

“Are Highways best run by concessions? The Italian experience”

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Abstract

Financing highways through project financing has numerous drawbacks, mainly fragmentation and irrational pricing. Regulation is difficult and inevitably discretionary, with a high risk of “capture” of the regulator. Benefits from competition could be better obtained through unbundling. Tolls are a form of taxation, not a price for a service. Setting tolls related to congestion rather than average costs would be socially desirable. The Italian experience is briefly analyzed. Highways were built on a “cost of service” principle, but in 1999 the logic of the system was changed. The State obtained a large profit from the privatization of Autostrade, by extending its concession for 20 more years. All the other 23 licensees obtained also extensions of their concessions. A price cap mechanism was introduced for tariff revisions, but the system is highly discretionary. The new regulatory system has allowed a dramatic increase in profits of the concessionaires.

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1. Highways are not an optional infrastructure

Maximization of social welfare requires that a country' road network be designed by a single public authority (State, Regions or counties, depending on the area roads are serving). To avoid (enormous) social waste, highways are everywhere planned as an integral part of the road system. In some countries (e.g. France, Portugal) parliaments authorize charging tolls on highways only if it exists an alternative “free” route, but this is only a political expedient: it all depends on the quality of the “free” alternative. If this was good enough, and there is no prescription that free state roads should be below highways standards, nobody would use the highway¹, and building the highway would be just a social waste.

Roads cannot be developed by private initiative, contrary to liberistic views² if only because state support authorizing and enforcing expropriations is needed. Of course, once the public authority has approved the construction of a new highway (road), both construction and maintenance can be contracted out to private companies. However, highways are both a legal monopoly (no new construction is allowed without state approval, and available territory is valuable and scarce), and a natural monopoly (fixed costs are preponderant), thus requiring state regulation if managed by a private company under a license contract.

2. Tolls are taxes, not the price for a service

Highways are a state monopoly, even if licensed to a private company. If the State applied a monopoly (i.e. profit maximizing) price, on many (most) tracks tolls would much higher than average costs (given the general absence of viable alternative routes), thus exposing the tax nature of tolls. The fact that, in practice, tolls are generally set at (or close to) average costs, does not change their fiscal nature. Indeed, the reference to the “user pay” principle is misplaced in the case of highways, since all the rest of the road network of “free”. Traffic using highways reduces congestion on alternative state roads, and the need for public sector

¹ The word “highway” (“autostrada”) was first used by an Italian entrepreneur, Mr Puricelli, in 1922, when he promoted the project for the first highway from Milano to the lakes north of the city. At the time, almost all roads were dirty roads, with numerous horses and carriages slowing the still rare motor vehicles. Highways thus offered a really different service, reserved to motor vehicles only. Now days, many “normal” roads may be just as good as highways; the difference is essentially a legal one.

² See for instance Walter Block (2003) “Overcoming difficulties in privatizing roads”, *Etics & Politics*, n° 2.

investments on (free) state roads. Thus, if traffic using the highway is charged (through tolls) the full cost of the infrastructure, it is actually, indirectly, paying a tax, in that it reduces the need for public expenditures. Traffic using highways is charged much more than it would be justified by the “user pay” principle considering also that, in addition to tolls, it pays also the normal fuel tax, which is thought to be a charge to cover public expenditure on roads.

3. Concessions are a source of income for the State: the case of Italy’s Autostrade

An additional reason that justifies considering tolls as taxes is that, according to the “user pay” principle, once the financial cost of the infrastructure has been amortized (through tolls), tolls should be lowered to a level that covers, at most, only operating costs, but this does not happen, at least in countries with long experience of tolling highways like Italy.

Let me mention an example, that of Autostrade SpA, Italy’s major concessionaire which accounts for two thirds of total (toll) highways traffic. Its network had been all (95%) constructed by the end of the ‘70ies and was supposed to be returned for free to the State in 2003. Construction had been almost entirely financed through debts, which had been practically all reimbursed by the end of the ‘90ies. Toll revenues had allowed also payment of fat dividends to the owner, the State holding IRI, which had originally contribute only a minimal equity.

According to the “user pay” principle, tolls should have been abolished at the end of the ‘90ies, or at most reduced to so as to cover only operating costs. Instead the Government decided to privatize the company to raise cash in order to reduce public debt (the company was considered to be well managed, and greater efficiency was never mentioned as an objective of privatization). To achieve this goal and maximize the selling price, the Government extended (in two steps) Autostrade’s concession by 35 years, from 2003 to 2038, and granted very generous conditions for future tariff increases over existing levels. Highways users were thus “taxed”, i.e. forced to (continue to) pay (increasing) tolls well beyond what was required to cover operating costs and new investments planned, thus ensuring a substantial (and rapidly increasing, as subsequent experience has shown) profit to the company.

Tolls set by the Government clearly included a tax component, which reflected in extra profits for the company (measured in proportion to its book equity). Private investors paid a price related to the expected (and originally underestimated) flow of this tax component which originated the extra profits. The price obtained by the State (through IRI) at the end of 1999, close to 7 billion euros, can thus be regarded as the present value of a 38 years tax flow “sold” by the State.

That of Autostrade is bound not to be an exceptional case. In Italy there are 24 highways concessionaires. When the next concessions will expire and the infrastructure returned for free to the State, both national and UE rules require that the concession be reassigned through a tender. How could this tender be framed? There are basically two different criteria: either to assign to the one who offers to run the new concession at the lowest toll (maximizing users’ benefit), or to assign to the

one who offers to pay to the State the maximum price, given a toll level (and rules to revise tolls) set by the State. The first criterion will certainly not be applied, if only because it could worsen congestion and it would result in an irrational toll structure nationwide. The State will certainly prefer to maximize the price it may obtain from the concession, as in Autostrade's case or in the more recent example of the "Autostrada dei Parchi (see paragraph 12), thus exposing the tax nature of tolls.

4. Building highways through project financing: where are the benefits?

In the project financing approach to the construction of a new highway, the public authority, having defined a project and possibly determined the amount of public subsidy, if any, assigns the concession through a tender to the operator who offers to build, finance and operate the highway, for a given number of years, at the lowest toll. This amounts to setting tolls at a level that covers costs (operating and financial). Governments tend to favour project financing, in this and other sectors, mainly because it reduces the need for public funding, i.e. it reduces both the budget deficit (at the time the money is spent) and the public debt.

The cost of private capital raised to finance projects of a public nature is of course much higher than interest on public debt. Investment bankers expect to receive returns of 15-20% on the equity portion, even if very rarely investors bear commensurate risks, as all sorts of guarantees are generally introduced in project financing contracts so that risks are actually born by the government or by the users (under the form of tariff adjustments to secure adequate returns and provisions to extend concessions, as the experience of Italian highways concessionaires well demonstrates).

Thus, to justify recourse to project financing, governments (and investment bankers which draw fat profits from these operations) tend to focus rather on the potential benefits in terms of greater efficiency. A number of studies in the U.K., where project financing has been used most, show that advantages of project financing compared to direct public investment depend entirely on how the risk of cost overruns in public procurement is evaluated, and by the discount rate considered (the closer the discount rate to the actual cost of public debt, the less advantageous appears project financing). No clear conclusions may be drawn by such studies about the supposed greater efficiency of project financing³.

In the highways sector, the room for greater efficiency in operation and maintenance is very limited, as technologies are standard and, anyhow, operating costs generally account for one third or less of revenues (at least in Italy), and consist mostly of collection costs. There is no evidence that the efficiency of Italian concessionaires has improved after privatization of Autostrade and other operators.

³ Peter Mackie and Nigel Smith (2004) "Financing Roads in Great Britain", paper submitted to the international conference "Highways, Costs and Regulation in Europe", Bergamo, Italy, November 21-23, 2004.

The real difference in a project's social return is in the planning and construction phase. In the Italian experience, enormous delays and cost overruns in road projects are due to administrative procedures (contrasts between local authorities concerning territorial aspects, compensations, environmental authorizations etc.). There is nothing a private concessionaire can do to overcome or reduce these "inefficiencies" of the public administration: he cannot start construction before obtaining all authorizations. Once the project has been defined, and authorizations granted, there is not much room for differential efficiency between construction contracts granted by the concessionaire or under public procurement.

Let me mention the example of Brebemi, the project for an 80 km new tract of highway between Brescia and Milano, in Northern Italy. The project has been under discussion for many years. A pre feasibility study was completed in 1997; the project was put on tender in 2003 (the first such tender in Italy!) and the concession granted in 2004, but the definite design has been approved (at least, so it seems!) only in mid 2005. It is worth noting that, in the tender for selecting the licensee, a point in favour of the winner was his promise to complete construction in 31 months, 7 less than in a competing offer. This indication of "greater efficiency" in the construction period seems really irrelevant, considering that due to public administration delays construction has not yet started two years after the tender was assigned, while construction costs are now estimated to have doubled (due also to subsequent project changes) and the price offered by the winner licensee needs obviously to be thoroughly renegotiated.

A real merit must be recognized to project financing: it secures that funds are available to complete construction, once this is started. In some countries, and Italy is again a good example, road projects may be initiated under pressure from local politicians, without certainty that public funds will be available to complete them. Even when enough funds are initially budgeted for future years, these may not prove enough to cover cost overruns, or the Treasury may suspend actual outlays to divert funds to other uses, if the political power of the promoters has declined. It thus may happen to see unfinished projects abandoned or delayed for decades, with enormous social waste. Can public authorities openly justify recourse to project financing due to their incapacity to secure financial discipline in public investments?

5. Shadow tolls or real tolls?

The financial advantages (lower public deficits and debt, even if paid by a higher cost of capital) and efficiency gains (if any) of project financing could be as well obtained with shadow tolls (mostly applied in the U.K, with limited experiences also in Germany, Portugal and Scandinavian countries) as with real tolls. An advantage of shadow tolls is that it reduces substantially collection costs (a relevant aspect in tracts with low traffic density), it allows to serve better the territory through more frequent exits and, above all, it causes no distortions in traffic flow between tolled and free roads. Shadow tolls also avoid the political cost of charging real tolls,

which may be an obstacle in countries where people are not accustomed to pay road tolls.

But of course, in the case of shadow tolls, the financial benefit of project financing for the public sector budget is only temporary, and actually only of an accounting nature, as costs must then be repaid over time out of budgetary funds, exactly as for the amortization of a public debt. Concerns over the rigidity of this burden on future years budgets has induced parliaments in some countries (e.g. Portugal, Norway) to limit new projects financed through shadow tolls. The amounts involved may be quite substantial. For instance, Professor Sawyer⁴ has estimated that the present value of future payments due out of budgetary funds for PFI projects amounts to some 20% of the recorded U.K. public debt.

The “financial engineering” nature of shadow tolls is well illustrated by the recent plan of the Italian government to “sell” (for some 3 billion euro) portions of the state road system to, presumably, an entity controlled by the state but not included in the E.U. definition of (consolidated) public sector. The price paid by this entity would be used to reduce public debt (as recorded in the official statistics), obviously at the cost of increasing budgetary outlays for repaying through shadow tolls the sums obtained by the sale of roads (with a cost for interests likely to be higher than interest on public debt).

Whenever they have a chance, governments clearly prefer to finance projects through real tolls. Tolls are justified by the “user pay” principle, but in reality, they are a special purpose “hidden” tax, that may be introduced at a political cost lower than openly raising taxes (if users “buy” the user-pay principle), and without explicit parliamentary approval.

6. Road pricing criteria

For the use of transport infrastructures, one can basically follow three different criteria: average cost pricing, marginal (social) cost and Ramsey-Boiteux pricing.

In Europe, the yield of transport fuel taxes covers much exceeds what governments spend for investment and maintenance of the road system. Governments appear to apply the Ramsey-Boiteux principle, as demand for fuel is highly price-inelastic. Transport fuel taxes may be deemed to cover not only direct costs of the road network, but also negative externalities (accidents, environmental effects) of road traffic. Additional tolls on road use do not appear thus justified to cover road costs.

Fuel taxes are efficient in that collection costs are very low, and equitable: the bigger car and the longer you drive, the more you pay. If vehicles, roads and road use were all homogenous, fuel taxes would be the most appropriate tool for road traffic taxation.

⁴ Malcom Sawyer (2004) “The Private Finance Initiative: the UK Experience”, paper submitted to the international conference “Highways, Costs and Regulation in Europe”, Bergamo, Italy, November 21-23, 2004.

Social costs of travel are instead extremely variable: certain roads are much more congested than others, congestion varies greatly over time and seasons, externalities vary according to the area, road maintenance costs depend upon the type of vehicle etc.. Optimal social use calls for different levels of taxation, which obviously cannot be obtained through a fuel tax: this is, in my opinion, the main / only reason that justifies the use of tolls, and it has nothing to do with recovering costs of (motor)roads.

Focusing only on congestion⁵, differences may (and should) be corrected, up to a point, by building (enlarging) roads where congestion is higher than average. But, even outside cities, it is inevitable that certain roads (bridges or tunnels) have no congestion while others are highly congested.

To ensure optimal use of the existing infrastructure, public authorities should apply tolls where congestion is higher than an average socially accepted level. Applying this pricing principle certainly entails serious practical difficulties, even if new technologies are making now feasible sophisticated applications to charge different tolls depending on the vehicle, route or time of travel.

This kind of tolls (“congestion tolls”) would greatly help to make users and public authorities aware of congestion costs; it would be a powerful incentive not only for optimal road use⁶ but also for investment allocation. It would help to determine the overall amount to be spent for the road system on the basis of an agreed socially acceptable level of congestion and it would discourage both politicians to build roads in areas where congestion is low and local communities to oppose construction/ enlargement of roads where congestion is high.

Obviously, according to this principle, no difference is justified between highways and “normal” roads: congestion tolls should be equally applied to both (if technology allows to do it), and we would perhaps discover that congestion, and the need/ usefulness of tolls, is much greater in some “normal” roads than on many highways, as the case of Italy suggests. Various experiments to toll for congestion in cities, as in the case of London, have demonstrated that substantial social benefits may be obtained.

Acceptance of this system (“congestion tolls”) by road users would be facilitated if toll revenues, a tax additional to that on fuels, were earmarked for specific purposes: in the case of cities, to subsidized public transport, outside cities to build/ enlarge the congested road where the toll is levied (or finance alternative transport systems). The UK government is studying the introduction of a nationwide system of tolls related to congestion, revenues from which would be used to reduce taxes on road fuels.

⁵ The European Commission (White paper 2001) estimates that road traffic congestion costs annually 0,5% of GNP, and that this will double by 2010: congestion is a major social problem.

⁶ The social benefit of charging for marginal congestion costs depends upon the elasticity of demand. If demand is inelastic, quantitative or technical restrictions may be preferable to pricing policies to control externality costs, see Marco Ponti (2000) “I costi esterni del trasporto e le linee politiche che ne derivano”, *Economia Pubblica* n° 5.

Congestion tolls may be criticized because they discriminate against the poor (all pay the same toll and benefit from similar reductions in travel time, but value attached to time is different). People who attach a high value to time gain from congestion tolling and these are presumably “rich”, although not necessarily so. Empirical studies on this point would be very useful, but I doubt that the adverse distributive aspect would turn out to be sizeable, considering also that revenues from congestion tolls could be used to the benefit of the “poor”, i.e. to improve public transport⁷. Anyhow, on distributional grounds, congestion tolls would be no worse than tolls now applied on highways. Overall, it appears socially preferable that part of congestion costs go into paying for tolls rather than wasted in queues (while air pollution associated with congestion is also reduced).

Tolls are also an appropriate instrument to charge for the differential damage to roads caused by different classes of vehicles, which cannot be recovered through fuel taxes. This justifies tolls on trucks, like those introduced in Switzerland or in Germany⁸. Such tolls may also provide an effective incentive for greater efficiency in the transport industry and for improving the quality of vehicles⁹.

The third pricing principle, to charge for average cost (only on highways financed through project financing!) has no logic and no merit but just that of making possible private investments in this sector.

Of course, costs are very relevant in investment decisions based on cost-benefit analysis, but average cost pricing for road use is nonsensical. Consider for instance a costly mountain (motor)road, built to avoid population leaving the mountain area or to reduce congestion on other routes. If users were charged for the average cost of the road, this might well defy the very purpose for which the road was built.

7. Building highways through project financing: the drawbacks.

7.a Financially driven investment allocation

Real tolls to finance the cost of highways are a “hidden” tax which may be introduced at low political cost. Financing highways investments (and maintenance) through real tolls (set to cover average costs) tends to cause distortions in investment allocation at country level. Conventions allow licensees to recover quickly the full cost of new investments by increasing average tolls over “their” network with no risk,

⁷ Congestion may be reduced also through subsidies: for instance, forms of subsidy (e.g. special lanes, exemption from tolls) could be justified to encourage car pooling.

⁸ The Swiss system coherently applies tolls according to the distance (and class of vehicle), no matter whether the truck runs an highway or a “normal road”. In Germany instead, since trucks are charged a toll only on highways, there is the risk of distorting traffic flows towards an excessive use of normal roads.

⁹ In the case of small countries where cross border truck traffic is relevant, like Switzerland or Austria, tolls on trucks are justified both to make foreigners pay for costs of roads and to limit environmental damages.

and Public Authorities easily approve investments that require no public funding. This tends to cause overinvestment in highways, while investments in normal roads are cut due to lack of public funds (as it has become evident in recent years, in Italy). New investments are directed where they can be easily financed through tolls, not where they would be most urgently needed to reduce congestion costs.

7.b Socially suboptimal pricing policy

Apart from this, the major drawback is certainly that the logic of the system requires to set tolls at the average cost level, which results in an irrational and socially suboptimal pricing policy, in addition to diverting traffic to free roads and thus causing suboptimal use of the road network. Traffic authorities have tied hands, they cannot choose any different and more socially desirable pricing system, for decades after granting a concession.

Maximizing social welfare would require to charge high tolls on congested tracts and low (or no) tolls on tracts with little traffic, i.e. exactly the opposite of what happens if tolls are set to cover average costs: in such case, higher tolls must be charged the lesser is traffic, while tolls must be set low, to avoid extra profits by the licensee, on high traffic tracts (thus worsening congestion).

Collection costs, which are a major portion of operating costs and account for 10 to 20% of toll revenues, are obviously a pure social waste.

7.c Fragmentation

Average cost pricing leads to an erratic and irrational structure of toll pricing for different spans of highways, depending upon historic costs and seniority, the more so the grater is the fragmentation of the network among several operators (irrational pricing may to some extent be limited if the average cost principle is not applied to single tracts but average costs are spread over the entire network of each licensee).

In Italy we have 24 concessionaires and tolls vary from 4 to 15 euro cents per km. These problems are common to countries where tolls are collected, like Spain, and are made worse by the coexistence of toll and free highways¹⁰.

Insert Table 1 about here

Fragmentation among large and small operators causes also an irrational pricing for new investments. If a new span of highway is built by a new operator (as in the case of the Brebemi in Italy) the toll is set to cover the full cost of that tract; on the contrary, if the same or similar tract was built by an operator who already manages a large network (like Italy's Autostrade) the cost could be spread among all

¹⁰ Germà Bel and Xavier Fageda (2004) "Is a mixed funding model for the highway network sustainable over time? The Spanish case", paper submitted to the international conference "Highways, Costs and Regulation in Europe", Bergamo, Italy, November 21-23, 2004.

users of that network¹¹, thus tolls on the specific tract could be much lower, depending on the licensee who is assigned construction.

A remedy to irrational pricing could be to separate tolls paid by users from tolls cashed by concessionaires through a (cumbersome) system of taxes and subsidies, accruing to and paid by a public fund. Concessionaires definitely oppose such system, probably because they could no longer appear to be “ordinary” companies with their own “clients”, they would become more dependent upon administrative decisions, and the tax nature of tolls would be exposed to the public perception.

7.d No competition

Fragmentation of the toll system among several licensees offers only the smell of competition, but not the substance. Each one manages its own natural monopoly, large or small as it may be, for the inevitably very long licence period. Tenders, be it for renewal of concessions or for construction of new tracts, are inevitably very rare and even then real competition is doubtful (for instance, in Italy project companies are mostly owned by consortia of licensees). The entire burden of promoting efficiency and securing quality and investments while avoiding extra profits by the licensee rests upon regulation.

7.e Regulation is very difficult, and discretionary

It is very difficult or impossible to design binding contracts for very long periods of time. The evolution of locations and traffic may require originally unforeseen new investments which the licensee may legally refuse to undertake unless he is fatly remunerated, or different pricing policies.

One of the problems of regulating networks is that the usual definition of productivity (cost per quantity produced) - which for highways is usually interpreted as operating costs per vehicle/km - has little or no meaning as a measure of efficiency, since it depends essentially from the evolution of traffic (as operating costs are substantially rigid), which is entirely outside the control of the licensee¹². It is therefore very difficult to establish incentives for greater efficiency (or for better quality) through a price cap mechanism.

In some countries (e.g. Spain), as traffic increases tariffs are reduced (which is good to avoid extra profits by the licensee but not to control congestion), in Italy

¹¹ If traffic is not enough to cover costs of new investments, concessionaires obtain subsidies by the government. Owners of large networks have thus a competitive advantage: they can more easily finance new investments without subsidies, because they can spread the cost over the entire network. However, groups tend to maintain “their” network managed by separate companies, in order to obtain more easily government subsidies for investments by “small” companies unable to cover costs with their revenues, without offsetting these financial needs with profits from their other companies.

¹² For italian highways, it has been estimated that traffic depends on the evolution of GNP, with an elasticity of 2, in the nineties.

instead revenues generated by a traffic increase above the level forecasted by the regulatory authority (ANAS), with forecasts revised every five years, accrue to the licensee. Very prudent, or one could even say over pessimistic traffic forecasts have been one of the major sources of extra profits of Italian concessionaires, since 1999.

Regulation of tariffs over contract periods of many decades is inevitably highly discretionary. As an example, I can mention what happened in Italy, when Autostrade's tariffs had to be renewed for the period 2003-2007. A committee of experts (NARS) attached to the Treasury was asked to review the size of the tariff adjustment which had been agreed between the licensee and the regulator (ANAS, a company fully owned by the Ministry of Transport); their opinion was that tariff increases should have been much lower, by as much as 20% in the end year 2007! But this committee had only a consulting role, and in the end tariffs "negotiated" between ANAS and the licensee were implemented¹³.

7.f High risk that the regulator be "captured".

As tariff adjustments are inevitably discretionary, private investors run the risk that an "aggressive" regulator may cut their capital returns; users run the risk that the regulator be "captured" by the licensee and induced to grant them large extra profits.

In setting tariffs, the politician/regulator faces two opposing interest groups: the users/voters and the licensee. The former are very numerous but unable to organise themselves; the licensee has instead large resources for lobbying, and all the interest to use them as its profit depends entirely on the tariff obtained by the regulator¹⁴. Thus, various forms of legal or illegal "capture" of the regulator are most likely to happen. Assigning regulation to independent Authorities rather than to ministerial offices might reduce such risk. However, as we see in Europe, politicians are very keen to keep control over concessionaires in their hands rather than passing it to independent Authorities, presumably because there is much potential return in dealing with companies whose profits depend entirely on tariff adjustments. In Italy, all concessionaires record huge profits, and some have been the "stars" of the stock exchange for several years. The same happens in Spain or France: enormous financial fortunes are accumulated thanks to highways tolls!

The risk of extra profits would be limited, and regulation made easier and more transparent, if tariffs were set so as to insure a fixed financial return to the licensee (and nothing more), determined with reference to an optimal WACC (periodically adjusted on the basis of financial market conditions), possibly with some limited and specific incentive/ penalty for quality and cost efficiency. Of course such system (cost of service), which would be close to financing infrastructures with the issuance of bonds, reduces the (alleged) efficiency gains obtainable through privatizations.

¹³ The Minister of Transport backed ANAS, and Autostrade got the tariff adjustment as proposed by ANAS. To avoid interministerial conflicts, the tariff adjustment was approved by law, and the same law (47/2004) even decided that the X parameter should be revised after ten instead of five years.

¹⁴ Massimo Di Domenico e Giorgio Ragazzi (2004) "Privatizations and Regulation according to Politicians Benefits", mimeo.

Why then not assign construction and maintenance of the entire national highways network to single government owned company?

8. A single government owned company to manage the entire network?

It should be by now clear that I do not believe that financing construction and maintenance of highways through real tolls to cover average costs is an optimal solution. However, if this must be it, it appears preferable to have one government owned company rather than several private licensees, for the following many reasons.

First, authorities would be free to set tariffs homogenous over the entire network, or to differentiate them to control congestion or for other socially relevant purposes, while maintaining an overall balance between costs and revenues.

Second, the little that might be lost in efficiency (although there is no evidence that government owned companies are appreciably less efficient than private operators, considering also cost rigidity) could be compensated by scale advantages from having a single operator.

Third, the task of regulation would be made much easier. Investments could be more readily decided and implemented. The risk that the regulator be “captured” and induced by the licensees to grant excessive tariff increases would be much reduced, and extra profits, if any, would anyhow benefit the state budget. Certainly, there could be the well known risks of state owned enterprises: over employment, generous salaries, poor incentives to increase productivity. But in this sector salaries are only a small portion of total costs, and the room for differential productivity is small. Moreover, at least in the Italian experience, even private licensees have little incentive to greater efficiency, as yardstick competition is not applied and the regulator bases tariffs on existing costs.

Fourth, the financial costs of raising capital for a government owned company is certainly less than what is demanded by private operators, who require a high return on equity and high premiums for generally low risks. Actually, the financial advantage of private funding is largely overstated. The need for equity capital subscribed by the State may be very small, as companies in this sector may be highly leveraged, given the stability of revenues; reimbursement of debt may be guaranteed, if needed, by lengthening the period of the concession. Indeed, neither private capital is invested if forecast revenues are not amply enough to cover debt service: if revenues are insufficient, government subsidies are anyhow required to launch a project. Notice also that, if a company draws its income from tolls it is excluded from the public sector accounts relevant for the European Monetary Union, even if it is wholly owned by the government: if the purpose of project financing is to improve public accounts, this can be as well obtained through a government owned company.

9. Unbundling

The best system to ripe the benefits of competition, while maintaining real (average cost) tolls, appears to apply “unbundling” to road investment and management¹⁵, that is to separate the various functions that are normally “bundled” in a project financing licensee and to contract out separately (through tenders) financing, construction, pavement maintenance, toll collection, cleaning etc, with real competition among many suppliers. This requires an efficient public agency, which would receive the revenues and pay the costs, with only a limited staff, dedicated to planning and contracting.

The logic of this system can be applied to entire (motor)road network. An example in this direction is Germany, where the function of collecting tolls (on HGV only) has been contracted out to a private company while revenue accrue to a special purpose public fund. Experience (e.g. Germany in 1973) has however shown that, at the national level, earmarking of toll revenues for investments on road does not stand up to the voracity of governments for other, more politically paying expenditures.

10. Highways concessions in Italy up to 1999

Projects for the first highways (8 meters wide and with a cement pavement) were promoted in the mid 1920ies by entrepreneurs such as Puricelli (constructions), Pesenti (cement), Agnelli (cars). The scheme was that of project financing. Mussolini’s government favoured these initiatives for prestige, and for their impact on employment and production, with no burden for public finance.

In less than a decade 375 km of highways were built by several private companies, under concession by the State. But traffic was not enough to cover costs: in 1930 there were only 250.000 motor vehicles in the whole country! To save licensees from financial collapse, in the mid 1930ies concessions were taken over by a government agency, investments were stopped and tolls reduced by one third to promote use of the infrastructures. In 1940 the highways network amounted to 485 km, of which 174 under concession to private companies and the rest managed by a state agency.

In 1950 the government-owned holding group IRI was commissioned to carry on the project for the highway link between Milan and Naples (“autostrada del sole”), through its subsidiary Autostrade SpA. Eight years later the new highway was opened.

Many other projects were started; highways were financed by companies owned by the government or by local public institutions, under concession contracts granted by ANAS, the government agency responsible for state roads. A law (463/1955) set the principle that every highway should be self financing, with

¹⁵ “Unbundling” is a system recommended also by the World Bank. See. Trujillo, J. et al. (1997). “Infrastructure financing with unbundled mechanisms”, in Inter American Development Bank (Ed.), *Alternatives to traditional BOTs for financing infrastructure projects*, Washington D.C.

government contributions limited to a maximum of between 20% to 30% of the total cost (36% for the Milan – Naples highway). It was also stated that if toll revenues exceeded the forecast of the initial financial plan, the concessionaire was to devolve the excess to the State (keeping only 10% of the additional income).

In 1961 a new law was approved introducing a regulation based on the cost of service and further reducing the independence of the concessionaires. The Transport Minister was empowered to set the level of tolls; the government offered to guarantee licensees' debt up to 50% of investment costs (later increased to 100%) and to increase its subsidy up to 52% of the cost of the new highways. However concessionaires were to hand over to the State toll revenues in excess of agreed costs and of their own capital remuneration, fixed at 6,5%. The State, through IRI, assumed a more prominent role: most new investments were assigned to IRI's Autostrade, which was however to turn over to the State the whole network in 2003, according to a convention signed in 1968.

By 1970 Italy had a very good network of highways (3.913 km), more than twice that of France and three times that of the UK. In 1975, 5.000 km of highways were completed, 665 km were under construction and 1.024 km were planned; 52% of the network was operated by Autostrade, 42% by companies controlled by local public institutions and only 6% by private companies.

Concessionaires' own capital covered only a minimal part of investment costs: thanks to the State guarantee they had easy access to credit, both in the bond market and from banks. But this changed drastically in the mid seventies, due to the petrol crisis and the increase of interest rates and investment costs. Concessionaires' finances came under strain, at a time when the State was also facing serious financial imbalances. Therefore, in 1975 the Government decided to stop construction of new highways, although projects under way were to be completed. By 1980 the network had increased to 5.900 km. Since then, very little has been added to the network's length: twenty years later the total length was 6.478 km.

Tariffs were often frozen by governments, as part of anti inflationary policies. This was possible because almost all licensees were owned either by IRI or by local public institutions. However, freezing tariffs reflected in a worsening of the public sector indebtedness, as licensees' debts were guaranteed by the State. In substance, this sector was regarded as part of the public sector, until the end of the 1990ies, when Autostrade was privatized and new conventions were drafted with the other concessionaires.

11. The 1999 renewal of concessions

In the past, concessions had always been renewed over time: some of Italy's 24 concessionaires still operate tracts built as far back as the 1930ies.

The renewal of the concession of Autostrade Spa in 1997, based as it was on a law intended to promote privatizations, was a controversial decision which was criticized by our "Corte dei Conti" and met also several objections by the European Commission. All other concessionaires seized this opportunity to demand extensions

of their concessions, to avoid also the risk that their concession be put on tender at its natural term, as required by the imminent application of E.U. rules. All concessions were thus renewed at the end of 1999.

A reason brought forward to justify the request of renewals was the fact that, in the past, tariffs had been frozen for various years, and licensees claimed a credit towards the State for revenues thus lost. Renewals were also considered a way to compensate licensees for other credits they claimed to have towards the State or ANAS, for public works they had financed on occasions such as the 1990 Soccer World Championship.

To limit pressures by the concessionaires, the Government had originally passed a decree allowing renewals only for a number of years (or fraction thereof) proportional to the ratio between the agreed claims and the EBITDA (average of the previous three years) of each licensee; this rule would have justified in most cases extensions of only a couple of years.

However, in order to obtain much longer extensions, licensees submitted programmes for huge new investments, which were accepted by ANAS even if often they had not yet been subject to any cost-benefit analysis; extensions granted to finance new investments were also about proportional to the ratio between the amount to be invested and the EBITDA of each licensee.

Overall, in 1999 licensees obtained extensions averaging about 10 years, with a maximum of up to 30 years in some cases. Ex post it appears that these extensions have been a most generous “gift” (paid by highway users)¹⁶, because only about one fourth of the planned investments have actually been implemented by the licensees over the last five years, while their EBITDAs have increased well beyond what had been forecasted, due to traffic and tariff increases.

12. The Italian highways network today

Italy has today (2004) 5.593 km of tolled highways, under concession to 24 licensee companies, and 894 km of free highways managed by ANAS¹⁷. All free highways are in the south of Italy, for political as well as economic reasons.

The Mezzogiorno being a “poor” region, governments have traditionally tried to promote its development by increasing public spending in transport infrastructures, even if the volume of traffic was relatively low and often insufficient to covers costs through tolls. Some of the free highways, like the never completed Salerno – Reggio Calabria, have a very low standard. However, the issue has now become politically sensitive, with political parties based in northern Italy arguing that the same rules should be applied countrywide, with regard to payments for the use of highways.

ANAS is planning to introduce tolls on all its highways, as upgrading works are completed, but no clear government decision in this sense as yet been taken due

¹⁶ Extension of concessions is one of the least transparent aspects of highways regulation, facilitated as it is by the fact that consumers do not perceive any increase of costs to them.

¹⁷ Anas maintains also some 20.000 km of state roads; provincial roads are about 145.000 km.

to its potential political repercussions. A first example in this direction was the “privatization” of the Autostrada dei Parchi, 115 km connecting Rome to Pescara and Teramo. The quality of this tract was poor, but tolls were low. After an open tender, the concession was assigned to a subsidiary of the Autostrade group, which undertook to upgrade the infrastructure and to pay (over a long period of time) 1,4 billion euros to ANAS; as part of the agreement, tolls were increased by 50%. Users complained because tolls were increased within a short period of time, while upgrading investments are still at the project stage.

There are two main groups: Autostrade which manages, with its subsidiaries, 3400 km of toll road (some 60% of the total), and ASTM - SIAS with about 1000 km of highways plus other 138 km managed by companies where it has an important share of capital. Both groups are privately owned: the Benetton family controls the first one and Mr. Gavio controls the second one. While Autostrade has one company (“Autostrade per l’Italia”) which controls most of the network (2854 km out of 3400 km of the whole group), ASTM – SIAS controls six subsidiaries, none of which has tracts much longer than the others.

The third operator is Autostrada del Brennero which is owned by local public authorities and manages 314 km between Modena and the Austrian border¹⁸. There are other six independent companies, owned by local public authorities or by public/private partnerships.

Large parts of the network are increasingly congested: over the last 15 years the length of the network was increased by 16%, while motorways traffic grew by 310%.

Tolls average about 6 eurocents per km, but they vary between 4 and 15 eurocents, depending on the concessionaire. It is estimated that the cost per km of an average passenger car is roughly equivalent to the cost per km of the gasoline tax: tolls amount to a doubling of the gasoline tax, for highways users.

Total revenues from highways tolls amounted in 2003 to 4,7 billion euros. After deduction of 20% for VAT and about 3% for a central Fund established in the 1970ies to cover default risks on concessionaires’ debts, net revenues accruing to the concessionaires amounted to 3,8 billion euro. If we consider also income taxes on companies’ profits, we may conclude that close to one third of gross revenues from tolls ends up in the state budget.

Another large share of revenues goes into (gross) profits: 20% in the case of Autostrade, 30% for Autobrennero (including a tax free fund, see footnote above), over 40% for Autostrada Torino-Milano, just to mention the major operators. In the period between 1997 and 2003, revenues of Autostrade rose from 1762 to 2571 million euro and profits increased from 151 to 522 million euro, i.e. from less than 10 to 20% of revenues; revenues of Autostrada Torino- Milano rose from 78 to 126 million, and profits increased from 18 to 41% of revenues.

¹⁸ Autostrada del Brennero has interests also in the rail sector. The company, which is highly profitable, has been authorized to create a tax free fund to finance the new Brenner rail tunnel. This fund amounted to 232 million of euro at the end of 2003, to be invested in treasury bonds. A subsidiary offers also international rail transport for freight (STR Brennero Trasporto Rotaia spa).

13. The tariff adjustment mechanism

Up to the end of the '90ies, the tariff level was to set so as to assure an adequate profitability, calculated on a WACC to be determined yearly by the government, based on prevailing financial market conditions. Any increase of traffic was to be reflected in lower tariffs.

In view of the privatization program, Cipe (Interministerial Committee for Economic and Financial Planning) decided, at the end of 1996, to adopt price cap as a general criterion to adjust tariffs for the public utilities, including highways. In this sector the increase in toll is a function of three factors:

$$\Delta T \leq \Delta P - \Delta X + \beta \Delta Q$$

where ΔT is the increase of tariff (weighted average for the entire network of each concessionaire), ΔP stands for (planned) inflation¹⁹, ΔX is the planned increase in productivity, ΔQ is the percentage change in the quality of service and β is a coefficient.

This approach seems to follow the standard price cap regulation model²⁰. The core of price cap regulation is to allow the operator to keep profits resulting from having achieved productivity gains greater than forecast, over a period of generally five years. However, at the end of the regulatory period there should be a “claw back” of extra profits: in the following period all forecasts should be made anew, and the new tariff should be set so as to reduce forecast profitability to the level deemed appropriate by the regulator.

Actual regulation of highways tariffs in Italy is far from this model, in spite of the reference to “price cap”²¹. One of the least transparent aspects in the interpretation of the X parameter. This is set by ANAS having regard to a number of

¹⁹ Planned inflation is set every year in the Government's Economic and Financial Planning Documents (DPEF). However, following a controversial interpretation of Autostrade' concession contract, ANAS agreed to allow differences between planned and actual inflation to be recovered in its tariffs, after the concession's first 5 years.

²⁰ The reference model can be as follows. A financial plan forecasts, for an initial period of generally 5 years, operating costs (OPEX), investments (CAPEX), depreciation (D) based on the recognized RAB (regulatory asset base), the planned increase of productivity (ΔX) and the level of profits to be recognized to the company, based on the weighted average cost of capital (WACC). The initial tariff T_0 is then calculated to assure that, considering also forecast tariff adjustments, the present value of forecast revenues be equal to the present value of costs and target profits: $T_0 = VA (OPEX + D + WACC * RAB) / VA [(1 + \Delta P - \Delta X) * Q]$

²¹ Giorgio Ragazzi (2004) “Politiche per la regolamentazione del settore autostradale e il finanziamento delle infrastrutture, *Economia Pubblica*, n° 4.

considerations, in addition to the expected increase of productivity: depreciation of planned investments, forecast traffic increase, compensation for past differences between planned and actual inflation, profitability to be recognized to the operator. Bundling together such different aspects reduces transparency and leaves wide discretionary powers to ANAS in negotiating tariff adjustments with each concessionaire. This became evident when Autostrade's tariffs had to be renegotiated for the second five years period. The 20% difference (in 2007 tariff levels) between ANAS and NARS (see paragraph 7.e) was due to a number of reasons, but it boiled down to the very "philosophy" of the price cap: NARS intended to apply the "claw back" of extra profits, while ANAS interpreted the convention as giving to the licensee the right to have tariffs adjusted according to the "formula", with little or no regard for the level of profitability.

There is no doubt that Autostrade realized large extra profits compared to the original financial plan for the period 1998-2002. Revenues in the last year were 25% higher than forecast, ROI increased from 6,8% in 1997 to some 16%, net profits more than doubled. The reasons for this were essentially two: the increase of traffic, which was 22% compared to the 11% forecasted, and the volume of investments which barely reached 40% of what it had been originally envisaged, in part due also to administrative delays in approval.

Assigning the "traffic risk" to the licensee appears a fundamental weakness of the Italian regulatory system²². While actual traffic growth is outside the control of the licensee, negotiating with ANAS "prudent" traffic forecasts offers a wide open opportunity for extra profits. This risk has been substantially increased, after a 2004 law that allows the regulatory period to be extended from 5 to 10 years.

Concerning new investments, if their volume is less than forecasted in the financial plan, while the tariff was set to include their amortization, the operator obviously benefits from extra profits. This was deemed acceptable by ANAS, due to the expectation that planned investments would finally be realized, even if with long delays. Recently it has however been decided that tariff increases for amortization of new investments (spread over a ten years period) would be recognized only when investments were actually under way.

The last term of the price cap formula, $\beta \Delta Q$, is supposed to measure improvements in the quality of service. As it is applied in Italy, Q is measured as the weighted average of two parameters: the quality of road pavement (60%) and the amount of accidents (40%).

Tariff increases for better pavement quality²³ seem unjustified, since expenditures for maintenance of road pavement are already included among recognized costs in the financial plans. Accidents are essentially a function of average

²² In an optimal risk allocation the operator should assume only the (small) portion of traffic risk that depends on his leeway for stimulating additional traffic.

²³ The roughness index is measured by cars equipped with special instruments directly by the licensees and the results of the tests are then examined by ANAS. Accidents are registered by the police and compared with the volume of traffic.

speed²⁴, and average speed may be effectively limited only by police regulations. Stricter police enforcement of speed limits thus translates in a tariff increase, which seems unjustified. There is little that operators can do on their own to reduce accidents. In recent years, due to the introduction of higher penalties for exceeding speed limits, accidents declined, but more so on ordinary roads than on highways. Licensees have also a dubious interest in reducing average speed, since users may opt for ordinary free roads if they cannot achieve high speed in highways²⁵.

In conclusion, the system applied in Italy is only nominally a price cap: there is no “claw back” of profits and profitability is not limited to a target rate of return. With regard to profitability, a peculiar “decree” states that tariffs in each regulatory period should be set so as to insure that the licensee obtains, for the next 5 (now 10) years, an IRR at least equal to the ROI of the previous period, with the consequence that if a high profitability is achieved in one period, it is “guaranteed” to the licensee for the next one. Following the introduction of the new regulatory system, in 1999, profits of all concessionaires increased dramatically.

²⁴ Accidents are related mainly to two factors: speed and traffic. According to a study by the National Committee for Research (CNR), the number of death is proportional to the fourth power of the average speed of the traffic flow. The number of seriously injured persons increases with the third power of speed, the total number of persons injured increases with the square of speed while the number of accidents increases by 2% for an increase in speed of 1 km/h.

²⁵ An interesting example is the company Milano Mare – Milano Tangenziali which in 1999 introduced very low speed limits in the urban tracts of the highway: 50km/h for lorries and 90 km/h for cars. While accidents declined, congestion increased substantially. Under strong pressures from the transport industry, only 20 days later the speed limit for lorries was upgraded to 70km/h and enforced only during daytime.

Table 1

Prospect of highways concessionaires in Italy

Licensee	Km	Term of Concession
ATIVA (Torino-Ivrea-Valle D'Aosta)	74,8	31/08/2016
Autocamionale CISA	101	31/12/2010
Brescia - Padova	182,5	30/06/2013
Centropadane	88,6	30/09/2011
Autostrada dei Fiori	113,3	30/11/2021
Autostrada del Brennero	314	31/12/2005
Venezia - Padova	23,3	30/11/2009
Serravalle - Milano	86,3	31/10/2028
SATAP (Torino-Alessandria-Piacenza)	164,9	30/06/2017
Torino - Milano	127	31/12/2026
Autostrade Meridionali	51,6	31/12/2012
Autostrade per l'Italia	2854,6	2038
Autovie Venete SpA	180,3	31/3/2017
Consorzio Autostrade Siciliane	217,4	31/12/2030
Raccordo Aut. Valle d'Aosta	27	31/12/2032
SALT (A12 Sestri Levante-Livorno)	154,9	31/7/2019
SAV (A5 Quincinetto-Aosta)	59,5	31/12/2032
SITAF (A32 Torino-Bardonecchia)	79,2	31/12/2050
SAT (A12 Livorno-Rosignano)	36,6	31/10/2028
Tangenziale di Napoli	20,2	31/12/2037
Torino - Savona	130,9	31/12/2038
Autostrade dei Parchi (ATI)	281,4	31/12/2029
Trafo M. Bianco	5,8	
Trafo S. Bernardo	12,8	