PRIVATIZATION AND REGULATION OF TOLL MOTORWAYS IN EUROPE

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Abstract: The private sector plays an increasing and relevant role in highway funding and management. For that reason, the regulation designed and enforced by public authorities becomes even more important for the social welfare results generated by this process. In this study, we analyze the current trends in highway funding and management paying special attention on the recent process of privatization and its motivations. Since public ownership and regulation are substitutes for government intervention, we check the hypothesis that highways privatization induces more strict regulation. Indeed, we observe that as the private sector increases its size, toll regulation becomes more detailed.

Key words: transport infrastructures, roads, privatization, regulation and tolls.

JEL Codes: L43, L92, L33

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0. Introduction.

In the last decade, the private sector has increased its participation in the funding and management of the highways network in Europe. General financial restrictions of the states, and particularly the need to solve fiscal unbalances, have been the main rationale for the privatization trend observed in several European countries (Vickers and Yarrow, 1991; Yarrow, 1999).

Public ownership and regulation are close substitutes for government intervention. In this paper, we examine the hypothesis that privatization of tolled highways has implied the design and implementation of more complex and detailed regulation schemes for elements such as tolls in highways. In this way, the increasing relevance of highways privatization also involves the need for a change in public policies. However, this does not mean a weaker role for government. Indeed, the regulation of private firms becomes even more essential in order to guarantee positive results from giving the right to exploit a natural monopoly that generates redistributive effects and macroeconomic impacts where it is established. This regulation is needed in the granting process and in the contractual design. Additionally, it plays a crucial role in the pricing rules that will set initial tolls and their adjustment over time.

We argue that the economic effects of highway privatization depend on the way the regulation is established on several aspects. If privatization is used just as a mechanism to obtain financial resources for the Treasury, then the lack of efficiency concerns will be reflected in the type of regulation implemented in practice.

In this paper, we focus the attention on price regulation of tolled highways. The analysis of that specific regulation tools set across European countries will allow us to assess efficiency concerns of policy-makers regarding privatization policies.

The structure of the paper is as follows. In the first section, we analyze the main trends in highway funding and management in Europe, focusing on the use of concession contracts awarded to public or private firms and to the methods of payment that apply to road users. In the second section, the most relevant characteristics of the price setting in tolled highways are examined. In the third section, we make a more detailed analysis of the pricing rules applied in the European countries in which the involvement of private sector is the highest. Then, given the analysis made in previous sections, we discuss about the substitution between public ownership and price regulation.

1. Main trends in funding and management of highways in Europe.

The length of highways in the European Union and the share of kilometers under private concessions are shown in table 1 (we also present data for Norway and Switzerland). Data in this table indicate that more than one third (37%) of the length of highways are under concession, and when it is the case, three out of four kilometers (75%) are awarded to private firms.

To this point, it is worth noting that not all the concessions are associated to the use of tolls. Some highways are managed by using shadow tolls or other financial strategies in order to fund its construction and maintenance. In that setting, the corresponding public administration usually pays the private firm for the traffic that the highway receives. The combination of shadow tolls and private firms in their management does not imply strict financial privatization since it is the public budget that is in charge of paying infrastructure costs.

****Insert table 1 about here****

Another interesting fact that we want to point out is the important role that the private sector plays in the southern and Mediterranean countries; France, Italy, Portugal and

Spain. In France, Italy and Portugal those firms control more three quarters of the highway network, while in Spain they manage a relevant 25%.

To this regard, the private involvement in highways has increased substantially in the last years due to the privatization strategies followed by both French and Italian governments. Indeed, Autostrade, the firm that holds the 60% of the Italian network under concession was privatized in 1999. Moreover, the three biggest public motorway firms were also privatized in France (Sanef-SAPN, APRR-Area y ASF) at the end of 2005. These firms jointly hold almost the 80% of the French network under concession.

On the other hand, in Spain and Portugal, the presence of private firms is actually older. In the first case, it is interesting to mention that three firm groups linked to building groups control the 90% of the network under concession (Abertis, Itinere and Cintra). These groups have a global dimension because of their participation in concessions granted around the world. In fact, these three Spanish firms played an active role in the French privatization process as main investors. Abertis was awarded the concessions of the Sanef Group (Sanef + SAPN); additionally, this firm has a close alliance with Brisa, the major group in the Portuguese concession market, as well as with Autostrade, the major group in the Italian market. In this latter case, Abertis and Autostrade did undertake a friendly merger operation in 2006. This merger has not succeeded because of the reluctance of the Italian government. However, there are some expectations that the negotiations leading to a merger will be retaken in the near future.

Otherwise, we find a sub-group of countries in the north and center of Europe (Benelux, Germany, Denmark and Sweden) that remain reluctant to use concession contracts. Another sub-group of countries (Austria, Slovenia, Hungary and Norway) make use of concessions but they have created public firms that manages such concessions.[1] In the United Kingdom, we also find a small share of private concessions among a relevant

general share of concessions. However, only in one of these motorways users are charged by direct tolls, whereas the rest are managed with the shadow toll mechanism.

Within the general framework of budgetary finance of highways, Germany, Austria, Belgium and Denmark have started the use of vignettes as a pricing mechanism for heavy vehicles. This fact is mainly explained for the implementation of the so-called 'euro-vignette' to fulfill several recommendations and objectives established in the European Commission's White Paper of transportation of 2001. The use of the 'euro-vignette' was suggested by the European Commission to promote and pursue environmental goals, and to reduce the distance that exists between social costs generated by these vehicles and the private benefit obtained from their use.

2. Price regulation in the toll motorways sector.

Economic Theory establishes that prices are an efficient mechanism to allocate resources when they are established under marginal production costs. In this sense, pricing the use of motorways must rely on efficiency concerns and it is necessary to stress the double role that tolls must play in a concession system. On the one side, tolls must be high enough to fund construction and operating costs. On the other side, pricing must follow efficiency criteria in order to regulate traffic demands.

Non-efficient pricing schemes can generate either congestion or overcapacity problems. The first one is a negative externality that causes a deviation of social marginal costs from private marginal costs. On the contrary, overcapacity implies the inefficient use of public or private resources. The classic works of Pigou (1920), Walters (1961) or Vickrey (1963) suggest two possible solutions that focus on pricing schemes when it is not possible to accommodate capacities in the short run. Firstly, it may be optimal to impose congestion taxes that can be included in the toll, so that these congestion taxes would modify the private costs structure to make them equal to the social ones. Secondly, the use

of price discrimination schemes concerning different user characteristics or time periods of infrastructure use may also help in obtaining efficiency targets.

2.1. Initial toll setting.

In Table 2 we show the criteria used in Europe to establish the initial toll level of new concessions. Firms usually define tolls as a payment for a service provided. However, it has been argued that tolls should be treated as a tax. In this way, Ragazzi (2006) claims that this is particularly true when the highway becomes totally amortized since in this scenario the toll should be decreased until the level in which operational expenses are funded. Nevertheless, tolls are kept much above this threshold so that a close relation with firm costs is not guaranteed. In any case, toll establishment is agreed between the public administration and the firm and it is usually connected to investment and operational and maintenance costs, as it is shown in table 3.

**** Insert Table 2 about here ****

**** Insert Table 3 about here ****

On the contrary, the monetary cost for the user varies upon the distance driven and the number of axles, height and/or weight of the vehicle. In addition, in some countries in specific concessions, the firm can also establish discriminatory schemes to charge different prices to the users depending on their characteristics (place of residence or frequency) and on the hour of the day or day of the week. Moreover, as required by EU directives, the corresponding VAT for each country must be paid on the top of the toll (with the exception of Norway, since this country does not belong to the European Union).

Generally, it is reasonable to argue that toll establishment in Europe does not seem to take into account assignative efficiency criteria. In this way, it is not usually considered the use of prices to regulate demand. Thus, a toll setting based on total costs instead of long-term marginal costs is rule around.

Otherwise, the existence of specific institutional structures and regulatory bodies can explain the different levels of prices between the European countries. In table 3 we show the evolution in average tolls/km. in countries with traditional toll motorways (France, Italy and Spain). French tolls are the highest while in Spain and Italy seems to be quite similar. The average toll/km in Spain has remained stable (in real terms) in the last years, whereas tolls in France and Italy have significantly increased.

In the case of France, the increase is mainly due to the application of 19.6% VAT in 2001 (with full effect by 2002), as required by European directives. However, pre-privatization did not bring about abnormal toll increases. The Italian case is different, and particularly relevant given the low level of tolls in 1998 (0.04 €/km) and the fast convergence that pushed its average toll/km so close to the Spanish level. Privatization processes and new systems of price regulation in Italy might have had an important influence on this increase. Indeed, there has been an abrupt increase of more than 100% in the Italian case, implemented just in the pre-privatization process, in order to increase financial receipts from privatization. In any case, it is important to point out that tolls usually allow attaining high profitability levels (see Bel and Fageda, 2005; Shaoul, Stafford and Stapleton, 2006).

2.2 Toll adjustment rules in Europe.

The regulation based on total costs – such as the rate of return method- has been the most widely used mechanism in sectors where important initial investments are needed, such as energy, telecommunications or transport. More recently, more attention has been given to the regulation of price caps where price increases are limited by inflation and, frequently, by some productivity and/or quality indicators. It is well known that the rate of return method promotes over investments and does not imply cost reduction incentives, while price cap mechanisms can offer the adequate incentive framework to reduce costs,

though it can generate problems of under-investments. (Wilson, 1993; Armstrong, Cowan and Vickers, 1994).

In the case of highways, the most common practice is a hybrid system where tolls are firstly determined by total costs, and then they are adjusted through some specific formulas following a price cap scheme. In table 4, we summarize the main characteristics of the regulatory mechanisms on toll adjustment in the countries where the use of tolls is implemented.

**** Insert Table 4 about here ****

Tolls increases follow Consumer Price Index in most countries, this being the main and more common element for toll adjustments over time. Generally, it is found that countries where the private sector has a more relevant participation, they use more complex and detailed systems of correction. On the contrary, those countries where participation of private sector is less important usually undertake bilateral negotiations, or a simple inflation adjustment. If we take into account the pro-privatization trends in Europe, it makes sense to conclude that toll regulation can become even a more relevant aspect for the highways sector and for its public intervention.

Moreover, only three countries (Spain, Hungary and Italy) contain correcting elements related with the traffic received, though in the Spanish case the final result can be perverse as Bel and Fageda (2005) asserts. The case of Hungary is especially interesting and exceptional, since its adjustment promotes the optimal road use by the implementation of optimal pricing schemes without taking into account other financial elements. It is worth recalling that a publicly owned firm, which operates within an administrative legal framework, manages the tolling system in Hungary.

The optimal use of roads by the implementation of pricing schemes would substantially help emerging congestion costs and it would be a powerful incentive for investment allocation (Ragazzi, 2006).

3. Private ownership and toll regulation: country studies.

In previous sections we introduced the existence of privatization in the European motorway network, in particular in the southern countries. In this section, we analyze the cases of Spain, Italy and France, which are the countries that has experimented a recent privatization process of their toll networks. The privatization undertaken in Italy and France involved a large share of their network, while the Spanish privatization undertaken in 2003 affected only 472 Km of toll motorways (17%). However, the study of the latter experience is also relevant since Spain is the country with the oldest general private model in toll motorways and therefore, it may also provide useful insights. For this reason, we start this review explaining the case of Spain and then we examine the Italian case. Finally, we consider the French privatization that is the most recent and opened experience.

3.1 Spain

The Spanish authorities privatized the public group of toll motorways ENA in 2003. The firm that obtained its concessions for a length of 75 years was SACYR and this policy allowed the State to obtain 1.586 million euro. However, the private participation in the toll motorways sector in Spain is old since the first toll motorways were awarded to the private sector in 1967 and the tradition of private firms has been seen as the natural way of management. Only the economic crisis in the late seventies and early eighties promoted the intervention of the State who nationalized some firms facing financial troubles, as it was the origin of most ENA concessions. With ENA's privatization the government returned those concessions to the private sector and established again an entirely private

system in the toll motorways sector - with the exception of some tunnels and access routes to large cities.

In Spain, toll motorways are basically regulated through law, and there is no specific and autonomous regulatory body. The Spanish Ministry of Fomento (responsible for public works and transportation) is in charge of specific sectoral regulation and supervision on national toll motorways. Monitoring is organized in the same way at the regional level. Toll regulation in Spanish highways is more complex than in the cases previously explained, so it deserves detailed analysis.

Although this administrative scheme never changed over the extensive history of toll motorways in Spain, the pricing rules did evolve in order to accommodate them to the new sector situation, especially in the last decades.

The initial price of tolls has depended on the initial conditions in the concession; thus, it has been set on individual basis. In addition, the government and the concessionaires have made particular agreements that have included changes in prices.

Until 1990, no pricing rule for automatic toll adjustment was established. This fact made more relevant the non-transparent bilateral agreements and renegotiations. However, a formula was established since 1973 in order to allow firms to claim for a toll adjustment. This right depended on the evolution of a price index that had the following form.

$$Kt = 0.30H_t/H_0 + 0.12E_t/E_0 + 0.08S_t/S_0 + 0.50 \qquad (1)$$

Where *H*, *E* and *S* are some related indexes of the labor factor, energy and metal products, respectively. When the increase of K_t was a 5% at least, then this gave the right to claim for a price revision.

On the contrary, in 1990, a national law established a general regulation for yearly price adjustments. This yearly adjustment is applied to all concessionaires in charge of national motorways. Initially, prices increased according to the following coefficient: $C=0.95\Delta RPI_{mean}$, where C stands for change in price, and RPI stands for retail price index expressed in %.

However, since 2001 prices on national toll motorways vary according to a price cap regulation constructed as follows (Tariff adjustments for regional motorways are regulated in regional laws):

$$Tt = CR * Tt\text{-}1 \qquad (2)$$

Where T stands for toll and C is such that,

$$CR= 1 + \Delta RPI_{mean} - X \qquad (3)$$

X is defined as follows

$$X= (1/100)\ ((ADT_{actual} - ADT_{predicted})/ADT_{predicted}] \qquad (4)$$

Where ADT stands for average daily traffic and $ADT_{predicted}$ refers to the ADT included in the economic and financial plan for the concession as approved by the Government Representation in the Concessionaire. In addition, X is bounded as follows:

a) As a general rule, X is bounded between 0 and 1 ($0 \leq X \leq 1$).

b) With regard to concessions that were already in effective operation before January 1 of 1988, X is not bounded as in a). Instead, the bounding rule works as follows:

$$1.15\ \Delta RPI_{mean} \geq \Delta RPI_{mean} - X \geq 0.75\ \Delta RPI_{mean} \qquad (5)$$

In applying this regulation there is no consideration for features such as quality of service, maintenance, or the construction of new lanes. The price cap system is an attempt to link price changes with the actual evolution of traffic. As stated in Law 14/2000, the

objective is to link extraordinary profits with reductions in the real prices of tolls, in order to share unexpected profits between users and concessionaires.

Older concessions are less constrained by the price cap regulation. Indeed, there cannot be real increases in tolls in the concessions that began operating after January 1 1988. In this way, X is not allowed to take a negative value. Additionally, the maximum nominal increase is $(1+\Delta RPI_{mean})$. For the older concessions, the maximum nominal increase is $(1+1.15\Delta RPI_{mean})$, allowing real increases of price. With regard to the lower bound, comparison is not straightforward but still possible. Given that $X \leq 1\%$ for recent concessions, it is easy to see that $0.75\Delta RPI_{mean}>(\Delta RPI_{mean}-X)$ if $RPI_{mean}\leq 4\%$. Even if RPI can potentially go over 4%, it is not likely to happen. The European Central Bank sets the EU inflation target at 2%, and since the middle nineties RPI in Spain has been regularly below 4%.

Finally, let us note a striking paradox involved in this regulatory dynamics. The price regulation works as follows: the largest toll increases take place with the lowest traffic increases, whereas the lowest toll increases are associated with the largest traffic increases. In short, exactly the opposite of what efficient price regulation would advise: increasing prices with congestion.

3.2. Italy

Financial motivations have been the basic driver of recent privatization of motorway concessions in Italy. The government launched a wide privatization program in 1997 because of the financial restrictions imposed by the Maastricht Treaty conditions (Baldassarri, Macchiati and Piacentino, 1997). As Ragazzi (2006) points out, there is no reason to believe that the privatization followed efficiency goals, since the room for greater efficiency in motorways is very limited. In fact, there is no evidence of productivity gains after the Italian privatization.

As a part of this program, Autostrade was transferred to the private sector in 1999. Autostrade's concession was scheduled to expire in 2003. In order to maximize privatization receipts the concession was extended until 2038 and the level of tolls was maintained (and further adjusted for inflation), although most of the investments had been amortized before 1999 (Greco and Ragazzi, 2005).[2]

In Italy, the price cap regulation established by the public authorities in 1996 pursues to benefit those firms that obtain larger productivity gains. Toll adjustment, thought in view of the privatization process, takes mainly into account the general price evolution (P), productivity gains (X) and some quality indicators (Q).

$$\Delta T \leq \Delta P - \Delta X + \beta \Delta Q \qquad (6)$$

However, Ragazzi (2006) asserts that in practice this is just nominally a price cap because there is no "claw back" of profits and profitability is not limited to a target rate of return. The main problem of this system is generated by the poor transparency that exists in some elements that are considered in order to compute these productivity gains (X).

Apart from the productivity gains obtained, there are other elements considered as a part of this variable (X) that do not help improving its transparency and allow ANAS - the regulatory agency- to negotiate toll adjustments with each firm in a bilateral way. These factors included in the productivity variable are (1) the depreciation of the planed investments; (2) the expected increase in traffic; (3) a compensation for differences between inflation forecasts and real inflation; and (4) the profit recognized by the operating firm.

Ragazzi (2006) mentions the large extra profits that Autoestrade obtained compared to the original financial plan for the period 1998-2002 as an example of this perverse regulation. The reasons were basically two: traffic increases (11% above the

forecasted) and the volume of investments which barely reached 40% of what was envisaged.

In addition, the variable (X) only takes the traffic received into account indirectly, and it does not seem to be designed to promote the efficient use of the road. Regarding the quality indicators, there are two aspects that form the variable (Q): pavement quality (60%) and total crash rates (40%).

3.3. France

Concerning the French privatization process, the Prime Minister, Dominique de Villepin, announced the implementation of this policy in his Declaration of General Policy on 6 June 2005. In this way, Mr. Villepin stated his purpose of reinforcing the investment in large infrastructure projects, particularly on highways and railways. In order to do so, he announced the using of 'innovative financial mechanisms': "I have decided to pursue the sale of the state-owned shares in the highway companies as a mean to finance the large public works…. The revenues obtained from these sales will go mainly to the Agency for the Finance of Transport Infrastructures, so that they can speed up…".[3] By early 2005, on January 26, it had been created the *Agence de financement des infrastructures de transport de France* (AFITF). One of the expected sources of revenues to fund this Agency was the benefits obtained by the French State and the public company Autoroutes de France as a result of their shareholding in the concessions of tolled motorways.[4]

On 7 September 2005, the French Government stressed that the main objective pursued with the privatization of the state-owned concessions was "to obtain financial revenues that will allow to pay a part of the National Debt and to finance new essential infrastructures."[5] Indeed, reducing the public debt (as well as reducing the budget deficit through the using of financial engineering mechanisms) was a strong incentive for the French government.

Since 1995, in France the government and the highway manager agree on an initial management contract ('contrat d'enterprise') for a period of five years, which defines the yearly evolution of tolls (some concessions, such as SAPN, have management contracts which length is longer than five years). This management contract, particular for each concession, contains objectives of investment and maintenance, road safety, environmental protection, as well as some social factors related to employees.

Once the management contract is over, the toll schedule follows a close relation to the Consumer Price Index. Hence, the French government provides certainty to the highway managers on the toll schedule for a five-years period, as a compensation for the agreement on some objectives of investment and safety. In this way, we can distinguish between two different phases in the toll scheduling in French highways: (1) a first stage based on the contract commitment; and (2) a second stage in which toll increase is based in the 70% CPI rule.

4. Discussion

In the previous sections, we have seen that a new wave of privatization is affecting the toll motorway sector in Europe. This process is especially relevant in the southern countries where the private sector has increased its size in the last decade mainly due to financial motivations. Otherwise, it has been observed that in the center and north of the continent the preferred way of funding and management of motorways is still the public budget. However, some countries in this geographical area use public firms to collect tolls.

From our previous analysis of highway policies in Europe, it can be inferred that public ownership and regulation are effectively partial substitutes for government intervention. In this way, we have found that the highest the privatization in a given country has been, the most detailed and complex toll regulation has become.

After examining the toll setting policies followed by different countries, one can reasonably conclude that the use of hybrid systems of price regulation prevails when the private sector has a relevant participation in the funding and management of highways.

Indeed, private tolls are initially established depending on total costs (construction, operating and maintenance costs) as it takes place in countries with public toll companies.

However, annual adjustments of tolls are computed through price cap schemes when the concessionaire of the highway is a private firm. These price cap schemes may take into account several factors, such as traffic forecasts deviations, productivity gains, quality and so on. To this regard, it has been shown that mechanisms of price regulation are substantially different in countries where the private sector has no role. In those countries in which public firms charge tolls, the government usually adjusts tariffs in bilateral negotiations or alternatively, the general price index is taken as the unique reference for price adjustments.

The simpler and more discretional price regulation mechanisms that are generally used in countries that relies exclusively on public agents provides evidence of the main hypothesis stated in this study, that is, public ownership and detailed regulation are substitutes in the toll motorways sector.

In this sense, the fact that the price regulation becomes more detailed and specific when private ownership increases may be explained by the separation between State and private firm. Otherwise, when there is public ownership, and therefore a closer relationship between them, there does exist more room for discretional behavior. The cases of Spain, with the oldest experience with private ownership, and the cases of Italy and France with their important and recent privatization reforms, show how this process emerges and how the regulation evolves to accommodate the new ownership patterns.

On the one side, it has been shown that Spain and Italy have the most sophisticated mechanisms of price regulation and that these mechanisms have been adapted over time as the private ownership increased. In this way, price cap schemes in these countries take into account several factors of the business, such as the deviation of actual traffic from predicted traffic (in the case of Spain) or several productivity and quality indicators (in the case of Italy). On the other side, we want to stress that these specific and detailed regulations did not prevent some perverse outcomes, and they need to be reformed for a better performance. In this way, in Spain price adjustments are less strict when traffic increases while in Italy the measurement of productivity gains is not transparent enough.

Regarding the French privatization, we must point out that this is the most recent experience so that it is reasonable to expect a reform towards a more complex scheme as it has taken place in the other southern European countries analyzed. Currently, there is a specific regulation for the first five years for each concession. This gives some stability for a period of time that can serve to reconsider the general rule applied after this stage. Moreover, this individual regulation also represents a strong public intervention in a way not considered before the privatization reform.

Furthermore, the case of United Kingdom also confirms our hypothesis that public ownership and regulation are partial substitutes for government intervention. Indeed, this country only has one private concession that is subject to direct toll, and price adjustments of this toll are unrestricted. Thus, price regulation is smooth in a country with a very low involvement of private firms in direct tolling.

We suggest that countries must take advantage of the regulatory reform needed and pushed by the growing participation of tolls and private firms. This may allow accommodating and reinforcing the appropriate framework for a price setting based on efficiency criteria that limit congestion and over-capacity. What we have found is that few

countries correct by traffic forecasts deviations and only one (Hungary) applies optimal price criteria. Therefore, most countries fail to fulfill the double function of tolls.

To sum up, the private sector plays a growing and relevant role in motorway funding and management in Europe. Since the implications in terms of economic efficiency of the increasing private investments in natural monopolies like motorways are determined by the regulation designed, it is of great interest to deeply analyze how public authorities act. For this purpose, this study attempts to emphasize the renewed importance of public regulation for the social welfare outcome in a sector in which private ownership becomes even more relevant than in the past. In this direction, we highlight the role played by this regulation as substitute of public ownership.

Notes

1. In fact, in Austria tolling is rather the exception, whereas the 'vignette' is the most common financing tool used in this country, as it happens in Switzerland.

2. Greco and Ragazzi (2005) stress the fact the efficiency did not appear to be a relevant objective of privatization.

3. Portail du Gouvernement, *Déclaration de politique générale: le programme du Gouvernement*. 8 June 2005.

4. Press release after de French *Conseil des Ministres* of 26 January 2005.

5. Portail du Gouvernement, *La privatisation des sociétés concessionnaires d'autoroutes.* Questions & Réponses, n. 020, 7 September 2005.

References

Armstrong, M., Cowan, S. and Vickers, J. (1994), *Regulatory Reform - Economic Analysis and UK Experience,* Cambridge, MA: MIT Press

Baldasarri, M., Macchiati, A. and Piacentino, D. (1997), The privatization of public utilities: The case of Italy. London: McMillan.

Bel, G. (1999), "Financiación de infraestructuras viarias. La economía política de los peajes*", Papeles de Economía Española*, 0(82), pp.123-139.

Bel, G. and Fageda, X. (2005), "Is a mixed funding model for the highway network sustainable over time?", in Ragazzi, G and W. Rothengatter (eds.), *Procurement and Financing of Motorways in Europe*. London: Elsevier, pp. 195-211.

European Commission (2001), "European transport policy for 2010 : time to decide". White Paper. European Commision, COM (2001).

Fayard, A. (2005), "Analysis of highway concession in Europe", in Ragazzi, G y W. Rothengatter (eds.), *Procurement and Financing of Motorways in Europe*. London: Elsevier, pp. 15-28.

Greco, A. and Ragazzi, G. (2005), "History and regulation of italian highways concessionaries", in Giorgio Ragazzi and W. Rothengatter (eds.), *Procurement and financing of motorways in Europe*. London:: Elsevier, pp.121-133.

Pigou, C. (1920), *The Economics of Welfare*. London: McMillan.

Ragazzi, G. (2005), Tolls and project financing: A critical view", in Ragazzi, G y W. Rothengatter (eds.), *Procurement and Financing of Motorways in Europe*. London: Elsevier, pp. 41-53.

Ragazzi, G. (2006), "Are Highways best run by Concessions? The Italian Experience", *World Transport Policy & Practice*,12 (2), pp. 22-34

Shaoul, J., Stafford, A. and Stapleton, P. (2006), "Highway robbery? A financial analysis of the design, build, financing and operation (DFBO) in UK roads", *Transport Reviews*, 26, pp. 257-274.

Vickers, J. and G. Yarrow (1991), "Economic perspectives on privatization", *Journal of Economic Perspectives* 5 (2), pp. 111–132.

Vickrey, W. (1963), "Pricing in urban and suburban transport", *American Economic Review*, 53, pp. 8-37

Walters, A. (1961), "The theory and measurement of private and social cost of highway concession", *Econometrica*, 29, pp. 676-699.

Wilson, R.B (1993), *Non linear pricing*, New York: *Oxford University Press*

Yarrow, G. (1999), "A theory of privatization, or why bureaucrats are still in business", *World Development*, 27, pp. 157-168

TABLES

Table 1. Motorway network in the UE-25, Norway and Switzerland, 2004.

Country	Motorways (km.)	Motorways under concession (km.)	Private firm concessions (% of total network under concession)
Germany	12.000	4	100%
Austria	2.000	2.000	0%
Belgium	1.729	1,4	0%
Cyprus	268	-	-
Denmark	973	34	100%
Slovakia	316	-	-
Slovenia	483	348	0%
Spain	10.500	2.610	96%
Estonia	96	-	-
Finland	603	69	100%
France	10.383	7.840	11%[1]
Greece	916,5	916,5	0%
Hungary	574	574	0%
Ireland	192	0	-
Italy	6.840	5.593,3	78%
Latvia	0	-	-
Lithuania	417	-	-
Luxembourg	130	0	-
Norway	629	550	0%
Netherlands	2.300	4	100%
Poland	552	-	-
Portugal	2.271	1.771	100%
United Kingdom	3.476	580	100%
Czech Republic	517	-	-
Sweden	1.450	16	100%
Switzerland	1341	-	-
TOTAL	60.956	22.911	75%[1]

Note 1: In December 2005 the French government privatized the three biggest concessionaires of toll motorways. Nowadays, the 95% of motorway km. under concession are under private hands. It is included when we compute the total weight of private firm concessions.
Note 2: Data for Malta, not available.
Source: Authors', using data collected in Eurostat, ASECAP and Fayard (2005).

Table 2. Initial toll setting criteria for new concessions in the UE-25, Norway and Switzerland.

Country	Toll setting criteria	¿Is some price discrimination allowed?
Austria	Financial costs, Investments, Operational and Maintenance costs and Environmental Costs.	No
Slovenia	Capital costs, Average costs of re-construction, Operational and Maintenance costs .	No
Spain	Financial costs, Investments, Operational Cost, concession lenght, Environmental costs and Rate of return.	Yes
France	Investment, Depreciation, phisical road structure, traffic forecasts, Operacional costs and financial costs.	Yes, but it is applied under national regulation.
Greece	Operational costs.	-
Hungary	Construction costs, Maintenance costs and commercial policy.	Yes, optimal pricing system.
Italy	Investments and operational costs.	No
Norway	Project costs, traffic forecasts and payment period of a fixed component (15 years)	Yes, but government authorization is needed.
Portugal	Average toll established in the toll network already in operation.	Yes
United Kingdom	The concessionaire establishes the toll level it wishes.	Yes

Source: Own construction using the information delivered by ASECAP.

Table 3. Average toll/km evolution. France, Italy and Spain 1998-2006. (€/km)

Country	1998	2001	2004	2006
France	0.17	0.18	0.23	0.23
Italy	0.04	0.10	0.10	0.13
Spain	0.16	0.16	0.14	0.16

Source: Road Haulage Taxation Database. ECMT (2006).

Table 4. Tariff adjustment mechanisms. UE 25 and Norway.

Country	Adjustment methods (ΔT)	Allocative Efficiency Criterion	Correction Factors
Austria	Bilateral Negotiation	-	-
Slovenia	$\Delta T = \Delta P$	No	Inflation (P)
Spain	Price Cap $\Delta T \leq \Delta P - X$	Key element because X is the difference between real traffic and forecasted, over this latter: $(1/100)[(IMD^R - IMD^P) / IMD^P]$	Inflation (P) y Traffic (IMD)
France	Stage 1: Individual Contract Stage 2: $\Delta T = 0.7*\Delta P$	No	Individual contract and Inflation (P)
Hungary	Adjusted to the demand received	Yes	Traffic Received
Italy	Price Cap $\Delta T \leq \Delta P - \Delta X + \beta \Delta Q$	Traffic forecasted as an element of correction, though it plays a secondary role in X	Inflation (P), Productivity (X) and Quality (Q)
Norway	$\Delta T = \Delta P$ (every 2-3 years)	No	Inflation (P)
Portugal	$\Delta T = 0.9 * \Delta P$	No	Inflation (P)
United Kingdom	Concessionaire's free decision (max. twice a year).	-	-

Source: Own construction using the information delivered by ASECAP.