

7 ECONOMY

7.1 INTRODUCTION

This chapter addresses the theme of economic impacts for cities considering or planning the implementation of a road pricing scheme. The main reason for economic inefficiency is congestion. Other externalities must also be considered, for example in situations where the price paid for road space usage is different from the effective social cost. Externalities create inefficiency. The OECD estimated that 4.1% of GDP was lost to transport externalities in 1994.

Road pricing can ensure that travel choices reflect the real cost of trips, rather than the perceived costs, in order to encourage economically efficient behaviours.

7.2 WHAT IS THE IMPORTANCE OF THE THEME?

Road pricing will change the costs of travel by car and by competing modes. It will also change the cost of commercial vehicle operation. Behavioural responses to these changes will also affect the environment in and around the charged area. All of these changes can be expected to influence the costs of doing business in the charged area, and the turnover of customer-focused businesses. They may also change property prices and residential location choices. The scale and direction of these impacts are difficult to estimate, and will be further affected by perceptions of the impact of pricing, any complementary policy initiatives, the resulting image of the charged area, and its relationship with competing centres.

These uncertain economic impacts are frequently cited as one of the main reasons for cities' reluctance to introduce road pricing. This is reflected in the results of the User Needs Assessment Questionnaire, in which our 21 city users ranked this topic second out of nine in terms of importance to them.

7.3 WHAT IS KNOWN ABOUT THE THEME?

The economic and relocation impacts of transport schemes are notoriously difficult to measure or predict. For road pricing, the lack of empirical evidence makes the problem worse. The early study of Area Licensing in Singapore did not attempt to assess the impacts on land use. It did ask business people for their assessment of the scheme, which was largely positive, but this may well have reflected a general view in Singapore at the time that government was making the right decisions. In analysing the economic implications of Singapore's Area Licence Scheme Holland and Watson (1978) did not report on detrimental economic impacts during its implementation. They noted that the number of goods vehicles entering the CBD during the charging period had increased. The argument is that operators were rescheduling trips to take into account reduced congestion. This supports the argument that there is a positive impact on the economy due to time saved to businesses. However it is also borne in mind that the implementation of the pricing scheme coincided with the period of the oil shocks (1970s) and hence it might not have been possible to discern the two impacts on the economy. Ten years later another attempt was made to assess the impacts retrospectively. It was concluded that there was no evidence of adverse impacts on economic activity in the city centre (Armstrong-Wright, 1986). However, this assessment was made difficult, both because parking restrictions had been introduced at the same time, about which businesses were much more critical, and because the Singapore economy had expanded rapidly in the intervening period, masking any impact of road pricing.

7.3.1 Desk Studies

An earlier study asked businesses in three cities, Cambridge, Norwich and York, what they expected to be the impacts of a road pricing scheme which charged £3 per day to enter the city centre in the

morning peak (Gerrard, 2000). The majority anticipated positive impacts on the environment and congestion, but negative ones on the economy and tourism, and on their own staffing and profitability. When asked whether road pricing would influence their next location decision, 53% said it would, and 26% that it might.

Model-based predictions typically suggest much smaller impacts. An analysis of the impacts of congestion charging in London was carried out using the MEPLAN model of London and the South East, which reflects the effects of changes in accessibility on location (May *et al.*, 1996). For a £4 charge to enter central London, the predictions were:

- central London employment would rise by 1.0%
- inner and outer London employment would fall by around 0.5%
- household numbers would fall by 0.2% in central London and 0.1% in outer London
- household numbers would rise slightly in inner London
- higher income household numbers would increase in central London.

A subsequent study in Edinburgh, using the START/DELTA model, which includes responses to both accessibility and environment (Bristow *et al.*, 1998), indicated that a £1.50 charge to enter or leave the city centre would increase city centre population by 2.2%; an earlier study with a similar model, but with different parameters, (Still *et al.*, 1998) had suggested a 1.8% reduction in city centre population, and a 3.1% reduction in city centre employment. Both studies suggested that the impacts of changes in accessibility were larger than, but opposite in sign to those of changes in environmental quality.

Research has been carried out to measure the potential economic impact of road pricing strategies. The general view is that the size of this impact is quite small but there is a need for more research to study actual schemes after they have operated for a number of years. The general consensus is that it has had little economic impact in Singapore (where a road pricing scheme has been in existence for over 30 years). In simulation studies, Eliasson and Lundberg (2002) estimated that congestion pricing would result in redistribution two percent of households and a slightly higher redistribution for businesses in a typical European city.

An EC FP5 City of Tomorrow project, PROPOLIS, has assessed the impact on seven cities of packages of measures including road pricing. It is intended to incorporate their results into the next version of this report.

7.3.2 Agglomeration

The interaction between firms and individuals in close environments allows the sharing of knowledge and the development of new ideas. The clustering of activity in one area is known as agglomeration. Whilst transport cannot generate clusters, it can play an important role in facilitating their expansion by reducing travel time and costs, bringing firms, workers and consumers closer than would otherwise be the case.

Transport improvements that deliver time, cost and journey time reliability savings, particularly for businesses and freight traffic, can significantly contribute to GDP through an increase in cost savings for businesses. The Eddington report (Eddington, 2006) attempted to consider the role that transport could contribute to productivity benefits within agglomerations. The report discovered that not all firms within an area are equally agglomerated and therefore the improvements experienced as a result of a transport improvement will not be uniform. The contribution to the improvement made will depend upon the characteristics of the industry. However, Eddington considered that the relation between agglomeration and transport is a relatively new and untested one.

Attempting to quantify the impact of transport policy on the wider economy has led to some Spatial Computational General Equilibrium (SCGE) modelling work by Laird *et al* (2005). These authors suggest that transportation affects the economy via the labour market, the goods market and the agglomeration economies. In particular, road user charging can influence the labour market by discouraging labour force participation through a decrease in the household wage (Parry and Bento, 2001). Laird *et al* argue that if network effects that appear in the wider economy (e.g. changes in output and employment) are considered a crucial argument in infrastructure decisions, careful economic

analysis of their strength and significance on a case by case basis should be made. As argued in Chapter 0, the difficulty here is attempting to quantify these in real world situations.

Weisbrod *et al* (2001) studied the relationship between urban traffic congestion and the production of economic goods and services in terms of business costs, productivity and output. Past research has found it difficult to assess the economic implications of congestion, mainly due to the fact that those that will have been affected prior to the research may already have left the charging zone and those remaining businesses are in a difficult position to comment under a non-congestion scenario. Congestion has an impact on scale economies in terms of lowering business market areas and reducing the agglomeration benefits of operating in large urban areas. The research findings from the study found that congestion does reduce the agglomeration benefits of urban areas by reducing access to specialised labour and delivery markets.

7.3.3 London Congestion Charging

In London, work looking at monitoring the impacts of congestion charging has been completed by Transport for London, which found out the following:

- The introduction of charging in February 2003 coincided with a temporary economic slowdown, as well as a wider set of local, national and international conditions that were not favourable to general economic performance
- Analysis of several different indicators of economic performance, including measures of business population and turnover, did not reveal evidence of a significant congestion charging impact.
- Shops within the inner core of the charging zone found that their rental values increased.
- TfL's business surveys conducted in 2004 showed a continued recognition of the transport benefits associated with congestion charging.

Other work conducted during 2005 found that trends in business registrations for VAT remained strong and that within the charging zone, the retail sector has increased its share of enterprises and employment since 2003. A majority of businesses in the congestion charging zone recognised that decongestion has created a more pleasant working environment and easier journeys for employees using public transport for work. Ernst and Young were commissioned to undertake an independent review of the monitoring of the business impacts. Their work reasonably concluded that the (then) £5 charge has had a broadly neutral impact of the central London economy. However, as charging had only been in place for 2½ years (the date of the review), this had made it difficult to draw definitive conclusions on the long term impact.

The Mayor's original business case for the scheme suggested that congestion costs the London economy around £2 - £4 million per week in lost time. This is coupled with TfL prediction that the range of public transport services available is saving Londoners in the region of £3.5 million per week.

TfL's view about 'concerns over the detrimental impact of charging on economic activity appear to be misplaced' is not shared by all business organisations. London Chamber of Commerce and Industry's two surveys found that 85% of the retailers who took part considered the charge had 'failed to improve their productivity'. John Lewis conducted some of their own research and concluded that the effects of charging had led to an estimated sales reduction of 7.3% at their Oxford Street store. However it is unknown as to how John Lewis conducted the study and any potential bias included in the research that may have influenced the results.

There is also prima-facie evidence to suggest the potential affect of external non-transport related issues that may have had an impact on business, particularly retail productivity. The most notable event relates to the 7th July 2005 bombings on the London Underground and bus network and the knock-on negative impact this had in terms of reduction in tourism.

Whilst it is plausible to consider that the July 2005 bombings in central London could have contributed to a downturn in business activity, Transport for London's work suggests that the impact of the

bombing on the business economy was short-term leading to short-term decline in retail sales, the trend has reversed with growth rates returning to 'normal' levels.

Work undertaken by Ernst and Young suggests that all TfL's work and conclusions are broadly in line with their own but that further quantification of all the benefits and costs arising from the scheme should be explored further to support the view that the charge delivers overall economic benefit even when all costs have been taken into account.

Whilst there is a degree of support amongst the business community for congestion charging (London First, 2006), it is also believed that many smaller businesses may have experienced a drop in custom which could have a likely impact on reducing future investment decisions.

Empirical evidence has now been obtained in London, in the context of early claims of a roundly 10% reduction in retail trade. Transport for London's early assessment was that retail firms were reporting reductions in turnover of around 2% in the first half of 2003, with food shops reporting reductions of 6%. However, much of this appeared to be due to other factors such as the decline in international tourism (TfL, 2004). The most recent assessment suggests that the impact of the £5 charge on the London economy has been broadly neutral (TfL, 2006). A more detailed study has been conducted by Bell, on which information is still being obtained.

7.3.4 Norwegian Toll Rings

Evaluation work completed in Trondheim by the Chamber of Commerce between 1991 and 1992 indicated that there was some evidence of businesses located within the toll ring having lost trade during the early part of 1992. However from the summer period of 1992, no significant negative impact on business trade could be read out of the figures and hence the Chamber of Commerce concluded that there was no significant effect of the toll ring on trade at all.

Tretvik (1999) reports an analysis of the impacts on turnover within, and outside the Trondheim toll ring. Before implementation, a shopping survey concluded that 25% of shoppers were likely to change the location or timing of their shopping activity in response to the toll ring. A second survey in 1992, a year after implementation, recorded that 10% had in fact changed destination or timing of their shopping trips. However, the impact on retail turnover did not reflect this downturn in activity. In 1992 the Chamber of Commerce concluded that there had been hardly any effect on trade as a result of the toll ring. Longer term time series data from 1987 to 1997 on Trondheim's share of county retail sales and on annual turnover in different parts of Trondheim showed that Trondheim as a whole, and the CBD in particular, had been losing market share between 1987 and 1990, but that the city's market share within the county grew in most years from 1991 to 1997, and that the toll ring's share was maintained throughout that period. While turnover will be affected by a wide range of factors, there is thus no evidence to suggest that the toll ring adversely affected trade within the ring.

7.3.5 Stockholm

In Stockholm, the congestion tax has two opposite and opposing effects on companies' transport costs. Clearly the congestion tax has led to increase costs for transportation in pure financial terms. Conversely, the introduction of the congestion tax should lead to a reduction in general traffic, implying that all traffic will be faster moving. The reduction in congestion with associated knock-on benefits, for example quicker loading / unloading times for delivery vehicles. The effect of the charge on local consumer purchasing power will depend to a large degree on whether consumers continue to drive after the charging system begins or whether they either begin or continue to use public transport. For those who use public transport under a congestion taxed scenario, the economic impact will be reduced relative to those who choose to make the journey by car. For most companies, it is thought that the congestion tax has only a small impact on the transportation requirements for most companies and so would not have a significant impact one way or another.

In terms of the congestion tax and its impact upon consumer purchasing is thought to be very slight as the revenue from the tax would represent no more than approximately 1% of the total GDP for the whole of Stockholm County.

In the case of the Stockholm Trial, sales and consumer surveys show that the congestion tax had minor or no effects on retail trade. The business community is dependent on a well-functioning road transport system and before the start of the trial there was a sense of worry that the congestion tax would change consumer behaviour and have a negative effect on the economic situation in the region. However, during the Stockholm Trial the retail trade increased by approximately 7 % within the zone, which should be compared to an equivalent rise in the trade outside the zone and in the whole country. The consumer durables trade in department stores and shopping malls rose by 7.5 % and 8.2-8.6 % outside the zone and in the whole of Sweden. The growth of consumer durables trade in street-facing shops climbed to 7 % during the trial. Moreover, sales of non-durables within the tax zone increased by 6.3 % compared to 8.8 % outside the zone and 6.6 % nationwide. The differences between growth rates is principally due to special events such as the creation of new retail areas outside the zone and renovation and rebuilds of department stores and malls inside the zone. Trend related changes in the retail trade also had an impact.

At an aggregated level it seems that the congestion tax had little effect on the companies total transport cost and the households disposable income and purchasing power. However the situation varies between individual households and companies. The total production of goods and services in the county (the gross regional product) amounted to an estimated SEK 750 billion in 2005. Compared to this the contribution made by the Stockholm Trial (SEK 1 billion) is minimal.

A model based analysis of a permanent congestion tax in Stockholm shows that there will be an effect on the appeal of certain areas effect measured by falling housing prices. However, the effect on housing prices were extremely modest compared to the changes that normally occur on the property market. The model also assumed the effects on traffic and accessibility to be worse than what was actually measured during the trial. Most likely it will be other factors than congestion tax that determine housing price trends in the various part of the county.

Model calculations of the effect on the location of residential premises and places of work also show that over the long term the inner city area and the surrounding area would fall by 1 % as a result of the change in accessibility with a permanent congestion tax. However, over the 20-30 year prediction period this is not a great change. Therefore the conclusion is that congestion charging most likely will not have any great effects on the future expansion of residential or commercial areas.

7.3.6 Impact on Freight

An often neglected topic is the impact of congestion pricing on freight traffic. One study considered changes in freight operators' behaviour as a result of the introduction of a time of day pricing initiative by the Port Authority of New York and New Jersey¹⁰. The authors claim that their study is the first comprehensive study on freight response to peak load/toll pricing (Holguin-Veras *et al*, 2006).

Through a survey of users of the system, the authors found that freight users actually responded through a combination of the following three methods

- increasing their productivity to offset the increased transportation costs
- changing to untolled facilities
- passing costs on to consumers.

The authors also speculated that the ability to pass on the costs depended on the nature of the “balance of power” between the carrier (i.e. freight operator) and the receiver. When the balance of power was in the receiver's favour, the freight operator had no choice but to increase their productivity to offset the charges.

¹⁰ Despite its name, the Port Authority of New York and New Jersey manages bridges, tunnels, airports and transit in New York City and Northern New Jersey. Variable Time of day pricing is implemented on its network of bridges and tunnels (George Washington Bridge, Lincoln Tunnel, Holland Tunnel, Goethals Bridge, Outerbridge Crossing, Bayonne Bridge) (see for example <http://www.panynj.gov/CommutingTravel> ,accessed April 2007, for more details)

These findings have very important implications for a truly integrated transportation policy that takes into account not only the movement of people but also the movement of goods and hence considers developments in the logistics industry. As Holguin-Veras *et al* argue, “the objective of moving traffic from peak to the off-peak hours necessitates a comprehensive approach that targets various links in the supply chain”.

7.4 WHAT ARE THE POLICY IMPLICATIONS AND IMPLICATIONS FOR OTHER THEMES?

There appears to be a mismatch between the perception that road pricing will lead to substantial out-migration of residents and business, and the generally low level of measured impact. However, this may be explained by the characteristics of those few cities which have as yet implemented road pricing, which are typically dominant centres in their regions, and subject to only limited economic competition. It may well be that smaller centres with closer competing centres would experience greater impacts.

In due course it may be possible to assess this further through additional empirical research. In the meantime research will have to rely on the results of predictive studies and broader analysis of the urban economy.

There are the following implications for other themes:

- Objectives: Support for the urban economy should be considered either as an objective of, or a constraint on, road pricing schemes
- Scheme design: It seems probable that schemes can be designed which have a lower adverse impact on the urban economy, or are more supportive of it; further work is needed to identify the critical design elements
- Technology: It is not clear that there is a link between technology and the urban economy
- Prediction: The availability of models which reflect the impact of accessibility and environmental quality on location choice and economic activity is fundamental to an improved understanding of this theme
- Equity: Economic impacts can have substantial secondary impacts on equity; poorer households are more likely to have to move if residential areas become more attractive, and are more vulnerable if they become less attractive; those without good public transport access are more vulnerable if shops and facilities close or leave an area.
- Acceptability: Most acceptability research focuses on the public rather than businesses, though economic impacts can be expected to have a significant impact on business acceptability; lack of public acceptability may well have an adverse impact on the urban economy and on residential choice
- Transferability: It seems likely that there will be marked differences in economic impact between cities; it will be some time before we understand this fully.

Here is a summary of the linkages between the other main themes and agglomeration:

- Objectives: The concept of agglomeration should be considered as an aid to urban pricing schemes
- Scheme design: Schemes could be designed in agglomerations that would be more effective than in a dispersed environment.
- Technology: It is unclear as to whether there is a linkage between the state of technology and agglomeration
- Prediction: The linkage between prediction and agglomeration is unclear
- Equity: The clustering of particular industries in one area could have an impact upon equity in terms of the re-location of particular types of workers. For example, the re-location of city professionals to one new hub of economic activity may have equity implications for those living outside the agglomeration
- Acceptability: Agglomeration has benefits in terms of concentrating economic agents together in clusters hence reducing travel time and cost – therefore the opinion of such a mass market may impact positively upon acceptability

- **Transferability:** It is likely that there will be differences in the sizes of agglomerations across cities and hence transferring knowledge / information between them may not be effective, e.g. what works for London won't necessarily work for New York.

7.5 WHAT ARE THE RESEARCH GAPS AND PLANS FOR FUTURE RESEARCH?

This remains an area of considerable uncertainty, on which more evidence is needed. There is a growing interest in the interaction between road pricing and the urban economy in the UK, which may well lead to new research results. It would be helpful to know of any other predictive research in partners' countries. It may be useful to commission an international expert to review work in this area in other countries.

Whilst it is recognised that there is a "compelling link between the transport system and economic prosperity, with new transport connections enabling new economic relationships to be forged" (Eddington,2006), little is known about the relationship between productivity and transport policy. This is one area in which more research is required. It is also recognised that there is limited knowledge of the relationship between the potential exploitation of agglomeration economies and the themes of this study.

It is generally thought that higher value of time users such as freight should benefit from road pricing. However this argument is based primarily on theory. There is little practical evidence to consider the implications on freight traffic. For example, there is little knowledge regarding the impact of congestion charging on just-in-time inventory systems and this is a topic that needs a considerable amount of further research.