THE REGULATION OF TRANSPORT SERVICES AND INFRASTRUCTURES: THEORETICAL AND POLICY ISSUES

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Abstract
The relevant theory assumed here for public regulation is known as "Public Choice", against the traditional "Social Choice" approach. The paper then analyzes the relative role of planning, regulation, and market competition within the transport sector, suggesting a "subsidiarity" rationale for policy intervention in general, and for transport infrastructures in particular. A set of technical issues of regulation is presented, stressing their overall impact on the performances of the sector. The conclusions focus on the close links between market competition results and effective regulation policies.

Keywords: Regulation; Pricing; Public choice
Topic Area: H7 Regulation / Liberalization

1. A few theoretical assumptions

The traditional "social choice" approach states that public intervention is needed in presence of social goals and/or of market failures. Historically this intervention has assumed the form known as "command and control", via direct production, or, more frequently, by means of "public agencies". The generalised poor performances of these agencies (generated by "capture", "rent seeking", and "informative rents" mechanisms[1]) have in fact motivated both the concept and the practical policy of "public regulation". "Command and control", "Regulation" and "Market competition" in turn can be seen within a "subsidiarity"[2] context: the former is to be employed whenever the latter fails to deliver.

A possible definition of "regulation" is the following one: "State intervention, aimed to reach welfare goals, by setting rules incentivating efficiency-oriented actors". This definition implicitly states that the State has special difficulties in joining welfare and efficiency objectives. Furthermore, "efficiency-oriented actors" may well be public enterprises, but this "orientation" is much more sharp and focused in private ("profit-motivated") firms. The fact that the State faces problems in getting productive efficiency looks inherently quite natural: the minimisation of labour costs is an all-important factor of efficiency, while welfare objectives are in general oriented to enhancing employment and labour conditions. But also managerial skills are compensated and motivated by profit more than by simple "good governance", that is the best possible outcome of public management.

Nevertheless, as we have seen, state intervention is needed not only in order to reach "autonomous" welfare goals, but also when the market fails to deliver productive or allocative efficiency.

Therefore, the very first issue is to define the proper scope of state intervention. And within the transport sector, there exists indeed a wide range of situations where this intervention is needed. Natural monopolies, externalities (both within the standard

[1] See Buchanan, 1969
[2] A term of dominant use within the European Commission policy papers

definition of exernality, like those related with the environment, and in the form of "club" externalities, like congestion), information asymmetries (related mainly to safety issues), and other "special" transport failures, like the "Mohring effect", or the existence of incomplete, or inherently unstable markets. Also income distribution can in some way included in the scope of state intervention, and even if it cannot be defined as a "market failure", it can be a legitimate public objective.

Which service has to be regulated (i.e. is in need of public intervention), and which one can be left open for competition, is theoretically straight-forward: it depends on the political objectives and on the "technical" evaluation of the efficiency of the market.

The second issue is related to the choice between "command and control" public policies, or "regulatory" interventions, within the above-proposed definition.

As we have seen, within a classical "social choice" model, the public "principal" is assumed in fact to be both benevolent and all-knowing. Therefore he will be perfectly able to obtain from his "agents" (public companies) efficient results. Furthermore, his objectives will remain strictly and unwavering aimed at welfare maximisation. But an assumption of public principals as "humans", and not angels, seem much more realistic[3].

Nevertheless, even if "regulation" (against "command and control") is assumed as the dominant strategy, it has to be kept in mind that its role is limited to a well defined subset of public objectives. Productive efficiency is the main one, given that in this area the public "principal" faces severe "conflicts of interests", as we have seen. A second set of objectives is related to natural monopolies and other market failures of the same kind (problems of efficient tariffs and access rules etc.) that generate mainly allocative problems.

But it can be objected that other public objectives cannot be kept strictly at a technical level (i. e. measured in terms of social surplus losses or gains), since their nature remains mainly political: distributive and environmental issues, for example. Also in these cases, a regulatory attitude looks more effective than direct state intervention.

For example, if a country, or a region, decides that local public transport has to be provided free of charge (while other services are deemed less socially relevant), this is a perfectly acceptable choice (but less so if these services are produced via "command and control" practices, and not via competitive tendering).

And in the case of an opposite political choice, if a free-market provision of collective transport generates unstable results, or dominant firms not justified by economies of scale, a proper regulation is again needed, without any foreseeable need to return to "command and control" practices.

Environmental issues are in theory allocative failures (social surplus is not maximised due to excessive consumption). Nevertheless the some concept of externality implies a relevant distributive content (some actors damage other actors without due compensation). Furthermore, the incertitudes linked to the measurement of the related economic costs leave a wide space to political judgement.

But also in this case, the tools needed to reach environmental improvements have to be efficient, i.e. able to minimize the social costs involved in every environmental policy. And a regulatory approach looks by definition more efficient: "vouchers" and and tariff techniques look far more promising than the "traditional" approach of imposing constraints and prohibitions.

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[3] This, has to be noted, not only within the radical context of a "public choice" setting, where the public "principal" is presented as a standard "homo oeconomicus", maximising egoistic objectives. Even within a more relaxed setting, where the mix of egoistic and altruistic objectives may be varied, and ex-ante basically unknown, a prudent attitude push toward some skepticism in assuming a pure "benevolent, all-knowing prince" hypothesis.

In conclusion, while the space of public decision remains very large within the transport sector, the space for "command and control" practices (as an alternative to public regulation) seems to be shrinking, at least in theory.

2. The scope of traditional planning in the transport sector

Important issues within transport policies remain to be dealt with planning instruments, even accepting the increasing role of regulation. The connections between land use, infrastructure planning and landscape control are the main areas where a more direct public role has to remain dominant. Low-density land use has been generated by mass motorization via the increased accessibility of low-cost residential and commercial areas[4]. Low density land use nevertheless makes public transport provision very costly, public transport is generally subsidised, and more so in the case where its full cost becomes unaffordable by many users. Therefore two external costs seem "embedded" in low density land use: public transport subsidies and the environmental costs of a more transport-intensive pattern of settlements (where individual transport becomes dominant). In theory, getting rid of any subsidy to public transport, and in the same time "internalising" all the private transport externalities will solve the problem without any explicit planning activity. But this scenario is totally irrealistic, since this issue is also strictly related with landscape values, that cannot be reasonably "priced"[5].

Regulation can well intervene here in optimising the construction and management process (public financing, concessionaire regimes, etc.). I.e. regulation activity is called to play its role in a later stage of the process.

3. The scope of market competition

Within the "subsidiarity" approach that we have suggested at the beginning, market competition has to be promoted as far as evidence of its failures emerges. Set aside infrastructure operations, where only regulated or "Demsetz"[6] competition is possible, within transport services the different modes offer a quite diverse picture. Within the dominant land transport mode, road haulage is basically open to competition, and no major problem does exist, due to very limited economies of scale and entry barriers that characterise this mode. The same pressure of competition and the social weakness of the operators (often small self-employers) generates problems of law-enforcement, that has to be improved, and even stricter environmental and safety standards are possible, but a re-regulation of this market is out of question.

Remaining within the road mode, long-to-medium distance bus services are urgently in need of real liberalisation, at least in continental Europe. Long-to-medium distance buses compete with rail services for low-income demand, and these services do not have any real impact on the environment, nor any need of subsidies (at the contrary of the rail and local services). Both the users and the taxpayers are severely damaged by this "defence" of the (public) rail services. This is a very effective example of "non-benevolent princes", given the social characteristic of the patronage of these services. The situation, nevertheless, is now slowly improving.

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[4] See Litman, 2002 and Maffii, Ponti, 2002

[5] Think at the price of a Tuscany "renaissance" landscape, menaced by a dozen of high rise condominiums… Infrastructure planning has similar problems: on top of the all- important landscape issues, here the natural and legal monopoly phenomena are also present, as are present regional development objectives. Moreover, for setting priorities and therefore supporting planners in taking into account efficiency objectives, the traditional cost-benefit analysis provides important clues.

[6] See Demsetz, 1968

Local public transport is quite a different case. Here the British experience[7] seems illuminating. Full liberalisation has generated problems of unstable markets, followed by spatial monopolies ("contestable" more within the economics textbooks than in practical terms). The users have been damaged, as the quality of service has deteriorated. There theory supports these practical results: "Mohring effects"[8] "network effects" and other types of market failures apparently are working together with some characteristic of the demand (related to information, the long-term effects of the decisions on residential location and on car ownership, etc.), in generating severe problems.

On the opposite side, regulated ("Demsetz") competition has delivered good results across the board (see the well known London case). Moreover, since regulated competition, in terms of competitive tendering, can fully guarantee any social objective (even free transport, if so decided), the widespread European resistance to the opening of this type of market is another example of "non-benevolent princes", "captured" by the interests of the suppliers of the service. In due time, even some form of full liberalisation may well be introduced, subsidising the users[9] instead of the suppliers (this approach has not been tried in the U.K.), and carefully checking the above-mentioned and ever possible undesirable consequences.

By far a more uncertain picture comes from the rail sector. Here, even within the services, both economies of scale and sunk costs are present, together with the above-mentioned other problems (Mohring effects, etc.). Furthermore, rail services have strong interlinks with infrastructure operations, generating large transaction and severance costs.

It exists very little experience in liberalisation of rail services. The British case has been very peculiar in its form, and anyway not very successful, manly due to severe mistakes in regulating the infrastructure (see also point 4.2.1). On top of this, there is little overall experience of "free access" of rail services over a given track network (set aside a partial case in the U.S.A.).

The European liberalisation process has been up to now reduced to limited entries within the freight sector in the time span of more there ten years. Nevertheless, the reason of this slow pace is far from technical in nature: liberalisation has been opposed with full success by the incumbent public companies, with the single states (their owners) protecting and helping this opposition.

The main problems here are two: the dimension at which separating the services from the infrastructure generates excessive transaction costs[10], and, as we have seen, the possible economies of scale, i.e., whether "natural monopoly" effects can arise even within the rail services.

The existence of the first problem is evident: for a subway line, where the separation of infrastructure from services has little economic sense. The rolling stock here is an essential asset, barely divisible from the infrastructure, and lacking any secondary market. So, where does the threshold lays? Possibly in presence of complex networks, where long-distance passenger services are operated together with freight and local services, separation is advisable. In the case of "isolated" lines with limited demand, separation seems a dubious choice, and a sound public regulation of a monopoly can well substitute open-access strategies.

Economies of scale are different in nature: for sure, there are present in rail services (rolling stock procurement in large quantities, maintenance etc. are strong examples). But here any real experience of a free market is lacking (outside the U.S.A., but even here with

[7] See Banister, 1997 and Fawkner, 1999
[8] See Ponti, 1997
9 See Ponti, 2002 (a) and (b)
[10] See Gomez-Ibànez (2003);

limits and specific constraints). In this case, a well-defined "dynamic" policy can be suggested[11].

The situation looks similar within the air sector. Notwhistanding widespread declarations of "liberalised markets", the sector is highly protected, (and self-protecting). The slot regime is based on "grandfather's rights", so that the must lucrative routes are plyed only by incumbent companies, and the intercontinental services are in general not open to external competition. Cross-subsides in these cases are a natural behaviour of the operators, and so the other markets are affected too [12].

The argument that large companies are "suffering" (even before September 11th), while low-costs new entrants are prospering, and therefore that competition is in fact at work, does not seem convincing at all. Large national companies are "suffering", since many years, from high costs, low productivity, and unsound fare policies; the only new development is that the States involved are for sure less ready now to subside them, and in Europe there are growing constraints in doing so. The low-cost companies are operating from minor airports and cannot "attack" the high-yield routes: i.e. these companies are growing notwhistanding the present barriers, and thanks to their inexpensive low fares are attracting low income travellers (and more recently, also budget-conscious business travellers).

A complete different structure of the entire air sector will probably emerge from a real liberalisation of this market. Little can be said of something never experienced before.

Even in this sector economics of scale, or of network, may play indeed a relevant role. There are also some doubts of another type of market failure that may emerge, in the form of incomplete, and therefore unstable markets[13], with the consequent need of some form of public regulation. But first of all, a real competitive market has to be promoted, getting rid of the "national champion" concept, that has nothing to do with efficiency and the protection of users. Only after this attempt, if problems of instability or "incomplete markets" emerge, public regulatory intervention can be properly aimed.

Sea shipping may be a case of an unstable liberalised market, already operating since many years. The wide fluctuations of demand, supply and prices may have for sure here generated some inefficient outcome, but on balance the overall benefits of this competitive setting seem to make public intervention not advisable, if not in order to protect the environment and, perhaps, the weaker labour components (as we have seen for the road haulage sector).

11 Weather economies of scale play a dominant role, is up to the market to decide. So public regulation has to be focused on braking all the possible entry barriers (technical, financial, informative, etc.), even helping the implementation of a secondary market for rolling stock. (See the British "Roscoes"). If a dominant company emerges thanks to its long-range lower costs, so the better for the users; the regulator has only to avoid "abuses of dominant positions" (i.e. the setting of a "Microsoft-on-wheels"). Given the actual role of the "dominant" inefficient public companies, it is for sure a long way to go before a "dominant" rail company, based purely on its competitive merits, will emerge.

12 See Doganis, 2001

13 See Tucci, 2002

Figure 1 The “Subsidiarity chain” in transport policy action

Main areas		Examples/Current issues
Liberalization	• Transport services in general	• Long distance rail and bus services • Intercontinental air services
Regulation	• Infrastructure operation/building • Unstable/non existing markets of services • Efficient charging and access rules	• Public – Private partnership in infrastructures • “Demsetz competition” for local transport • Competitive tendering for concessions • Slot allocation
Planning (direct public intervention)	• Infrastructure design and location • Environmental and social values • Land use/transport policies	• European “Common Transport Policy”, TEN, etc. • Kyoto standards • Urban sprawl containment

4. The scope of public regulation

4.1 The issues

As we have seen, public regulation has to "simulate" the market pressures toward efficiency, where market competition cannot work properly. This is the case of natural monopolies, i.e. transport infrastructures. "Club" or "co-operative" solutions of this problem can work only in theory: transport infrastructures are in fact not only natural monopolies, but also legal monopolies, in the sense that land use, of which they are a relevant “building brick”, is planned (under a "command and control" type of public intervention, as we have seen above). But their operations and physical construction can be efficiently regulated, i.e. left to efficiency-oriented actors (basically private ones).

It is already so for the pure construction activities, regulated by competitive tendering. Construction joint with operations, i.e. "project financing" practices, deserve a more in-depht analysis, as we will see later.

A proper regulatory regime for infrastructures is a high complex task, with many aspects still to be tested and even fully understood. Furthermore, the "resistance" of the political actors[14] to pass from a "command and control" regime to regulation practices seems specially strong (another proof, if still necessary, of the "capture" mechanisms so well defined within the already mentioned "public choice" approach).

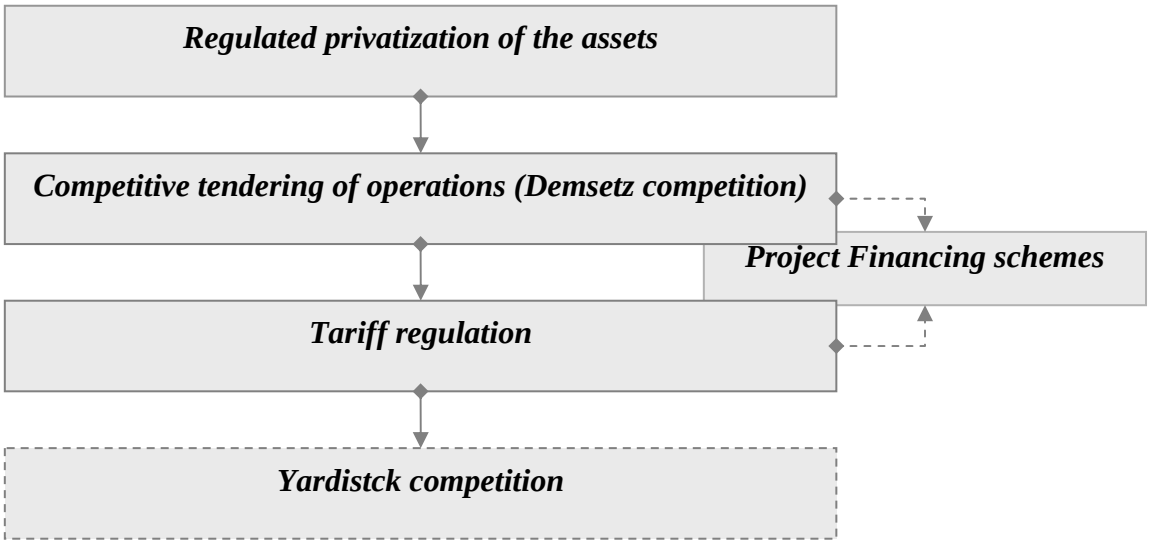
4.2 The main regulatory policies for infrastructures

There exists a wide range of regulatory policies; here are summarized the main ones, in order of their digree of innovative content, i.e. in inverse order of their “distance” from the *status–quo*. This also can be seen as a kind of “subsidiarity chain”.

This logical “chain” is someway different and more complex of the one proposed by Gomez-Ibanez in his recent book on the general subject of infrastructure regulation (2003), since “private contracts”, mentioned in that text as one of the main categories of regulation, are rare within the transport sector, while other issues looks far more relevant.

[14] See Ponti, 2001

Figure 2 The "Subsidiarity chain" in regulation of transport infrastructures



4.2.1 Privatisation of the assets

This is the radical British "model" for every public utility sector. The implicit risk for the public interest seems nevertheless quite high, given the "option value" enbedded in this choice, that is basically non-reversible. "Capture" risks remain paramount, given both the length of the public-private relationship involved (practically ethernal), and the power held by a (generally) large private monopolist, so created by a public decision.

In railways, the U.K. experience has shown severe problems both in information control during the privatisation phase[15], (apparently, the real future costs of maintenance have been underestimated by purpose), and in the subsequent regulatory policy. The core issue is that a private natural monopoly is contestable as a property (others may buy it), but keeps too much power against its public regulator. I.e. this is a policy that again assumes a "benevolent, all-knowing prince". Periodic tenders for concessions looks a far less demanding strategy, since the market pressure itself, and the transparency involved in the tendering process "helps" a more multi-faced control of the results.

For airport infrastructures (again mainly a British experience) the problems seem less severe, even if it remains on the table the developments in the long run, in which this type of policy may face the more complex troubles (for example, varying land use choices).

4.2.2 Competitive tendering of concessions ("Demsetz competition")

We are already seen the advantages of this tool for transport services, when full-fledged competition is deemed not advisable. For infrastructure operations, the experience is still quite limited, but in theory it looks a "balanced" policy, limiting the risks of "capture" linked with very long public-private relationships. For some type of infrastructure nevertheless, the length of the concession has to be fine-tuned, referring on the technical content of the assets involved, and the consequent need of sufficient "learning" time for the new-entrant company: for example, rail and air infrastructures may well need longer concessions than toll highways (that have mainly a simple maintenance and toll collection content).

For infrastructures, it is quite obvious that keeping for a long time the same operator raises the risks of information asymmetries and "capture" phenomena.

[15] See Nuti, 1997 and CESIT, 1998

Furthermore, long concessions for infrastructures are generally explained with the need of amortisation of long-life investments. But this is a highly questionable argument for transport infrastructures: these assets (essentially civil works) have a practically infinite life, and therefore there is no physical amortisation at play, only financial amortisation (if the case), and sound contractual constraints on maintenance standards and obligations seem a sufficient controlling tool. Therefore, the length of concessions can be limited, setting proper rules both for the incumbents and for the new entrants in case of change of concessionaire, the possible consequence of a re-tendering process.

4.2.3 Building and operating concessions ("Project Financing")

When a new investment is the main object of a concession, generally the practice in use sets a very lengthy concession period, assuming the need of a complete recovery of the invested capital. This practice has the well-know advantage of joining the responsibility of construction, operating and maintenance, with the consequent overall optimisation of the entire "system". But we have already seen the risks of long concessions[16], and the weak rationale of linking the assumed physical amortisation with the financial amortisation. Therefore this approach has to be considered with prudence, given also its capability of disguising public expenditures for private ones, via too generous risk guarantees in favour of the private investors, that transform in fact those investments in risk-free "sovereign" loans. This was the case for the high speed rail lines in Italy, but many other projects have similar contents, not easy to be immediately identified, given also the ever-present possibility of reopening negotiations in the long run, and far from a competitive context.

4.2.4 Tariff regulation

Tariff regulation is required basically in two cases: a) dealing with transport services, when there are distributive, congestion or environmental issues so suggesting; b) dealing with infrastructures, when productive efficiency has to be reached without competitive tendering (i.e., when the provider of the service is assumed unchangeable), and finally in the "extreme" case of privatisation of the main assets. "Price-capping" is the main technical tool in those cases. Of course, there are possible "mixed" or overlapping situations.

We deal in some more detail with the uncertitudes related to tariff regulation both within the transport services (see point 3), and for infrastructures (see point 4.3.3).

4.2.5 Yardstick competition

This strategy (known also sometime as "tournament") is for sure a form of "simulated market", but by far looks the most conservative policy among the ones considered here, and remains quite close to "command and control" practices. The regulator limits himself to compare the results of different public companies in the same field (for example, airports or railways), setting "prizes" and "punishments" in accordance to their performances. So far, so good . The problem is that this approach is basically coincident with a sound "command and control" policy, in the case when many operators are at play.

The troubles related to insufficient incentives, mixture of efficiency and welfare objectives, "capture", etc., that gave rise to the regulatory evolution itself, remain present in full. Regulators and regulated subjects are not sufficiently separated and juxtaposed. Even for the Japanese railway reform (perhaps the largest example of a form of yardstick competition within the transportation sector), the model has been adjusted in order to

[16] See Ponti, Federtrasporto, 1996

guarantee a high level of autonomy of the different local companies[17] from the central regulator, with the explicit aim to minimise the risks of "capture" mechanisms[18].

4.3 Some technical examples of regulatory issues within the transport sector

4.3.1 Congestion charges and access rationing

Congestion implies a mismatching of demand and supply of transport infrastructure (access rationing is basically the same issue). Two main problems can be underlined here. The first one is related to “project financing”.

The rationale of the construction costs of natural monopoly being charged to the users can be related with congestion charges, otherwise this charging generates a well-know welfare “dead-weight loss”. In turn, congestion charges are assumed to be by definition efficient, and therefore the related revenues can efficiently (and equitably, see the “club externality” problem[19]) be used for financing the infrastructure costs. But infrastructures "suffer" of indivisibilities, so in general they are under-utilised at the beginning of their technical life, and congested toward the end. Nevertheless financial needs go the apposite way: they are maximal at the beginning and thereafter tend to decline.

This is another element that suggest to keep a prudent attitude toward "project financing" strategies: the “old-fashioned” competitive tendering of construction contracts, followed by a sound periodic tendering of concessions for operations and maintenance, may often be a more prudent choice, where even the charges to the users can be kept under better control.

A second issue related to congestion is the (highly questionable) difference between the road mode and the "controlled access" modes, i.e. railways, airports (and ports).

Congestion on roads has to be regulated via “social surplus-maximising” charges, that exclude the less willing-to-pay traffic. It is assumed that, since congestion is non-existing (or minimal) within the “controlled access” modes, for them no congestion charging is needed. This would be true, if and only if the "excess demand" also in these modes is excluded by the traffic controller with a surplus-maximising rationale. But this is in general not the case: railway and airport (and ATC) capacity is controlled basically by "grandfather's rights", or similar inefficient criteria.

Auctioning the capacity, or setting a rationing access tariff, are the only two possible surplus-maximising practices (exactly coincident with a "road pricing" approach). These two alternatives practices differ in turn only from a distributive point of view (the first one "skims" all the social surplus from the users in favour of the operator of the infrastructure, while the second one leaves part of it to the users).

4.3.2 The "Minimal Efficient Dimension" issue

This is a kind of preliminary issue in regulating “network infrastructures” (in transport, toll highways and rail tracks; it can be considered a problem of “horizontal unbundling”, as compared with the “vertical unbundling” issue dominant in non-transport sectors). The issue arises because for these networks there is no market pressure to determine their efficient dimensions. Furthermore, this issue is important because the "efficient dimension"

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[17] And in fact the "regionalisation" process itself can be seen as a form of yardstick competition, where, even within a "command and control" structure, every region becomes both "residual claimant" for the resources involved, and may well compare the result of other regions. This is what happened in Germany with the decentralisation of local rail services, where the DB national rail company had to face the pressure of different, budget-minded regions, and had to provide more efficient services; this decentralisation at the end has set in motion even a real competition mechanism, with the rise of "new entrants", both public and private.

[18] See Japan Railway and Transport Review, 1994

[19] A “club externality” occours when the damaged subjects belong to the same social group of the damaging ones

has also to be "minimal", in order to avoid excessive power of the regulated against the regulator (again due to "capture" risks). So the issue at stakes here is a problem of balancing the possible economies of scale against "excessive power". (This "excessive power" in turn may well have a negative impact also on the proper working of a "Demsetz market" of concessions, and not only on the regulator).

Toll highway networks have probably very limited economies of scale, related only on the dimension of the maintenance centres. Therefore it is reasonable to split up the concessions in sub-sets of few hundred kilometres each. (Toll collection tends to become highly informatised, and already several concessionaires operate smoothly in an automated way without any physical interruption in the collecting systems).

But for the road system, the same concept of concessions as existing in the present experiences seems highly questionable. Concessions are now generally based on a set of toll links, or on a single link to be built and operated, ecc. . But the traffic structure within dense areas (i.e. in the European context) is mainly short –distance, and the demand for mobility is served by the entire local network, of which the toll links are just a component, and not always the largest one in terms of capacity. Within this picture, a toll level that is aimed only to cost-recovering (investment, maintenance ecc.), or to productive efficiency at best, is far from optimal in terms of allocative efficiency. Congestion and environmental externalities determine an "optimal" allocation of traffic flows that is far from the one induced by cost-recovery tolls. And if one considers also the possible economies of scale of maintenance and minor investments, an *area-based concession scheme* looks a much more sensible strategy. Furthermore, an area-based concession may well include other critical components: for example, the management of traffic information for emergencies (as in the case of major accidents), and even ancillary activities like parking facilities, and public transport "prioritization" (streetlights, separate lanes, etc). Also schemes for shifting the number of available road lanes from one direction to another in peak periods can become a component of a "package" of activities that conceives the road system of an area as an integrated service or "utility". These packages have obviously to be committed under competitive tendering, and the duration of the concession can be kept limited, in the order of less then ten years, limiting the "capture" risks involved in longer concessions[20].

For rail networks, the picture is even more complicated, due to the fact that even the experience of non-national concession of infrastructures is very limited. Nevertheless, for sure it is extremely unlikely that economies of scale coincide exactly with national borders (therefore confirming the "efficiency" of the present dimensions of the majority of infrastructure concessions or direct state management[21]). The Japanese experience tends to show that minimal efficient dimensions are probably more near a "regional" scale (for large countries at least), depending on the number of long distance lines that have to be "cut" in separating the networks (generally few, compared to the local lines that remain within the same region).

Also in this case, there is a long way to go, at least in Europe, where a strong nationalistic rationale continue to dominate over economic efficiency.

4.3.3 Financial issues

The established rule of setting a proper rate of return for regulated companies is based in general on the calculation of the WACC (Weighted Average Cost of Capital) index. This index is needed to remunerate properly the invested capital, specially, but not only,

[20] See Newbery, D, M *"Fair and Efficient Pricing and the finance of the roads,* University of Cambridge, 1998.
[21] See Preston and Root, 1999

when investments are financed through the tariffs in an explicit way, and not left within the price-cap mechanism (see the following point 4.3.5).

The correct evaluation of “invested capital” (a.k.a. “RAB”, Regulatory Asset Base) within a concession regime is a high controversial issue. In first place, its magnitude has to be kept to a minimum: productive efficiency requires, for capital not less than for labour, that the resources employed are only the “necessary and efficient” ones. But often a conflict of interests takes place within the public sector: in selling a concession, or in privatizing an existing one, the state may be willing to maximize its revenues, and doing so may permit or even promote a RAB far larger than the minimum technically needed in order to operate the infrastructure efficiently. And this capital that can be really of limited amount if the physical assets are kept public, see point 4.2.1. Furthermore, the actual price at which the concession is sold can be far higher that the “book value” of capital required: its price may well represent the discounted value of future expected profits. In turn, if the “sale value” is in some way included within the RAB instead of the “book value”, there is a risk of a spiralling and self-induced increase of the values of the entire concession system, given the fact that a “normal” level of profit on capital is guaranteed via the tariff mechanism. And also this second “over-evaluation” problem may generate a conflict of interests within the public administration, if short-term revenue maximization prevails on efficiency and on the defence of users from undue rents.

In turn, the definition of a proper WACC requires special attemption: it is necessary to take into account the specific level of risk of every regulated sector. Within transport infrastructures, if the commercial risk is taken away from the concessionaire by the public regulator, the WACC has to be lowered in consequence. Furthermore, it is advisable to define a target leverage level, in order to avoid "opportunistic" composition of capital from the concessionaires. Finally, concessionaires that are floated (i.e., which value is left at the "judgement" of the stock market) deserves a special attemption from the regulator, that is bound to be extremely transparent and prudent in all its regulatory actions, specially as far as the "X" parameter of the price-cap formula is concerned.

Also the inflation index within the price cap formula has to be handled with care: ther is a tendency to curb its level referring to the “planned” inflation, and not adjusting it on the real one. But this is an improper tool for addressing efficiency: inflation is an exogenous factor for the regulated company, and efficiency goals have to be addressed adjusting the “X” parameter, that holds this role by definition (see the following point).

4.3.4 Further price-cap problems: patterns and levels of efficient costs

The price-cap mechanism, although by far the better known tariff-regulation tool available for infrastructure concessions[22], faces several problems, of which a few are summarised here: a first one is related to which type of risk has to be left to the regulated companies. In transport infrastructures, it seems reasonable to leave to them only (or almost only) the industrial risks, and not the commercial ones (i.e., those related with the level of demand).

The basic rationale for this "sectoral" advice is linked to the exogenous nature of demand variations on transport infrastructures: these variations basically depend from the overall economic growth of the country and from national and regional transport policies (competing infrastructures and their tariffs, gasoline prices, liberalisation of services, etc.). In fact, if a company faces a risk that is outside its control, it has to behave “on the safe side”, maximising the relevant prices etc. It is the same rational that allows to the regulated company a full recovery of inflation (within the price-cap formula).

[22] See Marzi, Prosperetti and Putzu, 2001

A second problem is related to the "efficientisation" parameter, that is in general included in the price-cap formula. Its definition requires an accurate benchmarking, (even if efficient costs can be known only in a "learning by doing" process). Within concessions of transport infrastructures, this is far from easy, giving the absolute dominance of monopolistic, inefficient "examples" from which the relevant data have to be derived. Even the "speed" at which efficiency has to be obtained (implicit in the X value), has to be estimate taking into account the specific constraints faced by each sector (labour contracts, etc.). Obviously the "starting base", set each five years (the "regulatory lag"), when the price-cap is recalculated, are the costs[23] incurred at that moment by the concessionaire, and not its revenues (the objective of the mechanism is to make the users pay for efficient costs, and only for them, allowing for an incentivating factor, that is linked to the possible extra-profits gained in each five-year period, known as the "regulatory lag", by the concessionaire thanks to its efficiency). This periodic re-adjustment of the tariff is known as the "claw-back" procedure[24].

4.3.5. The regulation of investments

Price-caps, or competitive tendering, in theory guarantee "automatically" the efficiency of the investments: only the ones capable of generating net profits will be implemented by the regulated company.

The problem here, as we have already seen, is that by far the largest part of the transport investments in infrastructures are not profitable in financial terms, and are generally decided by the public actors for a set of social objectives. As far as this decision remains outside the autonomy of the concessionaire, it is perfectly correct then to finance the investments with a "public" source of revenue. This source can be both direct transfers, or an increase of tariffs on the whole network. The first case is in general dominant for railways (and ports), while the second is in use for highways. Airport investments are in general self-financed, with some cases of state or local subsidy for the smaller ones.

But guaranteeing the funds for investments to a profit-oriented subject generates the well know Averch-Johnson phenomenon[25], i.e. the pressure for maximising the level of "guaranteed" investments. In this way in fact, given a "normal" level of risk and of corresponding "normal" level of profits, the total amount of profits of the regulated company is also maximised. Therefore, special care has to be given to the evaluation of the social benefits of the (proposed) investments, to their design standard, and to their costs, even if a competitive tendering is made mandatory (that is not always the case, and anyway it is subject of "information asymmetries" on the side of the regulator).

All considered, large investments in the transport sector have to be kept basically within a "command and control" frame, specially if the benefits of "project financing" schemes are not fully guaranteed. This may well be the case of toll highways, that present low technical complexity: as we have seen, the potential efficiency gains of integrated construction and operations seem limited, and a different, more sensible strategy can be recommended.

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[23] WACC included, as "normal profit".

[24] Strange as it may seem, this obvious statement in important cases, for example in Italian highway infrastructures regulation, is not fully accepted, with large and undue extra profits for the concessionaires, that so prove themselves perfectly able to "capture" the regulator (also thanks to the "far from minimal" dimensions of the concessionaires).

[25] See Averch-Johnson, 1962

4.3.6. Safety and quality regulation

It is well known that a monopolist has to be regulated not only on the tariff (and access rules) side, but also on the quality side, since there are no specific incentives motivating quality (and sometime safety) improvements, as generally in the case of market pressures.

The problem here is technically quite complex, at the contrary of price regulation, that is, at least in conceptual terms, rather straight forward. Quality and safety of transport services provided by transport infrastructures require not only specific experiences and benchmarking, but needs also a direct and active role of the users, that are the main stakeholders, and generally, those who pay for the services (the "residual claimants"). There is up to now little experience on the involvement of these subjects, and there is a strong urgency to develop such experience. Setting "abstract" quality standards is anyway useful, but certainly not sufficient. Furthermore, it remains open the question of "objective" measurements of safety and quality, in order to limit the potentia costs of litigation, in case of disagreement between the regulator (and the stakeholders) and the regulated companies. Finally, the proper balance between "mandatory standards" and well-designed incentives is another problem that deserves special consideration in quality regulation, while for safety the standard has to remain obviously the dominant policy.

4.3.7 The problem of the "number of tills"

This issue is well known within airport regulation, but it is present also in railways and highway infrastructures (the main difference is that a proper regulatory experience is almost absent in the latter cases). The core of the problem can be summarised as follows: how complex the regulatory action has to be? There are in fact trade-offs: a fine-tuned regulation may be in theory more efficient, but is less transparent and laves less space to the regulated companies to develop general strategies of optimisation. Let's start with toll highway concessions. A double-till is already present when investments are decided and financed on top of the regulation of tariffs.

If tariff regulation takes into account also congestion and environmental issues, we can speak of a "triple till", i.e. three different "tools" of public intervention.

For airports, the dominant theoretical approach is known as "double till": tariffs are price-capped on the air side (landing fees, etc.), while on the land side (commercial activities, parking, etc.), the possible monopolistic rents are "skimmed" via specific royalties, since is technically almost impossible to regulate every single price of the services in offer. (In case of periodic competitive tendering, pre-set air-side tariffs reach the same "skimming" effect on the possible land-side rents). The single-till approach, used for London airports, limits price-capping on the air-side. But this generate a distorted price signal: since the price-cap periodically eliminates rents from the overall revenues, the tariffs on the air-side tend to decline sharply as the rents on the land-side raise. Therefore, the more traffic (i.e. congestion) an airport develops, the lower its air-side tariffs become, that is evidently inefficient in allocating the relevant traffic.

Within the rail sector, the problem lays between a double or a triple-till approach[26]: the double-till approach suggests to limit state intervention to the services (with subsidies for social or environmental goals) and to the investments (again with subsidies). This approach implies that the infrastructure is not subsidised, i.e. charges its full costs to the users (via track-use tariffs). Since the infrastructure is a natural monopoly, with sharply increasing returns to scale, its full-cost charging (against the marginal cost suggested by the economic theory), generates welfare losses. (In turn, track-use tariffs have to the price-capped, or the concessions have to be tendered periodically, in order to get incentivating effects on

[26] See OECD Round Table – Thompson, 2002

efficiency). Obviously, the triple-till approach requires specific subsidies for the infrastructure operations as well. Also the subsidies to infrastructure operations have to be capped (with a specific "subsidy cap"), if the concession is not periodically tendered out.

The trade-offs involved here are specially evident. Given the complexity of the sector, a triple-till approach risks to render "opaque" the public objectives embedded in the sector. What is the final cost for the public purse of the entire system? Furthermore, within the "double till" approach the subsidies given to the rail services may well include those that in the "triple till" case are earmarked for the infrastructure operations. The only remaining advantage of the "triple till" is its effect on competition in rail services: given the high entry barriers existing in the sector, low track-use tariffs (i.e., priced at marginal costs) are definitely more pro-competition (without the need of explicit subsidies to the service operators, not easy to muster within a competitive environment).

These examples can be extended to other infrastructures as well (ports, etc.), since the core issues are basically the same.

5. Conclusive remarks

Public regulation of transport services and infrastructures is a high complex task, and basically still in its infancy. "Command and control" practices dominate even when they are no longer needed. The liberalisation process in turn is slowed down by extended "capture" phenomena.

A first point has to be underlined: regulated ("Demsetz") competition is not conflicting with social objectives. Even free transport can (and must) be provided within a competitive context.

The main tenet of the problem is the following: direct intervention ("command and control"), regulation, and market competition have to be considered within a "subsidiary" approach. Why this approach makes explicit a definite "hierarchy" of strategies? The traditional assumption known as "social choice", of a benevolent, all knowing prince is no longer acceptable, even if the "perfectly egoistic" prince embedded in the "public choice" scenario is also too extreme. A balanced attitude has to stay "on the safe side": if you can, don't assume the prince as necessarily benevolent and fully informed.

Nevertheless, public regulation and market competition are not so far apart as commonly considered. The market is not the absence of rules and constraints, quite the contrary: it has been built as a complex set of rules and laws, that have needed a couple of centuries to be properly set, and are under continuous evolution, as social values (and the technology of the sector) evolve[27]. There is a large ideological difference between liberal values and pure "lassez-faire". Furthermore, public regulation itself is not a purely technical issue: in reality, embedded in regulation choices are different visions of economic democracy, and of social priorities.

The transport sector is quite peculiar in this sense: it is full of "market failures", and involves very critical values and social objectives (freedom of movement, the environment, safety and security, etc.). The more is strong the drive to liberalisation, the more the (necessary) public intervention has to be attentive and up-dated; in other words, the more "market" we want, the better "state" we need. Nothing is really spontaneous in market competition: it is a political construction, and much work remain to be done within the transport sector.

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[27] A good example comes from the former Soviet Union: the "destruction" of the State has generated a highly distorted economic structure (organised crime, etc.). In that country, the task of reconstructing proper market rules looks much more challenging than the "destructive" phase.

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