

**Is a mixed funding model for the highway network sustainable over time?
The Spanish case**

Germà Bel (Cornell University and Universitat de Barcelona) &
Xavier Fageda (Universitat de Barcelona)

Abstract: High capacity road services in Spain are tolled in some territories and are free in others, while quality is similar everywhere. Is it possible to make progress towards achieving functional and financial uniformity in the currently dual Spanish highway system? This paper focuses attention on this question. First, we briefly review and examine the models of financing applied in Spain, the private sector structure, and the regulation. Then, we discuss different policy choices that could lead to a homogeneous system of highway finance. Among them, the advisability and feasibility of eliminating tolls from motorways, or extending them to the whole network of motorways.

Key words: public property, infrastructure transport supply, public and private investment
JEL Codes: H41, H54, R42

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I. Introduction

Toll motorways in Spain are heavily concentrated in two transport corridors, the Mediterranean Coast and the Ebro river Valley. High capacity road services are tolled in some territories and are free in others, while quality is similar everywhere. User tolls were used to finance the first expansion of the motorway network in the sixties and early seventies. The second wave of the network expansion took place in the late eighties and early nineties and depended on the public budget for funds in this period. Since the late nineties, public financing has continued to be the main funding source for new motorways, although some have been financed through user tolls. In essence, the policy of recent years has combined expanding the network of free major roads while continuing to allow private firms to construct toll motorways.

Because of this irregular pattern of funding, the motorway network in Spain is quite singular among the most populated European countries, with mixed funding sources used to finance the building of new motorways and the maintenance of old and the new motorways. Rounding up, 80% of motorways have been built and are maintained with public funds, while 20% have been built and are maintained with user tolls. With little variation in level of road services, tolls are charged in some territories but not in others. This results in an unequal treatment of the road user and damage to the competitive status of the firms located in the toll territories.

Highway policies should be more rational, but it is not clear how progress can be made towards the functional and financial homogenization of the motorway network in Spain. The main goal of this paper is to examine this issue. First, we briefly review the history of toll motorways in Spain. Second, we analyze the different models of highway financing implemented since the sixties. Then, we characterize the structure and regulation of the motorways business sector. Based on the previous analysis, we discuss different policies that could be applied to produce a more homogeneous system of highway finance and management in Spain.

II. Toll motorways history in Spain: Promises and results

In the 1960's the Spanish economy was involved in a structural transformation, in accord with the *1959 Stabilization Plan*. The economy was growing fast and transportation infrastructures were an increasingly narrow bottleneck for productive activities. In 1962, the World Bank *Report on economic development in Spain* recommended an effort to repair and maintain the existing road network. The World Bank also suggested the building of a new motorway along the Mediterranean coast, from the French border to Murcia. This road would serve important industrial and agricultural areas as well as some of the most important tourist destinations of the country. It would cross those territories with the greatest and most quickly increasing traffic in Spain.

In 1967, the Government planned for 3,160 kilometers of toll motorways in the *Program of Spanish National Motorways (PANE)*. Up to 1972 the sections franchised to private firms comprised La

Junquera (French border)-Barcelona-Tarragona, Mongat-Mataró, Bilbao-Behovia, Villalba-Villacastín-Adanero, Seville-Cadiz, and Salou-Valencia-Alicante. The possibility of having motorways (even if tolled) raised great expectations, and political and institutional pressures to acquire such roads emerged all over the country. The *PANE* up-date of 1972, the *Advance of the National Plan of Motorways*, included 6,340 kilometers of toll motorways. Promises were high, but results did not meet expectations. Table 1 shows the concessions franchised up to the end of 1975. They add up a total of 2,042 kms.

Table 1. Toll motorways concessions until 1975

Concessionaire	Section	Period	Term (years)
Acesa	La Junquera-Barcelona	06-02-67	37
	Montgat-Mataró	06-02-67	37
	Barcelona-Tarragona	29-01-68	37
	Montmeló-Papiol	1974	-
Iberpistas	Villalba-Villacastín	29-01-68	50
	Villacastín-Adanero	30-09-72	50
Europistas	Bilbao-Behovia	23-03-68	35
Bética de Autopistas	Sevilla-Cádiz	30-07-69	24
Marenostrum (Aumar)	Salou-Valencia	08-09-71	27
	Valencia-Alicante	22-12-72	27
Audenas	Tudela-Irurzun	08-06-73	41
Audasa	Ferrol-La Coruña-Santiago-Pontevedra-Vigo-Tuy	18-07-73	39
Acasa	Zaragoza-El Vendrell	25-07-73	25
Vasco-Aragonesa	Bilbao-Zaragoza	10-11-73	22
Eurovías	Burgos-Malzaga	26-06-74	20
Aucalsa	Campomanes-León	17-10-75	46

Note: Tudela-Izurzun depends partially on the Navarre local government. Aumar took over Sevilla-Cádiz and Acesa acquired Zaragoza-El Vendrell. In 1976 Bilbao-Santander was provisionally franchised, but the final franchise was not undertaken.

Source: Bel (1999).

However, operational kilometers of toll motorways were slow to open. In fact, no more than 1,807 kilometers of toll motorways were operating by 1985, along with 1,363 kilometers of free motorways. To sum up, by the late sixties and early seventies, there was a general desire for motorways, and national government planning attempted to satisfy almost every single demand. We are left to ask why the reality was finally so modest if the proposals were so ambitious?

III. Motorways in Southern Europe: Tolls versus general taxation?

By the middle of the twentieth century, motorways financed in the public budget were not the general pattern in Mediterranean Europe. The most populated countries in Southern Europe, Italy and France, chose to finance motorways through user tolls. Even so, the networks were publicly owned and managed. In the sixties, Spain also chose to finance motorways through tolls. Why did Southern countries choose tolls instead of public budget financing?

Budgetary financing of infrastructure has two inter-related requirements: a) the political will to levy general taxes, and b) the availability of a modern and efficient tax system, so that public revenues are sufficient to finance such policies. Southern European countries have usually been less willing to use the general tax system than countries from Northern and Central Europe. Furthermore, the tax systems in the Mediterranean countries were the least efficient of the Western European countries in the sixties

and seventies. Indeed, tolls were used to finance motorways, because public budget constraints and a lack of political willingness to increase tax revenues made tolls the only option.

In Spain, the shortcomings of the tax system and the lack of willingness to upgrade it made it difficult to use the public budget to finance motorways. The PANE of 1967 already opted for financing through user tolls. Even in this case, a model of public management could have been applied, as in France or Italy. Spanish private firms used government loan warranties to obtain funds abroad, showing clearly that the state had the same or better access to external funds as private firms. Nonetheless, the Spanish government made a choice that was exceptional in that period: to award the building and operating of motorways to the private sector.¹

In fact, this concession did not insulate the public budget from the risks and costs of financing motorways. Numerous financial, fiscal, and commercial conditions transferred almost every single risk from the private firms to the state. Particularly, the insurance for the exchange rate in external debt has been especially damaging for the public budget. Indeed, the Spanish history of motorway development is a stark demonstration of the constraints and costs to the public budget that can emerge from a system of private toll motorways. The government's long-term commitments with private firms led to substantial payments. These commitments promoted inefficient economic decisions, whose costs were, and are still, borne by the Treasury.²

IV. Changing models since the eighties: From user tolls to public budget.

By the middle seventies, some of the shortcomings of the toll model had already emerged. The *1974 Report about national toll motorways* pointed out the reduction in the rate of traffic growth, the increase in the price of external debt, and the high building cost of the Spanish toll motorway network.³ Once the economic crisis of the seventies arose, what private firm would be willing to invest in motorway sections when demand forecasts were lower than they had been for the sections first franchised? Not surprisingly, the concessions suddenly stopped. The 2,042 kilometers franchised up to 1975 (not all of them in effective operation) did not rise until 1987, when a new motorway was franchised by the regional government of Catalonia. The territorial distribution of toll motorways in Spain is a consequence of the private model of finance and management. In general, sections with the highest expectations of profitability were the first to be franchised, and the concession process broke down when the crisis arose. No one had an interest in 'wasting' money to invest in corridors with low expectations of profitability.

This break down of concessions is typical of private systems of tolls. Each section is franchised on a separate basis, and its profits or losses are individually considered. In contrast, in France and Italy

¹ It is remarkable that in a country like the USA, so much oriented towards private initiative, only two private roads were built during the 20th century (Engel et al., 2002). More recently, one other southern EU country, Portugal, has franchised private toll motorways. In addition to this, the major Italian franchisee of motorways, Autostrade, was privatized in 2000.

² Bel (1999) contains a full account of the financial effects on the Treasury of the early motorways concessions.

public management allowed a network, rather than individual, approach to concessions. In Italy, the profits of some routes were used to expand the network into less profitable sections. This explains why the economic crisis of the seventies slowed down, but did not completely break down, the expansion of the Italian motorway network.

The Socialist Party (PSOE) won the 1982 election, and a state owned firm (Enausa, ENA from now on) was created in 1984 to take over three private concessions that had gone bankrupt and were unable to develop their franchised roads: Audasa, Audenasa and Aucalsa. As a rule, the socialist government chose a model of public financing of motorways in the *1984-91 Roads General Plan*. With this choice made, the model of motorways financing moved towards the usual model in Northern and Central Europe and the Anglo-Saxon countries. Three types of reasons could explain this change:

- 1) *Fiscal feasibility*: Creating and enforcing the Income Tax in 1977 was a huge step toward overcome the backwardness of the Spanish tax system. Having available modern fiscal tools, the new government chose to put fiscal pressure on the economy closer to the European Community average. This made possible the public financing of motorways, among other programs.
- 2) *Fast delivery of motorways*. Private toll motorways had delivered modest results. Between 1970 and 1985, some 1,700 kms of toll motorways were built, and the total network (including free motorways) consisted of 3,170 kilometers. With the new model, expansion of the network has been much more rapid. In just seven years, the network multiplied by 2.2, due to the addition of about 3,600 kilometers of free motorways between 1986 and 1992. During the nineties and the beginning of the new century, the supply of free, high capacity roads has been growing rapidly.
- 3) *Availability of European funds*: Within the context of the public financing model, there was an additional relevant factor: the four regional areas in which more sections of motorways were built between the middle eighties and the middle nineties are Castile-La Mancha, Andalusia, Castile-Leon and Valencia. All were regions included in Objective 1 of the European Community. This allowed the government to obtain high levels of co-financing from the European Community through the Regional Structural Funds.

Alongside the general trend towards budget financing, some specific new policies in favor of tolls have been implemented since the early nineties. At the national level we can outline (1) the re-negotiation agreements for extending the period of the concessions and, especially, (2) the *1997 Program of Toll Motorways*, drawn up by the government of the Popular Party (PP, conservative), in power after the 1996 national election (and until the March 2004 election). Agreements between government and private firms to extend concessions were widely used during the nineties. Indeed, at

³ Fernández et al. (1983) suggest that the real business was in the building, as happened with the Spanish railways in the 19th Century. The joint effect of tax and financial conditions included in concessions, along with commercial clauses—especially those allowing firms with stakes in a concessionaire to get involved in construction—is consistent with this hypothesis.

the end of 1996 a national law allowed concessions to be extended for up to seventy-five years, which has promoted the use of this type of agreement.

Each agreement was implemented through direct re-negotiation between the government and the concessionaire, since the EU rules regarding competitive procedures to extend concessions were not binding at that time. The firms were not required to pay any fee to the state for having the concession extended. Usually, concessions were extended either to compensate for reducing current toll prices or in return for the concessionaire agreeing to undertake unsound investments in other motorways. Indeed, the extension agreements resulted in huge profits for the private concessionaires; they had their businesses extended on very favorable conditions. The amount of investment agreed upon and some reductions in tolls do not justify the substantial increases in the term of the concessions. Indeed, toll reductions stimulate traffic increases,⁴ but this was often forgotten when negotiating the agreements. Since the marginal operating cost of a highway is very low, increasing traffic partially compensates for any toll reduction.

Finally, within the context of the new policies in favor of developing tollways, we must mention the *Toll Motorways Program* approved by the conservative government elected in March 1996, and reelected in March 2000. Even if this program was a real deviation from the former policy of (almost) no new toll motorways, it does not signal that the conservative government has dramatically changed the model of public budget financing. In fact, the government acknowledged that many of the new toll motorways franchised to the private sector needed huge subsidies from the treasury because of low traffic (current and future).

Second, and more importantly, the *1997 Toll Motorways Program* did not imply an end to the expansion of the free motorways network. In fact, the percentage of free motorways increases from 76% at the end of 1996 to 79% at the end of 2003. If we focus only on the sections of motorways that became operative between 1997 and 2003, 85.9% were free motorways, whereas only 14.1% were toll. Therefore, the overall percentage of toll motorways has decreased. Table 2 displays the evolution of the Spanish motorway network. Figure 1 shows the territorial distribution of national toll motorways and national free motorways in 2002.

The socialist party (PSOE) won the March-2004 National election. Although no policy against the currently operating toll motorways is expected, there will likely be a downsizing of proposals in the *1997 National Toll Motorways Program* that have not yet been implemented.

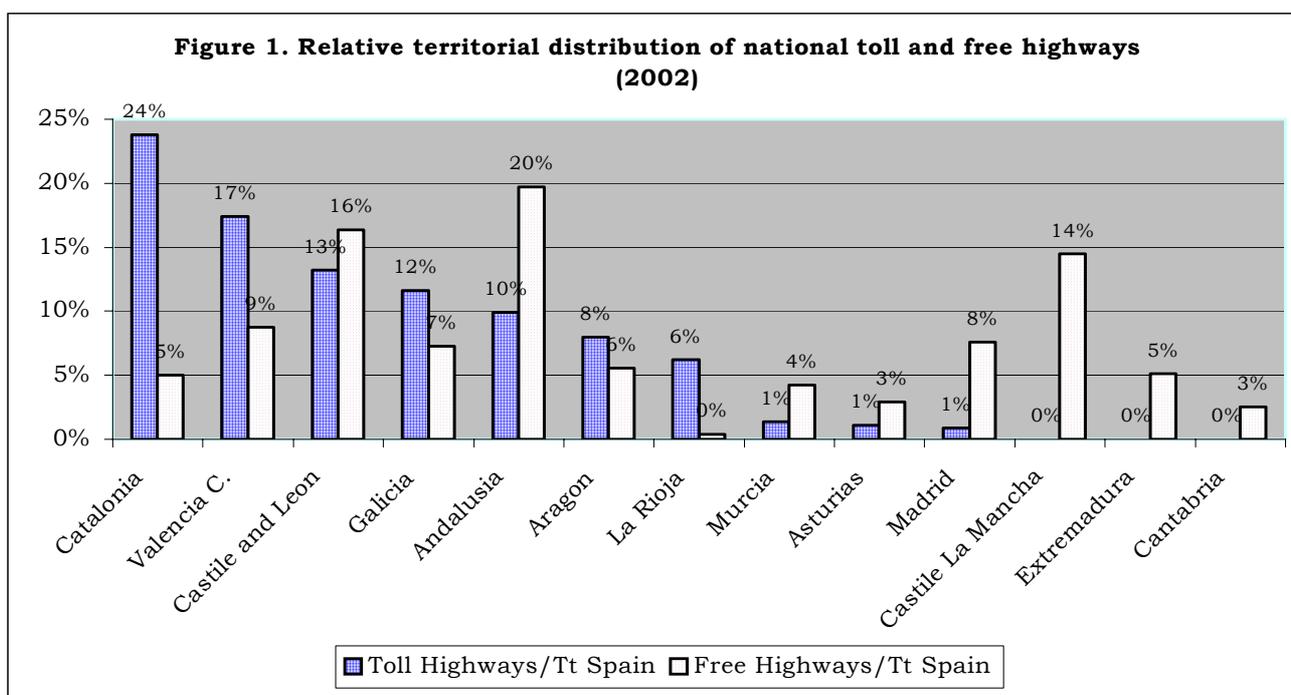
⁴ Matas and Raymond (1999) find negative and significant price-elasticities of demand in the Spanish motorways.

Table 2. Evolution of the Spanish motorway network length (kilometres)

Year	Total motorways	Toll motorways	% Toll/Total	Free motorways	% Free/Total
1970	203	82	40	121	60
1975	888	619	70	269	30
1980	1,933	1,530	79	403	21
1985	3,170	1,807	57	1,363	43
1990	5,126	1,898	37	3,228	67
1991	5,801	1,957	34	3,844	66
1992	6,988	1,991	28	4,997	72
1993	7,404	1,991	27	5,413	73
1994	7,736	2,011	26	5,725	74
1995	8,133	2,023	25	6,110	75
1996	8,503	2,023	24	6,480	76
1997	9,063	2,063	23	7,000	77
1998	9,649	2,072	21	7,577	79
1999	10,306	2,239	22	8,067	78
2000	10,480	2,239	21	8,241	79
2001	11,152	2,277	20	8,875	80
2002	11,406	2,386	21	9,020	79
2003	12,009	2,517	21	9,492	79

Note: Since 1985 free motorways include roads of four lanes that were not previously labeled as motorways. Hence, it should not be implied that the extension of free motorways was high in the early eighties. Actually, there was no real increase.

Source: Ministerio de Fomento (2004)



V. Current structure and regulation of the toll motorway business in Spain

V.I) Motorway sector structure

At the end of 2004, toll motorway concessions in Spain amounted to almost 2,900 kms, as is shown in table 3. It is worth noting that some of the concessions included in table 3 are not in effective operation yet. Around half of these kilometers belong to *Abertis*, the largest private Spanish firm in the motorway business. Indeed, *Abertis* holds 1,240 of the franchised kilometers (43% of the total). *Itinere Infraestructuras*, which is owned by the holding *Sacyr-Vallehermoso*, is the second largest group by length of concessions. *Itinere* bought the four concessions of the public firm ENA (*Audasa*, *Audenas*, *Aucalsa* and *Autostrade de Galicia*), which was privatized in June 2003. *Itinere* concessions amount to

467 kilometers (16% of the total). In addition, Abertis and Sacyr-Vallehermoso jointly control Avasa, which concession amounts to 294 kilometers (10% of the total). Finally, *Europistas* is a third important group because it is a significant shareholder of several concessionaires such as Autosol and Autopistas Madrid Sur.

Table 3. Toll Motorway Concessions in Spain (BOT)*. 2004

Build - Operate – Transfer (BOT)			
Concessionaire	Section	Kms	Price per km. (euros)
Acesa (Ab1)	Barcelona-La Jonquera	150	0.07
	Barcelona-Montmeló	14	0.08
	Montgat-Palafolls	49	0.07
	Montmeló-Papiol	27	0.00
	Barcelona-Tarragona	100	0.06
	Zaragoza-Mediterráneo	215	0.09
Aumar (Ab2)	Tarragona-Valencia	225	0.08
	Valencia-Alicante	149	0.07
	Sevilla-Cádiz	94	0.06
Aucat (Ab3)	Castelldefels-El Vendrell	58	0.08
Castellana (Ab4)	Avila-Villacastín	23	0.03*/0.05**/0.07***
	Segovia-San Rafael	70	0.04*/0.08**/0.11***
A-6 (Ab5)	Villalba-Adanera	28	0.11
Aulesa (Ab6)	León-Astorga	38	0.09
Avasa (Ab&SV)	Bilbao-Zaragoza	294	0.08
Audasa (SV 1)	Ferrol- Portuguese border	219	0.06
Audenasas (SV 2)	Tudela-Izurzun	113	0.08
Aucalsa (SV 3)	León-Campomanes	78	0.12
Autoestradas de Galicia (SV 4)	<u>A Coruña-Carballo/Puxeiros-Baiona</u>	61	0.05
AutoSol	Málaga-Estepona (a)/Estepota-Guadiaro (b)	105	0.06 (a) / 0.07 (b)
Accesos Madrid	Madrid-Arganda (a)/Madrid-Navalcarnero (b)	93	0.05/0.06 (a) / 0.06/0.08 (b)
Europistas	Burgos-Armiñón	84	0.10
Autopistas Madrid Sur	Madrid-Ocaña	88	0.03 / 0.07
Autopista Madrid-Levante	Ocaña-La Roda	118	n.o.
Enrasa	Madrid-Guadalajara	81	0.05 / 0.06
Augur	Alicante-Cartagena	77	0.02 / 0.03
Autopistas Madrid-Toledo	Madrid-Toledo	60	n.o.
Central Gallega	Santiago-Alto Santo Domingo	57	0.08
Autema	Sant Cugat-Manresa	43	0.06
Tunnel of Cadí	Tunnel of Cadí	30	0.30
Tabasa	Tunnel of Vallvidrera	17	0.12* * / 0.13***
Autopista eje aeropuerto	Eje aeropuerto	8	0 / 0.15
Tunnel of Artxanda	Tunnel of Artxanda	5	0.19** / 0.27***
Tunnel of Sóller	Tunnel of Sóller	3	1.18
Total		2,758	
Management Contracts			
Outsourcing Manager	Section	Kms	Price per km. (euros)
Europistas	Bilbao-Ermua	45	0.06
Bidelan	Ermua-Behovia	70	0.07
Total		115	

Note: ***: Peak time price; ** Regular price; * Off-peak time price.

n.o.: Not in operation in 2004. Prices refer to light vehicles

Source: Own elaboration based on info in the website of the Spanish Association of Tunnels and Motorways (Aseta), Interbiak and Bidegi.

Since the early nineties, a strong record of profitability has characterized the motorway business in Spain. Indeed, Table 4 shows firms' profits in the sector. They range from 130 million euros in 1990 to more than 600 million in 2002. In addition, it must be said that the Spanish stock market has

supported the development of the most important firms in the motorways sector, such as Acesa (now merged with Aumar/Aurea into *Abertis*), and *Europistas*. Acesa began to trade in the Madrid stock exchange in 1987 and *Europistas* in 1988.⁵ These firms deserve more attention because of their prominent role in the Spanish motorway business.

Table 4. Profits from regular activities. Spanish concessionaires (million euros)

1990	1995	2000	2001	2002
130.77	337.43	538.89	566.22	644.17

Note: Concessionaires of regional motorways in Catalonia and Galicia are not included.

Source: Ministerio de Fomento (2003)

Since the late nineties, Acesa and Aumar (later Aurea) began to expand, developing their presence in new markets in Spain, Europe, and Latin America. In April 2003, Acesa and Aurea merged, bringing forth *Abertis*. Currently, the *Abertis* motorway network covers a high proportion of the toll roads in Spain, with a turnover representing between 70 and 80% of the total business in the sector. The group is composed by Acesa, Aumar, A-6, Aucat, Castellana, Aulesa (and Avasa jointly with *Sacyr-Vallehermoso*). Furthermore, *Abertis* holds stakes in Autema, Accesos Madrid, Henarsa, Central Gallega, and Cadi Tunnel. In Europe, *Abertis* has undertaken strategic alliances with major private infrastructure operators, such as *Autostrade* in Italy and *Brisa* in Portugal, with a capital share of 8% and 10%, respectively. In the United Kingdom, *Abertis* holds a 25% share in R.M.G. *Abertis* and is present in Latin America with stakes in motorway operators in Chile (Elqui), Colombia (Coviandes), Argentina (Ausol) and Puerto Rico. *Abertis* shares (like those of Acesa and Aumar before) have traditionally been among those with the highest relative yield and most stable growth in the Spanish stock exchange.

As we have mentioned above, *Itinere Infraestructuras* is part of the holding company *Sacyr-Vallehermoso*. The acquisition of *ENA* in 2003 has substantially increased the involvement of such holding companies in the motorways business. Currently, *Itinere* is composed of the concessionaires formerly owned by *ENA* and is a shareholder of Henarsa, Autopistas Madrid Sur, Accesos de Madrid, and Central Gallega. *Itinere* also holds stakes in concessionaires in Portugal (Lusoponte, Autoestradas del Atlántico and Via Litoral), Brazil (Triangulo do sol, Via Norte) and Chile (Elqui and Los Lagos).

Europistas was created in 1968 to develop the Bilbao-Behobia franchise, one of the first toll motorways to be in effective operation in Spain. In 1974 *Europistas* was part of the consortium that obtained the Burgos-Armiñón-Málzaga franchise, which has been fully operational since 1984. The concessionaire of this motorway was Eurovías, in which *Europistas* held 35.1% of the capital. *Europistas* took over Eurovías in 2002. In addition, *Europistas* holds stakes in Autopistas del Sol, Autopistas Madrid Sur, Autopista Madrid-Levante and manages Artxanda Tunnels.

⁵ *Sacyr-Vallehermoso* has been traded in the Madrid stock exchange for many years. However, the traditional major activities of this holding have been construction and real estate development

Finally, a new kind of management contract was developed in 2003. As mentioned above, the toll motorway concession Bilbao-Behovia ended in June of 2003. Since then the local governments of Bizkaia and Guipuzkoa have been in charge of the motorway sections in their respective territories. Each government created a public entity for this purpose (Interbiak and Bidegi). In turn, these entities called for tenders to maintain and operate their sections. Autopistas de Bizkaia (whose main shareholder is Europistas) obtained the tender in the Bilbao-Ermua section, and Bidelan obtained it in the Ermua-Behovia section. In both cases, the management contract will be in force for ten years. The revenues of the outsourcing managers are composed of two components; one fixed, and the other varying with traffic flows. Direct tolls are still charged, and given the prices, the local governments will enjoy huge net revenues from the tolls paid by users.

V.II) Motorway regulation: Institutions and rules.

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.

The initial price of tolls has depended on the initial conditions in the concession and, thus, has been set on an individual basis. In addition, as explained above, the government and the concessionaires have made particular agreements that have included changes in prices. On top of bilateral agreements, a 1990 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: $C=0.95\Delta RPI_{\text{mean}}$, where C stands for change in price, and RPI stands for retail price index expressed in %.

However, since 2001 prices on national toll motorways⁶ vary according to a price cap regulation constructed as follows:

$$T_t = C_R * T_{t-1} \tag{1}$$

Where T stands for toll and C is such that,

$$C_R = 1 + \Delta RPI_{\text{mean}} - X \tag{2}$$

X is defined as follows

$$X = (1/100) ((ADT_{\text{actual}} - ADT_{\text{predicted}})/ADT_{\text{predicted}}] \tag{3}$$

Where ADT stands for average daily traffic and $ADT_{\text{predicted}}$ 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 ($0 \leq X \leq 1$).

⁶ Tariff adjustments for regional motorways are ruled on through regional laws.

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:

$$1.15 \Delta RPI_{\text{mean}} \geq \Delta RPI_{\text{mean}} - X \geq 0.75 \Delta RPI_{\text{mean}} \quad (4)$$

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, so as to share unexpected profits between users and concessionaires. In this way, it is worth noting that profits of the Spanish concessionaires increased substantially in the late nineties due to the strong record of traffic in the toll motorways. An increasing discomfort with tolls in the territories where they are charged and the high profits of the concessionaires have motivated the enforcement of price ceilings.

However, 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 $(1+\Delta RPI_{\text{mean}})$. For the older concessions, the maximum nominal increase is $(1+1.15\Delta RPI_{\text{mean}})$, 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 $0.75\Delta RPI_{\text{mean}} > (\Delta RPI_{\text{mean}} - X)$ if $RPI_{\text{mean}} \leq 4\%$. 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 has been regularly below 4% in Spain.

Finally, let us note two paradoxes involved in this regulatory dynamic:

- 1) Part of the extraordinary increase in profits during the last years is derived from the conditions included in the re-negotiation agreements promoted by the government in the late nineties. In fact, huge traffic increases are due to the conjunction of economic growth and reductions in tolls (given in return for concession extensions).
- 2) The response by the government has been to establish a price regulation that works as follows: the largest toll increases takes 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.

VI. Is it possible to homogenize the motorway financing model in Spain?

The lack of homogeneity in the motorway network in Spain creates some deficiencies in the management and financing of the network and causes territorial inequalities that provoke increasing discussions and instability. The functional homogeneity of the major motorway network could allow implementing more rational road policies, which would put an end to the high territorial diversity in financing models. Two basic alternatives could help to homogenize the network and remove the

territorial inequalities and competition distortions that tolls impose on high capacity roads: 1) Generalizing tolls throughout the motorway network, 2) Eliminating tolls.

Generalizing tolls. By the end of 2003 the total kilometers of motorways in Spain was around 12,000. Around 9,500 of them were operated without tolls. The practical feasibility of establishing tolls on free motorways has been appraised in several studies. Zaragoza (1992) points out that the material costs of establishing tolls would be very high. Also, he casts doubts on the legal feasibility of establishing tolls in many sections of free motorways that do not have a free road as an alternative. Soriano and Martín (1998) analyze the practical feasibility of this option taking into account the technological advances in charging tolls, and they infer similar conclusions. Indeed, establishing tolls can be expensive both in terms of time and money. Given the high costs and political difficulties involved in generalizing tolls, policy proposals in this direction are unlikely. The ideological stand of the party in government does not seem to matter in this regard.

Eliminating tolls where a free motorway alternative does not exist. This option has the advantage of being the most efficient as long as congestion does not exist. Hence, it applies specially to interurban sections where motorway capacity is high enough to absorb traffic coming from congested alternative roads. It has the disadvantage of requiring financial resources that could be invested in alternative projects. Still, it could be a sensible option from a financial point of view. This would require a gradual transition and the substitution of alternative tools that effectively make all users in Spain pay for motorway services. Furthermore, it would decrease the need for investment in currently congested roads parallel to toll motorways.

A question that is worth considering within this context is the effect of this kind of policy on the relationship between the public and private sectors, and particularly on the involvement of the private sector in the financing and management of infrastructure. As we have seen above, some Spanish motorway holdings companies (especially *Abertis*) have become global players in this business, and national policies are likely to regard them as a valuable asset for the overall Spanish economy. Let us analyze both issues separately:

- 1) Private financing of infrastructure: In this regard, it is important to note that direct tolls paid by users are not the only available form of private financing. In fact, there is also private financing when the public sector uses the model of postponed payment for an element of infrastructure. In respects to the ‘who pays?’ question, there are systems other than tolls to make users contribute to infrastructure financing: periodic tariffs, specific tariffs on products such as combustibles that are closely linked to the use of the infrastructure, etc.
- 2) Private management of infrastructure: the private sector is in charge of operating and maintaining infrastructure, whether revenues come from the public budget or users (direct or indirectly). In fact, the schemes for cooperation between public and private sectors are very diverse in this field.

This distinction is quite useful. Although usually forgotten, in a near future the financial requirements for maintaining and upgrading existent motorways will be higher than the financial requirements for investment in new motorways. Currently, maintenance of 80% of the Spanish motorway network relies on the public budget, and degradation has accelerated in the last years. A scheme of financing new investment through the public budget and maintenance through user charges could be convenient. This scheme is more demanding of users than current expectations. Recall that 84% of the new motorways (in the most recent national plan) are to be financed by the public budget, and users will finance only 16%. In contrast, the scheme proposed here is that all users contribute to financing the maintenance of all motorways.

This proposal would allow several options for cooperation between public and private sectors in the operation and maintenance of the national motorway network in Spain. One option is competitive tendering for time-limited management concessions, which could be financed either by a private operator charging tolls directly to users or through government payments from other resources.

Is it possible to incorporate this financing model in Spain if direct tolls must be used? Theoretically yes. However, we have argued above that there is no likelihood of generalized direct tolls, as recent long-term government plans have shown. Other forms of user financing may be more useful and viable in moving toward a generalized and homogenized financing system in Spain. The lack of rationality in the Spanish motorway system has arrived at a point where effectively increasing homogeneity is more important than worrying about the sort of financing used. After all, Economics usually deals with second best scenarios.

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