

Privatization and Regulatory Reform of Toll Motorways in Europe

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This article analyzes current trends in toll motorway privatization in Europe as an illustration of the paradox of simultaneous deregulation/privatization and reregulation. Changes in the form of government intervention are identified as transitions from internal control on processes and inputs to external control on performance outputs. The state guarantees its capability to intervene and seek its own objectives even when giving up public property. In fact, output regulation is a partial substitute for public ownership. We analyze the hypothesis that privatization of motorways spurs price regulation. Indeed, we observe that toll regulation becomes more detailed as the private sector increases in size, which is a regular reaction across different institutional frameworks. This result is consistent with the literature on the rise of a regulatory state, which emerges with a new mode of governance based on indirect government. Moreover, the study provides evidence of the importance of temporal context in modeling public sector restructuring.

Introduction

In the last decade, the private sector has increased its participation in the funding and management of the motorways network in Europe, as well as in the United States (see Bel and Foote Forthcoming; Geddes 2007). General financial restrictions on governments, and particularly the need to cover deficits, have been the main rationale for the privatization trend observed in several European countries (Vickers and Yarrow 1991; Yarrow 1999). Government intervention of some sort is common to sectors that are characterized by natural monopoly conditions, like road infrastructure, railroads, power transmission, and water distribution. Intervention may take the form of either public ownership (by operating the market with a public firm) or regulation as a means of external control (perhaps through agencies or commissions).

Accompanying privatization with regulation has a long history. In the first large scale privatization policy in the contemporary history that was implemented by the Germany's National Socialist Government in the

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1930s (Bel 2006), privatization was accompanied by an intense growth of governmental regulation (Bel Forthcoming; Lurie 1947; *The Banker* 1937). The idea that governments choose between public ownership and regulation when intervening in public services with monopoly characteristics is clear in Gómez-Ibáñez's (2003) contractual approach to government intervention: Concerns over monopoly often lead the government either to provide infrastructure services directly or to regulate the prices and quality of services provided by private infrastructure companies. This substitution effect between public property and regulation has been accurately modeled in Shleifer and Vishny (1994). From their political economy approach, these authors point out that those politicians who have control of firms might well prefer higher private and lower treasury ownership, as long as they can exercise control through regulation.

This idea of linking privatization with reregulation is well established in the literature on political science and public administration. Several studies have studied how governments increase regulatory presence when deregulating markets and privatizing public monopolies. In fact, giving up public ownership does not mean absence of public control. Instead, the state can transform its forms of intervention and use control mechanisms to achieve government objectives even while relying on private operators and agencies. This implies a transition from the so-called "positive state" to a "regulatory state," which is based on indirect government (Majone 1999).

Replacement of control on inputs and processes with control on outputs and performance is not exclusive to the public-private ownership dimension. We find this trend too in the bureaucracy-agency dimension by giving autonomy to the managers (Kickert 1998; Verhoest et al. 2004; Verhoest, Verschuere, and Bouckaert 2007). Following this rationale, we examine the hypothesis that privatization of tolled motorways in Europe has implied the design and implementation of more complex and detailed regulation schemes for controlling elements such as tolls.

The increasing importance of motorways privatization in response to budget constraints and needs for enlargement, also involves pressure for a change in public policies. Thus, privatization helps balance public budgets in the short run and satisfies certain political goals for infrastructure policy, but this does not necessarily lead to a weaker role for government. Indeed, the regulation of private firms becomes even more central to guaranteeing the expected results from privatization and the achievement of political goals by not letting go of the opportunity to execute external control.

The approaches adopted by the different players in this process will also depend on the forms of private involvement. In the context of our study, privatization does not transfer ownership of roads to the private sector. Instead, management and operation is transferred (through concessions) for a period, while ownership of assets remains public. Such concessions are a form of privatization because the private firm obtains

residual gains from the service delivery process, even though government retains control over some aspects of service delivery (Vickers and Yarrow 1991).

The structure of the article is as follows. In the first section, we briefly review related public administration literature. In the second section, we analyze the main trends in motorway funding and management in Europe, focusing on the use of concession contracts awarded to public or private firms and on the methods of payment by road users. In the third section, the most relevant characteristics of price setting in tolled motorways are examined. In the fourth section, we make a more detailed analysis of the pricing rules applied in the European countries in which the involvement of the private sector is greatest. Then, given the analysis made in previous sections, we discuss our hypothesis concerning the substitution between public ownership and price regulation.

Theoretical Background

It is well known in the public administration literature that total deregulation never occurs in practice (Majone 1990). Indeed, recent trends of privatization and liberalization moved the state away from the ownership of companies in strategic markets, but this trend did not fully eliminate public intervention. In fact, the state kept its ability to control the market and interfere in its decisions. Thus, the state changed its own form of public control by replacing public ownership with new and more detailed regulatory presence. By doing so, the state puts less emphasis on controlling inputs and processes in the production or delivery of public services and gives more attention to the control of the performance of those organizations in charge of production or delivery.

This is what Majone (1990) called "the rise of the regulatory state" in a moment at which a trend toward deregulation and privatization in strategic economic sectors was gaining ground in both the United States and Europe. This regulatory state is based on an interaction between deregulation and reregulation. Majone offers two interesting examples to show this substitution effect. The first is the experience in the U.S. telecommunications sector, which was deregulated in the early 80s. A new form of regulation accompanied this process: incentive regulation and price caps. A second experience is the privatization of the provider of telephone services in Britain. In this case, the entrance was regulated and price caps were used. In both cases, an agency was created to oversee the market. Hence, Majone concludes that deregulation and reregulation combine to keep public control even when the officially implemented policy is market deregulation. In this direction, Majone (1994) shows that when privatization takes place, this leads to the creation of new regulatory bodies and a considerable widening of the powers of those agencies. Indeed, government ownership is not the sole way to guarantee public control.

This concept brings our arguments close to the discussion on the trade-off between autonomization and control.¹ Walter Kickert coined the term “autonomization paradox” to denote the situation in which a grant of greater autonomy to an agency is accompanied by an external control increase. This paradox may easily appear in hybrid organizations, which combine public and private interests and values in a way that creates synergy as well as tensions.²

As stressed in Verhoest et al. (2004), control stands in opposition to autonomy, as it is used to influence the decisions and behavior of agencies in order to achieve government objectives (White 1991). The new regulatory state gives less emphasis to public ownership and centralization in administration, and increasingly relies on delegation to agencies or commissions, which have acquired renewed intervention powers (Majone 1999). Also, Tom Christensen and Per Læg Reid (2006) identified this process by confirming that regulation and agencification occur and perform in tandem, linking political control and agency autonomy.

This process implies a new and emerging mode of governance based on the transition from a positive state to Majone’s regulatory state (Majone 1997). This state attempts to develop new and more sophisticated forms of control in restructuring public sector activities (Hogget 1996). Therefore, new functions accompany the state in this transition. Rommel and Verhoest (2007) consider that these functions depart from the traditional functions of redistribution of income and macroeconomic stabilization. The regulatory state solves and corrects market failures and relies on indirect government.

Apart from changes in the form of control, the state usually accompanies the deregulation process with changes in the object of control: from internal control of processes to external control of outcomes. Thus, the new regulations are devoted to performance outcomes. The effort following full privatization of former monopolies is focused on establishing performance indicators and stricter regulation. The main result of this new strategy is a more detailed regulation of measurements of performance.

In this study, we analyze the transition from public ownership to more sophisticated and rigid regulation in a traditionally publicly operated sector: toll motorways. Even if liberalization cannot bring new entrants and competition to the field due to technical and economic considerations, motorways privatization is an emerging infrastructure policy in both the United States and Europe, and increases in regulation have accompanied such ownership transfers. Consequently, motorways privatization in Europe is an interesting illustration of the rise of Majone’s regulatory state as means of keeping a capability to intervene in the market even when giving up ownership. Hence, the European experience can help us explore the extent to which public ownership and regulation are partial substitutes. To do so, we focus our analysis on the rise of price regulation in those countries that have decided to privatize their motorways. This

regulation is chosen because it has become a key element in managing the performance of companies.

Our approach also fits well within the innovative institutional processualism literature on public management reform, by comparing case studies and focusing our attention on temporal context as a rationale for reform.³ Here we study policy reform in the motorways sector during a period of extended and recent privatization programs that are taking place in Europe. This process has included public sector restructuring across different institutional frameworks and is made clear through comparative analysis. Moreover, institutional diversity and the historical attributes of the sector provide interesting models of public policy change.

Main Trends in Funding and Management of Motorways in Europe

The length of motorways in the EU (plus Norway and Switzerland), the length of motorways under concession, and the share of kilometers under private concessions are shown in Table 1. Data in the table indicate that more than one-third (37%) of that length is under concession, and 3 out of 4 km (75%) under concession are operated by private firms.

To this point, it is worth noting that not all the concessions result in tolls charged to users (column 3 in Table 1 shows the length of tolled motorways). Some motorways use shadow tolls or other financial strategies in order to fund construction and maintenance. In this case, a public administration pays the private firm for the traffic the motorway carries. The combination of shadow tolls and private firms does not imply that funding comes from private sources, because the public budget covers infrastructure costs. For that reason, we will examine only the regulation of those tolls charged directly to users for our analysis, and we will not look at the regulation of shadow tolls.

The private sector plays a particularly important role in the southern and Mediterranean countries: France, Italy, Portugal, and Spain. In France, Italy, and Portugal, private firms control more than three-fourths of the motorway network, while in Spain they manage one-fourth. The privatization strategies followed by both the French and the Italian governments in recent years have increased private involvement in motorways substantially. Autostrade, which holds 60% of the Italian network that is under concession, was a public agency until 1999. In France, the three biggest public motorway firms (Sanef-SAPN [Société des Autoroutes du Nord et de l'Est de la France/Société des Autoroutes Paris Normandie], APRR-Area [Société des Autoroutes Paris Rhin Rhône], and ASF [Autoroutes du Sud de la France]) were privatized at the end of 2005. These firms jointly hold around the 80% of the French network under concession. In addition, between 2005 and 2006 three new concessions were awarded to entirely private companies: ARCOUR, ADELAC, and A'liénor.

Spain and Portugal have the longest history of private dominance of motorways. In the former, three firm groups linked to building groups

TABLE 1
Motorway Network in the EU-25, Norway and Switzerland (2004)

Country	(1) Motorways (km)	(2) Motorways under Concession (km)	(3) Tolled Motorways (km) General Tolls ^a	(4) Private Firm Concessions (% of Tolled Network under Concession)
Austria	2,000	2,000	140 ^a	0% ^a
Belgium	1,729	1	1	0%
Cyprus	268	0	0	—
Czech Republic	517 ^b	0	0	—
Denmark	973	34	34	100%
Estonia	96	0	0	—
Finland	603	69	69	100%
France	10,383	7,840	7,840	11% ^c
Germany	12,000	4	4	100%
Greece	916	917	917	0%
Hungary	569	569	0	n.a.
Ireland	192	0	0	—
Italy	6,840	5,593	5,593	78%
Latvia	0	0	0	—
Lithuania	417	0	0	—
Luxembourg	130	0	0	—
Netherlands	2,300	4	4	0%
Norway	629	550	550	0%
Poland	552	214	214	n.a.
Portugal	2,271	1,771	1,771	100%
Slovakia	316	0	0	—
Slovenia	483	348	348	0%
Spain	10,500	2,610	2,610	96%
Sweden	1,450	16	16	100%
Switzerland	1,341	0	0 ^a	—
UK	3,476	580	42	100%
Total	60,956	22,911	20,153	75% ^c

Sources: Length of motorways networks, motorways under concession, and private firms concessions: authors', using data collected in Fayard (2005) and Eurostat (Cyprus, Slovakia, Slovenia, Estonia, Ireland, Hungary, Lithuania, Latvia, Poland, and Czech Republic). Most information on toll motorways has been obtained from the European Association of Tolled Motorways, Bridges and Tunnels Web page (ASECAP, <http://www.asecap.com>). Information on Austria obtained from *Autobahnen-und Schnellstrassen-Finanzierungs Aktiengesellschaft* (ASFINAG). Data for Poland obtained from Bak and Burnewicz (2005).

Notes: Data for Malta, not available. Data for % private firms concessions in Hungary and Poland in 2004, not available (n.a.)

^aWe do not consider motorways where only specific tolling for heavy vehicles is applied. The amount of 140 km of tolled motorways in Austria is approximate. In this country ASFINAG, a publicly owned company (100% belongs to the Republic of Austria), is the main owner (65% and 79.9%, respectively) of two partially privatized operating firms (ASG and ÖSAG). These firms handle construction, operation, and maintenance for several network sections on behalf of and under contract to ASFINAG. In this way, there is minority private partial ownership in the Austrian concessions.

^bData for Czech Republic are not available for 2004; we use 2003 data.

^cIn December 2005, the French government privatized the three biggest concessionaires of toll motorways. Now, 95% of motorway kilometers under concession are under private hands. This figure is not included when we compute the total weight of private concessions in 2004.

control 90% of the network under concession (Abertis, Itinere, and Cintra). These groups also participate in concessions granted around the world. In fact, Spanish firms played an active role as the main investors in the French privatization process. Abertis was awarded the concessions of the Sanef Group (Sanef + SAPN), and has close alliances with Brisa, the major group in the Portuguese concession market, and with Autostrade, the major group in the Italian market. In this latter case, Abertis and Autostrade attempted a friendly merger in 2006, but reluctance on the part of the Italian government prevented its completion.

We do find a subgroup of countries in the north and center of Europe (Benelux, Germany, Denmark, and Sweden) that remain reluctant to use concession contracts and tolls. Another subgroup of countries (Austria, Slovenia, Hungary, and Norway) make use of concessions, but they have created public firms that manage such concessions and the charges to road users.⁴

Finally, we want to highlight the particular cases of the United Kingdom and Ireland. The relatively few concessions in the United Kingdom are all privately managed. However, of those, the M6 is the sole one on which users are charged direct tolls, while the rest are managed with a shadow toll mechanism.⁵ In Ireland, where motorways were traditionally funded out of the budget, the government has decided to increase its motorway network by introducing private participation in Build-Operate-and-Transfer schemes. Consequently, the first toll motorway on the island opened to traffic in December 2005. Some additional projects will be awarded to the private sector soon.

Price Regulation in the Toll Motorways Sector

Neoclassical 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 should rely on efficiency concerns, but it is also 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, pricing must follow efficiency criteria in order to regulate traffic demands. The theory also suggests that nonefficient pricing schemes can generate either congestion or overcapacity problems.

The European Commission espouses an efficiency criteria approach in official documents on transportation enacted in the last decade (European Commission 1995, 1998, 2001). However, tolling regimes are diverse in the European Union (EU) countries. This diversity is likely to remain for the near future because EU institutions have not been able to establish a harmonized community framework for motorway concessions. On the other hand, there are EU rules, set in Directive 1999/62/EC, to regulate charges on heavy commercial vehicles using certain infrastructure (Borgnolo and Rothengatter 2005). For instance, since January 2004,

commercial vehicles weighing more than 3.5 tonnes are subject to tolls on Austria motorways (Rothengatter 2005). Since January 2005, commercial vehicles of 12 or more tonnes are subject to tolls on German motorways. Outside the EU, Switzerland introduced tolls for commercial vehicles (more than 3.5 tonnes) in 2001.

In practice, however, toll setters have rarely been concerned with marginal costs. As we explain below, the financial breakeven point of concessionaires has been the only issue, and no weight has been put on efficiency criteria. The rest of the section is divided in two parts. First, we consider the factors that define initial toll setting in the European countries. Second, we describe the mechanisms used to adjust tolls over time.

Table 2 shows the criteria used in Europe to establish the initial toll level of concessions. As the reader can observe, we consider only those cases where tolls are directly charged to the users, leaving aside shadow toll regulation. Firms usually define tolls as a payment for a service provided. The process for setting tolls is a matter of an ad hoc agreement

TABLE 2
Initial Toll Setting Criteria for New Concessions in the EU-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
France	Investments, depreciation, physical road structure, traffic forecasts, operational costs, and financial costs	Yes, but it is applied under national regulation.
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
Slovenia	Capital costs, average costs of reconstruction, operational, and maintenance costs	No
Spain	Financial costs, investments, operational cost, concession length, environmental costs, and rate of return	Yes
UK	The concessionaire establishes the toll level it wishes	Yes

Source: Own construction using the information delivered by ASECAP (2003, 2004, 2006, 2007) in its Web page <http://www.asecap.com>.

TABLE 3
Average Toll/km Evolution for Heavy Vehicles Type 2: France, Italy, and Spain 1998–2006 (€/km)

Country	1998	2001	2004	2006	2006 (Euro 1998)	Real Change 2006/1998
France	0.17	0.18	0.23	0.23	0.21	24%
Italy	0.04	0.10	0.10	0.13	0.11	175%
Spain	0.16	0.16	0.14	0.16	0.13	-19%

Source: Road Haulage Taxation Database (ECMT 2006) for nominal average tolls. Authors' for 2006 tolls in euro 1998.

Note: Column "2006 (Euro 1998)" shows average toll adjusted for CPI.

between the administration and the firm, and it is usually connected to investment and operational and maintenance costs, as Table 2 shows.

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

Generally, it is reasonable to argue that toll setting in Europe does not take into account allocative efficiency criteria. The use of prices to regulate demand is not usually considered. Thus, the general rule has been that tolls are based on total cost instead of long-term marginal costs.

Beyond broad agreement on the basis for tolls, specific institutional structures and regulatory bodies help to explain differences in prices between European countries. Table 3 shows the growth in average tolls/km in countries with traditional toll motorways (France, Italy, and Spain). Toll shown are for heavy vehicles of type 2 because the European Conference of Ministers of Transport (ECMT) provides data for this category in a homogeneous way, which allows average tolls to be compared.⁶ French tolls are the highest, while those in Spain and Italy become similar toward the end of the period. The average toll/km in Spain has remained stable in nominal terms in the recent years, with a significant real decrease of 19%. Toll in France have increased in real terms by 24%, but the real toll increase has been much higher in Italy: average tolls in 2006 are 175% higher than in 1998 in real terms.

The Italian case is particularly relevant given the low level of tolls in 1998 (0.04 €/km) and their fast convergence, and almost equalization, with the Spanish level. Privatization processes and new systems of price regulation in Italy might have played an important role in this increase. Indeed, there was an abrupt price increase of close to 100% in Italy during the preprivatization process in order to increase the financial returns from privatization. In any case, it is important to point out that tolls usually

allow high profitability (see Bel and Fageda 2005). In France, the increase is mainly due to the application of the 19.6% VAT in 2001 (in full effect by 2002), as required by European directives. Privatization, however, did not bring about abnormal toll increases (Bel and Foote Forthcoming).

Regulation based on total costs—such as the rate of return method—has been the most widely used mechanism in sectors where large initial investments are needed, such as energy, telecommunications, or transport. Under this regulation, firms are not allowed to earn above a certain rate of return and price rises are capped at levels where the target rate will be earned (Bannock, Baxter, and Davis 1992, 360). Recently, more attention has been given to price caps that limit increases with an inflation index, and frequently, some productivity and/or quality indicators to permit the regulated company to keep some efficiency gains. The price cap is a number of percentage points (X) below the standard rate of inflation as measured in the retail price index (RPI). Usually, the price cap formula is set to $RPI-X$.

Since the seminal study by Averch and Johnson (1962), it is well known that the rate of return method promotes overinvestment and does not carry cost reduction incentives (Laffont and Tirole 1993). Price cap mechanisms, on the other hand, can offer incentives to reduce costs, but they can generate, in turn, problems of underinvestment (Armstrong, Cowan, and Vickers 1994). In addition, governments prefer price cap regulation because it allows the sharing of productivity gains derived from the economies of scale associated with demand increases. Thus, they address concerns about excessive profits.

In the case of motorways, the most common practice is a hybrid of rate of return and incentive-based regimes. Tolls are initially determined by total costs (similar to rate of return regulation), and then they are adjusted through some specific formulas following a price cap scheme. The adoption of a hybrid regime is justified by Estache et al. (2003) as recognizing both the existence of costs that the operators cannot control and the need to introduce incentives. The more volatile or unpredictable the uncontrolled expenditures, the more important it is to adopt a regime that reduces the operator's risks. Certainly, the motorways business contains high levels of demand uncertainty and each specific hybrid regime design involves decisions about how much of this uncertainty can be passed on to users.

In Table 4, we summarize the main characteristics of the regulatory mechanisms controlling toll adjustment in the countries where directly charged tolls have been implemented.

Linking increases to a consumer price index (CPI) has been the main and most common element for toll adjustment schemes. Most importantly according to our hypothesis, we observe that generally, such schemes use more complex and detailed systems of correction in countries where the private sector has greater participation. Where the private sector is less important, government and private managers usually undertake bilateral

TABLE 4
Tariff Adjustment Mechanisms. EU-25 and Norway

Country	Adjustment methods	Firm's Property	Allocative Efficiency Criterion	Correction Factors
Austria	Bilateral negotiation	Public	—	—
France	Stage 1: Individual contract Stage 2: $\Delta T = 0.7 * \Delta P$	Private	No	Individual Contract and Inflation (P)
Greece	Operational costs	Public	No	—
Hungary	Adjusted to demand	Public	Yes	Traffic received
Italy	Price Cap $\Delta T \leq \Delta P - X + \beta Q$	Private	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)	Public	No	Inflation (P)
Portugal	$\Delta T = 0.9 * \Delta P$	Private	No	Inflation (P)
Slovenia	$\Delta T = \Delta P$	Public	No	Inflation (P)
Spain	Price Cap $\Delta T \leq \Delta P - X$	Private	Key element because X is the difference between real traffic and forecasted, over this latter: $(1/100)([ADT^R - ADT^P]/ADT^P)$	Inflation (P) and Traffic (IMD)
UK	Concessionaire's free decision (max. twice a year)	Private	No	—

Source: Own construction using the information delivered by ASECAP (European Association with Tolled Motorways, Bridges and Tunnels, 2003, 2004, 2006, 2007) in its Web page <http://www.asecap.com>

Note: Where T is the toll, P is the retail price index of consumption, Q is a quality index, and X is the efficiency index associated with a price cap regulation. In addition, ADT^R and ADT^P are the average daily traffic received and predicted, respectively.

negotiations to cover each increase, or simply apply an inflation adjustment. Consequently, more complex and sophisticated regulatory schemes are found in countries where government has decided to transfer operation to the private sector. This is needed to guarantee public intervention and external control where discretionary control is lost by transferring property rights to the private companies.

In this section, we have reviewed the criteria used across European countries to specify price regulation and we have recognized a different pattern depending on the ownership of the operating firms, as was expected. In the next section, we study recent privatization experiences to evaluate how increases in private ownership have promoted new forms of public intervention that develop regulation as a new form of control.

Private Ownership and Toll Regulation: Country Studies

Within the toll motorways sector, three cases best illustrate the hypothesis defended across this study: Spain, Italy, and France. For this reason we provide a more detailed analysis for each, showing how all have recently entered into a process of privatizing their toll networks and, in all cases, have accompanied privatization with increases in price regulation.⁷

In Italy and France privatization has included a large share of their networks, while the Spanish privatization undertaken in 2003 affected only 472 km of toll motorways (17%). However, the study of the latter experience may provide useful insights as Spain is the country with the oldest general private model in toll motorways and has recently renewed its interest in new private projects. Cases outside the EU are also examined where they shed light on our main hypothesis. Thus, we look at the recent privatizations carried out in the United States and Japan and compare the experience of two countries, Croatia and Serbia, which have only recently separated. In all these experiences and consequently in different institutional frameworks, we find clear examples of how governments when turning to privatization of traditionally publicly owned monopolies transform their capability to control the market and its agents by increasing or setting strict price regulations that guarantee their intervention in the market even as they give up ownership.

This section offers a brief review of these privatization experiences and the associated regulations applied after operation and management were transferred to the private sector. These experiences serve to clarify the hypothesized substitution effect at the core of the current study. In this way, we show how governments attempt to control the market by using stricter regulation when operations and management are privatized.

Spain

Private participation in the toll motorways sector in Spain is old: The first toll motorway was awarded to the private sector in 1967 (the pre-

democratic period) and private firms have been seen as the natural base of toll motorways management. Only after the economic crisis of the late 1970s and early 1980s did the state nationalize some financially troubled firms and create ENA, a public agency for toll motorways management and operation (Bel 1999). Since motorways integrated in ENA were reprivatized in 2003, the sector has been entirely privately managed, and as is shown in Table 1, recent trends seem to favor the extension of the toll motorway network.

As explained in Bel and Fageda (2005), the initial price of tolls depends on the initial conditions in the concession; thus, rates are set on an individual basis under private contracts. Initially, changes in rates on Spanish motorways could also be a matter of nontransparent, bilateral negotiations between government and concessionaires. No automatic price adjustment rule was in place before 1990 though a formula was established in 1973 to allow firms to claim an adjustment. It is important to stress that this formula only gave the right to claim an adjustment but did not determine the amount of the increase. This was a matter for bilateral negotiation between the government and the firm.

In 1990, national law set a general rule for yearly price adjustments. This annual adjustment was 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 is expressed in percent. However, since 2001, prices on national toll motorways vary according to a price cap regulation (RPI-X). The introduction of a more complex and detailed price regulation arrived at the moment when private toll motorways were increasing due to new concession awards.

Included in the X factor of the Spanish price cap, we find the deviation between the expected and real traffic carried by the motorway. The predicted average daily traffic was included in the economic and financial plan for the concession as approved by the government representation in the concessionaire. However, different treatments (different bounding rules) within the industry remained, leaving old concessions less constrained as is shown in Bel and Fageda (2005).

The price cap system is an attempt to link price changes with the actual evolution of traffic in such a way as to tie extraordinary profits to reductions in the real prices of tolls. Thus, users and concessionaires will share unexpected profits, an objective stated in Law 14/2000. The implementation of this regulation does not consider features such as quality of service, maintenance, or construction of new lanes but is closely linked to performance control.

Detailed regulation of toll increases in Spain was introduced by the early 1990s, when private concessions were already the usual form of toll motorway operation and management. Since that time, regulation has become increasingly detailed and complex in tandem with a renewed interest in extending toll motorway network. Furthermore, as mentioned above, just before the reprivatization of ENA concessions in 2003 and the

awarding of new private toll motorway contracts, toll regulation in Spain achieved its highest level of detail, giving support to the association between privatization and more sophisticated regulation.

Another element affecting the governance of the market is the use of a government delegation that belongs to the Ministry of Transportation (Ministerio de Fomento) and enjoys no autonomy from the ministry. The delegation is used to control private companies and the market's evolution. Its main functions (regulated by law) are to oversee, inspect, and control the industry and its operators. In addition, the delegation has a voice, but no vote, on the councils of each concessionaire.

It is important to understand that the major Spanish toll motorway companies are also the world industry leaders. These companies (Abertis and Ferrovial) operate motorway networks across the globe and have recently increased their presence in such emerging markets as France, the United States, and Latin America. Indeed, Abertis is the largest private operator of toll motorways in the world, and Cintra-Ferrovial is also a world leader in the sector. This breadth of operation facilitates a more fluent relationship between the Spanish government and the companies, as the latter are an important part of the government industrial policy, which is centered on promoting national champions. This, together with historical confidence and trust built during more than 40 years, seems to provide a better relationship between government and firms. Hence, even if Spanish toll regulation has increased in detail, it is still far from reaching the complexity common in other countries that have recently privatized motorways. Historical institutional frameworks, thus, also shape government decisions in the public sector restructuring.

Italy

Financial motivations have driven the recent privatization of motorway concessions in Italy. The government launched a wide privatization program in 1997 in response to the financial restrictions imposed by the Maastricht Treaty (Baldasari, Macchiati, and Piacentino 1997). As Ragazzi (2006) points out, there is no reason to believe that the privatization responded to efficiency goals, as opportunities for greater efficiency in motorways is very limited and there is no evidence of productivity gains after the Italian privatization. Autostrade's transfer to the private sector in 1999 is illustrative. Autostrade's concession was scheduled to expire in 2003 and most of its investments had been amortized before 1999 (Greco and Ragazzi 2005). In order to maximize privatization receipts, the concession was extended until 2038, and the level of tolls was maintained (and further adjusted for inflation).

In Italy, the price cap regulation established by the public authorities in 1996 seeks to benefit those firms that obtain large productivity gains. Toll adjustment rules, adopted in the early stages of the privatization process, mainly respond to general price growth (P), productivity gains (X), and

some quality indicators (Q)—made up of pavement quality (60%) and total crash rates (40%)—weighted by a coefficient β .

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

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 flaw, however, lies in the poor transparency of some elements used to compute productivity gains (X).⁸ Indeed, the factors included in the productivity variable are: (1) the depreciation of the planned 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. In addition, the variable (X) only considers traffic volume indirectly. These additional elements diminish the transparency of X and allow ANAS (Azienda Nazionale Autonoma delle Strade)—the regulatory agency—to negotiate toll adjustments with each firm in a bilateral way. However, these regulations—designed and established in the early stages of the privatization process—are much more detailed and complex than practices followed before privatization was on the way.

Regarding ANAS, it is worth noting that this is an unusual regulator. Changing its legal status in 2003, this agency became a public firm that both regulates the market and operates some routes: it is simultaneously the regulator of and a player in the market. This double role involves a lack of transparency in its activities and assures discretionary control. It does enjoy more autonomy than the government delegation in Spain, because there is separation, but it is still seen as the government branch used to interfere in the market.

As a result, the Italian state decided to privatize its motorway network but imposed a detailed regulation to determine prices. Thanks to this regulation and the lack of transparency of ANAS’s role in the subjective construction of the X factor, government keeps its ongoing influence in the market.

Further proof of the government’s will to interfere in the market, even after deregulating and privatizing, was its political opposition to the Spanish firm Abertis’s attempt to take over Autostrade in 2006. The Italian government changed regulatory laws in order to prevent this takeover and to assure the Italian nationality of toll motorway operators in spite of agreement between the firms and the European Commission’s authorization.

Again, government’s industrial policy reappeared in the deregulated market and the state used its mechanisms to defend national ownership. In general, it seems easier to control and to influence national companies, and such companies allow much more room for relational contracting, which is a trust-based relationship between government and regulated firms. Relational contracting seeks desired policy outcomes, as it creates an

environment that implicitly promotes the achievement of shared goals (Brown, Potosky, and Van Slyke 2007). In addition, for these reasons, there are important differences between the Spanish and Italian schemes that result from historical institutional factors. As mentioned above, Italian motorways were operated by public companies until the late 1990s. Therefore, because privatization is still a recent public sector reform in Italy, the interest of foreign groups in acquiring its major operators has affected the shape of its regulation. Temporal context and institutional elements conditioned government reaction. Both approaches also seem to explain why price regulation is more complex in Italy than in Spain.

As a result, Italy clearly shows the government's will to keep its power of intervention in the market when privatization is a very recent public sector reform. In Italy, ANAS has been used for a long time to control and regulate the sector, but it was only right before privatization that a complex and sophisticated price regulation was introduced. This separated agency plays a double role by being a player and a regulator, and enjoys little autonomy from government. Moreover, the complexity in the formulation of price cap regulations seems to allow a high degree of discretionary control and subjectivity, which provides an easy way to influence and achieve government goals. This strategy seems to be promoted by historical institutional framework and temporal context: a tradition of publicly owned firms exploiting the motorway network and a very recent privatization experience with threats of foreign takeovers.

France

The French privatization process was set out in the Declaration of General Policy on June 6, 2005. It established the goal of reinforcing investment in large infrastructure projects, particularly on motorways and railways, using "innovative financial mechanisms" (French Government 2005a). On January 26, 2005, the *Agence de financement des infrastructures de transport de France* (AFITF) came into existence. One of its expected sources of funding was the returns obtained by the French State and the public company Autoroutes de France from their shareholdings in the concessions of tolled motorways.⁹

On September 7, 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 [the government] to pay of a part of the National Debt and finance new essential infrastructure." (French Government 2005b). Indeed, reducing the public debt (as well as reducing the budget deficit through financial engineering mechanisms) was a strong incentive for the French government.

Since 1995, the practice in France has been for the government and motorway managers to agree on an initial five-year management contract ("*contrat d'entreprise*") that defines the yearly evolution of tolls. Some concessions, such as SAPN, have management contracts of more than five

years. These contracts that are specific to each concession, contain objectives of investment and maintenance, road safety, environmental protection, and even some social factors related to employees. In return, the French government provides certainty to the motorway managers about the toll schedule over the period of the agreement.

The concession contracts awarded in 2006 establish that once the management contracts have been completed, the toll schedules will follow the CPI: with tolls increasing by 70% of CPI (*Journal Officiel de la République Française* 2006). In this way, we can distinguish between two different phases in toll setting in French motorways: (1) a first stage based on the contract commitment and (2) a second stage in which toll increases are based on the 70% CPI rule. This “two-stage” regulation is explicitly embedded in the new concession contracts, and future toll increases have been established in a more detailed way.

Therefore, the state’s intervention is huge in the first stage, through highly detailed contracts, and this assures that it will not lose control by transferring ownership to the private sector. Further proof of the will of the French state to monitor after privatization is the requirement that a member designated by the state sit on each concessionaire’s council board. This member has voice but cannot vote and is present at these council boards in order to oversee investment plans and to monitor that the industrial plans the concessionaires proposed when bidding for the contract are effectively implemented.

As in the case of Spain, no separated agency has been created to control the market, and the French Ministry of Transport is directly in charge of toll motorway concessions and their regulation. Again, the very recent French experience provides another interesting illustration of how privatization can go together with re-emerging regulation.

Other Experiences Outside the EU

Countries outside the EU also provide support for our hypothesis. For example, the recent awards of the “Chicago Skyway” (CSk, October 2004), and the “Indiana Toll Road” (ITR, January 2006) were the first important privatization operations in the United States. These cases provide clear examples of an extremely detailed toll regulation following privatization. For instance, before privatization was implemented, neither of the two toll motorways had any rule governing toll increases. In fact, toll increases were random and did not follow any regular pattern. Nonetheless, in both private concession contracts we find tolls defined out to the last year of concession (Bel and Foote Forthcoming), which is of great interest when we consider that all concessions were awarded for very long periods: CSk for 99 years and ITR for 75 years.

Our hypothesis is also supported by a comparison between two countries where tolled motorways make up a large share of the existing networks but are operated under different ownership regimes. In Serbia,

tolled motorways are the responsibility of a single public company. In Croatia, on the other hand, we find private concessionaires charging tolls to motorway users. In the latter, tolls are established following a regulated criterion that takes into account inflation and other economic factors, whereas in Serbia no rule and no criteria have been established to determine increases of tolls (European Association of Tolled Motorways, Bridges, and Tunnels [ASECAP] 2006). Therefore, the state in Serbia enjoys full internal control of the motorway while Croatia relies on a regulation to control its operation externally. In any case, the state has not given up its ability to interfere.

Finally, in 2005 the Japanese government privatized the public corporation that had ruled toll motorways for 50 years and separated it into several companies. Although the process is very recent, voices have emerged calling for a new role for regulation, which did not exist under public operation (Mizutani and Uranishi 2006).

Discussion

Experiences reviewed in the previous sections illustrate that a wave of concession privatization is affecting the toll motorway sector in Europe. This process is especially relevant in the southern countries where financial motivations have produced an increase in the size of the private sector in the last decade. In the center and north of the continent, while some countries do use public firms to collect tolls, the preferred method of funding and management of motorways is still the public budget.

After describing the different motorway policies implemented in Europe and the other case studies, it seems likely that public ownership and regulation might effectively be partial substitutes for government intervention in the toll motorway sector. This result is consistent with observations in other sectors with similar characteristics (railways, water distribution, power transmission, etc.). Thus, we have found that privatization is accompanied by a renewed interest in more complex and detailed toll regulation. Indeed, governments, by transferring property rights to private firms, do not lose intervention powers. In fact, they have turned their influence into stricter and more detailed regulation, which implies a new source of external control on the market. This control can be executed through or without agencies, and where agencies do exist, the government's interest in limiting their autonomy is recognized.

In this direction, the recent European privatizations show how a new mode of governance is emerging as deregulation and privatization gain room in public economic policy. Paradoxically, privatization is used to solve budget constraints while retaining a large capacity for public control and intervention. The state reregulates the market once privatized by increasing the sophistication of regulatory rules—in our case, price

regulation—and this is a common feature, independent of institutional frameworks, as has been shown in our review.

In doing so, the state changes its traditional control of processes and inputs to new control on management and performance. Toll regulation is a clear example of this transition that comes with deregulation and privatization. Thus, annual adjustments of tolls are usually computed through price cap schemes when the concessionaire of the motorway is a private firm. These price cap schemes may take into account several factors, such as inflation, traffic forecast deviations, productivity gains, quality, and so on. In this regard, it has been shown that the mechanisms of price regulation are substantially different in countries where the private sector has no role. Where 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 discretionary price regulation mechanisms generally used in countries that rely exclusively on public agents provides evidence supporting the main hypothesis stated in this study: Public ownership and detailed regulation can be partial substitutes in the toll motorways sector. Therefore, when ownership is retained by the state there is no reason to regulate the market because internal control is the easiest means for pursuing government goals.

When private ownership increases, the fact that price regulation becomes more detailed and specific may be explained by the separation between government and private firms. The cases of Spain, with the longest experience with private ownership, and Italy and France, with their important and recent privatization reforms, show how this process emerges and how 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 these mechanisms have been adapted overtime as private management has increased. Thus, price cap schemes in these countries take into account several factors.

Regarding the French privatization, which is the most recent, it is reasonable to expect a reform toward a more complex scheme, as has occurred in Spain and Italy. Currently, each concession is governed by a very specific regulation for the first five five years, and there is an active presence of government on the council board of each concessionaire. This gives some stability and assures public control in the first investment stage; meanwhile, the general rule to be applied after this stage can be thought through. Such individual regulation represents a strong public intervention, which was not considered before the privatization reform.

Similar results are obtained by examining non-EU experiences. In the United States, recent privatization operations have shown the government interest in applying detailed regulation schemes, and privatization in Japan raised awareness of the need to reregulate the market. A comparison

between Croatia and Serbia, with different ownership/regulatory schemes, also confirms our hypothesis.

To sum up, the private sector plays a growing and relevant role in motorway funding and management in Europe. This study attempts to emphasize the renewed importance of public regulation as private ownership becomes even more significant with the rise of a regulatory state, which paradoxically seeks to reregulate liberalized or privatized markets. In this sense, we highlight the role played by regulation as substitute for public ownership.

However, it is worth noting that this is an ongoing process, and substantial changes can happen in the countries that are now more active in introducing private participation. For this reason, it is important to limit the scope of our conclusions and wait for new developments.

Conclusions

This study can be inserted into the literature in political science and public administration that considers the paradox that as it pursues deregulation and privatization the state usually reregulates the market in order to assure its capability to intervene once ownership is lost. This rise of Majone's regulatory state implies the transition from internal state control of processes and inputs to external control on management and performance (outputs). As a result, the state guarantees its capability to control by transforming the mode and strategy of control.

The toll motorway industry, especially in Europe, provides an interesting illustration of this process. Recent privatization programs in Europe have been accompanied by increases in toll regulation. Countries relying on the private sector are restricted by more detailed and complex regulation on performance and output than are publicly owned systems. Consequently, privatization has promoted new modes of public intervention through reregulation of the toll motorways industry. This paradox is a regular fact in the experiences of Spain, Italy, and France, which are the three countries with the longest toll motorway networks in Europe. Hence, this government reaction seems to be reproduced across institutional frameworks in a temporal context of deregulation and privatization, though some aspects of reregulation are modeled by the national institutional context.

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Notes

1. See Verhoest et al. (2004) for a deeper review on autonomization and control. See Christensen and Læg Reid (2007) for a discussion on the dynamic interplay between increase in autonomy of regulatory agencies and political control. We take here the definition of autonomy and control used by Verhoest et al. (2007).
2. We are thankful to a referee for leading our attention to this point. See Kickert (1998) for a comprehensive and deep discussion on this issue and Kickert (2001) for an overview on the governance of hybrid organizations (agencies somewhere between pure government and commercial firms). Karré and Cardoso (2005) also offer an overview on the present literature and different approaches related to hybrid organizations. In addition, they expose some interesting examples of hybridity in the Dutch waste management and housing care and welfare provision (<http://www.hybridorganisations.com>).
3. Barzelay and Gallego (2006) offers an interesting and complete review on public management disciplinary approaches to public reforms, where they highlight the innovative and emerging importance gained by institutional processualism.
4. Indeed, in Austria and Hungary generalized tolling is rather the exception, whereas the "vignette" is the most common financing tool, as is true in Switzerland. The "vignette" is a form of license (sticker) purchased at the border by heavy vehicles (and cars in Austria) that permits the use of motorways for a given period.
5. The M6 concessionaire in the United Kingdom is the only company free to fix its own tariff policy (ASECAP 2006). This road has extremely low traffic volumes and a preliminary analysis of the concessionaire's financial accounts suggested that a huge increase in tolls is required to cover their financing costs. There is no price capping so that the concessionaire was able to price heavy goods vehicles off the road onto public roads, since they created additional maintenance costs. Other measures to drive additional traffic to the M6 have been implemented. Finally, it is worth mentioning that in the United Kingdom there are some other tolled concessions for bridges.
6. We can obtain some information on average tolls from national sources. However, these data are very difficult to compare in a sensible way. On one side, toll tariffs are applied according to vehicle classification schemes that vary among ASECAP members (ASECAP 2006). On the other side, we can certainly derive from national sources data on average revenues per kilometer. However, the quality of this proxy is diminished if different motorways within the national networks apply discount schemes, etc., and more important, it makes cross-country comparison less significant.
7. An additional case of a country with a large fraction of its toll motorway network operated by private firms is Portugal. However, in this case there have been no recent privatization operations, as practically all toll motorway concessions were awarded to private firms from the very beginning. The toll charges are set according to the economic and financial situation. They are reviewed annually based on 90% of the CPI (ASECAP 2006).
8. Ragazzi (2006) mentions the large extra profits that Autostrade obtained compared to the original financial plan for the period 1998–2002 as an example of the consequences of this regulation. The main reasons were two: traffic increases (11% above the forecast) and the volume of investments, which barely reached 40% of what was envisaged.
9. Press release after de French *Conseil des Ministres* of January 26, 2005. Indeed, the French government eventually established the funding of AFITF with 4,000 million euros obtained from toll motorway concessions privatization.

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