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MUNICIPAL REVENUES AND LAND POLICIES

Edited by Gregory K. Ingram and Yu-Hung Hong

Municipal Revenues and Land Policies

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Gregory K. Ingram and Yu-Hung Hong

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Prospects for Private Infrastructure in the United States: The Case of Toll Roads

José A. Gómez-Ibáñez

Interest in the private provision of infrastructure has grown around the world since the 1980s. In the United States the attention has focused primarily on roads, water and sewage systems, and airports because most of the other major infrastructure systems (such as electricity and telecommunications) are already in private hands. This chapter examines why the fruits of these efforts have proved to be disappointing, using roads as an example.

In the road sector, private participation typically involves the government awarding a license, usually called a concession, to a private firm to build, maintain, and operate a road and collect tolls from its users for a specified term, often 20 to 30 years. The concession contract specifies in detail the standards to which the road must be built and maintained, the maximum tolls that can be charged motorists, and any additional payments that the concessionaire must make to the government or vice versa. At the end of the concession, the road usually reverts to the government.

While many private road concessions were proposed in the United States during the last two decades, fewer than 20 are currently in operation or under construction.¹ One explanation is that there are political and economic obstacles

1. A recent tabulation by the Public Interest Research Group (Baxandall, Wohlschlegel, and Dutzik 2009, appendix B) counts 15 projects as either in operation or under construction as of 2009. But at least one of those, the Southern Connector Extension in Florida, was financed in part with contributions from neighboring landowners, but did not appear to have other

to charging motorists tolls in the United States. Most private road concessions rely at least in part on toll revenues and thus typically involve expressways, bridges, tunnels, or other limited access facilities where toll collection is relatively easy. Projects are typically divided into two types: greenfield concessions to build and operate a new road, and brownfield concessions to maintain and operate an existing road. Attractive greenfield projects are hard to find in the United States because some 58,000 miles of expressways have already been built (table 14.1), and there are few remaining unbuilt segments with sufficiently high potential traffic or sufficiently low construction costs to be profitable from tolls. Suitable brownfield projects are also scarce because 47,000 miles of these expressways are part of the Interstate and Defense Highway System, most of which were built using revenues from federal motor fuel taxes on the condition that they not be tolled. Lifting the prohibition on tolling these roads has proven almost impossible because motorists believe that they have already paid for them (through fuel taxes) and have become accustomed to using them toll-free for years.

A second explanation, which applies to other forms of infrastructure besides roads, is the considerable time and resources required to design a concession contract that protects both public and private interests and to award and monitor it. Private companies have long been involved in the provision of roads in the United States in that the government almost always contracts with private construction companies for the initial construction and for subsequent resurfacing and major improvements. Governments often contract with specialist companies for toll collection equipment, bond underwriting, and other services as well. The essential difference between a concession and traditional private procurement is that the concession replaces many separate short-term contracts for construction, resurfacing, and other services with a single long-term contract. The single contract offers critical advantages in that it improves accountability and creates greater opportunities and incentives to coordinate and optimize the once separate activities. But a single contract also greatly increases the difficulty of negotiation and enforcement. Its increased scope and long duration requires a more complex and extensive allocation of risks among the private members of the consortium bidding for the concession as well as between the consortium and the government.

A final problem is that governments designing these projects have sometimes been motivated primarily by the need for immediate budget relief or by the desire to tap private capital markets rather than by the real efficiency gains that the single consolidated contract promises. In such cases, private participation becomes essentially a zero-sum game: a politically controversial activity in which costs are shifted from one party to another with few possibilities of making all or most parties better off.

private involvement. Several private roads that are under construction were not listed, including the express lanes in the beltway around Washington, DC.

Table 14.1
Expressway and Freeway Mileage in the United States, 1980–2007

Year	Rural Interstate	Urban Interstate	Other Expressways and Freeways	Total All Expressways and Freeways	Percentage of Interstate System
1980	31,905	9,215	6,774	47,894	85.8
1981	32,971	9,315	6,803	49,089	86.1
1982	32,874	9,608	7,029	49,511	85.8
1983	32,764	10,248	7,003	50,015	86.0
1984	32,649	10,642	7,128	50,419	85.9
1985	32,760	10,828	7,169	50,757	85.9
1986	32,778	11,066	7,296	51,140	85.7
1987	33,107	11,211	7,390	51,708	85.7
1988	33,303	11,326	7,555	52,184	85.5
1989	33,378	11,471	7,582	52,431	85.5
1990	33,547	11,527	7,668	52,742	85.5
1991	33,677	11,602	7,709	52,988	85.5
1992	32,951	12,516	8,491	53,958	84.3
1993	32,631	12,877	8,841	54,349	83.7
1994	32,457	13,126	8,994	54,577	83.5
1995	32,580	13,164	8,970	54,714	83.6
1996	32,820	13,217	9,027	55,064	83.6
1997	32,817	13,247	9,063	55,127	83.6
1998	32,808	13,276	9,163	55,247	83.4
1999	32,974	13,343	9,132	55,449	83.5
2000	33,048	13,379	9,140	55,567	83.6
2001	33,061	13,411	9,121	55,593	83.6
2002	32,992	13,491	9,323	55,806	83.3
2003	32,048	14,460	9,870	56,378	82.5
2004	31,443	15,129	10,246	56,818	82.0
2005	30,905	15,703	10,560	57,168	81.5
2006	30,586	16,044	10,748	57,378	81.3
2007	30,360	16,312	10,913	57,585	81.0

Source: U.S. Department of Transportation (2009).

To develop these arguments, this chapter first provides a brief overview of private involvement in infrastructure in the United States and abroad. The next section describes the evolution of the U.S. highway system, including the shift from tolls to fuel-tax financing in the 1950s and the two waves of privatization in the 1980s and 2000s. This description is followed by a discussion of why the transaction costs of highway concessions are so substantial. The fourth section describes the benefits that might justify the transaction costs, arguing that privatization is likely to be more sensible and politically sustainable if it is used to generate real efficiency savings rather than to close budget gaps or tap private capital markets.

The Changing Role of the Private Sector in Infrastructure —————

Throughout the world, most forms of modern infrastructure—including railroads, water, sewage, electricity, gas, telephones, and mass transit—were first supplied by private companies in the nineteenth century. Private provision became controversial, however, as these services proved both essential to everyday modern life and to have elements of natural monopoly, so that consumers often enjoyed little choice among service providers. In most other countries, this dilemma was resolved by having the government take over the infrastructure companies. This transformation occurred in Europe during the 1930s and 1940s when socialism was ascendant and in the developing countries in the 1960s and 1970s, often soon after they achieved independence from colonial rule.

The United States debated public takeovers of private utilities in the first decades of the twentieth century, but chose to leave most services in private hands, although subject to government regulation of the tariffs the companies could charge. Water and sewage were often an exception, in part because the technologies were thought to be simple, reducing concerns about possible public-sector inefficiencies. In the mid-twentieth century, most mass transit firms and intercity rail passenger services were also converted to public enterprises because the government wanted to maintain more extensive service than could be supported by passenger revenues alone, and public subsidies were more politically acceptable if accompanied by public ownership. Commercial airports emerged in the early to mid-twentieth century as municipal enterprises as well, probably because air service was seen as important to local economic development, and airports were not viable without public subsidies in those early years. But electricity, gas, freight railroads, and telecommunications remained, for the most part, in private hands.

Highways were an exception in that private providers were rare in the late nineteenth and early twentieth centuries, both because railroads dominated intercity travel and because the difficulties of controlling access made it hard for private road providers to collect tolls from users.² Controlling access to bridges was

2. There was also a period of private turnpike construction beginning in the late eighteenth century and ending in the mid-nineteenth century, when canals and railroads developed into far more efficient methods of transporting freight and passengers over long distances.

relatively easy, however, and a handful of private bridges dating from this period still exist in the United States. As the use of automobiles and trucks spread, governments often contracted with private construction companies to build new roads or to rebuild or widen existing roads, but the ownership, design, and operation of the facilities remained the responsibility of public agencies.

The development of modern high-performance, limited-access highways beginning in the 1930s and 1940s increased the opportunities for private involvement (Gómez-Ibáñez and Meyer 1993). The key to the higher speeds and greater safety of these highways, often called expressways, was the combination of a dual carriageway to separate motorists traveling in opposing directions and access limited to entrance and exit ramps, which were often spaced many miles apart. But while controlled access made collecting tolls far more feasible, many of the first modern expressways were not tolled, and it was not until the 1960s that some toll roads were built and operated by the private sector. During this period, policy makers in Europe were debating whether the new expressways should be financed with tolls collected from motorists or with gasoline or other motor fuel taxes. Northern Europe chose gas taxes, and southern Europe—including France, Spain, and Italy—chose tolls, largely because many of the expressways in southern Europe were being built to accommodate northern vacationers in search of sun, and requiring local taxpayers to finance roads used heavily by foreigners seemed unfair. Spain pioneered having private companies build and operate toll expressways in the 1960s, perhaps because it was governed by a conservative dictator with close ties to business. France awarded licenses to build and operate new routes to four private expressway companies in 1970, but all but one of the companies went bankrupt in the energy crisis of 1973–1974, and most of the French expressway system was eventually built and operated by several large government-owned toll road companies.

In the United States during the 1940s and 1950s, policy makers engaged in a similar debate over the merits of a gas tax versus toll financing of expressways, although they always presumed that the roads would be operated by government agencies rather than by private companies. The eastern states favored tolls largely because their expressways carried a significant amount of “bridge” traffic whose trips neither originated nor terminated in the state and who thus might not buy gasoline locally. California favored fuel taxes because its large size and location on the Pacific coast ensured that almost all of its expressway users originated or terminated their trips in California and bought their fuel there. The debate between tolls and fuel taxes was resolved in 1956 when the federal government decided to impose a federal gas tax to finance the construction of the 42,000-mile Interstate and Defense Highway System. Gas taxes were chosen because some segments of the desired national network had too little traffic to be financed by tolls. States received federal grants to cover 90 percent of the costs of building Interstate System links on the condition that the roads would not be tolled. The roughly 3,000 miles of toll roads built before 1956, mostly in the East, were grandfathered into the Interstate System route network and could continue to

charge tolls. They were not eligible for federal Interstate System construction and maintenance grants, however, as long as they charged tolls.

Many countries began to rethink the division of infrastructure responsibilities between the public and private sectors during the 1980s. In some cases—such as Chile under Augusto Pinochet, Britain under Margaret Thatcher, and the United States under Ronald Reagan—the reforms were motivated at least partly by an ideological desire to reduce the role of the state. But in many cases, the motives were primarily pragmatic. Government-owned infrastructure companies or agencies often required substantial subsidies because their tariffs had been held down to unrealistic levels or because they had become inefficient. These subsidies were a substantial drain on government budgets, especially in developing countries where the public sector had limited sources of tax revenue. Privatization held the promise of making infrastructure more financially self-supporting from user charges, thereby liberating scarce tax resources for social services, such as health and education, which governments thought it less appropriate to provide based on ability to pay. In other cases, governments felt that their ability to finance badly needed infrastructure investments was constrained because they could not borrow from private capital markets at reasonable costs, and low-cost loans from international financial institutions or other donors were limited or came with onerous strings attached. Private infrastructure providers could tap private capital markets more readily, they hoped, thus bypassing these constraints.

The effects of these efforts to increase private involvement in infrastructure over the last three decades are hotly debated and differ significantly by country and sector (Gómez-Ibáñez 2007). Among developing countries, for example, World Bank statistics show new private investment in public infrastructure surging in the 1990s until the Asian and Russian financial crises of 1997–1998, falling for the next four years, and recovering steadily from 2002 through 2007, and then falling slightly in 2008 with the onset of the global financial crisis. By region, the developing countries of Latin American and East Asia were the leaders in the 1990s; South Asia and Eastern and Central Europe led the recovery after 2002; and the Middle East and Africa have seen little investment. By sector, telecommunications has seen the most investment and the least controversy, water the least investment and the most controversy, and energy and transportation (including toll expressways) fall somewhere in between. Comparable statistics are not readily available for the industrialized countries, but Europe has transferred many of its infrastructure companies to the private sector. For example, Italy and France sold their government-owned toll road companies to private investors in 1999 and 2005, respectively.³ The United States has seen some increases in private participation in highways, water, sewage, and, to a lesser extent, airports. Some of the difficulties and successes experienced in promoting private involvement in

3. Although most of Spain's toll road companies were private, Spain also had a government-owned company that it sold to private investors in 2003.

highways in the United States are similar to those experienced elsewhere, and some are different.

The Modern Experience with Private Highways in the United States

EARLY GREENFIELD PROJECTS

There have been two recent waves of interest in tollways and the private provision of highways in the United States: the first from the late 1980s to the early 1990s, and a second starting shortly after 2000 and ending, at least temporarily, in the financial crises of 2008–2009. The first wave focused on using private providers financed by tolls primarily to build new or greenfield expressways. By the 1980s construction of the Interstate System was essentially complete, and state and local governments were now interested in building expressways along routes where 40 years earlier the Interstate System's planners had not anticipated development and traffic. In addition, there was great concern among pundits and policy makers that the United States faced an infrastructure crisis, and that spending was insufficient to maintain the facilities it had built, let alone to construct additions. Popular opposition to tax increases had revived interest in toll financing. President Reagan was promoting the use of private contractors to provide other types of government services, so it seemed reasonable to explore that possibility for new highways as well. The backlog of maintenance was hard to address with private providers, given the prohibitions on tolling the Interstate System, but new expressways were an obvious target because they could be tolled (as long as they spurned federal highway grants).

Approximately a dozen states passed legislation authorizing private participation in highways, but only eight projects in four states appear to have been completed, as shown in table 14.2. Only five of the projects appear to have been financially successful on their original terms. Four were relatively short parkway extensions or bridges in Alabama that were built by two domestic firms and were sold in 2006 to Macquarie Infrastructure Group, an affiliate of an Australian investment bank that has been a major player in private infrastructure in the last several years.⁴ The fifth project was a set of four express lanes built in the median of the California State Route (SR) 91 expressway that were free for cars carrying three or more persons, but that cars with fewer than three persons could use if they paid a toll. The concept, now called high occupancy toll (HOT) lanes, has been much admired and imitated since. The remaining three projects that opened failed in various ways, and a large number of projects were proposed and never built.

The disappointing performance was partly due to the focus on greenfield projects, which pose greater traffic, permitting, and construction risks than do

4. United Toll Systems, a toll collection systems provider based in Alabama, built three of the projects. The fourth, the Foley Beach Express, was built by Baldwin County Bridge Company, a local privately owned firm organized for that purpose (*Toll Road News* 2000).

Table 14.2
The First Generation of Private Toll Road Projects Completed in the United States

State	Project	Type	Length (miles)	Construction Cost (\$ million)	Year Opened	Current Status
Alabama	Black Warrior Parkway	Greenfield	7.5	25	1994	Bought by Macquarie in 2006
Alabama	Alabama River Parkway/ Montgomery Parkway	Greenfield	12.5	12	1998	Bought by Macquarie in 2006
Alabama	Emerald Mountain Parkway	Greenfield	4.4	4	1998	Bought by Macquarie in 2006
Alabama	Foley Beach Express	Greenfield	5.0	44	2000	Bought by Macquarie in 2006
California	SR 91 Express Lanes	Greenfield	10	126	1995	Bought by Orange County in 2002
California	South Bay Expressway (San Diego County)	Greenfield	10	840	2007	Opened 16 years after concession
Texas	Camino Colombia Road	Greenfield	n.a.	90	1999	Defaulted and bought by state in 2003
Virginia	Dulles Greenway	Greenfield	14	300	1995	Defaulted in 1996 and bought by Macquarie in 2005

Source: Adapted from U.S. Department of Transportation (2008); Baxandall, Wohlschlegel, and Dutzik (2009, appendix B); other sources cited in the text.

brownfield projects. Greenfield projects have no traffic history to guide planners and involve more construction and thus greater potential for cost overruns and delays. These risks were heightened because the United States had already built some 52,000 miles of expressways by the late 1980s, including roughly 45,000 miles in the Interstate System and another 7,000 miles of various other expressways (see table 14.1). Finding projects that were still not built and stood a good chance of attracting enough traffic for tolls to cover all or most of the costs was bound to be difficult. The possibilities were generally either highways designed to serve areas that were as yet undeveloped but were considered ripe for growth, or highways designed to relieve congestion on existing heavily traveled roads. Development roads usually have the advantage of low construction costs, but their profitability hinges on whether the area develops as quickly as expected. Congestion-relievers typically enjoy much greater traffic potential, but suffer from higher construction costs and from the need to collect most of their revenues in only a few hours of the day, when the parallel untolled routes are congested.

The problems of traffic risk are illustrated by the experiences of the Dulles Greenway in Virginia and the Camino Colombia in Texas. The Dulles Greenway was first proposed in 1986 and opened in 1995, making it the first modern private toll road to be proposed and built in the United States. A classic development road, the Greenway is a 14-mile extension of an existing toll road and connects Loudon County in the Virginia suburbs with the expressway network serving metropolitan Washington, DC. The road opened with a fraction of the projected traffic, largely because Loudon County was developing more slowly than anticipated and the parallel untolled roads, although not built to expressway standards, provided more competition than expected. The concessionaire defaulted on its debt from 1995 to 1997, but its creditors chose not to foreclose. In the next few years, the road made a remarkable turnaround as Loudon County began to develop rapidly. By 1999 the concessionaire was planning to add a third lane in each direction, and by 2005 the road was profitable enough to be sold to the Macquarie Infrastructure Group for \$617 million. The Camino Colombia is a congestion-reliever designed to connect the border crossing at Laredo, Texas, directly with Interstate 35, bypassing congestion in the city. Promoters had expected much more truck traffic than materialized, and the road, built at a cost of \$90 million, was eventually sold to the state of Texas for \$20 million in 2003.

The problems of construction, permitting costs, and delays are illustrated by California's experience with the Assembly Bill (AB) 680 program.⁵ The Dulles Greenway and Camino Colombia roads were initiated by private entrepreneurs, but AB 680 was the first example of a state-initiated program of private toll roads. The bill, passed by the California legislature in 1989, authorized the California Department of Transportation (Caltrans) to enter into agreements with private companies to build and operate four facilities. Caltrans held a project competition, selecting four winners from eight submissions in 1990 and signing concession agreements the following year. Two of the winning projects were never built, at least partly because of objections from environmentalists and communities along the alignment. The most problematic was a proposed 85-mile road to be built from the south end of the San Francisco Bay area north through communities east of the Bay to Antioch, and then through the largely agricultural area of Solano County to Vacaville. Caltrans anticipated that the road would be controversial but selected it only because AB 680 required at least one project to be located in Northern California. The second never-built project was an 11-mile expressway through central Orange County that, to mollify abutters, was to be built on an elevated viaduct over the channel of the Santa Ana River, a partially concrete-lined river that is usually dry and serves primarily for flood control. Both Caltrans and Orange County were enthusiastic about the congestion-relieving potential of this project, but promoters eventually abandoned it in the face of

5. For a more complete discussion of the early history of the AB 680 program, see Gómez-Ibáñez and Meyer (1993, 172–192).

concern that the projected \$700 million construction cost was unrealistic and objections that the viaduct would be noisy and unsightly.

The two AB 680 projects that were built raised the fewest complications in construction and environmental permitting. One was the SR 91 express lanes described earlier, which were built in the median of an existing expressway connecting Orange and Riverside counties and thus involved few construction or land assembly risks. Because the lanes were used by carpools, promoters could argue that they would improve air quality, an important issue in the Los Angeles metropolitan area. Although SR 91 was financially successful, Orange County bought out the road in 2002 in response to political controversy over provisions in the concession contract permitting toll increases and prohibiting expansion of competing public facilities. The other completed AB 680 project was the South Bay Expressway, a 10-mile road serving growing communities in eastern San Diego County. This road finally opened in 2007, 16 years after the concession agreement was signed. Construction was delayed repeatedly by controversies over the alignment and design and because of uncertainties about the speed with which the communities served would develop.

Interest in private roads faded somewhat in the mid- and late 1990s, perhaps because of disappointment with the first generation of projects. The fears of an infrastructure crisis voiced in the 1980s had also subsided by the 1990s as 48 states and the District of Columbia finally responded with the more traditional remedy of increasing gas taxes. As a result, the average state gas tax nearly doubled, increasing from 8.25 cents per gallon in 1980 to 15.39 cents per gallon in 1990 (Federal Highway Administration 1981, table MF-1, 1991, table MF-121T).

INTEREST REVIVES

By the middle of the first decade of the 2000s, however, interest in private roads had revived. One key factor was the rise of infrastructure investment funds, led by the Macquarie Infrastructure Group. Macquarie argued that investors had overlooked private infrastructure and its attractive combination of low risk and high returns. Infrastructure services are so essential to modern life that demand and user revenues are fairly insensitive to economic conditions. Infrastructure is so capital-intensive that most costs are fixed as well, at least once the facility is built. By 2005 Macquarie had begun to buy up existing private toll roads and to look for new road concessions to bid on in the United States and elsewhere. Goldman Sachs, Morgan Stanley, the Carlyle Group, and others soon imitated Macquarie by establishing their own infrastructure investment funds, and by 2008 the many funds established had reportedly amassed over \$100 billion in equity capital to invest in infrastructure projects of all types, including roads (Anderson 2008).

Another contributing factor was the growing interest of experienced foreign toll road construction and operating companies in opportunities in the United States. In the 1970s and 1980s, large private toll road companies had emerged

in Spain, France, and Portugal to operate road concessions there. In the 1990s these companies had expanded into the developing countries and the transition economies of Eastern Europe, where many of the governments had begun to offer concessions. By 2000 Western Europe already had built an extensive network of expressways, so the opportunities for expansion there were limited, and the developing countries and transitional economies of Eastern Europe had proven to be difficult markets: traffic volumes were often insufficient to support toll expressways, and controversies over concession terms were more difficult to manage in foreign political and legal environments (Carpintero 2009). The United States, with its dependence on the automobile and its stable political and legal systems, seemed to be the ideal place to expand. Some foreign toll road operators had been involved in the first wave of private toll roads. The French toll road operator Cofiroute was a minor investor in the SR 91 express lanes, for example, and Autostrada of Italy was part of the Dulles Greenway consortium.⁶ In the next round of U.S. concessions, the foreign operators would come out in force, including Cintra and Abertis of Spain, Brisa of Portugal, and Transurban of Australia.

If the supply of private capital and expertise was growing, demand was growing as well. Ideology played a minor role: Texas and Florida, led by conservative Republican governors, started some of the most ambitious state-initiated programs during this period, and the U.S. Department of Transportation was more active in promoting private alternatives after George W. Bush was elected president in 2000. But financial concerns were decisive in most cases. By the middle of the decade, there was again widespread talk of an infrastructure crisis, and the crisis seemed to be confirmed dramatically by the collapse in 2007 of a bridge in Saint Paul, Minnesota, with the loss of 13 lives. Virtually every state was facing a transportation funding shortfall, and many responded by creating blue-ribbon commissions that often recommended private finance, among other options. The interest was bipartisan: a Democratic mayor and two Democratic governors would advance some of the most controversial private road schemes during this period.

The federal government had also responded to some of the problems faced by the first generation of projects with new measures to facilitate private roads (U.S. Department of Transportation 2008, 35–37). In 1998 Congress passed the Transportation Infrastructure Finance and Innovation Act (TIFIA), allowing the U.S. Department of Transportation to provide credit assistance—in the form of a direct loan, a loan guarantee, or a line of credit—for up to 33 percent of the costs of private transportation projects. Most second-generation private roads would use some form of TIFIA assistance, and by 2009 the government had supplied almost \$6 billion in federal loans and guarantees. In 2005 Congress also allowed state and local governments to issue up to \$15 billion in private activity bonds

6. Cofiroute was a private company, but Autostrada was government-owned at the time and was not sold to private investors until 2000.

(PABs) on behalf of private transportation providers. The interest on bonds issued by state and local governments is exempt from federal income tax, but the federal government limits the extent to which state and local governments can issue bonds on behalf of private enterprises. The 2005 provision gave the U.S. secretary of transportation the responsibility for allocating the \$15 billion among qualified projects.

The prohibition on tolling those portions of the Interstate System that had been built with federal grants was left largely intact, however. In 1991 Congress allowed tolls to be collected on non-Interstate roads that received federal highway aid as long as the purpose of the tolls was to finance a major reconstruction or expansion of that road. In 2005 Congress allowed very limited tolling of the Interstate System for pilot or demonstration purposes. Up to three new Interstate System highways could be built, and three existing highways could be rebuilt using tolls, for example.⁷ Tolls could be collected on the approximately 11,000 miles of non-Interstate System expressways and on the roughly 3,000 miles of mostly eastern toll roads that had been grandfathered into the Interstate System in 1956. But more than 40,000 miles of the Interstate System—roughly three-quarters of America's expressways—remained largely off-limits.

The second wave of private road projects included several novel greenfield proposals, although some came to grief (table 14.3). In 2002 Texas governor Rick Perry announced his Trans-Texas Corridor plan, an ambitious proposal to crisscross the state with 4,000 miles of corridors, some east-west, and some north-south. Rights of way 1,200 feet wide would be acquired to reserve enough room for railroads, gas pipelines, fiber optic cables, and other utilities as well as highways. Parts of the corridors were already served by expressways, but often they were congested and needed expansion, and new expressways were needed in other places. Private entrepreneurs were to take the lead, and in 2004 a competition to prepare more detailed plans for one corridor was won by a consortium of the Spanish toll road company Cintra and the American construction company Zachary. In 2007 the Cintra-Zachary consortium won a concession to complete State Highway (SH) 130, a half-built expressway near Austin that was within the corridor the companies were planning. But the Trans-Texas Corridor concept was abandoned soon after in the face of fierce opposition from environmentalists and defenders of property rights who thought that 1,200-foot-wide rights of way were excessive (Poole 2009).

Another interesting greenfield project is a \$600 million tunnel under Miami harbor connecting the port with a nearby Interstate System expressway. Trucks leaving the port currently must cross the city to reach the expressway, and the tunnel is to be toll-free to encourage trucks to use it. The concessionaire will receive availability payments from the state instead of tolls. The winning bid was much lower than the state had expected, and the project was financed in 2009

7. For a description of the various pilot tolling provisions, see U.S. Department of Transportation (2008, 37–40).

Table 14.3
Selected Second Generation of Private Toll Road Projects Proposed or Completed in the United States

State	Project	Type	Length (miles)	Term (years)	Construction Cost (\$ billion)	Upfront Payment (\$ billion)	Status
Colorado	Northwest Parkway	Brownfield refinance	9	99			Concession begun in 2007
Florida	Miami Harbor Tunnel	Greenfield			0.6		Financial close in 2009
Illinois	Chicago Skyway	Brownfield monetization	7.8	99		1.83	Concession begun in 2006
Indiana	Indiana Toll Road	Brownfield monetization	157	75		3.85	Concession begun in 2007
Pennsylvania	Pennsylvania Turnpike	Brownfield monetization		99		12.8	Bid withdrawn in 2008
Texas	Trans-Texas Corridors	Mixed	4,000		145–183		Abandoned after controversy over land takings and foreign ownership
Texas	SH 121	Mixed monetization		50		2.5	Concession awarded to public authority in 2007
Texas	SH 130	Mixed		50	1.3	0.026	Concession begun in 2007; under construction
Virginia	Capital Beltway HOT Lanes	Greenfield	14	75		1.9	Financial close in 2007; expected to open in 2014
Virginia	I-95 and I-395 HOT Lanes	Greenfield		70		0.8	Expected to open 2012
Virginia	Pocahontas Parkway	Brownfield refinance	9	99			Concession begun in 2006

Sources: U.S. Department of Transportation (2008); Baxandall, Wohlschlegel, and Dutzik (2009, appendix B); other sources cited in the text.

despite the financial crisis, although only after one of the lead investors was replaced.

HOT lanes similar to those for SR 91 were also proposed for expressway medians in Washington, DC, and in Dallas and Fort Worth, Texas. The Washington proposal was an initiative of Australia's Transurban and Texas-based Fluor

Corporation involving the construction of lanes on 14 miles of the Capitol Beltway and possibly on a 56-mile stretch of the I-95/I-395 corridor. In Dallas in early 2009 a 52-year concession to build \$2.7 billion in HOT lanes on the I-635 beltway was awarded to a consortium headed by the Spanish toll road operator Cintra (Public Works Financing 2009). The same consortium also won a concession to build HOT lanes costing \$2 billion on I-820 and SH 121 in neighboring Fort Worth.

BROWNFIELDS AND ASSET MONETIZATION

The most striking development in the second generation of private toll roads was the focus on concessions for brownfield (existing) expressways. The shift to brownfield concessions is not surprising given the earlier experience with risky greenfield projects. Although most of the Interstate System could not be tolled, the ban did not apply to almost 14,000 miles of expressways. This included 5,000 miles of expressways and several hundred bridges and tunnels that were already tolled—of which almost 3,000 miles were toll roads grandfathered into the Interstate System, most located in eastern states (table 14.4)—plus another 9,000 miles of untolled expressways that were not part of the Interstate System. Another novelty in the second generation was brownfield concessions designed to generate a large up-front payment that the government could use for other purposes. This practice, which came to be known as asset monetization, provoked much controversy.

Some of the early brownfield projects were intended to refinance failing toll roads rather than generate large up-front payments, as in the cases of the Pocahontas Parkway in Virginia and the Northwest Parkway in Colorado. Both expressways had been built by public authorities, but when they opened in 2002 and 2003, respectively, traffic proved to be less than projected and insufficient to service their debts. The 99-year concessions were won in 2006 and 2007 by consortiums headed by Transroute of Australia and a Brisa subsidiary from Brazil. The concessionaires paid off the public debt incurred in the construction. The toll rates were capped by the concession agreement, and if toll revenues exceed certain thresholds, the concessionaire is obliged to share the excess with the government.⁸

Up-front payments became the primary concern in several brownfield concessions starting with the Chicago Skyway. The Skyway is a 7.8-mile toll road connecting the suburbs of western Indiana and eastern Illinois with the Dan Ryan Expressway, an untolled road that leads to downtown Chicago. The toll road had been built by the city of Chicago in the 1950s and operated as a municipal department ever since. In 2004 Mayor Richard M. Daley decided to lease it so as to shed a noncore activity and generate cash. A consortium of Cintra and

8. The Pocahontas Parkway concession includes the obligation to build a 1.6-mile extension (U.S. Department of Transportation 2008, 13–14).

Table 14.4
Toll Roads in the United States

Year	Interstate Toll Roads (miles)	Other Toll Roads (miles)	All Toll Roads (miles)	Interstate Toll Bridges and Tunnels	Other Toll Bridges and Tunnels	All Toll Bridges and Tunnels
1985	2,466	2,307	4,773			
1987	2,447	2,182	4,629			
1991	2,674	2,047	4,721			
1997	2,772	1,599	4,371	111	197	308
1999	2,770	1,643	4,413	107	196	303
2001	2,817	1,785	4,602	105	213	318
2003	2,814	1,908	4,722	108	218	326
2005	2,795	1,835	4,630	106	217	323
2007	2,908	1,939	4,847	106	183	289

Source: U.S. Department of Transportation (2007, 2009).

Macquarie won the 99-year concession with a bid of \$1.83 billion, a sum that attracted the attention of many state and local officials. The payment was made in full in January 2005 and was used to retire municipal debt and create a municipal reserve fund with a small amount for current use.

The experience with the Skyway inspired Governor Mitch Daniels of the neighboring state of Indiana to lease the Indiana Toll Road to cover a projected \$3 billion shortfall in transportation funding over the next 10 years. The road runs 157 miles across the northern part of the state, connecting the Ohio Turnpike to the east with Illinois to the west and carrying mainly out-of-state traffic. In January 2006 the Cintra-Macquarie consortium again outbid several others with an offer of \$3.85 billion. The concession contract was modeled after that for the Skyway, the main differences being a term of 75 instead of 99 years and the inclusion of a clause prohibiting Indiana from building or significantly improving competing parallel roads during the life of the concession.

Texas was the next state to receive a large up-front payment, but from a public agency rather than a private concessionaire. Texas put two road concessions out to bid, both of them involving completion of expressways that were partially built and operation of both the existing and new segments. In one case—SH 130 in Austin—the projected cost of the section to be built was \$1.3 billion, so large that there were few possibilities of a large up-front payment. The Cintra-Zachary consortium won the 50-year concession with a bid of \$25.8 million up front and a promise of a share of future revenues. The other case—SH 121 in Dallas—required less investment and carried more traffic, so there was more potential for a large payment. Early in 2007 the Cintra-Zachary consortium won again with a

bid of \$2.1 billion up front plus \$700 million in guaranteed fees over the 50-year term of the concession.

The SH 121 award stimulated a debate about whether the terms were a good deal for the state and its motorists. Critics argued that a public agency could have paid more or charged lower tolls, and that if the road proved enormously successful, the profits would stay in the region. These concerns provoked the North Texas Tollway Authority (NTTA), a public agency that operated several toll roads in the region, to offer a competing bid of \$2.5 billion up front plus \$833 million in guaranteed future fees. Cintra and the Texas Transportation Commission protested this bid on the grounds that NTTA had initially agreed not to compete for the concession and that it was unfair to submit a bid after the deadline. Cintra's supporters also argued that the bids could not be compared directly because the NTTA bid exposed taxpayers and motorists to greater risks if things went wrong (Poole 2007; *Toll Road News* 2007). Cintra then decided to withdraw its bid, sensing that the political appeal of the NTTA offer was too great. NTTA assumed the concession, and the Texas legislature declared a two-year moratorium on further private road concessions while it studied the matter.

Other states considered leasing their toll roads during the period, including New Jersey and Pennsylvania, which had the third and second largest toll road systems in the country, respectively. Governor Jon Corzine of New Jersey abandoned a proposal to lease the 321-mile New Jersey Turnpike and Garden Parkway relatively quickly in the face of opposition from motorists, but Governor Ed Rendell of Pennsylvania went so far as to hold an auction for a 75-year lease on the 537-mile Pennsylvania Turnpike. Pennsylvania faced a large transportation funding shortfall, but the legislature was reluctant to pass a law to authorize the lease. The governor thought the legislature's resistance might crumble if it had an attractive bid in hand. The 2008 competition was won by a consortium led by Abertis, Deutsche Bank, and Babcock and Brown with a bid of \$12.8 billion, but it was not enough to overcome the opposition, and the bid expired.

The second generation of private highways ended with the credit market collapse of 2008–2009. The symbolic blow came in April 2009 with an airport rather than a highway concession. The city of Chicago, again the innovator, had offered the first major commercial airport lease in the United States for Midway Airport, the Chicago area's second largest airport. A consortium led by Citigroup had won the 75-year concession with a bid of \$2.5 billion, but could not meet the deadline for securing financing and had to withdraw, forfeiting a \$126 million deposit.

The Problem of Transaction Costs _____

The spread of private roads in the United States has been slowed by the sheer size of the existing expressway system and the limitations on tolling existing roads, particularly roads on the Interstate System. But the significant transaction costs of

designing, awarding, and enforcing a concession agreement have been an equally important obstacle. Transaction costs are higher for a private road concession than they are for more conventional public procurement in which the government contracts with private companies to build or resurface a highway. As a result, private concessions make sense only if they offer a benefit, such as a reduction in life-cycle costs, significant enough to offset the added transaction costs. This is true whether road privatization is viewed from a broad public policy perspective or from the more parochial perspective of potential concessionaires and the public agencies responsible for overseeing them.

INTERNAL TO THE PRIVATE PROVIDERS

Some of the transaction costs are internal to the private concessionaire and the consortium of firms that sponsor it. In a conventional procurement, the initial construction and subsequent highway resurfacing or widening are separately contracted. If the public agency needs to issue debt to finance the construction or improvements, it contracts separately with an investment bank or adviser to sell the bonds or place the loans. If tolls are collected electronically, that service too is often procured through a separate contract with an equipment supplier. With a concession, however, these once separate activities are consolidated in a single contract. The consortium bidding for a concession typically includes a toll road operator, an investment bank, and a construction company. If the consortium wins the concession, it creates a new company, called a special purpose vehicle (SPV) in the jargon of finance, whose sole responsibility is to execute the contract.

In theory, this consolidation of responsibilities in a single contract with one SPV generates many of the benefits of concessions by focusing and clarifying accountability. The SPV has incentives to build the highway properly, for example, because it is also responsible for maintaining it for many years to come. But the single concession contract also means that the SPV must have its own elaborate set of internal contracts or agreements to allocate responsibilities and risks among its various subcontractors, many of whom are also equity investors. If a construction company that is part of the consortium is to build the road on the SPV's behalf, for example, how will its compensation be determined? Will it be required to maintain a substantial equity interest so that its incentives are better aligned with those of other investors? With the conventional procurement, these toll road operators, construction companies, equipment suppliers, and investment banks have little need to worry about their relationships with one another. With a concession system, by contrast, establishing in the beginning how the relationships will work productively is critical to success.

These problems are compounded in concessions that require massive investments or up-front payments and are of long duration. The more money at risk, the more important it is to align incentives properly. The longer the duration, the more uncertainties and eventualities the agreements must cope with. It is not

surprising, therefore, that a consortium expects to spend \$5 million or more preparing a bid on even a modestly sized road.

BETWEEN THE PUBLIC AND PRIVATE SECTORS

The transaction costs associated with government oversight of the concessionaire are at least as daunting as those internal to the concessionaire. The increased scope of responsibilities of the private concessionaire increases the scope of public concerns and makes more extensive government oversight inevitable. One of the most obvious sources of concern is the potential for abuse of market or monopoly power. Private toll roads almost always compete for traffic with parallel untolled routes. An untolled alternative route is required by law in many countries and is a practical political necessity in others. If a toll road is to generate significant revenues from its users, however, the untolled alternative cannot be very competitive. A key to designing a financially successful toll road is to be certain that the untolled alternatives are significantly inferior.

If the concessionaire enjoys some degree of market power, there is no reason to believe that the toll that maximizes the concessionaire's profits will be the same as the toll that maximizes travel benefits for society as a whole (Small forthcoming; Winston forthcoming). Proponents of private roads argue that private operators have stronger incentives than public agencies to adopt sophisticated tolling strategies, including varying tolls by congestion or time of day, a policy that transportation economists have long advocated. While that is almost surely true, the fear is that the concessionaire will charge tolls that are too high on average, leaving the expressway underutilized and the parallel untolled routes heavily congested. There is also no reason to believe that the profit motive will provide the concessionaire with the right incentives to add capacity to the expressway. As a result, almost all concession agreements include provisions specifying the maximum tolls that can be charged and the minimum quality of service that must be provided, including, where relevant, the conditions under which the concessionaire must widen the road.

Highways raise a great variety of concerns besides monopoly and have many other politically active constituencies besides the motorists who use them.⁹ The highway system is a network, so the performance of one highway often affects the performance of parallel and other roads. Moreover, highways are often considered critical to regional economic development, so their provision is of great concern to regional business leaders, real estate developers, and others. Abutters and landowners care about the highways, especially if land has to be taken for a new road or for future widening. Environmentalists worry that increased highway traffic will degrade regional air quality, contribute to global warming, or promote suburban sprawl. Taxpayers may see the highway as a source of funds

9. For an interesting discussion of the complex public stakes in urban infrastructure projects, see Sagalyn (2007).

to support other badly needed public services, especially if the highway's users are from other political jurisdictions.

The problem of oversight is further complicated by the fact that each highway project varies, so it is hard to apply a standard contract to all. Some constituencies are more active in some projects and jurisdictions than others. The financial attractiveness of the projects varies with each road's likely construction costs and traffic potential, so the possibilities for addressing the concerns of these constituencies vary as well. These difficulties are compounded because highways are a state responsibility in the United States, and the federal government's influence is restricted to the conditions it attaches to federal grants. In most other countries, the national government is responsible for major roads, and there is a single national program for concessioning private roads. In the United States, by contrast, each state designs its own privatization program. To be sure, states do learn from one another, and lessons are often spread by consultants or by the companies involved in the bidding consortia. For example, the concession contracts for the Indiana Toll Road and the Pennsylvania Turnpike were modeled on the contract for the Chicago Skyway. But the variety of local circumstances is so strong that most oversight arrangements must be adapted at great cost in time and resources.

THE COMPETITIVELY AWARDED CONCESSION CONTRACT

The classic instrument for organizing public oversight of private road projects is the competitively procured concession contract. This simple approach is so appealing that it has been used in all but one private toll road project in the United States.¹⁰ The government, in consultation with potential concessionaires and other interested parties, drafts a contract that describes all the responsibilities of the concessionaire to the government and of the government to the concessionaire for the term of the concession. The concession contract is then awarded competitively according to clearly specified criteria. Often the contract specifies the investments and services the concessionaire must supply and the financial support (if any) that the government is to provide, and the concession is awarded to the bidder that proposes to charge the lowest toll. A common alternative is for the contract to specify the investments and services required and the maximum tolls allowed, with the concession awarded to the bidder that requests the lowest subsidy or offers the largest payment to the government.

The appeal of this approach is obvious. Competition for the concession reassures the public that the tolls are not excessive for the services and investment required. The limited duration of the concession and its periodic rebidding ensure that the terms are up-to-date. The fact that the contract provides a complete description of the obligations of the parties to one another limits the possibilities for

10. The exception was the Dulles Greenway in Virginia, which was regulated by the State Corporation Commission, the public agency responsible for setting electricity, gas, telephone, and other utility tariffs in the state.

opportunistic behavior for the duration of the contract. Since tolls are specified in the contract, for example, the concessionaire cannot take advantage of its control of an essential facility to raise tolls above the specified levels. Similarly, the government cannot take advantage of the fact that the concessionaire has made durable and immobile investments in the highway and order it to lower its tolls below those allowed in the contract.

The great weakness of the competitively procured concession contract is the possibility that it fails to foresee some future eventuality important enough to render the agreement unworkable for one or both parties (Gómez-Ibáñez 2003; Williamson 1976). Such a contract is said to be “incomplete,” and incomplete contracts pose difficult choices for the unhappy parties. They must either live with an agreement that no longer suits their needs for the remainder of the concession’s term or try to renegotiate the contract, knowing that they are likely to be vulnerable to opportunistic behavior by the other party. Renegotiation is doubly problematic when citizens are suspicious about their government’s competence or honesty, since the renegotiation can never be as transparent as the original competitive award.

Incomplete contracts are hard to avoid because it is hard to foresee the future, especially if the contract term is long or the environment of the project is changing rapidly. Providing contingencies for foreseeable risks is useful but has its limits; too many contingencies can make a contract complex and rigid in unexpected ways. The problem of incomplete contracts has been especially troubling in developing countries. In a seminal study of over a thousand infrastructure privatizations in Latin America and the Caribbean between 1982 and 2000, José Luis Guasch (2004) found that 74 percent of all water and sanitation contracts and 55 percent of all transportation contracts had to be renegotiated, most within a few years of their signing. Even in Chile, which has one of the most sophisticated concession programs, a recent study of 50 concessions (including 26 for highways and 10 for airports) found that the average concession had been renegotiated three times, leading to \$2.8 billion in increased payments to the concessionaires (Engel et al. 2009).

The experience so far suggests that incomplete contracts and renegotiations will be a problem with U.S. roads as well, further increasing transaction costs. Two of the first-generation private road projects have already required renegotiation. Orange County in California bought out the SR 91 express lanes project in 2002 largely because the concession contract prohibited the government from adding lanes. The non-complete requirement was understandable from the concessionaire’s perspective, but steady traffic growth rendered it unworkable for Orange County. The term of the Dulles Greenway in Loudon County, Virginia, was extended in 2003 to compensate the concessionaire for widening the road to three lanes.

Many of the second-generation private road projects are bound to be renegotiated as well, if only because many of the concession contracts are for terms as long as 99 years (Chicago Skyway, Pocahontas Parkway, and Northern Park-

way), 75 years (Indiana Toll Road), and 50 years (Texas SH 130). It is hard to believe that any mortal could write a contract for a facility as complex as a major road that would prove complete for 99 or 75 years: imagine, for example, the task of trying to forecast today's transportation technologies and policies in detail 99 or 75 years ago. Moreover, some of the specific terms of the leases are likely to prove unworkable in a much shorter term. For example, both the Chicago Skyway and the Indiana Toll Road concessions allow the concessionaires to increase tolls annually by the highest of three measures: (1) 2 percent; (2) the increase in the Consumer Price Index (CPI); or (3) the increase in the per capita Gross Domestic Product (GDP). In addition, the Indiana agreement prohibits the state from building or improving a parallel road during the life of the concession. It is probable that these terms will eventually lead to tolls on the concession facilities and levels of congestion on the parallel routes that are higher than the public will tolerate. It will be difficult for the city of Chicago and the state of Indiana to extricate themselves from the contracts, given the large up-front payments they received.

Potential Benefits

ACCESS TO CAPITAL MARKETS

Proponents cite several benefits that might offset the transaction costs of private roads, some more compelling than others. One frequently mentioned benefit is that private road providers are better positioned to tap private capital markets to finance badly needed infrastructure. Obviously, private financing is not free, but must be repaid with revenue from tolls, taxes, or other sources. This means that borrowing funds from private capital markets is not a remedy for infrastructure funding shortfalls that arise because the public is unwilling to authorize new or higher tolls or increase fuel taxes. Moreover, the public sector can also tap private capital markets by issuing general obligation bonds (backed by the full faith and credit of the issuing government) or revenue bonds (backed by a specific stream of revenue, such as toll road receipts). The key question is whether the private concessionaire can access those markets for lower interest rates. The lower the interest rate, the more one can afford to pay for or borrow against a given toll revenue stream, and the lower the tolls needed to finance a given investment.

In nominal terms, the cost of borrowing by the public sector appears to be somewhat lower than the cost of borrowing by the private sector. During the debates over the Chicago, Indiana, and Pennsylvania leases, for example, private consortia like Macquarie-Cintra were said to have a weighted average cost of capital (debt and equity combined) of 8 to 9 percent (Enright 2006; Foote and Gómez-Ibáñez 2007). This was fairly low compared to the cost of capital earned by other private firms and presumably reflected the high leverage that the consortium thought investors would accept for a low-risk asset like an existing toll road. In this same period, however, creditworthy state and local governments could sell general obligation bonds with interest rates of only 5 to 6 percent, while

revenue bonds could be sold for a percentage point or two more, depending on the revenue stream. The 99- and 75-year concessions are so long that their financing costs can be approximated by perpetuities. At the interest rate of 8 or 9 percent that Macquarie-Cintra was reportedly paying, the up-front value of a revenue stream of \$1 per year received in perpetuity is \$12.50 or \$11.11. At the interest rate of 6 or 7 percent paid on a state bond, however, the value of that same revenue stream is \$16.67 or \$14.29.

Proponents of the Chicago and Indiana leases object that investors typically require coverage ratios of 1.3 on state and local revenue bonds, meaning that the government can borrow against only \$1 of every \$1.30 of revenue it expects to collect. Private concessionaires can unlock more value from the asset, these proponents argue, because they use equity as well as debt and thus can borrow against the entire stream of revenue. Incorporating coverage ratios narrows the gap between the costs of public and private finance, but not by enough to make private finance significantly cheaper. With a 6 percent interest rate and a coverage ratio of 1.3, for example, a revenue stream of \$1 in perpetuity has an up-front value of \$12.82, about the same as 8 percent with no coverage ratio.¹¹ Moreover, this comparison of up-front payments ignores the substantial value of the revenue that the public cannot borrow against but still receives.

Economists argue that the cost savings of public over private finance is at least partly an illusion because public borrowing imposes hidden costs on taxpayers. Under private finance, private investors absorb the loss if the project proves to be a financial disaster and cannot repay its debts. But if the project is financed by a state or local general obligation bond, the state or local taxpayer must cover the loss. Federal taxpayers also bear part of the financing costs of a state or local bond because the interest paid on such a bond is not subject to the federal income tax. This argument presumes that the private investor assumes all the risk, which is not always the case. If the government guarantees a certain volume of traffic, for example, it shares the risk with private investors. And private investors benefit from some tax advantages as well. The very long leases in the second generation of private roads were apparently designed to reduce tax liabilities by qualifying the projects for accelerated depreciation. Under the federal tax code, businesses are allowed to depreciate the assets they own in 15 years. Leased assets qualify for the same tax treatment only if the term of the lease is longer than the expected economic life of the asset. Roads are very durable, so leases of 50 years or more were thought necessary for a business to qualify for the tax treatment.

When the various tax shields and hidden risks are stripped away, the social cost of borrowing by a public agency and a private concessionaire is probably comparable. Macquarie and the other investment funds argue that their products

11. With a coverage ratio of 1.3, one can borrow against only \$0.77 (1/1.3) of every dollar, and with a 6 percent interest rate the up-front value of \$0.77 per year in perpetuity is \$12.82 ($0.77/0.06$). With an 8 percent interest rate, the value of \$1 in perpetuity is \$12.50 ($1/0.08$).

are ideally suited for pension funds and insurance companies looking for reliable long-term returns that are higher than Treasury bills. But state and local government revenue bonds have similar characteristics. Neither product is so novel that it is likely to increase the rate of savings, which means that the cost to society in both cases will be the displacement of other private investments of similar risk.

All this suggests that better access to capital markets should not be the primary reason for a private road concession. While economists may understand that the lower interest rates associated with public finance are largely an illusion created by the hidden shifting of risks and tax liabilities, the public may not. All the public may notice and care about is that the up-front payment is lower or the tolls higher with private finance than with public finance. Moreover, the focus on interest rates ignores the much higher transaction costs associated with concessions than with the simple offer of a government bond. If the primary objective is to raise money on capital markets, a private concession is an unnecessarily complicated way of doing so.

MAKING TOLL INCREASES ACCEPTABLE

Another argument advanced by proponents is that private roads will help win public acceptance of the imposition of tolls or of toll increases. Some contend that motorists will have more confidence that their money will be well spent if a private firm rather than a public agency is managing the road (Winston forthcoming). A for-profit firm is less likely to propose investments that have little value, for example. This assumes that the concession contract aligns the concessionaire's profit-seeking motives with the pursuit of public purposes. If many citizens tend to be suspicious of government, many also tend to be suspicious of the private sector, particularly when it controls critical facilities and has little competition.

A variant of this argument is that concession contracts will tie the politicians' hands and insulate them from popular pressure to keep tolls at unrealistically low levels. As Macquarie's director of U.S. operations explained in congressional hearings, "Prices under a concession agreement increase in a gradual, less disruptive manner than under government management, where political pressure keeps tolls frozen until operational demands force sharp, sudden increases." The Chicago, Indiana, and Pennsylvania roads are all cases in point. Prior to leasing, the Chicago Skyway had not seen a toll increase for 10 years, while the Indiana Toll Road had no toll increases in 21 years and was actually losing money. The Pennsylvania Turnpike was generating surpluses in 2008, but had experienced only five toll increases since the original mainline opened in 1940.

To the extent that contracts can bind politicians, revenue bond covenants may serve the same purpose. Revenue bonds commonly include provisions that require the issuer to maintain tolls at levels sufficient to cover operating and maintenance costs, to service debt, and to maintain reserves. But the more important objection is that there are limits to our ability to bind politicians, whether

by concession contracts or bond covenants. Toll rates must be seen as reasonably fair, or politicians will find some way to break the contract.

The standard of fairness most commonly applied by U.S. motorists is that tolls should recover the financial costs of the facility being tolled and not much more. There are often calls for tolls to be eliminated or sharply reduced, for example, when the debt for the original construction or the subsequent improvement is paid off. Economists argue that tolls set this way often discourage the efficient use of the highway because they do not reflect the real social or economic costs of highway use. When the road is new and is not congested, the marginal cost of an additional user is likely to be much lower than the toll, so the road will be underutilized, and parallel untolled routes will be overly congested. But as time passes and congestion grows, the marginal cost of an additional user often exceeds the toll. On a congested highway, additional motorists impose large delays on current users or require costly widening projects or other capacity improvements. The toll does not reflect these costs and is usually far lower, especially if the debt from the original construction has been paid off or its real value has been reduced by decades of inflation. In short, economists would prefer that tolls not be tied to the financial costs of the highway provider, but be lower in some cases and higher in others. The public doesn't understand the economists' reasoning, however, and is especially skeptical of tolls that generate large surpluses for other purposes.

In this regard, the recent practice of leasing toll roads for large up-front payments is likely to prove politically problematic. Critics call these schemes unfair because tolls paid by future generations will be spent on the needs of the current generation. The architects of these schemes have responded by attempting to ensure that the proceeds are spent largely for long-term needs. Of the \$1.83 billion that Chicago received for the Skyway lease, for example, \$885 million was spent to retire municipal bonds, \$875 million went to establish medium- and long-term reserve funds, and only \$100 million was spent on current budget outlays. Indiana put its \$3.8 billion payment in an interest-bearing account that it will draw down for the state's transportation investment needs over the next 10 years, and the governor of Pennsylvania proposed putting the proceeds from the Pennsylvania Turnpike lease in a lockbox and spending only the interest it generated. Even so, the proceeds of the Chicago and Indiana leases are likely to be gone long before the concessions expire, and Pennsylvania's lockbox would have cost the state money if the interest earned on the funds in the box was lower than the cost of capital for the private consortium that submitted the winning bid.

An equally important source of controversy is the projected use of the up-front payments to support government services other than the toll road that is being leased. The Chicago lease was possible in part because most Skyway users are commuters from the suburbs of eastern Illinois and western Indiana and thus are not Chicago voters. Similarly the Indiana Toll Road serves primarily as a bridge between Ohio and Illinois, so most of its users are from other states. Even so, there were enough local motorists to cause Governor Daniels to insert

special provisions for lower tolls on local traffic, and to spend more of the lease proceeds on transportation improvements in the northern counties that the toll road passed through. The Pennsylvania proposal failed, however, in part because the turnpike passes through the state's three most important cities—Philadelphia, Pittsburgh, and Harrisburg—and carries much local traffic. Governor Rendell was essentially proposing to use higher turnpike tolls to compensate for a \$1.7 billion per year shortfall in highway and mass transit funding throughout the state, a prospect that seemed unfair to turnpike users.

In short, private concessions may provide political cover to raise tolls, but only within limits of perceived fairness. Chicago and Indiana were exceptions in that most of the toll payers were not voters in the jurisdictions that owned the highways. If the Pennsylvania legislature had accepted the governor's proposal and tolls had increased rapidly, the legislature probably would have found some way to force the renegotiation of the contract.

REAL EFFICIENCY GAINS VERSUS TRANSFERS

The most persuasive argument for private toll roads is that they can deliver real efficiency gains rather than simply transferring resources among different parties. Real efficiency gains occur when more or better outputs are produced with the same inputs. The Miami harbor tunnel is an example; the state had estimated that the tunnel would cost \$1 billion to build under a conventional construction contract, but the winning consortium had developed an innovative design that it believed would cost only \$600 million to build. The SR 91 express lanes are another example in that they provided the first practical demonstration of the HOT lanes scheme to increase the output of carpool lanes.

Transfers, by contrast, involve shifting costs or benefits from one party to another. For example, a change from public to private financing of roads is largely a transfer between taxpayers and motorists. If state bonds are replaced by bonds issued by the concessionaire, state taxpayers no longer bear default risks, and federal tax receipts increase because the interest income is now subject to federal taxation. The motorists must pay higher tolls, however, because the default risks and the need to pay federal taxes are built into the higher interest rate the concessionaire must pay. Similarly, to the extent that privatization makes toll increases more acceptable, it shifts costs from the taxpayers who no longer have to fund the toll road's deficits to the motorists who now pay more.

Real efficiency gains are important because they make private participation more economically sensible and politically acceptable. The greater the efficiency gains and the fewer transfers, the greater the possibility that private participation can make all or most of the affected parties better off. But when increasing private participation is largely about transferring costs, the reform becomes a zero-sum game.

Is private involvement in highways likely to lead to real efficiency gains? The public sector has long turned to private construction companies to build, resurface, and widen roads because of the efficiency gains of doing so. Private

construction companies are presumed to do the job for less because they are motivated by profit and unconstrained by the civil service and other rules that govern public agencies. By requiring the companies to compete for the contracts, the public sector captures most of the efficiency gains for taxpayers and motorists. Shifting from conventional procurement to concessions holds the promise of further efficiency gains largely because it broadens the scope of private responsibility and sharpens accountability through a single contract. In short, the very factors that increase transaction costs of concessions also make possible their potential efficiency gains.

Unfortunately, there is little empirical evidence of the size of the efficiency gains from moving from conventional procurement to concessions. Anecdotes about cost savings on the Miami harbor tunnel and the innovation pioneered by the SR 91 express lanes are sometimes cited, but it is hard to confirm these assertions or to know how representative the examples are. Statistical comparisons are complicated because data on large samples of comparable projects are hard to find, and it is often difficult to separate cause from effect. For example, one recent study in Australia compared 21 concession projects for various types of infrastructure with 33 similar projects that were traditionally procured (Allen Consulting Group and the University of Melbourne 2007). The researchers found that traditional projects had larger average construction cost overruns (15 percent compared to 1 percent) and were more likely to be delivered late (23 percent behind schedule compared to 4 percent ahead of schedule). A comparison in Britain of 37 concession-style infrastructure projects with a large number of traditional projects also showed fewer cost overruns and more timely delivery (U.K. Comptroller and Auditor General 2003). On the one hand, these studies may exaggerate the benefits of concessions because public officials may forecast the construction costs and schedules of concession projects more carefully, given the novelty and controversy of the approach (Small forthcoming). On the other hand, the studies may understate the benefits of concessions because they focus on the construction phase only, when the greatest advantage of concessions is likely to be in life-cycle costs and operational or marketing innovations.

Designing concessions to highlight the efficiency gains and downplay the transfers would be politically useful. Unfortunately, the focus on up-front payments in some recent concessions has had the opposite effect. It is clear, for example, that Abertis could bid \$12.8 billion for the Pennsylvania Turnpike concession only because it expected a rapid increase in toll revenues, presumably from toll hikes allowed by the concession formula. In round numbers, the turnpike was generating \$575 million per year in toll revenues and spending \$215 million on operations to generate a net cash flow before interest, taxes, and depreciation of \$360 million. That cash flow in perpetuity could support a bid of only \$4.5 billion.¹² Even reducing operating costs by as much as 40 percent would imply an

12. Assuming an 8 percent cost of capital, $\$0.360/0.08 = \4.5 billion.

up-front value of only \$5.6 billion.¹³ Only if Abertis expected the revenue stream to grow by 5 percent per year would the value of the enterprise exceed \$12 billion.¹⁴ Pennsylvania could have highlighted the efficiency gains by offering the bidder that proposed the lowest tolls a concession to operate the turnpike. But by offering the concession to the bidder with the largest up-front payment, Pennsylvania signaled that the reform was more about transfers than about efficiency.

Conclusions

Private concessions are unlikely to account for as important a share of the U.S. highway system as they do in southern Europe and many developing countries. In the first place, the extensive network of existing expressways limits the possibilities for greenfield concessions, and the restrictions on tolling on the Interstate System limits the opportunities for brownfield concessions. In addition, the transaction costs of concessions are probably as high in the United States as they are elsewhere. Transaction costs may be lower here because the relatively stable political and economic environment and the integrity of the U.S. legal system increase the chances that a complete contract can be drafted and enforced. But this advantage may be offset, at least in part, by a tradition of political activism that means that more constituencies must be heard, and by the fact that the states are responsible for expressways, which multiplies the number of different concession programs and requirements.

How much the United States loses in money and innovation from not having as many concessions is unclear. It seems likely that private concessionaires are more efficient and innovative, even though the empirical research on these issues is limited and far from conclusive. Moreover, even a small number of private concessions may play an important role in fostering innovation and pressing the traditional system to improve. But the U.S. expressway system is massive and in constant need of expansion and renovation, so more extensive involvement of private concessionaires might offer important benefits.

Interest in private toll roads is likely to revive after the current financial crisis has passed, if only because many of the same motives will be present. Government funding for infrastructure will still be perceived as inadequate. And although using private concessionaires to tap capital markets is often tantamount to an indirect and costly way of government borrowing, it has the political attraction of keeping the debt off the public's books.

If the role of private concessions is to expand, however, it will be economically and politically important to try to reduce the transaction costs and emphasize efficiency gains instead of transfers. For example, transaction costs might be

13. Operating costs would be reduced by \$86 million per year, and cash flow would increase to \$446 million per year. The value would be $\$0.446/.08 = \5.6 billion.

14. Calculated as $\$0.360/(0.08 - 0.05) = \12 billion.

reduced by decreasing the length of concessions to a maximum of 25 years to increase the chances that the contracts will prove complete. Efficiency gains might be emphasized by awarding concessions on the basis of low tolls rather than high up-front payments, with some provision for profit-sharing if returns exceed certain thresholds. It is heartening that a blue-ribbon commission established by the Texas legislature to review the controversies over private toll roads drew similar conclusions that large up-front payments should be avoided in favor of greater investment or more reasonable tolls (Poole 2009).

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