

## The Limits of De-regulation of Transport Infrastructure Services – Report on the OECD/ECMT Round Table 129 –

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### 1. Introduction

On 13-14 May 2004 a Round Table was held, by the Joint OECD/ECMT Transport Research Centre, on “The Limits of (De-)Regulation of Transport Infrastructure Services”. The discussion was based on background papers by Dominique Bouf and Julien Leveque (Laboratoire d’Economie des Transports, Lyons) Antonio Estache (World Bank), Günter Knieps (Albert-Ludwigs Universität Freiburg) and Marco Ponti (Università Politecnica Milano). The papers focused on special subtopics which provided the basis for the discussion.

Since the end of the 1970s, strong political forces have led to a reduction of public sector production in the vast majority of countries around the globe. In the US, for example, the share of what was produced in fully regulated industries decreased from 17 per cent in 1977 to about 6.6 per cent in 1988. Besides banking and insurance, telecommunications, public utilities and oil and gas extraction, it was the transport sector which underwent substantial regulatory reform. Significant reform steps were implemented for airlines, railroads and trucking, but only partially for pipelines, urban transit and inland waterways.

The motivations for the deregulation movement were strong and varied. Beyond a rather general expectation that deregulation and the substitution of public by private production would lead to efficiency gains, fiscal arguments have played a dominant role, in particular for transport infrastructure investment. Deregulation and privatisation were supposed to lead to a higher level of investment and a reduction in demands for public funds. For some parts of the transport sector, and in particular with respect to the provision of infrastructure services, deregulation is still evolving in many countries. For others, however, there seems to be increasing political support to re-regulate. Where systematic empirical information is available, it suggests that the fiscal objectives in particular have not been achieved. The volume of private capital that has been attracted to transport infrastructure has remained low relative to overall transport infrastructure investment. Moreover, the contractual rela-

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tions between governments and private providers of infrastructure services seem to have been far from stable. Overall, deregulation and privatisation seem to have had limited success in reducing the need for allocating public funds to the finance of transport infrastructure.

The first part of the Round Table discussion was devoted to clarifying the form and degree of regulation required for the transport sector and for the provision of infrastructure services in particular. It centred on the question of to what extent genuine competition is to be expected in the transport sector and to what extent the decreasing average costs of transport firms form the basis of natural monopoly powers. This part of the discussion will be reported in section 2. In section 3, we set out the second part of the discussion, focusing on the record of the deregulation efforts. Besides their limited success in achieving their fiscal objectives, regulators seem to hold a relatively weak position *vis à vis* the regulated firms: renegotiations of regulation contracts seem to be frequent and the bargaining power of the regulated firms appears to be increasing over time.

The Round Table concluded with a discussion of new concepts of regulation to strengthen the position of the regulators in pursuing the interests of transport system users, as well as those of present and future taxpayers. The last section sets out some general conclusions following from the discussion.

## 2. The limits of competition in the market and for the market

Historically, the reason for transport infrastructure services provision being in the public sector domain lies in the view that many services are “natural monopolies”. The indivisibility of transport infrastructure facilities, in general implies decreasing average costs with an increase in the number of users. In most geographical settings it would therefore be technically inefficient to have more than one local supplier of transport infrastructure services. It was believed that a public monopolist was much more likely than a private one to pass the cost advantages of a single supplier on to the consumers by charging prices that reflected costs. Given these beliefs, it was natural to give the supply responsibilities to state-owned monopolies. The Round Table discussed the problematic features of the transport sector, where infrastructure policies were based on what might be seen as an over-generalised natural monopoly hypothesis for the sector.

The historical “natural monopoly industries” were and are typically composed of both potentially competitive segments (for example, railroad rolling stock), where competition in the market may be an effective way to allocate resources, and other natural monopoly segments (for example, railroad track) where competition in the market would lead to a high degree of monopoly power. The vertical integration has expanded monopoly from one horizontal level (the natural monopoly level) to other, potentially competitive segments.

As has been argued convincingly by Knieps (forthcoming, this issue), it is crucial for successful deregulation to single out the potentially competitive from the natural monopoly segments. Strict criteria have to be applied to single out the latter. Following the terminology of the US antitrust legislation, they must constitute “essential facilities”, or a monopolistic bottleneck. Facilities are considered to enjoy network-specific market power if:

- they are indispensable for reaching customers and/or competitors to access complementary markets;
- there is no substitute to using just one particular facility;
- costs are high relative to the market potential such that an equilibrium with additional providers does not exist.

#### *Market entry and contestability*

Even if these technical characteristics are given, potential entry might obviate the need for regulatory intervention. In fact, part of the deregulation policies were based on the expectation that markets for transport operations and/or the provision of infrastructure services would be contestable. (On the concept of contestable markets, see Baumol, 1982 and Baumol, Panzar and Willig, 1982).

Contestable markets are markets where suppliers do not enjoy monopolistic market power, even if their number is small, due to the threat of market entry by potential competitors. To avoid market entry, incumbents supply under conditions which are similar to actual competition in the market, and efficiency is thereby ensured. However, crucial conditions for the contestability of markets do not necessarily hold for the transport sector, in particular for the provision of infrastructure services (Stiglitz, 1987).

- First of all, at least parts of the infrastructure investment costs are sunk. As infrastructure facilities are immobile and have no or imperfect resale markets, suppliers cannot recover the invested resources by selling the facilities in case they decide to exit the market.
- The existence of monopoly rents of incumbents may not attract entry. Potential entrants will anticipate what happens after entry, i.e. the fact that the positive profits of an incumbent monopolist may entail negative profits for an entrant who attempts to contest the market. In other words, a post-entry equilibrium might not exist due to the indivisibilities of the facilities<sup>1</sup>. Potential competition is then no substitute for actual competition.

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<sup>1</sup> This problem has attracted much attention in location theory and more recently has been studied for the competition between airlines (Button, 1999, 2003).

- With sunk investment costs, entry may not lead to competition but to tacit or explicit collusion, driven by each firm’s understanding of what is in its own interest.
- Attempts to avoid potential competition might lead to an inefficient choice of technology: Technology and capacity decisions of incumbent providers will be made, aiming at the preemption of further entry (cf. Davidson and Deneckere, 1986 and Kreps and Scheinkman, 1983). Potential entrants, on the other hand, will try to make technology choices that facilitate collusion, which might differ from least-cost technologies.

Neglect of these problems has led to support for simplistic privatisation and “complete” deregulation policies which have proved to be unrealistic or ineffective policy options, at least in transport infrastructure sectors (Joskow, 1999).

#### *Vertical disintegration*

The identification of the sector segments with potential competition and the isolation of the genuinely monopolistic sections has often been the basis of jumping to the conclusion that these parts should be vertically disintegrated. The most prominent discussion of whether such a conclusion is justified concerns the separation of the railway operations from the provision of the railtrack services.

While a general analysis of the transaction costs of potential trade relations between operators and infrastructure service providers is still unavailable, it seems that deregulation experience has led to less support for vertical disintegration, in particular in the rail sector. The analysis that led to the proposal for vertical separation has, as is now emphasized by the sceptics, neglected transaction costs which are caused by trading transport infrastructure services on markets. In fact, in view of the widespread advocacy of the separation of infrastructure services from operations, its actual role in railway policies has been limited. It is an important part of the transport policy of the European Commission but the separation including the privatization of the provision of infrastructure services has only been implemented in Britain. Interestingly, this form of restructuring of the rail sector is unique to Europe (Nash and Toner, 1999). Given the strong theoretical support for vertical disintegration this is all the more surprising, as only in the US can we speak of competition in the market of vertically integrated railway companies.

The downside of vertical integration and the saving of transaction costs are the increased costs of ensuring competition in the potentially competitive market segment. Even with vertical separation of transport operations and infrastructure services, one of the most difficult, contentious and important tasks which regulators must confront is defining the terms and conditions under which operators should have access to the regulated “bottleneck” infrastructure facilities that they need to serve their customers.

If transport operations and provision of infrastructure services are vertically integrated, regulators are confronted with enormous information costs to define the terms of non-discriminatory access to infrastructure facilities. A basic pre-condition for establishing non-discriminatory access is the existence of transparent cost accounting systems with a clear separation of variable and fixed costs for the different integrated activities. The cost accounting framework has to allow the detection of cross-subsidization and the verification that infrastructure pricing is not discriminatory against competing operators.

Access to infrastructure has, however, more dimensions than just pricing. The quality of equipment provided, the information on demand and customer characteristics, the coordination of timetables for railways, etc., all offer opportunities for discrimination. Non-price terms and conditions of access to infrastructure often involve subtle issues that are even more difficult to identify than price discrimination.

#### *Competition for the market*

Even if there remain natural monopoly parts of the transport sector, competition can still be theoretically exploited by putting up for competitive bids the exclusive right to provide the service with natural monopoly characteristics, offering medium- to long-term franchise or concession contracts. Based on the seminal work of Demsetz (1968), some advocates of deregulation and privatisation argued that such a competitive bidding would lead to efficient supply, obviating the need for regulation. While franchise contracts have been successful for some parts of public services, with relatively small transaction costs to set up the contractual relation and a relatively small scale of investments, they have not been a panacea for transport infrastructure projects (Ponti, forthcoming).

First, the durability of infrastructure investments requires long-term franchise contracts to recover capital costs. In many countries, the state of financial markets, i.e. the unavailability of long-term credit, is a serious obstacle to setting up long-term concessions of franchises. Short-term finance for long-term infrastructure investment confronts private investors with the double risk of dramatically changing capital market conditions, plus the risk that the government might not maintain its commitment to the public-private partnership. In both cases, investors might be unable to recover the high share of investments in transport infrastructure that is sunk.

On the other hand, the high costs of terminating a franchise contract on the provision of transport infrastructure services and having a new competitive bidding process limits the possibilities of a contract administrator to commit credibly to a detailed, *ex ante* specified regulatory policy.

Another determinant of what might be a weakening of the public administrator's position over time is the fact that incumbents accumulate knowledge capital that can only be acquired by actually operating the facility.

Together with the impossibility of specifying all contingencies in a franchise contract, this implies a potential *ex post* hold-up problem. In other words, private partners maintain the quality of the service, make capacity adjustments or adapt prices only if additional demand by public partners is met. Renegotiation of transport infrastructure investment has been the rule rather than the exception and public concession contract administrators have essentially the same job as regulators.

There is very little disagreement that "competition for the market" does not work as a substitute for real market competition in the provision of transport infrastructure services. Good regulatory institutions are crucial to improving the performance of the natural monopoly segments of the transport sector in general and transport infrastructure in particular. They are also the basis of the introduction of competition into the potentially competitive segments of the transport sector.

#### *Political economy*

A major reason for the disappointment with regulatory policies lies in the fact that regulatory concepts were mostly aiming at increasing efficiency only, while actual policies were fraught with various distributional objectives as well. In the practice of transport policy, distributive objectives sometimes play a greater role than efficiency objectives even if regulatory policies are not useful instruments to change the personal or regional distribution of income. The most common redistributive objective of transport policy measures and infrastructure investment has been the broad social objective of giving all citizens of a country access to transport infrastructure services at "affordable" prices. Other distributive objectives of transport and regulatory policies have been to sustain or increase local employment levels, to achieve a more equal regional income distribution and to favour local equipment manufacturers or construction companies. The latter objectives have at times been argued for by making reference to efficiency objectives, i.e. by arguing the case of realising network economies or increasing returns to scale.

As a consequence, the regulation of natural monopolies has been used as a vehicle to implement a wide range of implicit tax and subsidy programmes. The regulation of transport infrastructure facilities is an effective instrument to achieve distributional objectives for at least two reasons: the monopoly status makes it impossible for the (local) economy to undermine the distributive intentions by behavioural changes or re-adjusting business plans; second, the magnitude and nature of the redistribution of income and wealth may be buried in a complex system of tax- and tariff-setting, plus fiscal redistribution which insulates the policy from any meaningful public scrutiny. Such a system of hidden taxes and subsidies is

much more difficult to monitor than “on budget” legislative tax and direct subsidy programmes.

At least to some extent, cyclical changes of the views on regulation have to do with polarised views on the role of government in a market economy. The position favourable to regulation is based on the assumption that it serves a “public interest” by correcting some form of market failure, in the particular form of a natural monopoly (Noll, 1989). It corresponds to the metaphor of the political decisionmaker being an omniscient and omnipotent welfare maximiser. It follows that these social welfare maximisers should either directly regulate or manage firms. Such a view emphasizes and emphasized policymaking as a technical problem. It is based on the implicit assumption that once a policy which maximizes or improves social welfare has been found and recommended, it will be implemented as designed, and the desired effects will follow. The overwhelming evidence conflicting with this view of planning and policymaking, interpreted as “imperfections” of government decisionmaking, sometimes resulted in the extreme belief that deregulation and the toleration of the associated market imperfections would lead to the best practical outcomes.

Both positions disregard the endogenous process of political decisionmaking; they ignore that a policy proposal is the starting point of a process which is political at every stage -- not only the process of legislation but also the implementation, including the choice or formation of an administrative agency and its subsequent operation. They fall short of incorporating a model of the political process whose essence is that many participants simultaneously try to influence the actions of the immediate policymaker.

Beginning with Stigler (1971) and continuing with Peltzman (1976) and Becker (1983), the public interest view had been challenged by a theory of the regulator’s behaviour, with the implications that compact, well-organised groups (frequently producers) will tend to benefit more from regulation than broadly diffuse groups (like consumers or taxpayers). Regulatory policy will then seek to preserve a politically optimal distribution of rents across the coalition of well-organised groups. As the political benefits (e.g. re-election chances) arise from the redistribution of wealth, the inefficiency created by the regulatory process is limited by the decreased redistribution potential. The discussion at the Round Table, however, showed that a more general recognition of the political process in regulatory policy is needed.

The above-mentioned early literature on “capture” ignores informational asymmetries. In the absence of such asymmetries, firms would be unable to extract rents and therefore have no reason to influence the political process that leads to the regulatory outcomes. Voters and legislators would be able to control their agents (members of committees and agencies) who thus would not get away with policies favouring interest groups over the common good. Only recently have theoretical concepts become available which help to analyse why regulated firms and interest groups have been active in influencing the political process

concerning regulation of the provision of transport infrastructure services (Laffont and Tirole, 1993, Part V)<sup>2</sup>.

There was strong agreement among the Round Table participants that the political economics of the transport sector explain why deregulation has remained partial in many countries and why the outcomes of deregulation have been unexpected. In contrast to the prescriptions which were developed according to the “public interest” perspective of regulation policy, the segments of the sector which have a potential for competition were not deregulated (long- to medium-distance bus services in some countries, railway transport operations) and where regulation is needed, often no regulatory agencies were set up. Where regulatory institutions had been set up, regulators almost always lacked independence, or were not accountable to the general public.

This leads to the question whether and to what extent regulators should be given discretionary powers or their action space be constrained by constitutionally fixed rules. Such rules could in principle limit the influence of interest groups, incumbent firms and other well-organised groups and therefore regulatory capture, as is emphasized by the public choice or contractarian literature on regulation (cf. in particular Buchanan and Tullock, 1962, and Buchanan, 1988). If the involvement of interest groups and firms in the political process is aiming at changing the distribution of rents arising from the provision of infrastructure services, this could lead to better regulatory outcomes. However, renegotiation of regulatory arrangements might be required by the fact that they are incomplete; that, for example, concession contracts cannot account for all possible contingencies. The restriction of the possibilities to renegotiate the terms of regulatory arrangements might then well increase hold-up problems in an ongoing contractual relationship, i.e. lead to inadequate quality and capacity expansion due to perceived political risks for the private investors (Hart, 1995). Moreover, it does not appear to be certain that the establishment of constitutional rules of regulation does not suffer from a political influence that leads to outcomes which differ from the “public interest” prescriptions (Dixit, 1996, chapter 2).

### 3. The Empirical Record of Decentralising the Transport Sector

Empirical information on the effects of deregulation and privatisation of transport infrastructure provision is scarce and often anecdotal. Reviewing the unsystematic evidence gives the impression that, overall, deregulation has led to efficiency gains, with substantial differences between the modes of transport. Significant efficiency gains have been achieved

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<sup>2</sup> A more general review of the analytics of the political decisionmaking process can be found in Tirole (1994) and Dixit (1996). Grossman and Helpman (2001, 2002) have extended this approach by developing an analytical framework of interest group behaviour with special reference to trade policy. Wilson (1980, 1989) studies the dynamics of newly created agencies.



where the potential for competition in the market for infrastructure services is relatively high, e.g. for ports or airports.

Systematic international evidence is provided by an international survey “Public Works Financing International” (cf. Estache 2001 and forthcoming). It estimated that about 1 137 transport infrastructure projects with private involvement, worth US\$ 684 billion, were planned in 2003. About half of them were toll road projects, a quarter in the railway subsector, and the rest were plans to finance air- and seaports.

The fact that only one half of the projects were under construction or in operation by 2003 might indicate that the enthusiasm of the early nineties had suffered in the process of defining the details of public-private projects in practice. The 1997 financial crisis led to a major drop in the number of commitments. At the same time, the dimension of the decrease was greater for poorer countries than for rich countries. The diminished expectations of private investors are reflected in the doubling of the debt-to-equity ratio from the mid-nineties to 2001. The average cost of equity to finance transport infrastructure is, according to World Bank accounts, 3 percentage points higher than the average of transport infrastructure capital costs.

Another aspect of the diminished expectations is the less than expected stability of deregulation and privatisation arrangements: where systematic evidence is available, renegotiation of concession contracts has been the rule rather than the exception. In a sample of infrastructure concession contracts in Latin America, about 30 per cent of all concession contracts which had been set up between 1983 and 2000 were renegotiated. In the transport sector, the share was more than 50 per cent. On average, renegotiations started already about three years after signing the contracts. Certainly, not all of the renegotiations can be considered to be problematic. On the contrary, the incompleteness of concession contracts makes them inevitable and implies that they may enhance efficiency. The high instability of transport infrastructure concession contracts, however, casts doubts on an optimistic view regarding the optimality of the contracts and the substitutability of competition in the market by competition for the market (Estache, forthcoming).

The disappointment with the limited extent of political implementation and the achievement of its objectives notwithstanding, efficiency has improved, according to most case studies (Joskow, 1999, Winston, 1993). This has been confirmed by the Round Table discussion. Of major importance for the success of deregulation seems to be the time frame of the implementation. Whether privatisation and deregulation should be introduced gradually or by taking one big step is a relevant question without a universal answer. The decisions on the sequencing of reforms have depended on:

- the performance attributes of the existing system and the analysis of where the current performance problems are;

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- the complexity of implementing a ‘big bang’ approach, given the imperfections of current regulatory institutions as well as the distortions resulting from the current pricing and taxation regime;
  - the capacity of legal and political institutions to support competitive markets for infrastructure services;
  - the time required to create market and regulatory institutions; and finally
  - the government’s capability to commit *ex ante* to a restructuring framework that supports investment and competitive entry.

As has been pointed out above, one of the most important drivers of privatisation and de-regulation was the expectation that the provision of transport infrastructure services would be depoliticised and the implementation of hard budget constraints would lead to substantial benefits for the fiscal sector. The evidence which is available so far does not allow a final judgment on whether the fiscal objectives have been achieved: Early empirical studies gave a positive picture of the fiscal consequences of privatisation and deregulation. There are, however, indications that the reported effects were largely of a temporary nature. The divestiture of transport infrastructure facilities led to one-off public returns which led in turn to short-run improvements of the fiscal situation of public authorities. More importantly, the rental payments of private service providers to the public owners have been temporary as well: a recent study looking at debt reductions, sales and rental fee gains has shown that the recurrent expenditures increased significantly. Most of these increases were due to demands or subsidies for passenger transport. The return of operational subsidies might be a signal that the reform of the transport sector has not achieved the objective to depoliticise the sector.

In many cases, the expectation that privatisation and deregulation would do much to increase the level of transport infrastructure investment has not been met either. The share of private capital in financing transport infrastructure has remained relatively low and, with privatisation, the public investment part seems to have dropped by more than what was taken up by private investment. To some extent this has been due to the fact that transport infrastructure investment was a target for realising public expenditure cuts even more than before the reform (Campos *et al.*, 2003).

Another reason for the limited success of the reforms lies in the fact that in many countries the number of potential bidders for concession or franchise contracts has been very small. Apart from the resulting danger of collusion in the bidding process, this is a potential basis for rent-seeking activities by incumbent private firms.

#### 4. Regulatory Concepts

To some extent the disappointment with the regulatory reforms of the transport sector derives from the malfunctioning of the regulatory mechanisms that had been put in place. A last discussion block of the Round Table therefore addressed questions concerning the improvement of the regulatory mechanisms.

If a regulator had complete information about the regulated firms' present and future technological and cost opportunities, about the demand of all types of consumers and how they will evolve, about the data necessary to pursue distributional objectives and about the public's assurance that the regulator can be trusted to pursue his goals efficiently and impartially, the regulator's task would be straightforward. The regulator could calculate (second-best) optimal price levels and an optimal tariff structure for every point in time and adjust them as costs, demands and distributional objectives change. The regulator would simply execute a well-defined set of "public interest" objectives efficiently. If this were a useful characterisation of reality there would be no reason to separate the regulator from the regulated firm, since the public regulator would have all the information required to produce and price efficiently. This has sometimes been the implicit rather than explicit rationalisation for the public ownership of natural monopoly (sub-) sectors.

The central problem of the design of regulatory mechanisms is the fact that the regulated firm has private information about available technologies and corresponding cost functions, the operating characteristics of its network, the effort it expends to reduce costs, the quality of its services and the responsiveness of its customers to various quality and price signals. Even if this asymmetry of information can be substantially reduced in principle, the potential efficiency gains to be had from such a reduction have to be measured against the monitoring and control costs of the regulator.

In fact, standard regulatory concepts did not and do not recognise that cost, demand and quality information is not publicly available and that the monitoring of regulated firms is costly. This holds for "cost plus" contracts where owners or franchisees are allowed to charge prices, or are paid transfers, to cover the full costs plus a "fair" rate of return. It holds for the various pricing rules, the variants of marginal cost pricing and average cost pricing, and for rate of return regulation, too. To verify the performance of the firms, the regulator has to know not only the actual cost of the firms but also the technically possible least costs. If the best practice technology or least cost input-output relationship is unknown to the regulator and/or if the monitoring and verification of the costs and demand information of the regulated firm is costly, firms do have opportunities to receive information rents. In other words, reported costs might conceal profits such as overstaffing, overinvestment in firm amenities and a "quiet life", in the sense of a low level of effort to reduce costs or improve the quality of the services provided. In some way, the regulator is confronted with the problem of containing informational rents independently of whether the

regulated firm has a public or private owner or is operated by a private concession-taker with public ownership.

The Round Table discussion reflected a growing support for the view that private ownership of transport *infrastructure* facilities poses enormous problems to achieve the regulatory objectives. At the same time, there was a broad agreement that public ownership does not obviate or reduce the need for regulation. The rent-seeking opportunities of a public firm and/or private franchisees are not fundamentally different from those of regulating privately owned and operated firms. Two main arguments seem to favour public ownership of transport infrastructure facilities:

- It is often easier for private firms to hide information from the regulator. The revelation of some part of the relevant business information might conflict with the interests of private shareholders.
- The high degree of indivisibility of transport infrastructure investment and the fact that markets for infrastructure facilities do not exist imply that there is a holdup problem: private investors perceive the risk that after the investment has been realised and expenditures are sunk, governments might revise initial commitments to the disadvantage of the investors. Due to these circumstances, the chances of combining private ownership of transport infrastructure facilities and a strong regulatory regime seem to be limited.

Against this backdrop, the regulatory concepts have to be evaluated according to their effectiveness in reducing the informational asymmetries between the regulator and the monopolistic firm, and the associated potential for earning informational rents by the regulated firm.

Yardstick competition is perhaps the most important instrument which allows the regulator to induce the regulated firms to reveal truthful cost information. The basic concept foresees that the regulated firm sets its price equal to the average of the marginal costs of other similar firms producing the same good or service. Additionally, the firm receives a lump-sum transfer, equal to the average investment of other firms to reduce their cost. Thus, for each firm a “yardstick” is defined by the performance of other firms. Shleifer (1985) has shown that, in a non-cooperative equilibrium, each firm has an interest in revealing its true cost and investment to reduce its cost.

Although yardstick competition has been applied in the Japanese railway sector (Okabe, 2004) and in the Norwegian bus industry (Dalen and Gomez-Lobo, 2003), it has not been introduced in the transport infrastructure sector beyond the proposal of extending benchmarking efforts to yardstick competition (Estache *et al.*, 2002, on Mexican port liberalization).

There are four major reasons for the slow progress in introducing yardstick competition in the provision of transport infrastructure services:

- A first reason lies in the fact that many infrastructure facilities are interdependent or form a network. If there are unbounded network economies, the introduction of yardstick competition implies that the country or region in question has to forego network economies to increase the (surrogate) competitive pressure. For railways, for example, this seems to be a difficult decision to take, as the British example shows.
- The benefits of yardstick competition and performance evaluation can only be reaped if the agents act non-cooperatively. As Shleifer (1985) had already remarked, “an important limitation of yardstick competition is its susceptibility to collusive manipulation” (p. 327). The stronger the network economies the smaller will be the number of firms that are subject to yardstick competition. Given a small number of firms and repeated interaction between the regulated firms and the regulator, collusion between the regulated transport infrastructure service providers is a pertinent possibility. The danger of collusion can be reduced by changing the yardstick scheme but at the cost of achieving a social optimum. This has recently been confirmed by experimental research (Potters *et al.*, 2003). What is more, collusion-proof yardstick mechanisms appear to be hard to define in general (Lafont and Martimort, 2000).
- Even if competing transport infrastructure entities of the same mode can be defined, the question arises whether they could and would have identical cost functions in the state of technical efficiency. Transport infrastructure facilities, as local monopolies, are strongly influenced by exogenous factors like geography as well as the population density and its distribution. Therefore, the firms subject to yardstick competition will be heterogeneous and it might be difficult to account for the heterogeneity in defining the correct, firm-specific yardstick (Bouf and Leveque, forthcoming).
- The heterogeneity problem is made more severe if yardstick competition is implemented in a system of decentralised regulatory powers, entailing the danger of the emergence of differing local yardsticks, leading to discriminations between firms (Bivand and Szymanski, 1997).

For all these reasons, the chances for implementing yardstick competition for maintenance may be greater than for construction and capacity adjustment of transport infrastructure. A first important step towards the implementation of yardstick competition is the adoption of accounting conventions that allow a benchmarking between firms using comparable data at a fairly aggregate level. Price cap regulation combined with the assignment of the burden of proof of cost conditions and investment levels to infrastructure service providers were seen as an important step forward to improving existing regulatory regimes.

## 5. Summary of Policy Conclusions

While deregulation and privatisation in the transport sector has led in general to increases in productivity, not all desired effects of the reforms have materialised. This holds in particu-

lar for transport infrastructure investment, where privatisation and deregulation have not caused the expected mobilisation of private resources and where franchise relations have not been as stable as expected. Based on the current conceptual discussions and a review of the reform results, the Round Table drew the following conclusions:

- The internal heterogeneity of the transport sector does not allow for polar policy prescriptions such as “deregulate and privatise” or “tax finance and produce publicly”. Whenever competition in the market is possible, and entry and exit costs admit potential competition, market outcomes will be superior to detailed regulatory regimes and public production.
- There are, however, major parts of the industry where indivisibilities, network economies, and the absence or malfunctioning of resale markets for investment goods lead to inefficient market outcomes. Strict criteria should be applied to identify those sections which require regulation at all.
- In these sections the opportunities for private ownership, in particular for transport infrastructure, have been sometimes overrated. The regulatory tasks for the monopolistic parts of the sector do not differ fundamentally between different regimes of ownership.
- The transaction costs induced by regulatory regimes deserve greater attention than in the past. A major area of debate in this respect concerns the separation of ownership of infrastructure and transport operations. The Round Table discussion reflected a growing concern that the neglect of transaction costs has led to problematic consequences of vertical disintegration.
- Any regulatory policy has to acknowledge informational asymmetries between the actors involved. Some of the traditional regulatory concepts have ignored the enormous monitoring and control costs incurred by regulators.

Transport sector reforms did not have much success in depoliticising the provision of transport infrastructure services, as well as transport services in general. In most cases, regulators do not enjoy the independence envisaged at the beginning of the reform process. The incompleteness of concession contracts and mutual commitment problems of contract partners have led to frequent renegotiations with a political character.

Both these characteristics, the information problem and the lack of de-politicising regulatory policies, suggest that rule-bound, performance-based mechanisms like yardstick competition should play a stronger role for the transport sector. The implementation of such mechanisms would reduce the information problems of regulators and the opportunities for discretionary, opportunistic behaviour by regulatory agencies.

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