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ABSTRACT

Public-private partnerships (P3s) typically rely on long-term contracts between participants. When conditions arise that fall outside the expectations embodied in the contract, one party may seek to renegotiate the contract terms. Globally, the frequency of P3 contract renegotiations has been sufficient to raise questions regarding why these events occur and what their consequences are for the projects and society. The literature highlights four relevant causes behind renegotiation occurrences: unexpected exogenous changes, contractual relationship complexity, winner´s curse and rent seeking opportunities. This study examines the U.S. experience with highway P3 renegotiations and explores the main drivers behind them. While the U.S. highway P3 market has grown gradually, failure to understand renegotiations and their potential consequences may dampen the market and adversely affect national infrastructure investment efforts. The analysis finds that insufficient evidence exists to disentangle the drivers of renegotiation in the U.S., although exogenous changes and contractual relationship complexity appear to be paramount. Compared to the Latin American experience, the U.S. institutional framework helps protect the public sector from private opportunism by guaranteeing service provision even if the private entity files for bankruptcy.

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INTRODUCTION

Contract renegotiation allows contract participants to accommodate changes brought on by unexpected state changes not accounted for in original (incomplete) and often long-term contract relationships (Hart and Moore 1988). While parties to a contract might desire agreements that account for every contingency and preclude future renegotiations, such contracts would be prohibitively expensive to develop. As a result, compromises are required. However, this often enables contract parties to behave opportunistically with asset specificity, necessitating costly renegotiations of earlier contractual agreements (Klein, Crawford, and Alchian 1978; Williamson 1996).

This study focuses on contract renegotiation within the U.S. highway public-private partnership (P3) market. Contract renegotiation is common in the private sector, especially in finance (Roberts and Sufi 2009) and labor contracts facing unexpectedly high inflation (Rich and Tracy 2013). Considering infrastructure P3s' long-term nature, inherent uncertainty, and need for sophisticated expertise, one may expect contract renegotiations to form an important component of the P3 contract process (Saussier, Staropoli, and Yvrande-Billon 2009). However, a number of unique complexities arise when contractual renegotiations involve the public sector. In addition, when renegotiation possibilities emerge in the infrastructure P3 context, public perceptions tend to be very negative. Observers often suspect that such renegotiations result from poor planning or opportunistic behavior by parties seeking rent at the cost of users and taxpayers. All these factors make P3 contract renegotiations a fruitful topic for research.

In addition, a deeper understanding of P3s may provide particular assistance for policymakers, especially in the transportation sector. Alternative procurement mechanisms for transportation infrastructure investment have experienced growing interest in the U.S. (Department of the Treasury 2014), and P3s in particular have become increasingly popular as severe budgetary and financial constraints drive governments to employ project equity and debt to access private sector funding and financing (Engel, Fischer, and Galetovic 2006a; Small 2010). Figure 1 shows the growing trend in U.S. P3s reaching financial closure each year between 1986 and 2013, across four infrastructure sectors. The number of deals closing annually increased rapidly during the mid-1990s and has fluctuated since then. The transportation sector in particular included increasing numbers of projects during this period, especially since 2010, despite some dips in the 2000s. In total, 512 P3 projects reached financial closure across all four sectors by the end of 2013. While the number of U.S. transportation-sector P3s remains relatively small compared to other world regions, the highway and tolled highway subsectors have provided the largest proportion of P3s and P3 contract renegotiations within the sector.

Despite P3s' growing popularity, an inadequate understanding of renegotiation drivers may affect the approach's future viability. Several notable U.S. highway P3 renegotiation and bankruptcy cases have received wide attention, and analyzing why these renegotiations occurred, and drawing policy conclusions, may inform future P3 implementation.[1] The

[1] For example, note that the region's P3 concessions dropped dramatically after their peak in 1997. The authors attribute the drop to frequent conflicts between public and private partners, resulting in project renegotiations and terminations (Guasch, Laffont, and Straub 2006b).

existing literature extensively investigates Latin American and European experiences with P3 contract renegotiations, but it lacks a rigorous analysis of the U.S. context. Knowledge of foreign market experiences is valuable, but the U.S. P3 market's unique characteristics, like its combination of common law and a federal system of government, may have practical implications for how economic institutions evolve and how renegotiations proceed (Beck, Demirgüç-Kunt, and Levine 2003; Katsivela 2007; La Porta, Lopez-de-Silanes, and Shleifer 2008; Qian and Weingast 1997).

As a result, this study explores the U.S. P3 renegotiation experience by addressing the following research questions: (1) How has the U.S. experienced highway P3 renegotiations? (2) Does the U.S. market demonstrate any distinct characteristics with regard to renegotiation drivers?

While the term "P3" may refer to a variety of contracts between public agencies and private firms, our interests reflect the Organisation for Economic Cooperation and Development's (OECD) definition:

> "an agreement between the government and one or more private partners (which may include the operators and the financiers) according to which the private partners deliver the service in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners" (ITF 2008).

In the context of this study, we employ the term "P3" when referring to infrastructure projects and facilities delivered through schemes where private firms partner with a public agency in delivering and providing a service. "

Turning next to renegotiation, the theoretical literature often defines the term broadly to include any modifications to P3 concession contracts (Guasch 2004; Guasch, Laffont, and Straub 2008). The empirical literature, in contrast, tends to consider only major revisions to contractual agreements that the original contracts did not account for (Guasch, Laffont, and Straub 2008). Given this study's case study approach, we require a more precise definition. As a result, we define P3 renegotiation to include modifications to P3 contractual agreements involving associated legal processes, including but not limited to changes in tariff arrangements and service requirements, buy-outs of the private consortium, and bankruptcy filings. We believe our definition does not substantially alter the literature's conventional view, although we acknowledge that our perspective is motivated primarily by historical events in the U.S. P3 market.

Due to the small the number of P3 renegotiation cases in the U.S. highway sector, we explore the research questions through a series of case studies. Ultimately, the analysis highlights several unique characteristics of the U.S. P3 market. First, the 2008 financial crisis acted as an external shock to a number of U.S. highway P3s, directly and indirectly affecting demand for these facilities. Second, contractual complexities may explain why some P3 projects, particularly early ones, underwent renegotiations. Third, partner inexperience, both public and private, as well as premature institutional environments, influenced several cases. Overall, we find that the factors driving P3 contract renegotiations are very complex. Attributing a renegotiation case to any single factor or cause would be naive. Furthermore, empirically validating several theoretical explanations proved difficult (e.g. opportunism, the "winner's curse" effect). Often, only circumstantial evidence is available. To conclude, we suggest some directions for further analysis.

The remainder of the paper develops as follows. The next section summarizes the theoretical and empirical literature regarding P3 renegotiation, and the following section presents six case studies. The final section discusses the case study findings and offers concluding remarks.

LITERATURE REVIEW

Drivers of Renegotiation: Theory

Renegotiations can occur for several reasons. Economists, for example, have focused on the inherent incompleteness of P3s' contractual agreements (Guasch 2004). Given infrastructure projects' complexity and uncertain environments, contracts between public agencies and private partners cannot account for every contingency. As a result, incomplete contracts may cause renegotiations due to both strategic and non-strategic factors.

The perception that renegotiations produce negative consequences for users arises from literature focused on opportunistic behavior by the private and the public sectors (Guasch 2004). For instance, P3 actors might pursue contract renegotiation as a strategic or opportunistic response to rent extraction opportunities, even at the expense of other parties in the deal. Both, government and private actors can behave opportunistically, against each other or against the public. In the government case, incumbent politicians might use P3s as an off-balance sheet mechanism to increase debt for infrastructure (Engel, Fischer, and Galetovic 2001; Engel, Fischer, and Galetovic 2009), expecting increases in infrastructure investment to produce favorable election results.

Alternatively, private partners might behave opportunistically by winning P3 contracts with low offers, only to hold-up the government later asking for higher compensation via renegotiations (Guasch 2004). Given the often-prohibitive financial and political costs associated with soliciting new firms, the sponsoring public agency, at a disadvantage, may succumb, agreeing to change the terms as demanded.

The Mexican highway case offers a well-known example of such bidder opportunism. The Mexican government granted 52 highway projects to private contractors during the 1990s, but many bids employed extremely opportunistic forecasts. As a result, the government was forced to refinance the highways in 1997 at the cost of $3.3 billion.[2]

Public and private partners involved in a P3 project may also pursue contract renegotiation in order to defend themselves against potentially negative outcomes. The literature suggests three causes of non-strategic renegotiation: a) exogenous changes; b) inadequate preparation for complex contractual relationships; and c) ruinous agreements generated by excessive competition during the bidding process (known as the "winner's curse").

In the first case, renegotiations can help adapt the original contracts to current environment when unexpected exogenous events like macroeconomic shocks occur (De Brux 2010a; Guasch, Laffont, and Straub 2008). Abrupt fluctuations in supply prices, interest rates, or regional economic activity can profoundly affect a P3 project's financial performance. In these instances, the project's financial equilibrium changes without

[2] All references are in nominal U.S. dollars unless otherwise indicated.

inducement by either the public agencies or the private firms. Similarly, before using *force majeure* clauses after events like earthquakes, storms, or riots, the parties may try to maintain the original agreement through renegotiations.

The financial crisis in 2008, for example, likely triggered a number of U.S. highway P3 renegotiations. Such shocks can have direct effects given the close association between macroeconomic output and travel demand. Intuitively, a highway project's travel demand decreases during a recession, lowering the facility's revenue. In addition, the 2008 financial crisis' housing aspect undermined travel demand forecasts. Several highway P3s appeared financially viable given assumptions regarding increasing regional demand. During the crisis however, many development projects stalled, indirectly lowering demand for transportation facilities. Looking internationally, Guasch et al. highlight the 2001 Argentinean currency devaluation and Brazil's similar experience in 1999 (Guasch, Laffont, and Straub 2003). The authors suggest that uncertainty surrounding such events and the lack of guiding principles for readjustment introduce regulatory risk for P3 projects.

The second case involves situations with very complicated contract development, especially when adequate bureaucratic capabilities are lacking (Saussier, Staropoli, and Yvrande-Billon 2009). For example, public agencies may authorize P3 executions without adequate project management, legal, and/or financial staff. The private sector might also lack adequate staff or P3 experience. Confusion often emerges under these circumstances, motivating either or both partners to consider renegotiation. Which party initiates the process depends on which party the ambiguity favors.

The third case, referred to as the winner's curse, develops when bidding processes produce ruinous agreements. This situation may occur, for instance, when a public agency puts an existing toll road concession out for bid. The winner would make a financial arrangement to pay the government upfront to operate and maintain the facility for a pre-determined period. Subsequent toll revenues would cover the debt obligation as well as the facility's operation and maintenance costs. Since the facility's physical condition and future demand are often unknown, firms submit bids based on limited information with respect to the asset's true value. Auction processes favor the highest bids, potentially selecting a firm who overestimated the asset value. In such cases, unexpectedly low profits or even losses may result. After executing the contract, the winner may discover the concession's financial unsustainability and may request a contract renegotiation to continue operating the facility (Thaler 1988).

A Survey of Empirical Literature

While the literature lacks a clear-cut test to determine why any particular renegotiation takes place, several empirical studies have investigated P3 renegotiations outside the U.S. Although far from comprehensive, this section reviews some of the findings.

A number of studies have summarized statistics pertaining to P3 renegotiations in the Latin American transportation sector. An analysis of 218 Latin American transport concessions between 1989 and 2000 showed that 45% of the concessions underwent a renegotiation process. Fifty percent of these were initiated by the private partners (Guasch, Laffont, and Straub 2008). Similarly, an earlier study of the Latin America and Caribbean region from 1985 to 2000 found that 55% of transportation concessions faced renegotiation, compared to 9.7% for electricity concessions and 74% for water and sanitation (Guasch 2004). The study also found that on average across all sectors, renegotiation occurred two

years after the contract award. In the transportation sector however, renegotiation occurred after three years on average. In addition, renegotiation occurred more frequently after competitive bidding (46% of concessions) than after bilateral negotiations (8%), offering some support for the winner's curse theory. Renegotiations were also more prevalent under lowest tariff award criteria (60%) and under requirements for private partner investment in the contract's underlying asset (70%). Finally, the study found that renegotiation occurred more frequently under price caps (83%) and when initiated by the private sector (61%). Table 1 summarizes additional findings.

Guasch et al. developed a model for contract renegotiations initiated by private contractors, empirically estimating factors associated with 307 P3 renegotiations in five Latin American countries' transportation and water sectors (Guasch, Laffont, and Straub 2008). The authors found that having an established P3 regulatory environment reduced the probability that a P3 project would undergo renegotiations. The regulatory framework helped prevent mistakes, decreased the risk of disruptive modifications to contractual agreements, and provided a means for both partners to address contingencies. The authors also found an association between price cap provisions[3] and higher renegotiation probabilities; the greater risk to private partners under price caps increased agreement fragility. Private investment was also associated with significantly higher renegotiation probabilities, as were minimum revenue guarantees introduced to protect private partners. The authors argue that revenue guarantees lower efficiency incentives while raising incentives for strategically aggressive bidding. In addition, the authors found that most of the statistically significant variables, namely regulator existence, price cap regulation, concession duration, elections, economic growth, etc., generated the same directional effects for both government-initiated and firm-initiated renegotiations.

As regards government-initiated P3 renegotiations, the literature has also found links between institutional instability and politically motivated renegotiations initiated by public agencies to extract rent from private firms (De Brux 2010b). Guasch et al. discuss a "typical" case where a newly elected political authority, seeking voter approval, unilaterally decides either to dishonor the initial contract's toll increases or to lower existing tolls. We describe this as public sector opportunism (Guasch, Laffont, and Straub 2006a). The authors formalize such renegotiations, finding that contract designs, inadequate regulatory frameworks, deficient institutional environments, and external shocks all increase the probability of government-initiated concession renegotiations. These findings support the public sector opportunism and the exogenous shocks and complexity arguments. The authors argue that these factors have distinct effects for public agency-initiated renegotiations compared to renegotiations initiated by private partners. In contrast, private financing and investment requirements decreased the likelihood of government-initiated renegotiations, but increased the likelihood of renegotiations initiated by private partners. Higher corruption levels, conversely, increased government-initiated renegotiations while decreasing renegotiations led by private partners. This finding provides support for the public sector opportunism explanation for some renegotiations.

The literature also finds institutional effects for private partner opportunism. Athias and Nuñez empirically investigated 49 toll road concessions around the world, focusing on the relationship between competition levels during initial bidding and renegotiation

[33] Price-capping refers to a regulation developed "to squeeze out inefficiencies (…) by forcing transport industries to provide their services at increasingly lower real prices" (Button 2010, 470).

likelihoods (Athias and Nuñez 2009). Analyzing differences between original traffic forecasts, as included in winning bids, and actual traffic levels, the authors find an association between higher numbers of bidders in toll road concession auctions (more competition) and aggressive bids. This finding supports the winner's curse explanation for renegotiation. The analysis shows a stronger effect when public procuring agencies withhold their traffic forecasts when soliciting bids. The authors also demonstrate a stronger winner's curse effect when the public agency has limited experience with P3s (civil law countries or countries lacking stable institutions).[4] In other words, bidders behave strategically and the winner's curse effect is stronger when renegotiations are easier.

CASE STUDIES

Next, we briefly examine the renegotiation experiences of six U.S. highway P3s: Dulles Greenway (Virginia), Pocahontas Parkway (Virginia), Elizabeth River Crossings (ERC, also known as Midtown and Downtown Tunnels, Virginia), State Route 91 Express Lanes (SR-91, California), South Bay Expressway (SBX, California), and Indiana Toll Road (Indiana). We selected these cases to encompass the diversity of U.S. experiences with P3 highway renegotiations, especially across different geographies and years.

As shown in Tables 2 and 3 the six projects were developed in the two decades between 1993 and 2012 and they vary across several metrics: design characteristics, road length, road opening date, and the time of financial closure. Newly constructed roadway lengths range from no construction (the Indiana Toll Road was a brownfield project) to 14 miles (22.5km, Dulles Greenway). Some projects, like the Otay River Bridge (SBX) and the new Midtown Tunnel (ERC), include sophisticated technical designs. Others do not. The following sections briefly describe each case in turn, with an emphasis on renegotiations.

Dulles Greenway

The Dulles Greenway is located in Loudon County, Virginia and covers 14 miles (22.5km) connecting the Washington Dulles International Airport with Leesburg. As Virginia's first modern toll road, it was built in 1993 and opened in 1995 using the state's Highway Corporation Act of 1988. The project began with an unsolicited proposal from the Toll Road Corporation of Virginia (TRCV) that convinced legislators that approving the act would provide private funds for unfunded infrastructure projects (Wang 2010).

The project's original construction cost estimate came to $350 million, and the Toll Road Investors Partnership II, L.P. (TRIP II), owned by the Shenandoah Group, Autostrade International, and Kellogg Brown & Root, provided $40 million in equity. The remaining funding derived from private debt involving CIGNA Investments, Prudential Power Funding Associates, John Hancock Mutual Life Insurance Company, Barclays, NationsBank, and Deutsche Bank AG (FHWA 2014a). The project was financed purely by the private sector and the TRCV even acquired most of its right of way without using condemnation through eminent domain. After 42.5 years, facility ownership would revert to the Commonwealth of Virginia.

[4] According to the authors, renegotiation is easier in civil law countries because legislation is the primary source of law. The court system must ponder and evaluate different codes, many of which may contain contradictory principles. In contrast, legal cases provide the primary source of law in common law countries, so contradictory statutes are less common (Athias and Nuñez 2009, 18–19).

The initial contract closed in 1993, but after the facility opened in 1995, traffic volumes were lower than expected. Revenues during the first years amounted to only 20 to 35% of initial expectations. TRIP II then sought to increase facility usage, including a toll reduction during the first year of operation that required approval from the state. Revenue did not grow to financially sustainable levels, and the project went into default the next year. In 1997, the partners increased toll rates and raised the speed limit to 65 miles per hour (104.5km/h). Two years later, the project restructured its debt and reached an agreement to increase the number of lanes from four to six. In 2001, TRIP II obtained a 20-year concession extension (to 2056) and three years later, they introduced variable toll rates adjusted for distance and time of the day.

In 2005, Macquarie Infrastructure Group (now Macquarie Atlas Roads) bought TRIP II, with 50% of it eventually purchased by Macquarie Infrastructure Partners (Macquarie Atlas Roads 2009). In 2013, Virginia granted TRIP II the right to increase tolls annually by one percentage point above the consumer price index (Samuel 2008). That same year, and following California's South Bay Expressway experience (see below), an effort commenced to have the Commonwealth of Virginia "buy back" the toll road to lower the toll rates (Tanner 2013).

Pocahontas Parkway

The Public-Private Transportation Act (PPTA) of 1995 increased the flexibility provided by the Highway Corporation Act of 1988. It allowed Virginia to evaluate unsolicited proposals from private entities and employ financing tools like tax-free bonds (Commonwealth of Virginia 2012). After a private infrastructure investment market emerged, Fluor Daniel and Morrison Knudsen (FD/MK) submitted a proposal to VDOT seeking a P3 agreement to design and build State Route 895, also known as Pocahontas Parkway. The road had been planned and approved by VDOT since 1983, but no funds were available for construction (Wang 2010). The Pocahontas Parkway Association (PPA) formed as a non-profit 63-20 corporation to raise tax-exempt revenue bonds to finance the project's $354 million construction cost.[5] The remaining financing consisted of an $18 million State Infrastructure Bank loan and $9 million in federal funding for roadway design (FHWA 2014c). FD/MK provided an additional $5 million in equity. The agreement included a four-lane toll road with an 8.8-mile (14km) extension, including a 0.3-mile (500m) bridge connecting Chesterfield and Henrico south to Richmond. When the facility opened to traffic in 2002, revenue came to 45% of expectations (USGAO (U.S. Government Accountability Office) 2004, 51).

In 2006, facing a PPA default, VDOT received an unsolicited proposal from Transurban LLC regarding the project (Samuel 2006). As a result, the contract }with FD/MK was terminated and a new agreement was signed with Transurban LLC. The new agreement included rights to enhance, manage, operate, maintain, and collect tolls from the roadway for 99 years. However, the agreement also included an obligation to construct the 1.85 mile (3km) Richmond Airport Connector (RAC), with the expectation that the extension would

[5] In the U.S., public agencies may issue tax-exempt municipal bonds, enabling more cost-effective financing of public projects. Under the Internal Revenue Service Rule 63-20 and Revenue Proclamation 82-26, nonprofit public benefit corporations ("63-20 corporations") are also allowed to issue tax-exempt bonds. As a result, groups can establish 63-20 corporations that then form concession agreements with private firms to deliver, for instance, design-build-operate-maintain stages of an infrastructure facility. While the private partner usually arranges financing, the 63-20 corporation issues the debt (FHWA 2014b).

increase demand for the Parkway. The agreement's financial structure included $141 million in private equity, $55 million in subordinated debt, a $150 million Transportation Infrastructure Finance and Innovation Act (TIFIA) loan, and $420 million in bank debt (FHWA 2014c). Three banks participated in the deal: Depfa Bank, Banco Espirito Santo de Investimento, and Bayerische Hypo- und Vereinsbank.

After 2009, facility usage diminished due to toll increases and declining regional travel demand after the 2008 financial crisis. Even the airport connector's completion did not increase demand enough to cover debt service. In 2012, Transurban completely wrote off its project equity of and planned to turn the toll facility over to its lender before becoming insolvent (Samuel 2013). In May 2014, DBi Services, a private company, took control of the road (Martz 2014).

Elizabeth River Crossings

Using the PPTA legal framework for unsolicited projects, VDOT approved an agreement with Elizabeth River Crossings OPCO, LLC (ERC) to design build, finance, operate, and maintain (DBFOM) the Downtown Tunnel/Midtown Tunnel/MLK Extension, also named the Elizabeth River Crossings project. The project will increase the connection capacity between Norfolk and Portsmouth and includes a) a new two-lane tunnel next to the existing Midtown Tunnel, b) improvements to the Downtown Tunnel, and c) improvements to a 0.8-mile (1.3km) stretch of U.S. Route 58. Construction began in 2012 with a concession length of 58 years and cost estimates of $2.1 billion, not including costs related to renegotiations. ERC, a joint venture of Skanska Infrastructure Development and the Macquarie Group, invested $272 million in project equity. Additional funding derived from a $465 million TIFIA loan, $408 million in public funds, $675 million in private activity bonds, and $268 million in toll revenue from the existing tunnels (FHWA 2014d).

The project underwent a public-sector-initiated renegotiation in 2012 to delay tolling in exchange for a government payment of $100 million (Samuel 2012). Then, in 2014 when tolls were set to begin, a new governor renegotiated the contract terms to lower tolls during the first revenue-generating years. The renegotiation cut toll rates in exchange for $82.5 million (Office of Governor 2014). Toll collection at the new rates commenced February 1, 2014. The public had severely objected to the original plan involving tolls on the existing tunnels in advance of the project's completion. Opponents claimed that such tolls were effectively taxes rather than user fees since users saw no viable free alternative (Reinhardt, W. G 2012). Danny Meeks, a resident of Portsmouth, filed a lawsuit contending that VDOT unlawfully imposed the toll charges. Eventually, the Supreme Court of Virginia ruled in VDOT's favor (Meeks v. Elizabeth River Crossings OPCO, LLC and Virginia Department of Transportation, 2013 VA App. 2013).

California State Route 91 Express Lanes

In the 1980s many believed that Southern California needed a billion dollar investment in its road infrastructure (RoadTraffic-Technology 2012). To address this need, the state enacted Assembly Bill No. 680 allowing P3 use in four demonstration projects (Giuliano et al. 2012). The four projects were selected through a competition organized by the State Department of Transportation, one of which included a project building express toll

lanes in the existing State Route 91's median.[6] In 1990, the state signed a build-transfer-operate (BTO) franchise agreement with the California Private Transportation Company (CPTC) as the private partner. The companies forming this entity included Level 3 Communications, Inc., Compagnie Financiere et Industrielle des Autoroutes (Cofiroute), and Granite Construction Inc. (Caltrans (California Deprtment of Transportation) 2009). The private partner provided $20 million in equity with additional funding coming from a $7 million subordinated loan from the Orange County Transportation Authority (OCTA) and $100 million in bank loans from Citicorp USA, Banque National de Paris, Societe Generale, Deutsche Bank and CIGNA Investments (FHWA 2014e).

The toll lanes opened in 1995, connecting Orange County to Riverside County through a four-lane, 10-mile (16km) extension. The operation agreement was to last 35 years. In addition, it was the first U.S. road to rely completely on electronic toll collection and congestion management pricing, that is, prices adjusted to traffic flow.

Given the growing transportation infrastructure needs in the area, the OCTA bought out CPTC in 2003 in order to reduce traffic congestion. Of particular concern was the original franchise agreement's "non-compete" clause constraining Caltrans and OCTA's ability to add "competing" or "complementary" road capacity. As a result, OCTA issued $195 million in toll revenue bonds (Metro ExpressLane 2014), purchasing the project for $207.5 million.

South Bay Expressway

The South Bay Expressway (SBX) was part of the same legal experiment that developed the State Route 91 Express Lanes. The project was designed as a design-build-operate-transfer (DBOT) agreement lasting 35 years and covering a 9.4-mile (15km) extension connecting Spring Valley to Otay Mesa in southern San Diego County, California. The goal was to serve anticipated development generated by growing trade with Mexico (Wang 2010). The state signed an agreement in 1991 with California Transportation Ventures, Inc. (CTV), originally owned by Parsons Brinckerhoff, Egis Projects, Fluor Daniel and Prudential Bache, although the first two partners left after 1992. In 1997 Koch Industries bought 29% of the stock (Giuliano et al. 2012) and in 2002 CTV was bought completely by Macquarie Infrastructure Group.

The project experienced several delays through its life. First, the private firm had agreed to manage the project's environmental permits. However, it did not obtain the requisite permits until 2001 despite the franchise agreement having been signed in 1991. Government environmental agencies including the U.S. Fish and Wildlife Service, the Army Corps of Engineers, and the U.S. Environmental Protection Agency imposed permit requirements including wetlands restoration, protected habitats for endangered species, and recreational improvements in nearby communities.

Second, Parsons Brinckerhoff decided to sell off its stake to Macquarie Infrastructure Group in 2002 after the permitting delay. This change in the agreement allowed Macquarie to access much-needed public funds to offset costs associated with the construction delays

[6] The criteria used by Caltrans included: the importance of the transportation need served, the ease of implementation, the experience of the consortium, the promotion of economic development and how innovative it was (Wang 2010).

and environmental permitting. This included $140 million from the U.S. Department of Transportation (USDOT) via the Transportation Infrastructure Finance and Innovation Act (TIFIA) (FHWA 2014f). Additional funding came from private equity ($130 million) and bank debt ($400 million) from Banco Bilbao Vizcaya Argentaria, Depfa Bank plc, Allied Irish, Bank of Ireland, BNP Paribas, Commonwealth Bank, DVB Bank, DZ Bank, and HSH Nordbank (Fretz 2010).

Third, design changes to reduce environmental impacts complicated the Otay River Bridge construction, requiring a "top-down" approach using precast segmental structures to build the 19-story bridge (Soule and Tassin 2007). Ultimately, the contract between CTV and the bridge constructor, Otay River Contractors (ORC), involved a schedule that could not be fulfilled (according to ORC) due to requirements by Caltrans, the City of Chula Vista and the County of San Diego. This eventually led to litigation. Ultimately, the bridge-related issues delayed the project's opening by over 15 months and raised the estimated cost from $400 million in 1990 to $635 million when the project opened in 2007.

In addition, the project opened just as the subprime mortgage crisis hit San Diego, reducing demand to about a third of expectations (Chapter 11. Case No. 10-04516-LA11. Declaration of Anthony G. Evans, Chief Financial Officer of South Bay Expressway, L.P., in support of the debtor´s chapter 11 petitions and first day motions. 2010). This situation eventually led CTV to file for bankruptcy in March 2010. After a settlement between the creditors, the U.S. Bankruptcy Court created the New SBX Equity owned by all the creditors (Samuel 2011). USDOT claims were reduced from $170 million to $99 million and the banks' claims were reduced from $361.4 million to $210 million. Finally, the San Diego Association of Governments (SANDAG) bought the New SBX Equity, paying the banks $247.5 million in cash, and extinguishing the private sector participation in the project. Of the original $172 million owed to USDOT (capital plus $32 million in capitalized interest), the department will receive an estimated of $93 million from toll revenues and will keep 32% of the project ownership, sharing any of the operation's surpluses (Hawkins 2011; Jensen 2011; FHWA 2014f). Following its acquisition, SANDAG decreased toll rates by 40%, decreasing revenues by 20% (Poythress 2012).

Indiana Toll Road

The Indiana Toll Road (ITR) provides particularly valuable insights for policy debates regarding toll road P3s (Wee 2012). The project, originally named the Indiana East-West Toll Road, was funded by tolls through a legal framework established in 1951. The road opened in 1956 as part of the U.S. Interstate Highway System, covering 156.28 miles (251.5km) and connecting Chicago, Indiana, and Ohio. The Indiana Toll Road Commission managed the road until 1981, after which the road became part of the Department of Highways. In 1983, the newly created Indiana Toll Finance Authority, later the Indiana Transportation Finance Authority, took over the highway, giving it political and financial independence from the state (Levy 2011).

In 2006, under Governor Mitch Daniels, Indiana awarded the rights to maintain, operate, and collect tolls from the Indiana Toll Road to ITR Concession Co. LLC for the following 75 years. The ITR agreement included an operate and maintain (OM) contract covering the 156-mile (251 km), four-lane highway, and the construction of additional lanes along 10 of those miles. Four companies submitted proposals and ITR Concession Co. LLC, a joint venture between Cintra Concesiones de Infraestructuras de Transporte (acquired by Ferovial in 2009) and Macquarie Atlas Roads, won the bid, offering to pay $3.8 billion up front. The deal included $748 million in equity and $3,248 million in debt from Santander,

Bankia, Dexia, The Royal Bank of Scotland plc, BNP Paribas, Banco Bilbao Vizcaya Argentaria and Depfa Bank (InfraDeals 2014). The deal allocated $255 million to the seven counties adjacent to the toll road, $250 million to the third-lane expansion, and $40 million to introduce electronic toll collection. An additional $150 million went to Indiana's 92 counties for road improvements (Gilroy and Aloyts 2013).

The deal raised much opposition arguing that the state would see short-term gains in exchange for private firms profiting at the expense of citizen welfare over the long term. However, the joint venture faced a $260 million loss in 2010, with expectations for debt service default by 2012 (Holeywell 2011). The recession and gas prices offer possible explanations.

Given growing debt service concerns in 2013 and 2014, the participants began renegotiations with their lenders. In March 2014, for example, the project partners sold $500 million of their debt to investment firms "for around 60 cents on the dollar" (Glazer 2014).

In total, five renegotiations have occurred between the Indiana Toll Road's public and private actors (IFA 2013a). First, in exchange for state reimbursement ($60 million), the private actors agreed to a "toll freeze" in 2006 until electronic tolling was in place. Second, that same year, the state agreed to an investment obligation reduction. Third, in 2007 the state agreed to delays on certain investments until 2010. Fourth, it agreed to reimbursements in 2008 due to lost revenue connected to the electronic tolling ($60 million). Finally, in 2010 the state agreed to additional delays on certain investments until 2011. In September 2014, ITR Concession Co. LLC announced it would file for bankruptcy, as the project's interest rate swaps worked against its financial position by increasing its debt by $2.15 billion (Benman 2014).

DISCUSSION

To summarize, Table 4 offers an overall assessment of the renegotiation cases and Table 5 replicates the analytical structure used by Guasch (2004) for the renegotiation of Latin American concessions (shown in Table 1). The public sector started the renegotiation process in two of the six cases. In one of them, Elizabeth River Crossing, toll deferral was the main interest. In the second case, State Route 91, OCTA repurchased the P3 to eliminate the non-compete clause that prevented the state from expanding road infrastructure near SR-91. In the remaining cases, the private sector initiated renegotiations. Dulles Greenway involved tariff changes, additional investments and the extension of the concession. Pocahontas Parkway involved additional investments and the extension of the concession. Indiana Toll Road obtained a reduction in the investment obligations and compensation for toll freezes. Three of the four cases involved changes in the private partner, although Indiana Toll Road may soon face the same situation as it filed for bankruptcy in September 2014.[7]

In the absence of a clear test to discriminate between competing renegotiation causes, we provide some circumstantial evidence to help sort through the possibilities. We consider the four theoretical explanations discussed above – opportunism, exogenous

[7] South Bay Expressway here tariff decrease occurred after the local government took charge of the road.

changes, contract complexity, and the winner's curse – taking into consideration the relevant project dates (Table 4) and outcomes (Table 5).

Opportunism

Many claims have surfaced that both the public and private sector actors involved with the SR-91 Express Lanes project exhibited opportunistic behavior (Vining, Boardman, and Poschmann 2005). On the one hand, the private party obtained substantial profits, $29 million in just one year, compared to the construction cost of $130 million. It also possessed a non-compete clause that protected it from competition. On the other hand, the government initially attempted to ignore the non-compete clause but was forced to settle in court after concealing attempts to construct additional capacity, arguing safety reasons. Additionally, the government attempted to acquire the toll lanes legislatively via condemnation. Despite these claims, one needs to consider whether opportunistic motives ("guile") were present (Williamson 1996). While it is not obvious that it existed in the case of the private sector, in the case of the public sector it appears there were attempts in that direction. However, the final purchase agreement appears to have been satisfactory for both actors.

Moving beyond anecdotal discussions, we turn to circumstantial evidence to investigate opportunism more empirically. When considering *public sector* opportunism, elections offer a starting place (Guasch, Laffont, and Straub 2007). As discussed previously, changing public leadership might create incentives to extract rents or political benefits and/or to protect oneself from the accusation of doing so.[8] Facing threats to their political power, incumbents might try to extract political benefits via renegotiations. Hence, this analysis tests whether renegotiations and/or changes in authorities occur more frequently in states with higher political contestability. We measure contestability by identifying shifts in political party control since 1992 in one or more state government branches – governor and both legislative chambers (see Table 6).

By this measure, Indiana shows the lowest contestability in its Senate (no party shifts) and governorship (one shift), but the highest contestability in its House of Representatives (four shifts). In this case, renegotiations began under complete Republican Party control (2006) and continued when Democrats took control of the State House (2007). No further renegotiation has occurred since the Republicans recovered complete control in 2010, but the Indiana Toll Road's pending bankruptcy filing may change this record. Based on this evidence, we cannot conclude that public opportunism drove the renegotiation process in Indiana.

Over the study period, California experienced no changes in its Senate's party control, two changes in its House, and three changes in its governorship. The state's purchase of State Route 91 took place in 2003, one year before Democrats lost the governorship. Similarly, the significant South Bay Expressway renegotiation transactions took place when the Democratic party controlled the governorship and both legislative houses, although the party had either recently gained or was about to lose that control.

[8] The former makes references to the differences in the incentives faced by the roving and the stationary bandit according to (Olson 2000). The latter makes references to third-party opportunism and political contestability explored for public contracts in (Moszoro and Spiller 2012).

Again, this evidence remains insufficient to conclude that public opportunism drove California's highway P3 renegotiations.

Of the three states, Virginia shows the most contestability across the governorship and both legislative bodies. The Pocahontas Parkway renegotiation witnessed changes in party control across all three bodies. Similarly, the Elizabeth River Crossings renegotiations witnessed changes in the Senate and the governorship. In the case of Dulles Greenway, the renegotiations occur in around half of the years that there was a shift in power in one of the government branches in Virginia. These findings would suggest that this state is more prone to experience renegotiations originated by public sector opportunism. Nonetheless, in the absence of information regarding guile the evidence may be insufficient.

It is difficult to demonstrate private opportunism without information available only through the courts. However, we can show whether the companies behind the deal have faced other renegotiations (see Table 7). While this does not necessarily indicate a record of private opportunism, previous renegotiation experiences might familiarize a company with renegotiation procedures, aiding them when complexity or exogenous shocks overwhelm subsequent projects. From this investigation, we see that, as of 2012, the Macquarie companies, Fluor Company, Skanska Infrastructure Development, and Ferrovial all participated in highway P3 projects around the world that faced a renegotiation process at some point. Further research is needed to understand how to interpret their behavior.

Exogenous Changes

In the presence of exogenous shocks, renegotiations may help both parties accommodate unexpected changes. In the highway P3 case, we must consider macroeconomic risks as potentially significant exogenous changes. To evaluate whether exogenous changes drive U.S. renegotiations, we investigate five macroeconomic variables found in the literature: inflation rate, economic growth, unemployment rate, input prices, and interest rate (Guasch, Laffont, and Straub 2007).

To capture negative demand shocks we can check shifts in the inflation rate, economic growth, and the unemployment rate. First, we consider whether sudden increases in the inflation rate, measured through the Consumer Price Index (CPI), indicate negative real income shocks. If toll road usage represents positive income-elasticity, then sudden increases in the inflation rate should decrease available income and the revenue generated by transportation P3s. Figure 2 shows no inflationary spike since 1992. In fact, the most significant shifts reflect the Great Recession's deflationary period spanning March 2009 through October 2009. This suggests that inflation shocks could not have triggered the case study renegotiations.

Second, declines in economic growth, measured through gross domestic product (GDP), may diminish the income available to spend on toll roads. Figure 3 shows that California and Virginia each experienced an annual recession in 2009. In addition, both states experienced almost zero growth between 2001 and 2002, potentially affecting the Dulles Greenway and South Bay Expressway renegotiations. Indiana, by contrast, experienced four years with negative growth (2001, 2005, 2008, and 2009). While these GDP declines were important in the state, the Indiana Toll Road's financial close (2006) and its renegotiations (2012 and 2014) do not coincide with these economic downturns. However, the recessions' effects may have persisted over several years despite rapid recoveries in economic growth. For example, the 2009 recession did not immediately influence the projects, but its effects accumulated in the following years, affecting

government budgets and elevating unemployment. As a result, the evidence linking economic growth shocks to renegotiations is mixed.

Third, a surge in unemployment might also decrease demand for toll roads. We include unemployment in addition to economic growth because unemployment rates can rise or remain high despite recovery to economic growth. Figure 4 shows the unemployment rate from January 1992 through April 2014. Unemployment showed a decreasing trend until the economic downturn of 2001, increasing by almost 2% in the states under analysis. Unemployment rates diminished again starting in 2003, but with the exception of California, they did not reached their previous lows. Unemployment rose again with the Great Recession, peaking between 2009 and 2010 before slowly diminishing. The persistently high unemployment rates seen after 2009 may help explain the demand risk-related renegotiations occurring after the recession (e.g., Pocahontas Parkway and South Bay Expressway).

A different perspective considers how changes to input prices and interest rates might affect the supply of transportation infrastructure by altering project profitability. Using the Producer Price Index (PPI), we first consider two potential sources of cost increases: construction machinery manufacturing and iron and steel mills. Figure 5 shows PPI changes for both sources starting in 1992. Inflation for construction machinery manufacturing has remained constant under 10%. Iron and steel mills' production costs however have shown much more volatility, particularly between 2002 and 2011. Cost changes during this period ranged from 45% inflation in November 2004 to 40% deflation in June 2009. These unexpected fluctuations in steel costs may have driven the South Bay Expressway's renegotiation.

Interest rate shifts may also affect a project's perceived profitability. Partners may prefer to invest their money under variable market rates rather than in a P3 project. Figure 6 shows the bank prime loan rate from 1992 to 2014, noting how debt service increased 50% between 1993 and 1994 and increased 100% between 2003 and 2005. Such high interest rate periods may have affected the Dulles Greenway renegotiations (1994 to 2000, 2005).

Considering all this evidence collectively, it appears that economic growth, unemployment rates, input prices, and interest rates may have had important effects on the case projects' profitability and their likelihood of contract renegotiation.

Contractual Relationship Complexity

The challenges associated with writing and managing P3 contract agreements often lead to complexity in the resulting contractual relationships. If renegotiation represents a response to this complexity, it can occur in the absence of exogenous shocks. Static environments, or slow-changing ones, will still exert negative pressures on P3s, especially if the public and private partners lack appropriate capabilities. As a result, this analysis considers five sources of complexity in P3 contractual relationships: the project's technical complexity, the contract design, political pressures, the parties' previous experience, and the institutional environment.

Complex infrastructure designs might require complex contracts and ultimately renegotiations. To test this hypothesis, we compare the case projects' infrastructure designs, including road length and the inclusion of bridges and/or tunnels (Table 3) with the renegotiation histories (Table 5). On one extreme, the Indiana Toll Road did not require any

new lane construction. On the other extreme however, South Bay Expressway required a complicated bridge structure that led directly to renegotiations, changes in the private partnership, and a bankruptcy filing. Looking across all six projects, technical complexity appears to be a driver behind most of the renegotiations under consideration.

A P3 contract's structure may also introduce complexity. Table 8 shows the contract type, duration, and length (pages excluding exhibits) for each of the six cases. Elizabeth River Crossing's 160-page "core contract, representing a design, build, finance, operate and maintain (DBFOM) contract lasting 75 years, shows the most management complexity for both public and private parties. Given these characteristics, one would expect more renegotiations for ERC than the 40-year Dulles Greenway, as a contract with a longer duration increases the uncertainty of the relationship.

The political environment surrounding a P3 project can also increase complexity. To test this hypothesis, we employ an ethnic fractionalization index to measure public disagreement. Research using ethnic, linguistic, and religious fractionalization, or societal fragmentation along those lines, shows that population diversity can complicate agreements regarding the provision of public goods (Alesina, Baqir, and Easterly 1999; Alesina and La Ferrara 2000; Alesina, Glaeser, and Sacerdote 2001). Our analysis employs an ethnic fractionalization index using census information from 2010. Table 9 shows that fractionalization is the highest in California (0.77), high in Virginia (0.58), and relatively low in Indiana (0.37).[9] When compared worldwide data as summarized in Table 10, California and Virginia show a high proportion of ethnic diversity. As a result, we should expect more citizen opposition and higher political complexity in these states, possibly driving higher renegotiation probabilities.

Looking next at the public partners, we evaluate whether each state had previous experience with P3s. Governments with limited P3 experience may struggle to manage such innovative projects. Five of the case study projects were among the first in their state. Indiana Toll Road was the first P3 in Indiana while the State Route 91 Express Lanes were the first in California. South Bay Expressway, despite its construction a decade after State Route 91, was part of California's initial 1989 experiment under Assembly Bill No. 680. Dulles Greenway was Virginia's first private toll road since the 1800s, a project constructed under the Highway Corporation Act of 1988 (VDOT 2006). Similarly, Pocahontas Parkway was the first project to take advantage of the state's Public-Private Transportation Act of 1995, and was the first 63-20 corporation for highways. As a result, government inexperience offers a reasonable explanation for these project's renegotiations, as governments did neither have the appropriate institutional knowledge nor human resources with the experience to deal with some of the uncertainties of dealing with these agreements. The Elizabeth River Crossings project, however, cannot be considered novel. The financial close in 2012 and the state's two-decade experience with P3s prior to the deal suggest that inexperience of the state agency cannot possibly explain this project's renegotiation process.

Finally, institutional environments can also contribute to contract relationship complexity. Even with decades of P3 experience, a firm or government may not have the technocratic capacity to manage a P3 contract. Taking this into consideration, we review state management capacity using the State Management Report Card, funded by The Pew

[9] The fractionalization index follow s this formula: $FRACT_j = 1 - \sum_{i=1}^{N} s_{ij}^2$, where s_{ij} is the proportion that any particular racial group has in state j. This index follows the work by (Alesina et al. 2003).

Charitable Trusts evaluating state performance, focusing our attention on the infrastructure component[10] (summarized in Table 11 for 1999, 2005, and 2008) (Barrett and Greene 2008; Government Performance Project 2005; King, Zeckhauser, and Kim 2004). According to these ratings, Virginia demonstrates the strongest infrastructure performance during the analysis period. Indiana falls in the middle of the table, with California showing one of the lowest scores. In this regard, one would expect Virginia to have the strongest institutional quality of the states under consideration. The case results do not reflect this expectation, so government management capacity probably is not a strong driver of U.S. P3 renegotiations.

In addition, since Guasch et al. find evidence that regulatory bodies diminish renegotiation probabilities in highly corrupt environments, we analyze whether state regulatory bodies oversee the P3 contract process (Guasch, Laffont, and Straub 2007). Virginia has the Office of Transportation Public-Private Partnership (OTP3) whose objective is to ensure the timely delivery of Public-Private Transportation Act (PPTA) projects addressing priority transportation needs. OTP3 operates under the Secretary of Transportation, and while outside VDOT, it receives administrative support from the agency (OTP3 (Office of Transportation Public-Private Partnership 2014). In addition, the multimodal PPTA Steering Committee reviews the OTP3 recommendations. In contrast, California and Indiana both rely on their Departments of Transportation to oversee their P3 projects (KPMG 2013). These institutional differences suggest that OTP3's independence and dedicated resources should reduce the number of negotiations in Virginia. The case results do not reflect this expectation, suggesting that the presence of dedicated regulatory agencies does not reduce renegotiation occurrences.

Winner's Curse

Finally, bidding processes typically favor high bids, potentially generating profit shortfalls that necessitate contract renegotiations (Athias and Nuñez 2009). To investigate whether this "winner's curse" influenced any of the study cases, we evaluate the award processes and the numbers of bidders involved. Only two of the case projects involved bidding processes: the Indiana Toll Road and Elizabeth River Crossings. The winning Indiana bid by Cintra Concesiones de Infraestructura de Transporte and Macquarie Atlas Roads offered $3.8 billion up front. In contrast, Indiana Road Company LLC offered $2.8 billion, Itinere Infraestructuras S.A. offered $2.5 billion, and Indiana Toll Road Partners LLC offered $1.9 billion (IFA 2013). Given that the competing bids fell at least $1.3 billion below the winning bid, it appears the "winner" over-bid.

In contrast, the Elizabeth River Crossings' renegotiations appear to be unrelated to the winner's curse. While three companies submitted statements of interest, only one pursued the project. As a result, a bilateral negotiation process between the public and private actors established the deal's final elements, including the price. This potentially reduced the winner´s curse effect but increased opportunism possibilities.

[10] This component evaluates states based on five dimensions (Barrett and Greene 2008): a) The state regularly conducts a thorough analysis of its infrastructure needs and has a transparent process for selecting infrastructure projects; b) the state has an effective process for monitoring infrastructure projects throughout their design and construction; c) the state maintains its infrastructure according to generally recognized engineering practices; d) the state comprehensively manages its infrastructure; e) the state creates effective intergovernmental and interstate infrastructure coordination networks. The evaluation takes into consideration academics and journalists expert knowledge of the area and the states.

CONCLUSION

This paper investigated the U.S. highway P3 market experience, focusing on contractual renegotiations. Beginning with a theoretical framework derived from a brief literature review, we conducted six case studies of tolled highway P3 renegotiations. These cases vary considerably with regard to their contract types, engineering characteristics, and political and economic circumstances. Moreover, in contrast to E.U. or Latin American markets, these U.S. projects inhabit distinct, state-based institutional and regulatory environments. However, U.S. P3 renegotiation has not experienced the same level of analysis as international markets. The relatively few U.S. P3s and scarce data availability might explain this situation, but they present considerable difficulty for employing econometric tools in research. This paper offers a foundation to bridge this gap in the literature.

The cases presented in this paper demonstrate that external shocks initiated several of the renegotiations. In particular, the 2008 financial crisis directly and indirectly affected travel demands for four of the six P3s investigated in this paper. How the timing and location of these deals relate to underlying changes in the larger U.S. economy and shifting roles for public and private actors remains to be explored.

The analysis also suggests that complexity in the contractual agreements might explain why the SR-91 and South Bay Expressway projects underwent renegotiation. Both projects formed the first U.S. P3 experiences and institutional inexperience likely influenced their subsequent renegotiations. For example, the experience gap produced a very demanding non-compete clause limiting the construction of competing transportation infrastructure around SR 91. Similarly, inexperience surrounding the South Bay Expressway allowed the transfer of environmental permitting risk to the private sector. Ultimately, the cases reveal that the factors driving P3 contract renegotiations are very complex. Attributing renegotiations to a single factor appears unrealistic. The case studies also reveal the difficulty in empirically investigating the relationship between private and/or government opportunism and P3 contract renegotiation. Moreover, only circumstantial evidence exists regarding the winner's curse effect. Overcoming these challenges suggests a direction for further research.

The U.S. infrastructure P3 market is relatively new and still emerging. One may argue that these renegotiation cases represent a learning curve that both public and private decision-makers must overcome in order to establish a stable market for infrastructure investments with reasonable returns. The literature contains a number of policy proposals in the literature (Engel, Fischer, and Galetovic 2006b). However, this study points to the need for continuing, careful research to understand both the U.S. P3s' unique characteristics and the institutions necessary to manage them and reduce any undesirable consequences associated with contractual renegotiations.

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REFERENCES

Alesina, A., R. Baqir, and W. Easterly. 1999. "Public Goods and Ethnic Divisions." *The Quarterly Journal of Economics* 114 (4): 1243–84.

Alesina, A, A Devleeschauwer, W Easterly, S Kurlat, and R Wacziarg. 2003. "Fractionalization." *Journal of Economic Growth* 8 (2): 155–94.

Alesina, A., E. Glaeser, and B. Sacerdote. 2001. *Why Doesn't the US Have a European-Style Welfare System?*. NBER Working Paper 8524. National Bureau of Economic Research. http://www.nber.org/papers/w8524.

Alesina, A., and E. La Ferrara. 2000. "Participation in Heterogeneous Communities." *The Quarterly Journal of Economics* 115 (3): 847–904.

Athias, L., and A. Nuñez. 2009. "The More the Merrier? Number of Bidders, Information Dispersion, Renegotiation and Winner's Curse in Toll Road Concessions." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1269630.

Barrett, K, and R Greene. 2008. "Measuring Performance. The State Management Report Card 2008." *Governing*, March.

Beck, T., A. Demirgüç-Kunt, and R. Levine. 2003. "Law and Finance: Why Does Legal Origin Matter?" *Journal of Comparative Economics* 31 (4): 653–75. doi:10.1016/j.jce.2003.08.001.

Button, Kenneth. 2010. *Transport Economics*. 3rd ed. Aldershot, Hants, England ; Northampton, MA: Elgar.

Caltrans (California Deprtment of Transportation). 2009. "Toll Road Fact Sheet. AB 680 Private Toll Road Program." http://www.dot.ca.gov/hq/paffairs/about/toll/status.htm.

Chapter 11. Case No. 10-04516-LA11. Declaration of Anthony G. Evans, Chief Financial Officer of South Bay Expressway, L.P., in support of the debtor´s chapter 11 petitions and first day motions. 2010. U.S. Bankruptcy Court Southern District of California.

Commonwealth of Virginia. 2012. "PPTA Implementation Manual and Guidelines." The Commonwealth of Virginia. http://www.vappta.org/ppta_implementation_manual_guidelines.asp.

De Brux, J. 2010a. "The Dark and Bright Sides of Renegotiation: An Application to Transport Concession Contracts." *Utilities Policy* 18 (2): 77–85. doi:10.1016/j.jup.2009.07.003.

De Brux, J. 2010b. "The Dark and Bright Sides of Renegotiation: An Application to Transport Concession Contracts." *Utilities Policy* 18 (2): 77–85. doi:10.1016/j.jup.2009.07.003.

Department of the Treasury. 2014. *Expanding Our Nation's Infrastructure through Innovative Financing*. Washington, D.C.: U.S. Department of the Treasury. http://www.treasury.gov/press-center/press-releases/Documents/Expanding%20our%20Nation%27s%20Infrastructure%20through%20Innovative%20Financing.pdf.

Engel, E., R. Fischer, and A. Galetovic. 2001. "Least-Present-Value-of-Revenue Auctions and Highway Franchising." *Journal of Political Economy* 109 (5): 993–10250.

———. 2006a. "Privatizing Highways in the United States." *Review of Industrial Organization* 29 (1-2): 27–53. doi:10.1007/s11151-006-9108-6.

Engel, E, R Fischer, and A Galetovic. 2006b. "Privatizing Highways in the United States." *Review of Industrial Organization* 29 (1-2): 27–53. doi:10.1007/s11151-006-9108-6.

Engel, E., R. Fischer, and A. Galetovic. 2009. *Soft Budgets, Renegotiations and Public-Private Partnerships*. 15300. NBER Working Paper. National Bureau of Economic Research. http://www.nber.org/papers/w15300.

FHWA. 2014a. "Project Profiles: Dulles Greenway." https://www.fhwa.dot.gov/ipd/project_profiles/va_dulles_greenway.htm.

———. 2014b. "P3 Defined: 63-20 Nonprofit Public Benefit Corporation." http://www.fhwa.dot.gov/ipd/p3/defined/dbfo_6320.aspx.

———. 2014c. "Project Profiles: Pocahontas Parkway." http://www.fhwa.dot.gov/ipd/project_profiles/va_pocahontas.aspx.

———. 2014d. "Project Profiles: Downtown Tunnel / Midtown Tunnel / MLKI Extension." http://www.fhwa.dot.gov/ipd/project_profiles/va_midtown_tunnel.aspx.

———. 2014e. "Project Profiles: 91 Express Lanes." http://www.fhwa.dot.gov/ipd/project_profiles/ca_91expresslanes.aspx.

———. 2014f. "Project Profiles: South Bay Expressway." http://www.fhwa.dot.gov/ipd/project_profiles/ca_southbay.aspx.

Fretz, D. 2010. "PFI - First US TIFIA Road Files for Protection." *Reuters*. http://www.reuters.com/article/2010/03/24/idUSLDE62N29I20100324.

Gilroy, L., and D. Aloyts. 2013. *Leasing the Indiana Toll Road: Reviewing the First Six Years Under Private Operation*. 108. Policy Brief.

Giuliano, G., L. Schweitzer, K. Holliday, and T. Minch. 2012. "Public Private Partnerships in California. Phase II Report. Section VII: California Political Environment." http://www.metrans.org/sites/default/files/research-project/Section_VII_California_political_environment.pdf.

Government Performance Project. 2005. *Grading the States 2005: A Look inside*. Government Performance Project. http://www.pewtrusts.org/~/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/government_performance/GPPReport2005pdf.pdf.

Guasch, J. L. 2004. *Granting and Renegotiating Infrastructure Concessions Doing It Right.* Washington, D.C.: World Bank.

Guasch, J. L., J. J. Laffont, and S. Straub. 2003. *Renegotiation of Concession Contracts in Latin America*. 3011. World Bank Policy Research Working Paper. Washington, D.C.:

World Bank. http://books.google.com/books?hl=en&lr=&id=m6FZpHvQL54C&oi=fnd&pg=PA2&dq=%22as+developed+ones-+was+provided+by+government+owned+enterprises.+However,%22+%22the+most+important+reason+may+be+that+privatization+renders+difficult%22+%22participation+can+and+has+been+accomplished+in+a+variety+of+forms,+ranging%22+&ots=F4jvkxrPhE&sig=OkqUw5pWHIdRSMfL-I1A5lQanRs.

Guasch, J. L, J. J Laffont, and S Straub. 2006a. "Concessions of Infrastructure in Latin America: Government-Led Renegotiation." Working Paper. University of Edinburgh.

———. 2007. "Concessions of Infrastructure in Latin America: Government-Led Renegotiation." *Journal of Applied Econometrics* 22 (7): 1267–94.

Guasch, J. L., J. J. Laffont, and S. Straub. 2008. "Renegotiation of Concession Contracts in Latin America." *International Journal of Industrial Organization* 26 (2): 421–42. doi:10.1016/j.ijindorg.2007.05.003.

Guasch, J. L., J. L. Laffont, and S. Straub. 2006b. "Concessions of Infrastructure in Latin America: Government-Led Renegotiation." Working Paper. University of Edinburgh.

Hart, O, and J Moore. 1988. "Incomplete Contracts and Renegotiation." *Econometrica* 56 (4): 755–85.

Hawkins, R. 2011. "SANDAG Officially Takes over South Bay Toll Road." *U-T San Diego*, December 21. http://www.utsandiego.com/news/2011/dec/21/sandag-officially-takes-over-south-bay-toll-road/.

IFA. 2013. "Other Bids." http://www.in.gov/ifa/files/Other_Bids.pdf.

InfraDeals. 2014. "Assets Owners Database." http://www.infra-deals.com/public/.

ITF. 2008. *Transport Infrastructure Investment: Options for Efficiency*. Paris: OECD.

Jensen, R. 2011. "Tollway Exits Chapter 11 -." *The Bond Buyer*, May 5. http://www.bondbuyer.com/issues/120_87/south_bay_expressway_bankruptcy-1026333-1.html.

Katsivela, M. 2007. "Contracts: Force Majeure Concept or Force Majeure Clauses." *Uniform Law Review* 12 (1): 101–19.

King, D, R. G Zeckhauser, and M. T Kim. 2004. *The Management Performance of the US States*. Harvard Kennedy School Faculty Research Working Paper Series. http://www.hks.harvard.edu/fs/rzeckhau/GradingStatesv1.pdf.

Klein, B., R. G. Crawford, and A. A. Alchian. 1978. "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process." *Journal of Law and Economics* 21 (2): 297–326.

KPMG. 2013. "Massachusetts Department of Transportation (MassDOT). P3 Program Comparison."

http://www.massdot.state.ma.us/Portals/0/docs/infoCenter/boards_committees/PublicPrivate/P3_Comparison_101113.pdf.

La Porta, R., F. Lopez-de-Silanes, and A. Shleifer. 2008. "The Economic Consequences of Legal Origins." *Journal of Economic Literature* 46 (2): 285–332. doi:10.1257/jel.46.2.285.

Levy, S. M. 2011. *Public-Private Partnerships: Case Studies on Infrastructure Development*. Reston, Va: ASCE Press.

Macquarie Atlas Roads. 2009. "Macquarie Atlas Roads Prospectus." https://www.macquarie.com/dafiles/Internet/mgl/mig/docs/prospectus.pdf.

Martz, M. 2014. "Pocahontas 895 Toll Road under a New Operator." *Richmond Times*, June 17. http://www.timesdispatch.com/news/pocahontas-toll-road-under-a-new-operator/article_94f7e91f-e346-57c4-807d-fd7c60fcdb64.html.

Meeks v. Elizabeth River Crossings OPCO, LLC and Virginia Department of Transportation, 2013 VA App. 2013. Circuit Court of the city of Portsmouth.

Metro ExpressLane. 2014. *Debt Capacity Assessment*. http://media.metro.net/projects_studies/expresslanes/images/public_reports_exlattachmentc_04-2014.pdf. http://media.metro.net/projects_studies/expresslanes/images/public_reports_exlattachmentc_04-2014.pdf.

Moszoro, M, and P Spiller. 2012. "Third-Party Opportunism and the Theory of Public Contracts: Operationalization and Applications." In *Manufacturing Markets: Legal, Political and Economic Dynamics*, edited by Eric Brousseau and Jean-Michel Glachant. Cambridge, UK: Cambridge University Press.

Office of Governor. 2014. "Governor McAuliffe Announces Initial Toll Rates Will Be Cut in Half for the Downtown/Midtown Tunnels Project in Hampton Roads." *Virginia Department of Transportation*. http://www.virginiadot.org/newsroom/statewide/2014/governor_mcauliffe_announces_initial70257.asp.

Olson, Mancur. 2000. *Power and Prosperity: Outgrowing Communist and Capitalist Dictatorships*. New York: Basic Books.

OTP3 (Office of Transportation Public-Private Partnership. 2014. "Office of Transportation Public-Private Partnerships." *Office of Transportation Public-Private Partnerships*. Accessed October 1. http://www.vappta.org/.

Poythress, K. 2012. "Traffic up on South Bay Expressway." *U-T San Diego*. http://www.utsandiego.com/news/2012/aug/20/traffic-up-on-south-bay-expressway/.

Qian, Y., and B. Weingast. 1997. "Federalism as a Commitment to Perserving Market Incentives." *The Journal of Economic Perspectives* 11 (4): 83–92.

Reinhardt, W. G. 2012. "Midtown Financial Close Ignites Virginia Politics." *Public Works Financing*, April. http://www.pwfinance.net/document/research_reprints/1_Midtown_corrected.pdf.

Rich, R., and J. Tracy. 2013. "Early Contract Renegotiation: An Analysis of US Labor Contracts, 1970–1995." *Journal of Labor Economics* 31 (4): 825–42. doi:10.1086/669965.

RoadTraffic-Technology. 2012. "South Bay Expressway, San Diego County, CA - Road Traffic Technology." *RoadTraffic-Technology*. Accessed December 12. http://www.roadtraffic-technology.com/projects/stateroute125/.

Roberts, M. R., and A. Sufi. 2009. "Renegotiation of Financial Contracts: Evidence from Private Credit Agreements." *Journal of Financial Economics* 93 (2): 159–84. doi:10.1016/j.jfineco.2008.08.005.

Samuel, P. 2011. "South Bay Expressway Reorganized out of Bankruptcy." *Toll Roads News*, April 16. http://tollroadsnews.com/news/south-bay-expressway-reorganized-out-of-bankruptcy.

———. 2012. "Virginia Gone to Financial Close on $2.1b Norfolk Crossings P3, Compromises on Toll Timing, Coverage." *Toll Roads News*, April 20. http://tollroadsnews.com/news/virginia-gone-to-financial-close-on-21b-norfolk-crossings-p3-compromises-on-toll-timing-coverage.

———. 2013. "Pocahontas Parkway Turned over to Lenders ADDITIONS -." *Toll Roads News*, June 14. http://tollroadsnews.com/news/pocahontas-parkway-turned-over-to-lenders-additions.

Saussier, S., C. Staropoli, and A. Yvrande-Billon. 2009. "Public–Private Agreements, Institutions, and Competition: When Economic Theory Meets Facts." *Review of Industrial Organization* 35 (1-2): 1–18. doi:10.1007/s11151-009-9226-z.

Small, k. a. 2010. "Private Provision of Highways: Economic Issues." *Transport Reviews* 30 (1): 11–31. doi:10.1080/01441640903189288.

Soule, B., and D. Tassin. 2007. "The Otay River Bridge." *Structure Magazine*, July.

Tanner, D. 2013. "Virginia Cites High Toll Rates in Proposed 'Buyback' of Private Toll Road." *Land Line Magazine*, January 15. http://www.landlinemag.com/Story.aspx?StoryID=24653.

Thaler, Richard H. 1988. "Anomalies: The Winner's Curse." *The Journal of Economic Perspectives* 2 (1): 191–202.

USGAO (U.S. Government Accountability Office). 2004. *Highways and Transit. Private Sector Sponsorship of and Investment in Major Projects Has Been Limited*. USGAO. http://www.gao.gov/new.items/d04419.pdf.

VDOT. 2006. *The History of Roads in Virginia*. Virginia: Virginia Department of Transportation. http://www.virginiadot.org/about/resources/historyofrds.pdf.

Vining, A. R., A. E. Boardman, and F. Poschmann. 2005. "Public–private Partnerships in the US and Canada: 'There Are No Free Lunches.'" *Journal of Comparative Policy Analysis: Research and Practice* 7 (3): 199–220. doi:10.1080/13876980500209363.

Wang, Y. 2010. "Recent Experience In The Utilization Of Private Finance For American Toll Road Development." University Of Southern California. http://digitallibrary.usc.edu/cdm/ref/collection/p15799coll127/id/345049.

Wee, J. 2012. "Public-Private Partnerships: The Project Financing of the Indiana Toll Road - INS190-PDF-ENG." Harvard Business School Publishing. https://cb.hbsp.harvard.edu/cbmp/content/INS190-PDF-ENG.

Williamson, O. E. 1996. *The Mechanisms of Governance*. New York, N.Y.: Oxford University Press.

APPENDIX: TABLES AND FIGURES

Table 1. **Common outcomes of renegotiation process in Latin America and the Caribbean, 1985-2000**

Renegotiation Outcome	Percentage of Renegotiated Concession Contracts with the Given Outcome
Delays on investment obligations targets	69
Acceleration of investment obligations	18
Tariff increases	62
Tariff decreases	19
Increase in the number of cost components with an automatic pass-through to tariff increases	59
Extension of concession period	38
Reduction of investment obligations	62
Adjustment of canon –annual fee paid by operator to government: favorable to operator	31
Adjustment of canon –annual fee paid by operator to government: unfavorable to operator	17
Changes in the asset-capital base: favorable to operator	46
Changes in the asset-capital base: unfavorable to operator	22

Source: Guasch, J. Luis. 2004. Granting and Renegotiating Infrastructure Concessions Doing It Right. Washington, D.C.: World Bank. http://site.ebrary.com/id/10054298.

Table 2. **Descriptive summary information for the six U.S. P3 renegotiation case projects (1995-2013)**

Project	State	Main Revenue Source	Contract Type	Original Cost Estimate	Final Construction Cost	Purchase Price From Original Private Partners
Dulles Greenway	Virginia	Toll	DBFOM	350 million (1993)	338 million	617.5 million (2005)
Pocahontas Parkway	Virginia	Toll	DBFOM	381 million (1998)	314 million (2002)	611 million (2006)
Elizabeth River Crossings	Virginia	Toll	DBFOM	2,089 million	n/a	n/a
State Route 91	California	Toll	DBFOM	88.3 million (1990)	130 million (1995)	207.5 million (2003)
South Bay Expressway [a]	California	Toll	DBFOM	400 million (1990)	722 million (2007)	351.7 million (2011)
Indiana Toll Road [c]	Indiana	Toll	OM	3,778 million	n/a	n/a

Source: Compiled by authors from multiple sources.

DBFOM: Design, build, finance, operate, and maintain.
OM: Operate and maintain.
[a] Includes the construction of non-toll 3.2 miles (5km).
[b] Construction of 1.2 miles (1.9km) of tunnel and 1 mile (1.6km) of highway. Maintenance of 50 lane-mile.
[c] Acquisition that did not require construction.

Table 3. **Complexity in the design and construction phase of P3s under consideration**

Project	State	Constructed Length, miles (km)	Bridge	Tunnels
Dulles Greenway	Virginia	14 (22.5)	Yes	No
Pocahontas Parkway	Virginia	8.8 (14.1)	Yes	No
Elizabeth River Crossings	Virginia	2.2 (3.5)	Yes	Yes
State Route 91	California	10 (16.1)	No	No
South Bay Expressway	California	12.7 (20.4)	Yes	No
Indiana Toll Road	Indiana	10 (16.1)*	No	No

Source: Compiled by authors from multiple sources.

*Indiana Toll Road includes the operation and maintenance of the originally constructed 2+2 lanes for 156 miles (251km). In addition it includes the design, construction, finance, operation and maintenance of a third line, in each direction, for 10 miles (16.1km).

Table 4. **Relevant characteristics and dates of U.S. P3s projects under consideration (1993-2013)**

Project	Return	Tolls	Dates	Relevant dates
Dulles Greenway	From 30% down to 14%	Tolls regulated by Virginia State Corporation Commission	1993	Financial close
			1993	Construction starts
			1995	Opening year
			1995	Tolls decreased
			1997	Tolls increased. Speed limit increased (65 mph)
			1999	Debt restructured. Project modified: from 2*2 lanes to 3*3.
			2001	Extension of concession period (20 years)
			2004	Variable peak and discounted off-peak point-to-point rates
			2005	Macquarie Infrastructure Group purchases P3
			2013	Tolls (2013-2020): the higher of CPI plus 1%, real GDP, or 2.8%.
Pocahontas Parkway	Originally not-for-profit	First 2 years in contract. VDOT adjusts afterwards	1998	Financial close
			1998	Construction starts
			2002	Opening year
			2006	Transurban USA purchases the contract for: Lease Develop-Operate Extension of concession period (to 99 years) Additional investments: 1.6-mile (2.6km), four-lane (Airport Connector), and electronic tolling
			2012	Transurban USA writes off its equity on the parkway to zero.
			2014	Transurban USA transfers the operation to DBi Services
Elizabeth River Crossings	Revenue-sharing after threshold	Highest of 3.5% or CPI	2012	Financial close
			2012	Construction starts
			2012	Delays tolling until 2014 in exchange for $125 million. Private partners increased equity by $207 million.
			2014	Tolls are decreased. Compensation unclear

			2017	Expected opening
State Route 91	17%		1993	Financial close
			1993	Construction starts
			1995	Opening year
			2003	Orange County (OCTA) purchases it to eliminate non-compete clause
South Bay Expressway	18.50%		2002	Macquarie Infrastructure Group (MIG) purchases CTV
			2003	Financial close
			2007	Opening year
			2010	Files for bankruptcy
			2011	Exits Chapter 11 as San Diego Association of Governments (SANDAG) purchases it. Tolls are decreased
Indiana Toll Road		Inflation cap	2006	Financial close
			2006	Opening year
			2006	"Toll freeze" until electronic tolling is in place. State reimbursement
			2006	Reduction on investment obligations
			2007	Construction starts
			2007	Delays in certain investments until 2010
			2008	State reimbursement due to lost revenue
			2010	Delays in certain investments until 2011

Source: Compiled by authors from multiple sources.

Table 5. **Outcomes of renegotiation processes in the US highway P3 cases (1995-2013)**

Renegotiation Outcome	Dulles Greenway	Pocahontas Parkway	Midtown and Downtown Tunnels	State Route 91	South Bay Expressway	Indiana Toll Road
Delays on investment obligations targets	No	No	No	No	No	Yes
Acceleration of investment obligations	No	No	No	No	No	
Tariff increases	Yes	No	No	No	No	No
Tariff decreases or freeze or delay	Yes	No	Yes		Yes	Yes
Increase in the number of cost components with an automatic pass-through to tariff increases	No	No	No	No	No	No
Extension of concession period	Yes	Yes	No	No	No	No
Reduction of investment obligations	No	No	No	No	No	Yes
Adjustment of canon –annual fee paid by operator to government: favorable to operator	No	No	No	No	No	No
Adjustment of canon –annual fee paid by operator to government: unfavorable to operator	No	No	No	No	No	No
Changes in the asset-capital base: favorable to operator	No	No	No	No	No	No

Changes in the asset-capital base: unfavorable to operator	No	No	Yes	No	No	No
Other: increase speed	Yes	No	No	No	No	No
Other: private partner changes	Yes	Yes		Yes	Yes	No
Other: additional investment	Yes	Yes	No	No	No	No
Other: decrease in investment	No	No	No	No	No	Yes
Other: eliminate non-compete clause	No	No	No	Yes	No	No
Renegotiation initiated by	Private	Private	Public	Public	Private	Private

Source: designed based on Guasch, J. Luis. 2004. Granting and Renegotiating Infrastructure Concessions Doing It Right. Washington, D.C.: World Bank. http://site.ebrary.com/id/10054298.

Using information from IFA. 2014. "IFA: Indiana Toll Road Lease." Accessed March 4. http://www.in.gov/ifa/2328.htm.

Levy, Sidney M., and American Society of Civil Engineers. 2011. Public-Private Partnerships: Case Studies on Infrastructure Development. Reston, Va: ASCE Press.

FHWA 2014. "Project Profiles." FHWA Office of Innovative Program Delivery. Accessed March 3. https://www.fhwa.dot.gov/ipd/project_profiles/index.htm.

Wang, Yin. 2010. "Recent Experience In The Utilization Of Private Finance For American Toll Road Development." University Of Southern California. http://digitallibrary.usc.edu/assetserver/controller/item/etd-wang-3492.pdf.

Table 6. **Shifts in political party majority across state government branches, since 1992**

State	Changes in Governor's Party	Changes in State Senate Majority Party	Changes in State House Majority Party
Virginia	1993, 2002, 2009	1995, 2008, 2011	1997
California	1999, 2003, 2011	None	1995, 1997
Indiana	2004	None	1994, 1999, 2004, 2010

Source: using information from Lucy Burns Institute. 2014a. "Indiana House of Representatives -." Ballotpedia. http://ballotpedia.org/Indiana_House_of_Representatives.

———. 2014b. "Virginia House of Delegates -." Ballotpedia. http://ballotpedia.org/Virginia_House_of_Delegates.

Table 7. **Primary private owners and their road asset portfolio facing renegotiations**

Project	Dates	Main Private Stockholders Behind the Project	Asset Portfolio of Other Roads of Stockholders (2012)	Asset Portfolio of Other Roads Facing Renegotiation (2012)
Dulles Greenway	1993	Shenandoah Group, Kellog Brown & Root	None	None
	1995			
	1997			
	1999			
	2001			
	2004			
	2005	Macquarie Infrastructure Group (now Macquarie Atlas Roads)	B103, Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone	Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone
	2006	Macquarie Infrastructure Group and Macquarie Infrastructure Partners	B103, Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone, Autoroute A25	Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone
	2013			
Pocahontas Parkway	1998	Fluor Daniel and Morrison Knudsen	A59 Motorway Project, I-495 Capital Beltway HOT Lane Project, I-95 HOV/HOT Lanes Project, Windsor-Essex Parkway	A59 Motorway Project
	2006			
	2012	Transurban DRIVe (owned by Transurban Group and Capital Partners, now CP2)	I-495 Capital Beltway HOT Lane Project, I-95 HOV/HOT Lanes Project	None
	2014	Dbi Services	None	None
State Route 91	1993	Level 3 Communications, Inc., Compagnie Financiere et Industrielle des Autoroutes (Cofiroute owned by Vinci Autoroute), and Granite Construction Inc.	None	None
	2003	N/A	None	None

Elizabeth River Crossings	2012 2012 2014	Skanska Infrastructure Development, Macquarie Infrastructure Partners II, and Macquarie Mercer Infrastructure Trust	A1 Motorway, Antofagasta Regional Highway, M25 Widening Scheme,	A1 Motorway, Antofagasta Regional Highway
South Bay Expressway	1991	Parsons Brinkerhoff, Egis Projects, Fluor Daniel and Prudential Bache	A59 Motorway Project, HSL/Zuid, I-495 Capital Beltway HOT Lane Project, I-95 HOV/HOT Lanes Project, Windsor-Essex Parkway, A2 Motorway PPP Phase 1, A24/IP3 Viseu-Chaves, A28 Rouen-Alencon Motorway, A63 Highay, A8, A88 Motorway Falaise-Sées, L2 Bypass Marseille, M25 Widening Scheme, M6 Motorway Phase III, North Luzon Expressway, Ostregion PPP Package 1	A59 Motorway Project
	1992	Parsons Brinkerhoff, and Egis Projects	A2 Motorway PPP Phase 1, A24/IP3 Viseu-Chaves, A28 Rouen-Alencon Motorway, A63 Highay, A8 (Augsburg-Munich), A88 Motorway Falaise-Sées, L2 Bypass Marseille, M25 Widening Scheme, M6 Motorway Phase III, North Luzon Expressway, Ostregion PPP Package 1	A2 Motorway PPP Phase 1, A24/IP3 Viseu-Chaves, A8 (Augsburg-Munich),
	1997	Parsons Brinkerhoff, Egis Projects, and Koch Industries	A2 Motorway PPP Phase 1, A24/IP3 Viseu-Chaves, A28 Rouen-Alencon Motorway, A63 Highay, A8, A88 Motorway Falaise-Sées, L2 Bypass Marseille, M25 Widening Scheme, M6 Motorway Phase III, North Luzon Expressway, Ostregion PPP Package 1	A2 Motorway PPP Phase 1, A24/IP3 Viseu-Chaves, A8 (Augsburg-Munich),
	2002 2003 2010	Macquarie Infrastructure Group	B103, Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone	Indiana Toll Road, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone
	2011	Banks: DEPFA Bank plc, Allied Irish, Bank of Ireland, BNP Paribas, Commonwealth Bank, DVB Bank, DZ Bank, and HSH Nordbank	None	None

Indiana Toll Road	2006	Cintra Concesiones de Infraestructuras de Transporte, Macquarie Infrastructure Partners, and Macquarie Atlas Roads	A-22 Algarve Shadow Toll Road, A-27/28 Norte Litoral Shadow Toll Road, A-66 Motorway - Benavente to Zamora, Acores Shadow oll Road, AP-36 Ocana-La Roda Highway, C-16 Sant Cugat-Terrassa-Manresa Highway, Central Greece E-65 Highway Project, Costa del Sol Hghway - Ausol II, Costa del Sol Highway - Ausol I, Highway 407, Highway 407 East to Highway 35/115, I-635, Ionian Roads Project, M-203 Alcalá O´Donnell Highway, M-30 Ring Road PPP, M3 Clonee-Kells, Madrid-Ocaña Highway Concession, N4/N6 PPP, North Tarrant Expressway, North Tarrant Expressway Segments 3A and 3B, Trans-Texas Corridor SH130 SEg 5&6, B103, Dulles Greenway, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone, Autoroute A25, Dulles Greenway	A-22 Algarve Shadow Toll Road, A-27/28 Norte Litoral Shadow Toll Road, AP-36 Ocana-La Roda Highway, C-16 Sant Cugat-Terrassa-Manresa Highway, Highway 407, M-203 Alcalá O´Donnell Highway, Madrid-Ocaña Highway Concession, Dulles Greenway
	2006			
	2006			
	2007			
	2008			
	2009	Ferrovial, Macquarie Infrastructure Partners, and Macquarie Atlas Roads	A-22 Algarve Shadow Toll Road, A-27/28 Norte Litoral Shadow Toll Road, A-66 Motorway - Benavente to Zamora, Acores Shadow oll Road, AP-36 Ocana-La Roda Highway, C-16 Sant Cugat-Terrassa-Manresa Highway, Central Greece E-65 Highway Project, Costa del Sol Hghway - Ausol II, Costa del Sol Highway - Ausol I, Highway 407, Highway 407 East to Highway 35/115, I-635, Ionian Roads Project, M-203 Alcalá O´Donnell Highway, M-30 Ring Road PPP, M3 Clonee-Kells, Madrid-Ocaña Highway Concession, N4/N6 PPP, North Tarrant Expressway, North Tarrant Expressway Segments 3A and 3B, Trans-Texas Corridor SH130 SEg 5&6, B103, Dulles Greenway, M6 Motorway Toll, Societes des Autoroutes Paris-Rhin-Rhone, Autoroute A25, Dulles Greenway	A-22 Algarve Shadow Toll Road, A-27/28 Norte Litoral Shadow Toll Road, AP-36 Ocana-La Roda Highway, C-16 Sant Cugat-Terrassa-Manresa Highway, Highway 407, M-203 Alcalá O´Donnell Highway, Madrid-Ocaña Highway Concession, Dulles Greenway
	2010			
	2014			

Source: using information from InfraDeals. 2014. "Assets Owners Database." InfraDeals. InfraDeals. http://www.infra-deals.com/public/.

Table 8. **Complexity of the contract of the P3s under consideration**

Project	State	Type of Contract	Original Contract Duration (years)	Is the contract available online?	Original Contract Length (pages without exhibits)
Dulles Greenway	Virginia	DBFOM	40	Yes	61
Pocahontas Parkway	Virginia	Original: DBOT. Modified: BOT	30	Yes	96
Elizabeth River Crossings	Virginia	DBFOM	75	Yes	160
State Route 91	California	BTO	35	No	*
South Bay Expressway	California	BTO	35	No	*
Indiana Toll Road	Indiana	DBFOM + OM	58	Yes	112

Source: Compiled by authors from multiple sources.

* No information was available on the California P3 highway contracts.

Table 9. **Fractalization Index for the United States (2010)**

US State	Ethnic Fractalization
Maine	0.1166
Vermont	0.1189
West Virginia	0.1391
New Hampshire	0.1683
North Dakota	0.2214
Montana	0.2452
Iowa	0.2504
Kentucky	0.2745
South Dakota	0.2987
Wyoming	0.3208
Minnesota	0.3431
Wisconsin	0.3464
Ohio	0.3495
Missouri	0.3564
Indiana	0.3733
Idaho	0.3776
Nebraska	0.3946
Pennsylvania	0.4018
Michigan	0.4210
Tennessee	0.4364
Utah	0.4433
Kansas	0.4453
Oregon	0.4631
Arkansas	0.4717
Massachusetts	0.4790
Rhode Island	0.4997
Alabama	0.5113
Washington	0.5398
Mississippi	0.5439
South Carolina	0.5456
Louisiana	0.5547
Connecticut	0.5548
Oklahoma	0.5731
Delaware	0.5759
Colorado	0.5812
North Carolina	0.5829
Virginia	0.5831
Alaska	0.5915
Illinois	0.6362
Georgia	0.6370
District of Columbia	0.6446
Florida	0.6451
Maryland	0.6511
New Jersey	0.6793
New York	0.7004
New Mexico	0.7037
Arizona	0.7041
Texas	0.7238
Nevada	0.7440
Hawaii	0.7521
California	0.7665

Source: using information from U.S. Census Bureau. 2013. "2010 Demographic Profile." U.S. Census Bureau. http://www.census.gov/popfinder/.

We use the following racial classification: White non-Hispanic, Hispanic, African American, Asian, American Indian and Alaskan Native, Native Hawaiian and Pacific Islander, Other, and Identified by two or more.

Table 10. **Summary of ethnic fractionalization in the world (1979-2001)**

	Country	Ethnic Fractionalization
Maximum value	Uganda	0.9302
Percentile 90	Gambia	0.7864
Percentile 75	Nepal	0.6625
Percentile 50	Palau	0.4342
Percentile 25	El Salvador	0.1984
Percentile 10	Cyprus	0.0938
Minimum value	Comoros	0.0000

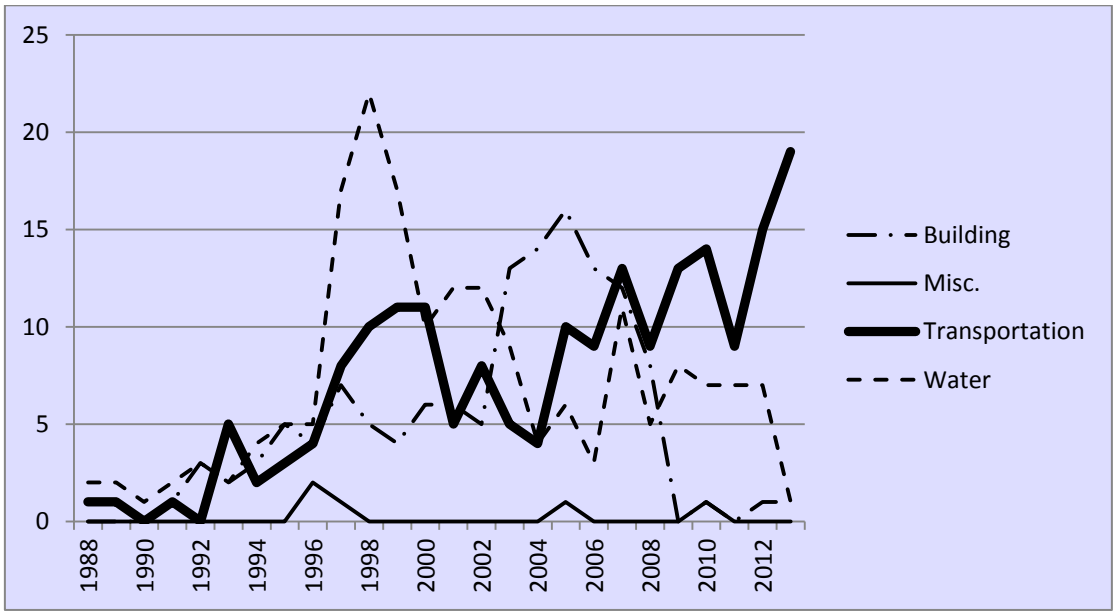
Source: using information from Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. 2003. "Fractionalization." Journal of Economic Growth 8 (2): 155–94.

Table 11**. The State Management Report Card. Infrastructure Grade**.

US States	1999	2005	2008
Alabama	1	2	6
Alaska	6	6	4
Arizona	3	7	7
Arkansas	5	6	6
California	4	5	7
Colorado	5	6	6
Connecticut	6	6	6
Delaware	8	9	9
Florida	5	9	10
Georgia	5	6	8
Hawaii	7	4	5
Idaho	7	6	7
Illinois	7	6	5
Indiana	5	7	9
Iowa	7	8	6
Kansas	8	7	6
Kentucky	10	9	10
Louisiana	8	6	6
Maine	4	8	6
Maryland	10	10	9
Massachusetts	9	4	3
Michigan	9	9	10
Minnesota	10	8	6
Mississippi	8	6	6
Missouri	10	7	9
Montana	9	7	6
US States	1999	2005	2008
Nebraska	10	9	9
Nevada	9	9	7
New Hampshire	5	6	3
New Jersey	9	7	6
New Mexico	2	3	6
New York	4	9	7
North Carolina	9	6	7
North Dakota	9	7	7
Ohio	8	10	7
Oklahoma	5	4	4
Oregon	7	8	6
Pennsylvania	8	9	7
Rhode Island	6	7	6
South Carolina	7	6	4
South Dakota	8	8	8
Tennessee	7	7	8
Texas	5	7	8
Utah	10	11	11
Vermont	8	7	9
Virginia	11	10	9
Washington	11	8	9
West Virginia	6	5	4
Wisconsin	10	5	7
Wyoming	6	5	8

Source: Compiled by authors from multiple sources.

Figure 1 **Number of P3s Reaching Financial Closure in the U.S. by Sector, 1986-2013**

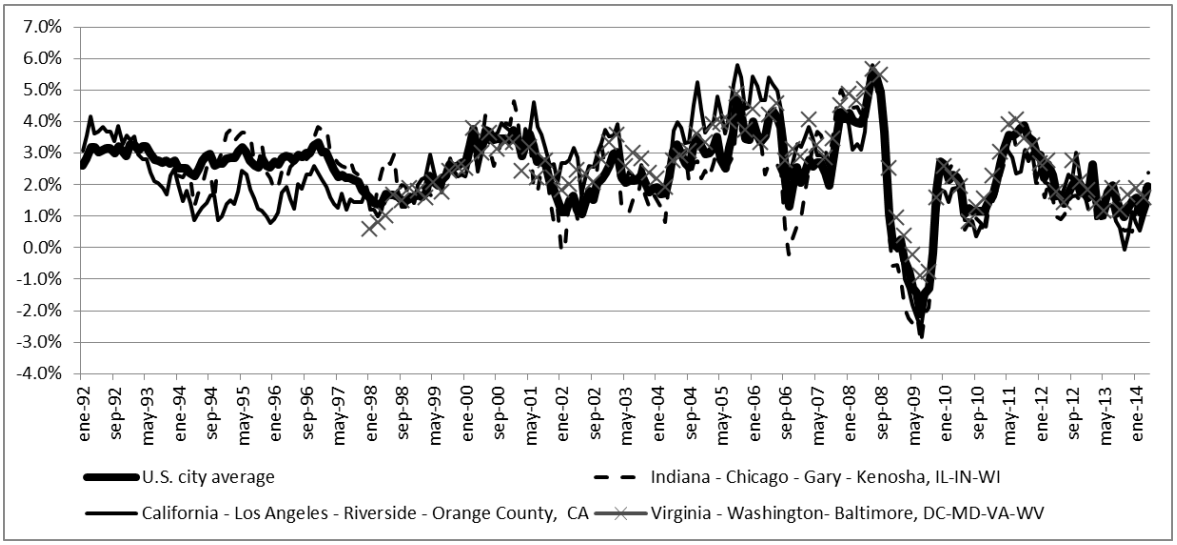


1. Note: P3s of all contract types, including concessions and management contracts

Sources: Public Works Financing Newsletter. 2014. "Projects Database." Public Works Financing Newsletter. http://pwfinance.net/projects-database/.

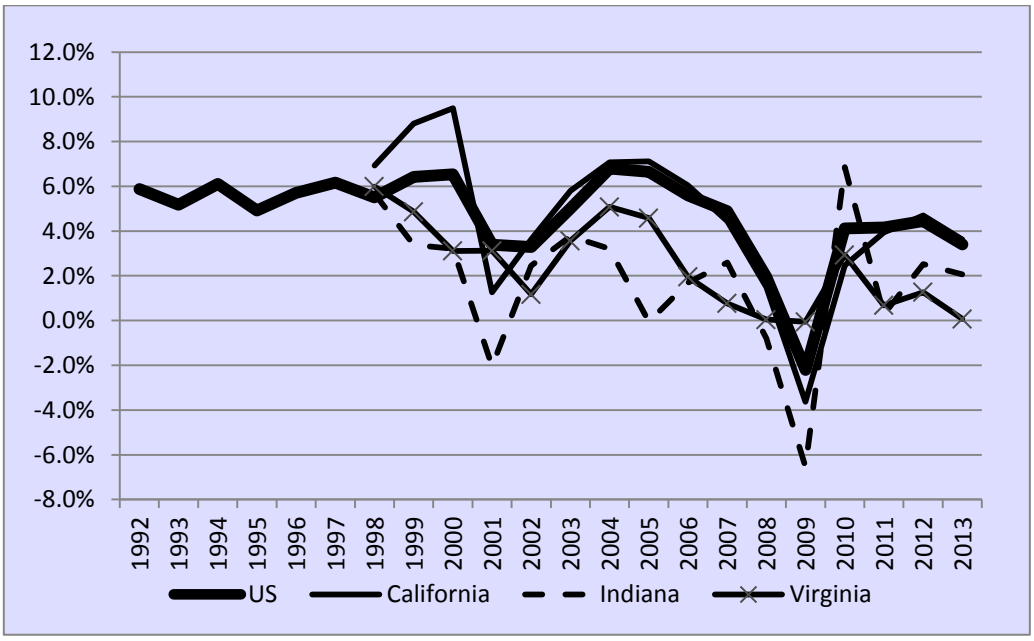
2.

Figure 2. **Inflation rate using CPI – All Urban Consumers (1992-2014)**



Source: using information from Bureau of Labor Statistics. 2014. "Databases, Tables & Calculators by Subject." Bureau of Labor Statistics. http://www.bls.gov/data/#prices.

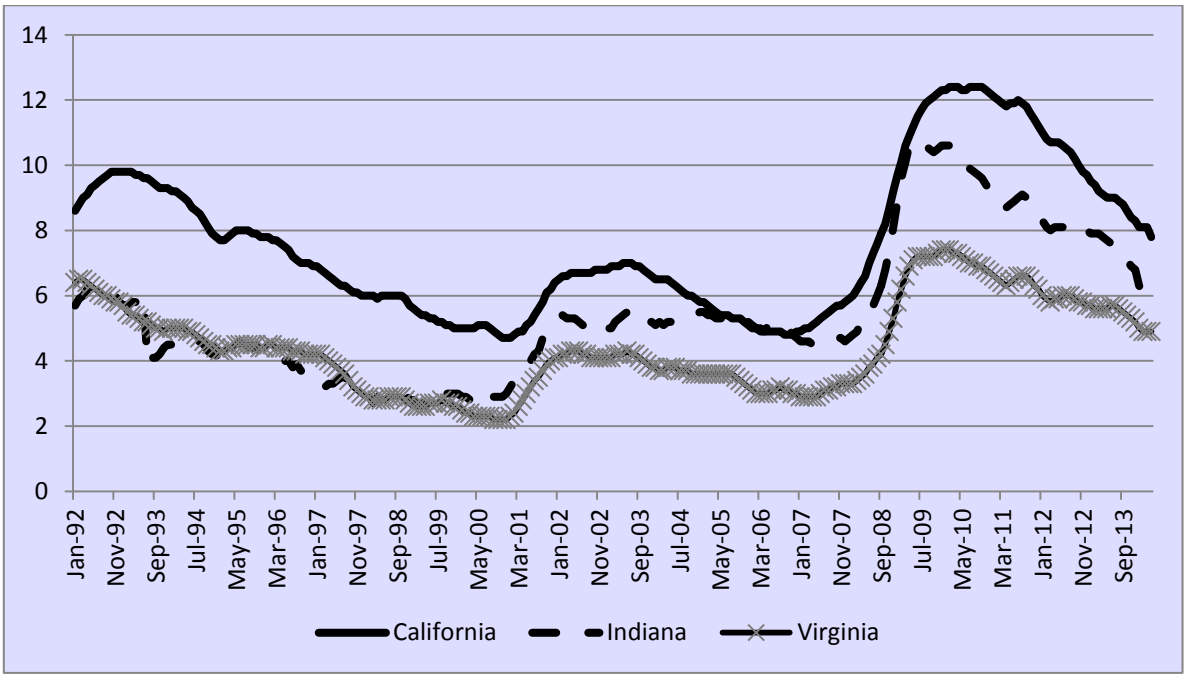
Figure 3. **Real Total Gross Domestic Product (GDP) growth in selected states (1992-2014)**



Source: using information from Bureau of Economic Analysis. 2014a. "BEA Regional Economic Accounts." Bureau of Economic Analysis. http://www.bea.gov/regional/index.htm.

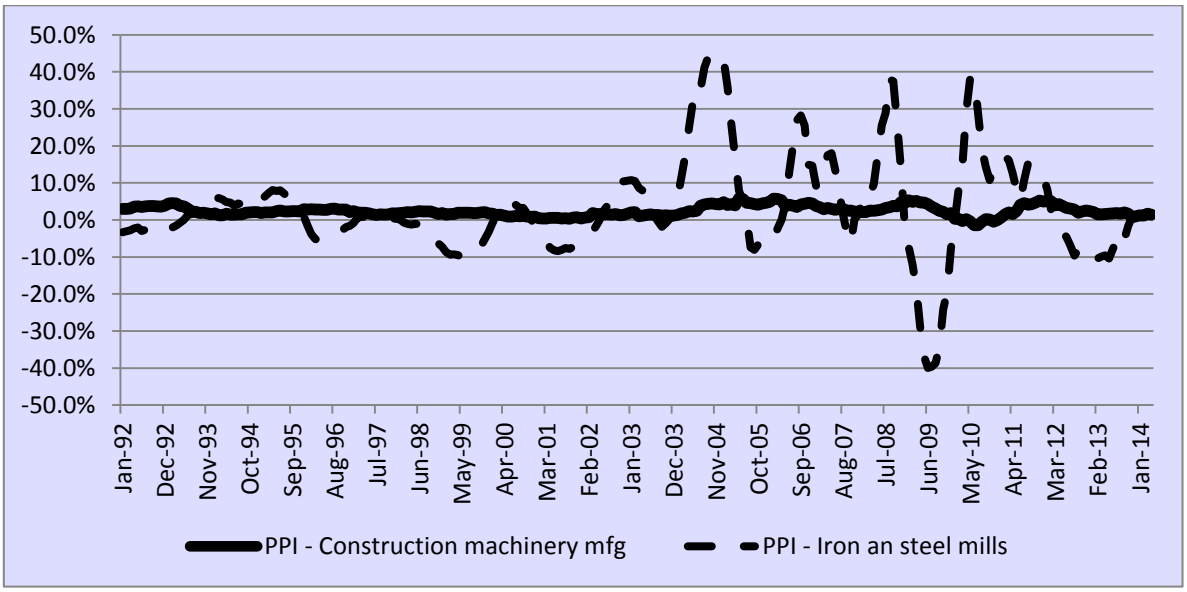
———. 2014b. "BEA National Economic Accounts." Bureau of Economic Analysis. http://www.bea.gov/national/index.htm#gdp.

Figure 4. **Unemployment rate in States with transportation P3 with renegotiations (1992-2014)**



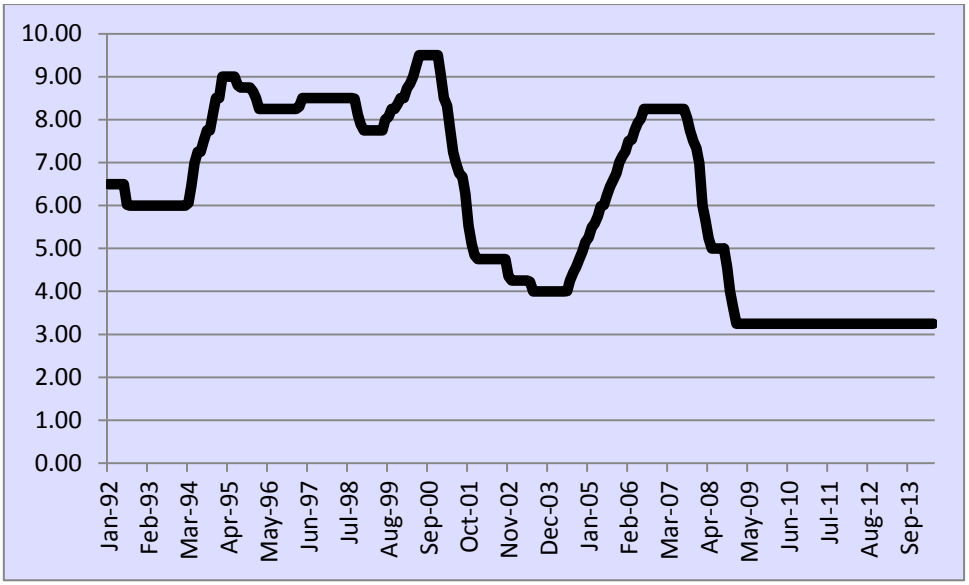
Source: using information from Bureau of Labor Statistics. 2014. "Databases, Tables & Calculators by Subject." Bureau of Labor Statistics. http://www.bls.gov/data/#unemployment.

Figure 5. **Inflation rate using PPI – construction machinery and iron and steel mills (1992-2014).**



Source: using information from Bureau of Labor Statistics. 2014. "Inflation and Prices." Bureau of Labor Statistics. http://www.bls.gov/data/#prices.

Figure 6. **Prime Bank Loan Rate, not seasonally adjusted (1992-2014)**



Source: using information from Federal Reserve Bank of St. Louis. 2014. "Prime Bank Loan Rate." Federal Reserve Bank of St. Louis. http://research.stlouisfed.org/fred2/categories/117.