

## **Public Transport Provision Under Varying Regulatory Regimes**

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### **Abstract**

The provision of public transport is in most countries subject to some form of regulation. This is often implemented at a local or regional level. This paper considers the issues which arise when jurisdictional boundaries do not coincide with the boundaries of market areas, such as that for labour, which determine transport flows. Similar problems may arise for international transport. Using an analogy with models of fiscal federalism it is shown how conflicts can arise when the different authorities have different priorities and that this may result in solutions which are both inefficient and welfare reducing. The problems are illustrated with reference to metropolitan transport in the UK and the development of the TENs in the EU.

**JEL codes:** H54, H73, L51, L92, L98, R48

### **Introduction**

There has been considerable development in our understanding of the way in which different regulatory regimes can affect the provision of public transport services. This is usually based on a model in which there is a single regulatory authority. There has been some development of models which look at the changes arising when there are multi-level authorities in which a top level authority delegates the day to day regulation to a lower level authority but still seeks to achieve some overall objective. Examples of this include elected governments delegating detailed regulation to regulatory agencies, national governments delegating the detailed regulation of local transit services to local government authorities, or supra-national bodies such as the European Union setting overall policy rules for national governments. In these multi-level cases there are potential vertical conflicts which arise since there is a nested

principal-agent problem in which each level seeks to control the effort of the lower level whilst the lower levels seek to minimise the effort needed to deliver the target objective under conditions of asymmetric information.

However there is a further potential set of problems which arises through horizontal conflict between agencies at the same level. Many public transport services are provided across jurisdictional boundaries. The obvious ones are international rail and air services. Traditionally rail services operated almost exclusively within national boundaries and air services were subject to double approval rules on a bilateral basis, but liberalisation has changed this whilst leaving in place differing national regulatory structures. At the more local level, where labour market areas may be larger than those of the authorities responsible for local public rail and bus transit, this could lead to inconsistent planning of the provision of commuting services. Current discussion in the UK over the planning of local transport, especially bus services, has identified that since deregulation there has been a particular problem of coherent planning in the metropolitan regions outside London (Department for Transport, 2006, 2007).

Such inconsistencies may simply be examples of inefficiency through the lack of coordination, but they may also arise through deliberate attempts to secure local advantage through competition.

In this paper we further develop a simple model of regulatory competition in a multi-agency world which extends the discussion of Vickerman (2006a). This is then applied to some examples of cases drawn from metropolitan transport and international rail services. The analysis demonstrates how regulatory conflicts can lead to inefficiencies which impact not just on the provision of transport services, but also on the potential wider benefits from transport, most notably labour market efficiency and productivity growth. These are compared with the possible inefficiencies from centralised regulation. The paper concludes with a discussion of policy implications and alternatives.

## **Basic Regulatory Structures**

The move from largely public sector provision of public passenger transport and of roads to a situation where the private sector provides service under some form of franchising or public-private partnership regime has been a feature of the past two decades. Although the introduction of private sector provision was usually foreseen as involving only relatively light regulation, largely to maintain service quality, there have been moves towards a greater degree of regulation (often referred to as 're-regulation') in recent years.

The question to be addressed here is what happens when service providers on the infrastructure (including operators of the infrastructure itself) operate under different types of regulatory regime. Such cases may arise where different parts of a vertically unbundled service fall under different regulatory authorities, for example where the infrastructure operator is regulated separately from the transport service provider. An alternative example is where a service crosses jurisdiction boundaries which impose different regulatory structures. Key questions involve the level of service provision, the maintenance and renewal regime and the pricing decision (where this is not the instrument of regulation).

There exists a range of possible regulatory instruments which can be used in the transport sector. The deregulation of transport was largely achieved under the premise that the market would secure an optimal allocation and that it was only necessary to provide a form of quality regulation to prevent firms attempting to gain market advantage by indulging in unsafe operating practices. Decisions on levels of service, frequency and fare levels were seen to be commercial decisions for which both actual and potential competition would yield efficient outcomes. This applied in the case of airline deregulation or bus deregulation in the UK where entry and exit are relatively easy. Achieving this has proved more difficult in the rail sector where entry and on-track competition are more difficult to achieve. Experience has suggested that further regulation of service levels, price and/or rate of return may be necessary to ensure an efficient outcome. Thus passenger rail franchises in the UK have become much more prescriptive over precise service details.

The simplest form of regulation in use in transport is a form of quantity regulation in which the regulator controls the allocation of capacity on a network or the level of service provision. Here the regulator decides the level of service to be provided so the service provider is insulated from direct consumer demand by the regulatory authority. Such systems are found both in slot allocation on rail infrastructure and at airports (House of Commons Transport Committee, 2006a) and in some franchising operations where the operator simply delivers to a service contract. These latter are similar to the situation found for example on London buses and the latest passenger rail franchises in the UK where there is little scope for innovation (House of Commons Transport Committee, 2006b).

Since the operator is not able to respond directly to demand, the regulator has to set the level of output. If the regulator is able to set output efficiently so as to reflect the true costs of the operator and to induce effective competition for the franchise so that the costs of delivery are set at the most competitive level, then there is an efficient outcome. However, where the regulator is not able to do this, for example where there is ineffective competition for franchises or the regulator attempts to set a service level and guide price for a franchise or slot which is uneconomic, then the outcome will not be efficient and this will affect both current output decisions and investment decisions relating to future output.

Auctions of slots or franchises are supposed to get round this problem by ensuring that the bidder correctly evaluates the worth of the franchise and bids the correct value. Experience with such auctions suggest however that this may not happen. There is a tendency to over-bid for franchises leaving the revealed value of the franchise insufficient to meet costs (the 'winners curse'). This has been found both in recent cases in the UK rail passenger rail franchises (House of Commons Transport Committee, 2006b) and particularly in the auctions of new telecommunications bandwidths (Klemperer, 2002a, 2002b, 2006).

Where the market is allowed to function at the level of final demand, where operators take output decisions which relate to actual revealed demand, regulation may have to be exercised over price or rates of return to avoid exploitation of monopoly power. Such

regulation will lead to similar results over levels of output to the quantity regulation discussed above, but the impact on welfare may be different because of the redistribution implied. It typically implies that without such regulation the operator would supply too low a level of output as a result of the monopoly power enjoyed. Price regulation typically takes one of two forms: cost plus or price-cap. In the former case the focus is on the operator's costs to which an acceptable profit or rate of return on capital is added. Such regulation removes most incentives from the operator and all the risk (or gain) is taken by the regulator. In such cases the user benefit may be reduced. In the case of a price cap the regulator typically fixes a maximum rate of increase of prices which is related to the overall consumer price index, usually with a requirement for some efficiency savings. Here both risk (and potential gain) accrue to the operator. Rate of return regulation simply operates on the rate of return on capital but has similar effects to price cap regulation.

The interesting cases with price-cap regulation arise when there is asymmetric information since there is an incentive to the operator not to reveal the full extent of efficiency savings possible to avoid facing a more stringent price-cap in subsequent periods. The operator may also be inclined to under-invest if it is felt that the regulation will be too stringent (Helm and Thompson, 1991).

Thus the incidence of regulation is likely to lead to distortions both in the level of capacity provided and the allocation of that capacity which will have an impact on costs, user benefits and the potential for wider economic benefits. For example, if there is under-investment due to the expectation of too stringent regulation (and hence an unacceptable rate of return on investment) not only will user benefits be lower, but also the benefits from agglomeration effects. The question is therefore whether the loss through regulation is greater or smaller than the loss which would arise through allowing monopoly exploitation of the infrastructure. This will depend on the price elasticity of demand for the particular service (and hence the degree of monopoly power which can be exercised), the stringency of the

regulation, and the scope for regulatory capture by which the operator seeks to use informational asymmetry to capture a larger share of the potential gains.

### **A Basic Model of Regulatory Competition**

The basic conclusion from this preliminary analysis of the problem is that the regulatory structure may lead to possible divergences between the expected and actual user benefits which may result in an inefficient allocation and would need to be taken into account in the appraisal process. These divergences may lead to further impacts on the wider benefits. In a single regulatory framework these divergences can be accounted for by an adjustment to the valuation of user net benefits which allows for the extent to which the regulatory environment distorts costs. Most new investments fit into such a single regulatory structure. However there are increasing numbers of instances where a single investment may straddle regulatory structures leading to problems for both the setting of price and the evaluation of net benefits.

It is assumed that the different regulatory authorities have different sets of objectives and may thus either use different regulatory instruments or set the same regulatory instrument at different values. The regulated firms can thus seek to exploit these differences between the regulatory authorities to capture economic rent. There is a form of double asymmetry in information as the regulators may be badly informed about each other's objectives and may not pass information about the regulated firms between themselves. The degree of asymmetry in information between the firm and each regulator may also differ.

There are two sets of problems here: the need for differential responses by the operator to each regulatory authority implying increased transactions costs; and the potential that the regulatory authorities begin to indulge in a form of regulatory competition in order to capture more of the benefits for their jurisdiction (equivalent to tax competition between jurisdictions).

Most of the work on inter-jurisdictional competition relates to tax/subsidy competition and competition through the differential provision of public goods. Epple and Zelenitz (1981) demonstrate how competition will usually fail to prevent local governments

exercising a degree of monopoly power through their ability to share in the rent gain from the fixity (non-tradable nature) of land. However, the key result from this is that some of this rent capture is from the residents of the jurisdiction and that although freedom to move between jurisdictions may reduce the rent seeking power of a local government, it will not eliminate it completely. Oates and Schwab (1988) extended the discussion with a model including both a tax on mobile capital and an environmental standard. Where jurisdictions are homogeneous a social optimal would result with a zero tax rate on capital and an optimal environmental standard where marginal willingness to pay equals the marginal social costs of environmental improvement. Where jurisdictions are not homogeneous or they choose to set a non-zero tax rate this would lead to distortions in both fiscal decisions and decisions on environmental standards. The implication is that standards would be weak in such a situation as jurisdictions compete for mobile capital.

In contrast Wellisch (1995) shows that the rent gain from pollution controls are not confined to the jurisdiction where firms are located as they are likely to be owned by non-residents which will lead to a potential setting of excessive standards by a jurisdiction. Kuncze and Shogren (2005a, b) attempt to reconcile these results. They demonstrate that small competing jurisdictions are unlikely to be able to set first best tax and standards policies, especially when the tax base on which local jurisdictions are reliant is mobile. This confirms the potential for a so-called race to the bottom and calls into question the appropriateness of devolved responsibilities. The Oates and Schwab result depends critically on the benefits from the standards being redistributed to the residents of a jurisdiction who are assumed immobile.

These models are based on the assumption of a single tax, the rates of which can be varied, and a single standards instrument which can be set at different levels. In a world of different possible policy instruments there is an argument in favour of decentralisation because it may promote policy innovation. Strumpf (2002) argues that the result is more complicated than this. With large numbers of homogeneous jurisdictions the centralisation of policy may produce greater innovation, but if there are many policy options decentralisation

may lead to greater innovation. The key to this is the extent to which jurisdictions are able to learn from each other such that there is a spillover effect.

The tax competition concept has been applied to the transport case by De Borger et al (2004, 2005) who show how parallel routes under the control of different jurisdictions might be tolled when they are able to discriminate between local and transit traffic. This shows how jurisdictions may try and shift the burden onto transit traffic and this may have implications for external regions' transport costs. In a similar vein Levinson (2001) has shown empirically how states' option to toll may lead to a form of 'beggar my neighbour' policy in which there is a strong incentive to push the burden of financing on to the residents of neighbouring jurisdictions.

This work on tax, tolling and standards competition all points to support for the view that the way different jurisdictions regulate transport could lead to significant implications for both the efficiency of the overall network and welfare generation. There is both theoretical and empirical support for the view that decentralised decision making can lead to sub-optimal outcomes which increase as the jurisdictions become less similar and there is more scope for the migration of both capital and labour between them. Such effects will increase if we introduce more modes of transport, especially where the different jurisdictions have different priorities towards them.

In the light of this we return to a more detailed examination of the two cases introduced in Vickerman (2006a) where there is the potential for distortion from different regulatory regimes: metropolitan transport in the UK and the European Union's Trans-European Networks.

### **The Metropolitan Transport Case**

The problem of metropolitan transport arises when jurisdictions with regulatory powers, including the right to contract out public transport services, do not coincide with the natural economic boundaries as given by, for example, the metropolitan labour market.

Suppose that the core part of the metropolitan area has its own transport authority which regulates fares and service levels, but the more peripheral parts of the city region lie outside this structure. This is not dissimilar to the case of Transport for London or the Passenger Transport Executives in other major UK cities. Suppose the metropolitan transport authority has a policy of subsidising fares and promoting investment in and the use of public transport as part of a policy to reduce congestion, but that services outside the authority's area have to be provided on a commercial basis. In such circumstances the likelihood is that new projects will concentrate on serving the needs just of the authority's area and service levels will be less well developed in the more peripheral parts of the city region outside the authority's area. One consequence of this is that the potential agglomeration economies through the enlargement and thickening of the metropolitan labour market may be lost as fares will be higher and service levels poorer in the more peripheral areas. Different parts of essentially the same project will be evaluated on a different basis.

This has prompted a debate on the extent to which Transport for London should assume responsibility for rail services operating outside its immediate area in order to ensure consistency in planning, or at the very least there should be an extension of the same ticketing and fares regime across the entire area. The debate has also widened to suggest that PTEs in other city regions should similarly assume responsibility for rail services operated within their areas. Bus services within the major metropolitan areas outside London are provided in part on a commercial basis, but the Passenger Transport Executives are responsible for coordinating the provision of contracted services (those outside the commercial network which are deemed socially necessary). However, these PTEs only have a coordinating role, finance and regulatory powers reside with the constituent authorities. In cases where there are major differences of political or policy stance between such authorities it becomes extremely difficult to provide effective and relevant services. Economic flows rarely coincide conveniently with jurisdictional boundaries (see Department of Transport, 2006, 2007 for a detailed discussion).

The same issue arises with investment in major projects as clearly demonstrated by Altshuler and Luberoff (2003) for such project in major cities in the US. A good current example of this is the long-standing proposal to develop *Crossrail* a new full-gauge rail system which would link communities across the wider London region from Maidenhead (Berkshire) and Heathrow in the West to Shenfield (Essex) and Abbey Wood in the East. There will be a new tunnel section between Paddington and East London linking six stations in central London with connections to the London Underground (metro) system. The outer parts of this route are outside the boundaries of the area controlled by Transport for London, especially in the West where three local authorities are involved with one further one in Essex in the East. Whilst the major reason for delay is not directly associated with this division of responsibility and ultimately the decision will be a central government one to underwrite the funding, it nevertheless precludes a single voice promoting the project. Furthermore as the Barker (2006) review of planning for major projects has identified the devolution of detailed planning decisions to local authorities can lead to unnecessary delays with projects which can be shown to be in a wider regional or national interest.

The argument for Crossrail is essentially an economic one about the wider benefits. This has led to a significant amount of research to identify the way in which such a development will benefit productivity and agglomeration effects in the wider London labour market. The key to these impacts is the relationship between employment density and productivity and the way in which labour supply may adjust in imperfect markets to changing patterns of transport costs. Using detailed evidence on price-cost mark-ups estimates of productivity gains can be made (Graham, 2007) and labour market evidence on agglomeration (Venables, 2007), estimates of the wider benefits can be calculated. These suggest that the wider benefits may amount to as much as 55 per cent of the direct transport benefits (Department for Transport, 2005). This is an aggregate benefit, the distribution of such benefits between different jurisdictions may be more critical to the acceptability of a project. Such distribution effects are not certain and may differ with different projects as shown in a stylised manner by Venables and Gasiorek (1999). This demonstrates clearly the potential

loss of overall benefits which could be incurred without some overall planning of a project which can account for the full wider benefits. Individual authorities are more likely to engage in behaviour which results in a race to the bottom.

### **European Cross-Border Rail Connections**

The second example is that of rail investments in the Trans-European Networks. This applies both to the international elements in the high-speed passenger rail network (such as the North European HSR Network which links five member states) and the main multi-modal links. Despite an overtly common accounting system for rail under various European directives, investment is appraised differently in different member states, particularly with regard to the relative use of public and private finance. Even allowing for this there remain differences in key elements of the public sector appraisal system, such as different discount rates which make it difficult to get a common appraisal basis for a complete project.

The North European HSR system involves separate projects in each country (more than one in Belgium, for each of the three links radiating from Brussels towards France, Germany and the Netherlands). Since the link between Brussels and Köln involves services operated by two different technologies there have been further technical problems in accommodating both services on a single infrastructure (see Vickerman, 2006b for a more detailed discussion). This has led to distortion both in the timescale for the development of such services and in their wider impact. Whilst the French parts of the network were completed in 1993, the entire network will only be completed in 2007.

The root cause of the problem can be traced back to the different regulatory structures in place for the rail sector in the five countries which led to differing appraisal procedures. These were compounded by a differential use of public-private sector partnerships. Thus in France and Belgium the rail networks were developed by the public sector whilst in the Netherlands and UK joint ventures with the private sector were developed, but with the public sector leading in the Netherlands and the private sector leading in the UK. The degree of effective public subsidy was vastly different in the different cases, as was the degree of

control maintained by the public sector and its exposure to risk. In the British approach what was initially a private sector venture into which the public sector bought in order to guarantee certain regional and local benefits became a largely public sector project in terms of finance and risk bearing and arguably poor value for money for the public sector (National Audit Office, 2001). In the Dutch case much greater initial control was maintained by the public authorities which let management franchises for the delivery of the infrastructure (and separately for the services on it) through arms length relationships (Vickerman, 2006b).

Hence regulation, and above all variations in regulation, have led to effective difficulties in the effective and consistent appraisal of investments and consequently the realisation of benefits. In most cases it is likely that variations in regulatory impacts arise simply because projects cross regulatory jurisdiction boundaries, with no regard being given to this in the appraisal process. Each jurisdiction applies its own appraisal policies and then there is an attempt to resolve any deviations in the investment decisions. What we have not explored so far is the possibility that any implicit competition in regulatory structures might be used to capture potential benefits. In this case jurisdictions would be aware that there may be the potential for a project's benefits to be redistributed between jurisdictions according to the final nature of details of the project or any conditions imposed. This situation could be exploited to impose regulations which ensured a larger share of the benefits.

This implication is based on the findings from the application of a simple model by Francois and Wooton (2001) which shows how the gains from trade liberalisation can be distorted by imperfect competition in the shipping industry. Similarly, Findlay and Round (2006) show how bilateral agreements and the attitude of regulatory authorities to airport pricing and mergers have led to the loss of potential benefits from liberalisation in air transport.

This suggests that moves to deregulate and liberalise at an international level in the interest of promoting greater efficiency may simply result in the emergence of alternative forms of market impediment at the national level which aim to capture the potential gains. The issue is thus whether the fragmentation which arises from the removal of high-level

regulatory structures in the interests of competition does not simply produce a less efficient wasteful set of regulatory structures. Does this suggest the need for a return to more centralised regulation at national over regional, or supranational over national levels? An alternative point of view would be that greater transparency in the regulatory structures could lead to a more competitive environment as inconsistencies would be clearer. It is the ways of achieving this which poses a challenge for further research.

## **Conclusions**

In this paper we have sought to address the question of what happens when a transport service or infrastructure is provided across jurisdictional boundaries which have different competitive and regulatory structures. The essence of this is that the lack of coordination, or potentially worse the existence of competition between authorities for selfish reasons, can lead to outcomes which are both inefficient and welfare reducing. Using analogies with theories of taxes and standards under fiscal federalism it is relatively easy to show the types of problems which may arise in a world of imperfect competition and asymmetric information.

We have examined superficially the issues which might arise in a metropolitan labour market within a country which is not contained in a single regional authority or over links in an international infrastructure network such as one of the trans-European networks. These have shown the potential for problems similar to those which have previously been identified in the international shipping or airline sectors.

The next stage is therefore to develop more formally a model of such market situations to assess what degree of intervention or adjustment to an appraisal might be needed to correct for such problems.

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