this, whilst probably possible, might lead to chaos, it might be assumed that a more stable and structured pricing system would be used.

Others [12] have detailed the arguments against MSCP for infrastructure, noting that since it only covers variable and not fixed costs that it can militate against investment in infrastructure, a key transport problem for the EU. It is difficult to implement, there is no consensus on what are marginal costs and at what levels, and that it may have regressive effects. Congestion seems to be the externality that drives the case for road pricing, yet it could be said to not be an externality since it only affects road users.

There is a fundamental difference as to how you cost road pricing dependent on the goals. Demand management driven by MSCP will drive price to a point where current demand will fall (since the good is currently under priced). Estimates across Europe suggest this may be as high as €8 per cordon crossing [13]. For a revenue based model of roadpricing, the price may well be better set at a lower point, one which will maximise revenues but not necessarily reduce demand. The Norwegian tolls are reportedly good at raising revenues but have little effect on traffic levels [14].

1.4 Use of revenue

Revenues are huge, in London alone it was estimated that revenue streams could be as a high as £200m a year, and yield surpluses of £80-140m per annum. The Swiss LSVA scheme is expected to be raising €1billion per annum in 2005, against a running cost of only 4%. The first model of urban road pricing, the cordon tolls in Norway, were only ever set up as explicit revenue generators [14]. Finance ministries and politicians have noted the huge opportunity for revenue and have begun the debate as to what to use it for. In a purely free market view of economics the revenue from one good should be used to reward the provider of that good and fund further investment. To follow that line of thought, all road pricing revenue should be spent to fund new roads, signage, maintenance, and innovation in roads. A proportion might be dedicated to various core users, bus lanes for buses, access and signage for freight, messaging systems that target both general and specific customers.

The Commission, whilst a deregulator in many ways, is likely to propose in future proposals that the shortfall in transport infrastructure is funded in whole or part by the charges for its use. Stated aims to promote and achieve modal shift from road to other modes is likely to mean that they will propose intentionally distorting the market, shifting revenue flows between modes to support wider policy goals. In that they will be following the basis of the UK legislation that expressly drives congestion charging revenues in urban areas into public
transport and road infrastructure. The ZTL follow up actions in Rome [15] also suggest that some cities may think of funding other city logistics ventures such as urban distribution centres from the monies.

Parry and Bento [16] explored the interactions between taxes on work-related traffic congestion and pre-existing taxes in the labour market. They argued that a congestion tax raises the overall costs of commuting to work and discourages labour force participation at the margin. The resulting efficiency loss in the labour market can be larger than the efficiency gains from internalising the congestion externality. By contrast, if congestion tax revenues are used to reduce labour taxes, the net impact on the labour supply is positive and the efficiency gain in the labour market can raise the overall welfare gains of the congestion tax by as much as 100 percent. Recycling congestion tax revenues in public transit subsidies produces a positive, but smaller, impact on the labour supply.

1.5 Acceptance

The DESIRE project [17] explicitly looked at the acceptance of road pricing and reported back on the key acceptance issues for such proposals. They identified two main types;

**Political:** Fairness, non-discriminatory, redistributive of incomes; Efficiency, the costs of the scheme versus revenue; Effectiveness, how closely does it meet it’s stated goals; The sharing of a common view as to the problem and the purpose of pricing; The principles of pricing; The application of revenues;

**Technical/Procedural:** User friendliness; Administrative costs; Fraud sensitivity/enforcement; Privacy of the user; Robustness of the system; Transparency.

It was noted that freight operators were inclined to support the use of revenues for dedicated infrastructure such as express lanes for goods vehicles, and that the freight transport companies supported the charges since they viewed the indirect benefit of lower congestion as of greater marginal benefit than the charge itself. The additional conditions which the freight industry required for acceptance were;

- No increased administration costs; No increased tax burden on road transport at a macro economic level; Closed system of revenue and expenditure with users influencing investment decisions using earmarked revenue; Other modes of transport also internalise external costs; Heavy Goods Vehicles play not more than 100% of the costs they are responsible for.
- Since the indirect benefits derive from reduced passenger transport, private cars must also be part of a road pricing scheme.

Experiences in Norway suggest that public acceptance is easier if one focuses on the benefits to be delivered from the spending of the revenue and that the longer a system is in place, the more it becomes part of the accepted physical and financial landscape. The fact that these temporary schemes are seriously being considered as permanent features must be in part due to the initial opposition having faded to acquiescence [14].

Freight industry attitudes towards congestion policies have been researched [18] low support for congestion pricing was identified. There was some support amongst carriers performing just-in-time work with short average loaded trips and amongst white and brown goods carriers. The majority of fleets were opposed. On the other hand they did find support for improved transport management and enhanced urban priority for freight. BESTUFS identified strong opposition from the freight industries of Spain, Belgium, Switzerland and Sweden. Surveys on city freight carried out in the UK in 2002 by the author suggest a higher level of acceptance for road pricing, but again a demand for other measures, such as use of dedicated bus lanes by freight.

The UK Freight Transport Association (FTA) is supporting congestion charging as a wide policy objective, but dismissing any positive effects on freight operators and claiming that it is an unmerited tax. With particular reference to the London Congestion Charging Scheme, the FTA states that the small increase in average travel times will not be great enough to allow greater consolidation of drops into fewer vehicles, meaning no efficiency benefit to freight. It is stated that freight is very inelastic to congestion charging; that if a customer requires a timed delivery, the imposition of a charge to reach that destination is unlikely to be significant enough to change that demand. Unlike passenger transport, freight has no alternative in an urban environment, and as such the charge is viewed as a tax [19].

It is not just the industry itself that argues that freight for urban destinations is effectively unaffected by congestion charging, Verhoef et al [13] modelled freight in this fashion when studying the possible effects of road pricing in the Randstad area of the Netherlands. That study did show travel time gains for freight and business travellers (some of whom may classify as services in a broader view of urban freight).

1.6 EU directives

The key objective of the EU, as espoused by the Directorate General for Transport and Energy (DGTREN) is to “… break the link between the growth of transport and economic growth, … shift the balance of transport modes; eliminate bottlenecks; place users at the heart of transport policy.” [2] In the arena of road pricing the Commission has to address the incompatibility of the EU directive 1999/62/ECC, which set minimum fixed road tax rates for HGVs and made the Eurovignette permit the only fiscal instrument for travel on EU motorways. To permit a change, a new directive will be needed. DGTREN is developing just such proposals. In this area the Commission is looking to develop infrastructure charging in all modes. The use of charging to achieve policy goals is a key part of the 2001 White Paper on Transport [4].

The purpose of the EC infrastructure charging policy is to reflect the cost of different pollution levels, travelling times and damage costs as well as infrastructure costs - to apply the polluter pays principle and provide incentives to reduce congestion, pollution, and ‘re-balancing the modal split’ [20]. The Commission wants to explicitly distort the marketplace, maybe realpolitik makes true free market aspirations a pipe dream. The short term charging reforms
proposed include “using further differentiated road tolls, extended where appropriate to other parts of the road network, and the development of distance-related charges for HGVs to succeed fixed period user charges” [21].

1.7 Overview of nation states across EU

The BESTUFS work identified that although there are key countries with ongoing trials and implementation, road pricing is of very low importance in nations today. The research suggests that importance will grow:

![Bar chart showing the importance of road pricing for urban freight.]

**Figure 1:** Importance of road pricing for urban freight [10].

BESTUFS also surveyed the number and status of projects, finding that whilst demand management projects were in the majority, that revenue led projects were in the majority in terms of implementation.

![Bar chart showing the status of projects reported to BESTUFS.]

**Figure 2:** Status of projects reported to BESTUFS [10].

Whilst Spain, France, Austria, Finland, Denmark and Greece all have low interest in urban road pricing, despite participation in some studies, others have a strong interest. Belgium has recently mooted cordon road pricing for Brussels in 2005. The issue is controversial in the Netherlands, high profile in the UK, and in practice in Norway, Italy and Switzerland. Germany, whilst not talking of urban pricing is planning a HGV distance based scheme mid decade. Sweden came close to implementing road pricing in the 1990s, but fell foul of Byzantine industrial, trade union and party politics [22].
1.8 Urban road pricing: the case of London

The UK has a great deal of activity in this field, in a localised fashion designed to limit the political impact on the ruling party. The Transport Act of 2000 and the Greater London Act devolved authority and responsibility to local government for congestion charging, directing the revenues to infrastructure and modal shift, with ring fencing; all the revenues collected are reinvested in transport itself. Until 2003, road user charging was theoretical. Now the situation is different, following London’s successful experience with congestion charging (LCC). This improved journey times inside the charged zone, and cut congestion levels up to 30% [23] According to a survey carried out in February 2004 on 500 companies [24], business has been favourable to the charging scheme, with 72% reported it as a success. The acceptance of LCC is confirmed, as only 2% of companies would consider relocating outside the zone. However, There are other shops and businesses in London, who argue that they have been affected by the charge. The London Chamber of Commerce states 75% of their members have experienced a downturn in their business since 2002, and half blame LCC. The first six months since February 2003 saw at the John Lewis store on Oxford Street fall 7.3% [24].

The Greater London Authority (GLA), the authority in charge refutes criticism stating that only 1-2,000 car trips carrying a maximum of 3,000 shoppers to Central London are being deterred, representing less than 1% of potential business [25]. Further studies are pending. The reduction of congestion, the decreased journey times and the protection of the environment are undoubtedly aims achieved by this policy.

1.9 Conclusions

It is too early to judge what the effects of road pricing in its various forms will have on urban freight, nor whether a global conclusion can be ever drawn. Freight may find less congested roads, faster trip times and greater reliability, but the improvement may be so marginal that it doesn’t lead to any step change in
logistical efficiency. Charging may be fiscally neutral for freight, a charge so small that it can be ignored, or they may be able to pass it on to customers. If it is neutral then the question has to be asked, is it simply a tax, with no overt rationale or broader policy objective? If so then is that a burden which a city or a country wishes to place on business in general and a hard pressed and efficient industry?

There is the issue of what will be done with revenues. Free marketers argue it should be ploughed back into road infrastructure, but practice suggests that it may be diverted to other modes and users. LCC was promoted as a way to improve public transport and investment in infrastructure, a key finding of the DESIRE project on acceptability. The BESTUFS surveys suggest that it is only revenue raising schemes that are given the go ahead. Little is said of reinvesting funds for freight. One could imagine schemes that supported, dedicated freight routes, better signage, enforced and controlled unloading/loading access or even driver training and education. They are not to be seen.

It is in the opinion of the authors and based on the material collected that only experience, unique to each city and culture, will show just how differing schemes affect urban freight. It is recommended that further follow up research be made and then used to better model future schemes. It is recommended to the freight industry that they monitor the situation closely and pay close attention to where the revenues from such schemes are spent and lobby for them to be used directly for the benefit of freight in the urban environment, and therefore for the cities as a whole.

References


