Optimizing Public-Private Partnerships: A Case Study in U.S. Transportation Infrastructure

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Abstract

Public-Private Partnerships have emerged as one of the most common models for generating private investment in infrastructure. However, there is still significant debate surrounding which factors drive P3 project results. While many P3 deals have proven to be a success and generated numerous benefits, others have resulted in failure and bankruptcy. This paper analyzes one such case, the 2006 Indiana Toll Road Concession. Celebrated as a landmark deal that would serve as a model for future P3 deals, the project resulted in a 2014 bankruptcy filing. The project suffered from the broader economic impact of the Great Recession, but the project ultimately failed because of deal-specific flaws. Analysis of the deal and its impact shows that (1) P3's can generate social welfare so long as the public allocates sufficient risk to the private partner and (2) private parties suffer when they overbid for projects, despite many incentives to do so.

Keywords
Public-Private Partnerships, infrastructure development, transportation investment

Disciplines
Business, Public Policy & Administration

1. INTRODUCTION

1.1 Public-Private Partnerships

Across the United States, aging infrastructure has imposed significant economic costs at both the local and national level. The significant underinvestment of years past has left the country in need of massive amounts of infrastructure spending. However, the economic struggles of the past decade have burdened federal, state and local governments with severe budgetary constraints and reduced borrowing ability. Facing pressure to both reduce public sector debt and improve the quality of public services, the government has hoped that the private sector would generate infrastructure investment on its own. In light of these problems and a substantial demand for new infrastructure, governments have had to turn to the private sector for financing. However, research has shown that the private sector will either underinvest in infrastructure or invest in projects that are not socially optimal (Helm, Wardlaw, & Caldecott 2009). As a result, the government has found that it must work *with* the private sector to increase infrastructure spending, rather than simply rely upon the private sector to generate financing for new infrastructure projects on its own.

One of the most frequently utilized methods of accessing private capital for infrastructure investment is a Public-Private Partnership, or P3. While there is no universally accepted definition of a P3, the World Bank defines it as a "long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance." In practice, a P3 involves a private entity supplying capital for public assets, such as toll roads or water plants, in exchange for some form of financial return. While there are many varying models and structures for different types of P3's, we will define a P3 any long-term contract between a government agency and a private sector entity (or entities) for the development, construction, operation or management "of public sector infrastructure facilities by the private sector entity, or the provision of services (using infrastructure facilities) by the private sector entity to the community on behalf of a public sector entity" (Grimsey & Lewis 2002).

In other developed nations - such as the United Kingdom and Canada - governments rely heavily on private capital and P3's for infrastructure investment. The primary benefit of the P3 model is that it increases overall investment in infrastructure, which is vital to a nation's economic prosperity. Additionally, the private and public sectors interact in such a way that can create value that is unattainable by either party individually. For example, the private sector can create incremental value by bringing expertise in efficiently funding and managing infrastructure assets in a manner that lowers overall cost (Buckberg, Kearney, & Stolleman 2015). In essence, a private party that can purchase risks from the government and manage them more cost-effectively can potentially deliver a better end-product and save money for the public. On the other hand, the government adds value through technical assistance and subsidies such as the issuance of tax-exempt Private Activity Bonds (Eichel et al. 2005). Unfortunately, many characteristics inherent in investment in infrastructure projects make them generally unsuitable for private investors. These features include an abundance of market failures, cost subadditivity and negative externalities (Roumboutsos & Pantelias 2015). However, transactions can be structured in such a way that makes deals appealing to both the public and private sectors. In fact, the extent to which deals can be made palatable, and perhaps even attractive, for investors will ultimately determine the level of private participation in infrastructure investment.

1.2 Application of the P3 Model in Transportation Infrastructure

One segment of infrastructure in which P3's have become particularly prominent is transportation. The nation's transportation infrastructure is of critical importance to both quality of life and economic growth, as highways are used for the labor force to commute to work, for travelers to access different locations throughout the country, and for businesses to transport goods. The United States transportation infrastructure, at the federal level, was initially established in 1956 as the Interstate Highway System. Since that time, the number of vehicle miles has increased by a factor of four - from 700bn in 1960 to nearly 3tn in 2009. Despite this drastic increase in traffic, investment in transportation infrastructure has lagged.[1] Together, these factors have led to increased road congestion with significant associated economic costs: 5.5 billion hours spent annually in traffic cost consumers over $120bn in fuel and lost time.[2]

A robust transportation system requires significant spending - in 2013, all levels of government spent approximately $156bn in aggregate on highway infrastructure. The federal government, primarily via the Highway Trust Fund (HTF), paid roughly $40bn of that total. Historically, the asset value of the HTF grew on an annual basis, driven by a contribution of new assets and growth of existing assets. However, in recent years, government spending on transportation has exceeded additions to the HTF, resulting in a declining balance.[3] Consequentially, the federal government has had less funding to provide to states for use in highway construction, maintenance, and operation. As was recently said by US Transportation Secretary Anthony Foxx, "with public investments in our nation's important transportation assets

[1] Congressional Budget Office: Using Public-Private Partnerships to Carry Out Highway Investment
[2] National Economic Council: An Economic Analysis of Transportation Infrastructure Investment
[3] Joseph Kile's May 2014 testimony before the Senate Committee on Finance

steadily declining, we need to find better ways to partner with private investors to help rebuild America." The sentiment of this statement is a prime example of the forces driving cash-strapped government agencies to turn toward the private sector in search of P3's for highway investment.

With diminishing federal funding on the one hand and aging highway infrastructure on the other, many state governments have chosen to use the P3 model as a solution. When applied to transportation infrastructure, the P3 model generally dictates that the government maintains ownership of the toll road, while the private party is responsible for operation and management. Furthermore, the government frequently imposes mandatory minimums for highway improvement and development; an example would include requiring the private party to pay for installation of electronic toll collection systems as part of a concession agreement.

1.3 Stakeholder Considerations

The growing use of P3's in transportation infrastructure marks a stark departure from the traditional infrastructure construction model, under which the government bore nearly all the risk of building and managing transportation infrastructure. In any P3 project, there are a significant number of stakeholders whose interests must be considered, including government agencies, numerous private parties, and the public itself. This adds considerable amounts of intricacy to projects that already have significant inherent technical complexity (Leviakangas et al. 2016). As a result, there are a large number of inputs that must be analyzed and prepared for in order for the project to be successful. Among these are risks inherent to all construction projects, including risks related to the ultimate demand for the final product, cost overruns, project delays, etc. (Karim et al. 2012). In addition, P3's face additional risks, both from the political nature of the activity and the additional processes related to negotiations, bidding and contracting between the various parties (Pipattanapiwong 2004).

Despite parties knowing in advance the risky nature of a P3 project, many large-scale P3's lack a rigorous framework for properly establishing mechanisms related to bidding, payment, operations, etc. The combination of a high degree of risk exposure and the difference in goals between stakeholders often leads to debate about proper deal structure. As a result, in most scenarios, risks are allocated to the party least able to refuse them, rather than the party most capable of effectively managing and mitigating them (Thomas et al. 2003). When parties underestimate risks, or are allocated risks that they are incapable of managing, the result is increased cost, project delays, and services that fail to deliver value-for-money to the community (Ng & Loosemore 2007).

1.4 Present Research

There is consensus amongst researchers that, while P3's offer potential benefits as an alternative to traditional infrastructure investment models, many of these projects have had questionable economic value. Traditionally, research has relied on the Value for Money (VfM) approach to evaluating the economic merit of P3 deals (Tsukada 2015). Under the VfM framework, the cost of the P3 project over its entire life is compared to the cost of executing the same project without including the private sector. The problem with VfM is that is only considers the financial cost of infrastructure development; it ignores the non-financial aspects such as road congestion, freight rates, and overall social welfare. Alternative efforts have been made to improve upon the VfM model, such as the Value for Funding (VfF) approach (Kim &

Ryan 2015). This method utilizes the cost comparison mechanism found in VfM, but also takes into account costs related to the current public-funding dilemma. However, this approach is also incomplete, as it too fails to consider many factors relevant to judging the success of a P3 project.

There is also significant research on risk allocation in P3 deals, and this research can primarily be broken into two broad categories: quantitative and qualitative. Quantitative studies have proposed multiple approaches to optimizing the equitable allocation of risk: a risk allocation model derived from game theory (Medda 2007), a fuzzy adaptive decision making model (Khazaeni et al. 2012), a general algorithm based on an application of the knapsack problem (Alireza et al. 2007), and many others. Much of the qualitative research (Kangari 1995; Roumboutsos & Anagnostopoulos 2008; Loosemore & McCarthy 2008; Jin & Doloi 2008) involved the use of questionnaires. These questionnaires were primarily targeted at private companies, government agencies, contractors, civil engineers and other entities involved in P3's. The results were primarily used to determine *ex-post* views on how risk was allocated and the degree to which participants felt this distribution was equitable.

The aforementioned research could be improved because, for the most part, it generalizes all types of P3 models and projects into one large amalgamation. There are many different types of P3 models, with different structures that dictate the terms of payment, revenue sharing, liability responsibility, etc., and it is important to acknowledge that certain issues may be unique to a specific type of P3. Therefore, the literature could be improved by further development of the case study method for examining optimal deal structures. There have been numerous examples of P3 case studies to date, including P3's for the construction of kindergartens in Kazahkstan (Mouraviev & Kakabadse 2014), railway projects in Sydney (Ng & Loosemore 2007) and toll road projects in Indonesia (Abednego & Ogunlana 2006). There is a further opportunity to advance the research in P3 transport infrastructure if cases are studied where sufficient project-level data is available (Chen, Daito, & Gifford 2016).

To augment the research done via all three aforementioned types of studies, this project will utilize further case study research. This will serve to identify more discrete characteristics of individual P3's - as opposed to broad generalizations about P3's as a whole - that will determine the optimal methods of executing transportation infrastructure P3's. Measuring performance and establishing optimal deal structure have presented a problem for P3's, and there is an opportunity in the research for this study to identify which characteristics of P3 deals lead to success or failure (Hodge 2010). This research will have significant practical use for both public and private entities involved in structuring P3 deals. There is much at stake in these situations, as private investors risk losing billions in capital while the government risks providing insufficient or nonexistent infrastructure where it may be vitally needed.

2. THEORETICAL FRAMEWORK

2.1 The Public Perspective

To simplify this analysis, it is best to divide the stakeholders into two distinct groups: public and private entities. To distinguish on finer lines - between municipal, state and federal governments, for example - is possible, but unnecessary for determining the ideal way to structure a P3. It is important, however, to acknowledge that public and private stakeholders measure returns in very different ways.

Public stakeholders in P3's include a wide range of government entities, all of which are seeking to best represent the taxpayers' interests in any given deal. This group is not motivated by profit, but by a variety of other, sometimes non-monetary, factors. Governments know that an underdeveloped highway system is correlated with lower economic performance and quality of life. Toll ways are used for commuters traveling to work, tourists, and freight for resale. The government, then, must consider its duty to maximize consumer surplus under tight budget constraints.

To illustrate how different deal structures for a toll road may impact consumer surplus, consider the dichotomy between shadow and real toll systems for a hypothetical toll road. Under a shadow toll, road users pay no fee to use the toll road. Instead, a sponsoring governmental agency pays the concessionaire based on road usage. The amount paid to the private sector is a function of different inputs including inflation, traffic volume, etc. Under a real toll, the concessionaire charges drivers each time they use the road, and toll rates are determined by factors including type of vehicle and distance traveled.

Examine the graph shown in Figure 1 of the Appendix. This graph shows the demand curve for a hypothetical toll road. Maximum road usage occurs at Q_0, where price is 0 (denoted P_0). This is representative of the zero-toll (as viewed by the customer) shadow toll system. This maximizes consumer surplus, which is represented by the entire area bounded by the demand curve to the axes. However, when a real toll is used - say, price increased to P', road usage drops to Q'. There is a deadweight loss due to the fact that consumers who want to use the road no longer do as a result of its cost. The blue shaded area marked B represents this deadweight loss. The grey shaded area marked A is equal to the aggregate amount that consumers pay to use the toll road.

There are concerns for the public sector that extend beyond consumer surplus measures. For example, the amount that a state government is able to charge a concessionaire for toll road operating rights determines how much money the state can allocate to other issues, such as education. Therefore, consumer surplus sacrificed on one individual toll road project may be recouped or exceeded by other projects that relied on that same government revenue for financing. Another area of concern for the public sector is what could happen in the event of a potential bankruptcy. Bankruptcy during a large-scale transportation project would be drastically different from that of a traditional corporation; it would be highly unlikely that a toll road could be liquidated in bankruptcy court, even if solely due to the physical nature of the asset. Instead, taxpayers could be left saddled with additional debt or worthless equity in a failed infrastructure project. For example, the Congressional Budget Office found that the bankruptcy of California's South Bay Expressway P3 saddled taxpayers with a 42% loss.

2.2 The Private Perspective and Toll Road Valuation

Unlike government entities that are responsible to their constituents, private investors in P3 deals have fiduciary duty to their investors and shareholders. This means that their goal is profit - generally measured by internal rate of return, or IRR. Currently, a wide variety of private investors, ranging from large construction companies to private equity firms, have shown interest in P3 transportation deals. Different sorts of investors have different return parameters based on the nature of their funds. For example, private equity funds may require a higher IRR than a construction company with a lower cost of capital or return hurdles; different sorts of deal structures are suitable for different types of investors. Consider again the shadow toll system described earlier. Often, shadow toll payments are disbursed based on set payment bands, each corresponding to pre-established volumes of road usage. The lowest band, which would be used if traffic volume did not reach a minimum threshold, would pay a return sufficient to service senior debt but provide no return on equity. The middle bands would pay a range of return on equities; the top band would cap the maximum return on equity at a certain level of traffic usage. Depending on the projected traffic usage of the roadway and corresponding potential for return, different investors may find different P3 projects suitable. To measure returns on the private side, the study uses IRR methodology, which is typically used by infrastructure funds for bidding. Under this methodology, the IRR serves as the targeted return on equity and determines purchase price through annual cash flows to equity holders[4]**.** Infrastructure funds generally aim for IRR's in the range of 8.5 to 12%.

[4] Credit Suisse *Illinois Tollway System Valuation*

To calculate IRR, the private party must make cash flow projections and valuation estimates to determine the appropriate bid for the project. Given that the P3's designed to build large toll-roads are often multi-billion dollar projects, it is vital to have a universally agreed upon valuation framework. In practice, both private and public sector officials use a discounted cash flow (DCF) approach to valuation. This is appropriate for the cash flows inherent in this type of project due to the finite life of the concession stream as well as the relatively low volatility of the asset. Large toll road projects are generally marked by the following cash flow characteristics: significant upfront capital investment, revenue determined by traffic volumes and toll rates, low operating expenses relative to revenue, high financing costs relative to revenue, and low maintenance capital expenditures relative to revenue. In an ideal world, the equity value of a toll road increases as it moves through the construction and operation cycles. During construction, investors have less certainty regarding future road usage and therefore apply a higher risk premium to their valuations. As the road is completed and operation is undertaken, this risk premium is lowered and the investment value increases.

2.3 Research Question

Considering the two parties and their respective interests, there are two questions that must be answered to determine if a particular P3 project has achieved the optimal aggregate welfare for both potential stakeholders. The first question is, as a public good, is the end product beneficial to society? The theoretical framework described earlier for calculating consumer surplus can only approximate this, as other factors are also relevant to the public's consideration, including safety, travel times, and accessibility of different locations.

Second, was the price paid in line with an appropriate valuation for the project? That is, did the private entity pay an amount that is aligned with reasonable projections for road usage, operating and maintenance costs, etc.? If the private investors pay too little, they take surplus that would otherwise belong to the government and/or to taxpayers. If the private investors overpay and cannot service the project's debt, all parties suffer; the investors may lose their equity investments in any potential restructuring, and the government may be forced to take on debt that it meant to avoid in the first place.

3. RESEARCH METHOD & DATA

3.1 Case Study Method & Case Selection

To analyze transportation project P3's on an aggregate level would obfuscate the factors that ultimately lead to the success or failure of any individual project. Each partnership has unique characteristics based on the nature of the specific deal, and it is important to analyze how these individual variables relate to the partnership's end-result and social impact. It is more instructive to examine a specific P3 project for which the causes and effects of project performance are determinable. To do this, the case study method was utilized. A case study approach is appropriate when "the focus of the study is to answer 'how' or 'why' questions, you cannot manipulate the behavior of those involved in the study, [and] you want to cover contextual conditions because you believe they are relevant to the phenomenon under study" (Baxter and Jack 2008**;** Yin 2003). This research aims to answer *why* transportation P3 projects succeed or fail, satisfying the first condition. There is certainly no way for the study to influence those involved, such as massive engineering firms or government agencies, i.e. the second condition is also satisfied. Regarding the third condition, the contextual conditions of each P3, such as the type of infrastructure, the parties involved, the contractual specifications and the payment mechanisms in place, are not only relevant to project performance (the "phenomenon under study"); rather, they are the drivers of such performance.

To utilize the case study methodology, the cases must be properly selected. To determine what case(s) to study, the unit of analysis must first be established (Miles & Huberman 1994). In this study, the unit of analysis will be an individual P3 transportation infrastructure deal. However, this in itself is too broad of a case unit, and must be narrowed down so that the question being answered is sufficiently specific. To do this, certain boundaries must be placed on the set of possible cases. Some possible boundaries include time, place, and context (Stake 1995; Yin 2003; Creswell 1998). In this study, the boundaries include context and location, defined here as type of infrastructure and nation of domicile respectively. In particular, the cases studied here will be restricted to transportation infrastructure project P3's within the United States.

When selecting the individual case for this study, a host of transportation P3's were considered. Currently, there are five operating P3 toll road concessions in the US, and twenty-two P3 roadway projects still under construction. The projects yet to be completed were excluded from selection, as a key aspect of this study would be assessing the performance of the project *after completion*. Furthermore, it would be impossible to measure the impact of the toll road on consumers and society if they have not yet begun using the road. This left the five concessions currently under operation: the Northwest Parkway (Colorado), Chicago Skyway (Illinois), Indiana Toll Road (Indiana), Pocahontas Parkway/Richmond Airport Connector (Virginia), and PR-22/PR-5 (Puerto Rico)[5].

Amongst these cases, the two most important factors in case selection were the availability of data on the project, and the extent to which performance of the project could be assessed. The data for the PR-22/PR-5 P3 was very limited due to the nature of Puerto Rico's filing requirements, which left it unsuitable for study. From the other cases, the Indiana East-West Toll Road, or Indiana Toll Road ("ITR)", was the most suitable for research. The concession lasted initially from 2006, when the lease began, until 2014, when the private

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[5] Federal Highway Administration data

operator of the roadway filed for bankruptcy protection. The fact that the project ended in bankruptcy made it especially appropriate for study. Performance was readily determinable, and the bankruptcy proceedings provided a wealth of data on the deal.

3.2 The Indiana Toll Road

The history of the ITR began in 1951, when the Indiana General Assembly passed legislation to undergo the necessary $280 million project. The ITR is 157 miles long, covers 735 lane-miles, and runs east-west from Ohio to Illinois, connecting the Ohio Turnpike on the east to the Chicago Skyway on the west. For this reason, it is also called the Indiana East-West Toll Road. It is divided into two sections: a 134-mile eastern section and a 23-mile western section. The road itself is shown in Figure 2 of the Appendix. In 2005, Indiana Governor Mitch Daniels was searching for funding in support of his “Major Moves” plan to build and improve the state’s transportation infrastructure. However, the amount of transportation investment required greatly exceeded the funding available. This led to the state’s decision, in 2006, to initiate an auction process for a 75-year concession on the road.

3.3 The ITR Public-Private Partnership

When the Indiana Department of Transportation conducted the auction for the ITR lease concession, numerous multi-billion dollar bids were solicited. The winning bid of $3.8 billion was paid to the Indiana Finance Authority, a government agency. This bid was $1 billion higher than any other bid, and double the sale price expected by state officials. While many parties bid for the concession, the winning bid came from a consortium of investors with experience in infrastructure investment: Cintra Concessiones de Infraestructura de Transporte (“Cintra”), a subsidiary of the Spanish infrastructure firm Ferrovial, and the Australian firm Macquarie Atlas Roads ("Macquarie"). Together, these investment partners ran operation of the ITR P3 under a Joint Venture entitled Indiana Toll Road Concession Co. LLC ("ITRCC"). Under other, unrelated P3 agreements, Macquarie also operated the Chicago Skyway in Illinois and the 407 Express Toll Route in Ontario. Under the terms of the deal, ITRCC paid $3.8 billion in cash to the state, and in exchange, received the right to operate the roadway and collect all toll and concession revenues. ITRCC was also required to pay $6mm per year to the police for highway patrol and make leasehold improvements, including the installation of an electronic toll collection system. The State of Indiana retained ownership of the road. This freed up significant capital for the state to spend on rebuilding other highways, constructing new bridges over the Ohio River, and maintenance on Interstate 465 near Indianapolis. However, this came at a steep cost to road users, as the agreement mandated passenger tolls were consequently set to rise 72% within two years, up to 8% in 2010, and 2% per annum thereafter.

The $3.8bn purchase price was funded in part by three tranches of bank debt: a $3.2bn acquisition facility, a $150mm liquidity facility to fund early period interest payments, and a $665mm CapEx facility to fund expected capital expenditures through June 2015. A portion of the acquisition facility was used to pre-fund a revenue stabilization reserve of $100mm. Combined with an equity contribution of $374mm from each Cintra and Macquarie, this resulted in a leverage level of 80%, much higher than that of the average leveraged transaction. In order to determine if this was a fair price for the concession agreement, the study utilizes a model that would have been reasonable at the time of the investment for valuing the roadway deal.

3.4 Data Collection

For this study, data was collected from four main sources:

I. *Government agencies* - Data from state and federal government agencies was used in this study. Due to the involvement of the public entities in P3 projects, government agencies at both levels the must disclose significant data related to the deal. This is due to the Freedom of Information Act, which mandates disclosure of government-controlled documents. Furthermore, government agencies collect and provide data related to highway usage and toll rates. This data was necessary to assess both pre-deal valuation and post-deal financial performance and socioeconomic impact. In particular, the government agencies that provided the data used in this research included: the US Department of Transportation, the Federal Highway Administration, the Congressional Budget Office, the US Department of the Treasury and the Indiana Department of Transportation.

II. *Private Firms* - The private entities involved in this deal (Macquarie and Cintra) also disclosed data related to the deal. This included how the deal was valued, funded, and evaluated after closing. These companies provided data specific to this P3 through various presentations made available to for use by investors. Furthermore, two private firms - Crowe Horwath and Wilbur Smith Associates - were significant sources of data related to the state's analysis of the ITR concession. Crowe Horwath is a large accounting and consulting firm that had been the toll road's external auditor for many years leading up to the deal. Wilburn Smith is an engineering firm that worked in concert with the Indiana Department of Transportation to come up with estimates for the deal's traffic volume and toll revenue. The data from these firms was used in creation of the ITR valuation model.

III. *Bankruptcy Filings* - The bankruptcy filing of the private toll road operator provided quantitative data on the operational and financial performance of the ITR during the time period 2006-2013. The official case for this bankruptcy is entitled *In re ITR Concession Company LLC, Case No. 14-34284 (PSH) Jointly Administered, United States Bankruptcy Court, Northern District of Illinois*. The supplemental filings and exhibits in the bankruptcy case provided the data used to assess the impact of the bankruptcy on the entities involved. These filings and the data they provided were accessed via PACERS (Public Access to Court Electronic Records System).

IV. *Bloomberg & Financial Press* - Bloomberg, the financial and news reporting service, provided data used in both deal analysis and financial valuation. As far as deal analysis, Bloomberg provided access to the filings, exhibits, and press releases that contained details of the transaction. For valuation, Bloomberg was used to obtain data on historical treasury yields and market data for comparable toll road operators; this data was also utilized in the DCF model used to value the ITR project. Other financial news sources (Wall Street Journal, etc.) were also used to collect transaction-specific data.

4. HYPOTHESES

Current academic literature attributes much of the success and failure to the risk and profit-sharing frameworks used by individual P3's. Consider again the shadow vs. real toll choice described earlier - in the real toll environment, the private roadway operator assumes full traffic and revenue risk. However, this ignores the importance of valuation, prior to deal-close, in ultimate project success. To determine how much to bid for a project, private investors first determine a project valuation, then apply their own proprietary IRR hurdles, and finally calculate the maximum amount they can bid to obtain their desired returns. As discussed earlier, one of the research questions that must be considered with regard to transportation infrastructure P3's is whether or not the private sector paid a fair price for the asset it obtained. In this case, the asset in question is the 75-year concession on the Indiana Toll Road.

> **Hypothesis 1a.** *Improper valuation of a P3 project will ultimately lead to project failure.*
>
> **Hypothesis 1b.** *The price paid by the private sector for the Indiana Toll Road concession exceeded the project's intrinsic value.*
>
> **Hypothesis 1c.** *Overpaying for the toll road left ITRCC with more debt that the project could support, leading to bankruptcy.*

The second research question outlined earlier examines the effectiveness of the P3 model in achieving its goal of providing a public good. Toll roads are public goods, and a P3 is meant to serve the public by improving consumer welfare in multiple ways. This includes improved availability and delivery of the public service or asset, exhibited through lowered traffic congestion and toll rates. P3's may ultimately reduce the cost of building a specific roadway or provide the government with additional budgetary flexibility, but they cannot optimally serve their purpose of improving the public asset (the toll road) without maximizing consumer surplus. For example, the Indiana Toll Road concession included step-ups in toll-rates that would increase the cost of using the road for both passengers and commercial vehicles.

Project performance is heavily tied to the success of the partnership between the private and public sector. If the project fails to perform as expected, end-users can expect lower road quality and higher toll rates. Additionally, other expenditures – such as fewer vendor and lodging options or reduced spending on police for highway patrol – may be cut in times of poor performance to reduce operating expenses.

Hypothesis 2a. *The success of a P3 in providing a high-quality public good is ultimately driven by project performance.*

Hypothesis 2b. *The bankruptcy of ITRCC resulted in an overall decrease in consumer welfare.*

5. CASE ANALYSIS

5.1 Valuing the Long Term ITR Lease Agreement

To value the ITR, the DCF model described earlier was used. This particular model is based heavily off of the original model and data presented to the Indiana Finance Authority by Crowe Horwath. The financial model and supporting data can be found in Exhibits 1 through 8 in the Appendix. Arguably the most important aspect of predicting project viability and ability to service debt load is coming up with accurate forecasts for traffic volume and toll revenue. To this end, data was obtained from a series of studies performed by engineering firm Wilbur Smith associates. This involved a combination of economic factors with contractual performance obligations specific by the lease agreement.

The projections for annual traffic volume, implied toll rates, and toll revenues can be found in Exhibit 2. For the years 2006 through 2010, the model incorporates a toll rate increase of 72% for passenger vehicles to be introduced over two years and a 120% increase for commercial vehicles to be phased in over four years. During this period, the implied toll rates ranged from $1.60 to $3.41. For the years 2011 through 2030, it is assumed that traffic volume grows at 1.1% per annum and that the vehicle mix between passenger and commercial vehicles remains constant. The toll rate increases for this period were not set by the lease agreement (as the 72% and 120% increases were), so historical data was used. From the ITR's opening in 1956 until its privatization in 2006, the growth rates for seven-year periods (how often toll rates were changed during that time) were 22% for passenger vehicles and 16% for commercial vehicles. These numbers were used to produce the financial analysis for the years 2011-2030 in the aforementioned exhibit. To err on the side of conservatism, the annual traffic volume for 2031 through 2081 (the end of the lease term) was set at half of the implied growth rate between 2011 and 2030, or 0.55%. Similarly to the 2011-2030 period, the 22% and 16% seven-year toll rate increase were assessed to passenger and commercial vehicles respectively.

The primary other source of revenue - concession revenue - comes from agreements between the toll road operator (here ITRCC) and vendors of restaurants, gasoline, lodging etc. on the ITR. Vendors pay the concessionaire a percentage of revenues or a fixed rent, depending on the specific agreement. For the ten-year period between 1996 and 2005, concession revenues had a compound growth rate of approximately 2% per annum, and this rate was used in forecasting concession revenues between 2011 and 2081. As shown in Exhibit 3, operational expenses grew at a fairly constant CAGR between 1998 and 2005; this growth rate is approximately 5.1%, and was the number used to project operating expense growth going forward (as shown in Exhibit 1). After incorporating all of these projections, a proxy for cash flow was tabulated (see Exhibit 6). The main aspect missing from this proxy is depreciation. However, this model utilizes the simplifying assumption that, in the long run, annual CapEx and depreciation will be equal. As a result, depreciation can be ignored as its non-cash add-back is negated by the equal amount of CapEx. These “cash flows” are then discounted using a 6% discount rate, resulting in a present value (as of the 2006 investment date) of approximately $1.92bn, a full $1.88bn less than the ultimate $3.8bn purchase price. The 6% discount rate assumed an equity beta of 1.0, and the 2006 10-year government bond yield of 4.42%.[6] An equity beta of 1.0 was used because the road is a public good and therefore is best represented by market risk.

[6] United States Department of the Treasury Data

5.2 Project Performance

Despite being lauded as one of the most progressive and forward-thinking deals of its time, the project soon faced strong headwinds. On the one hand, the Great Recession of 2007 struck shortly after deal closure, causing general economic activity to slow drastically. On the other, projected traffic volumes failed to materialize. However, on an operating basis, i.e. without considering debt costs, the ITR was still able to performed relatively well. Between 2006 and 2013, ITR EBITDA nearly tripled from $54.4mm to $158.6mm. Revenue also grew from $75.4mm to $206.7mm. These figures represent fairly robust CAGR figures of 16.52% and 15.50% for EBITDA and Revenue respectively. This data is displayed in Exhibit 8.

However, the majority of this revenue and EBITDA growth was generated by the increase in tolls. In order to reduce the burden placed on consumers - i.e. deadweight loss generated by higher tolls - the government subsidized the cost of tolls. As a result, revenue and EBITDA figures were inflated even as traffic volumes decreased. In fact, passenger vehicle traffic decreased from 16.8mm to 15.0mm vehicles, a CAGR of -1.61%. Commercial vehicle traffic decreased at a similar CAGR of -2.00%, from 10.6mm to 9.2mm vehicles. In aggregate, traffic volume fell from 27.4mm to 24.2mm vehicles, a CAGR of -1.76%. This data is summarized in Exhibit 9. This represents a difference of approximately 3% per year from the projections used in the valuation model that established a $1.92bn valuation. Based on the original 2006 total of 27.4mm vehicles, this difference could cause a disparity in traffic volumes of approximately 22% over the course of the seven years from 2006 to 2013; this figure represents the percentage difference between growing the 2006 figure at the project 1.1% rate versus the empirically exhibited -1.76% rate. This serves to illustrate that the traffic estimates used in the model, and by the State of Indiana, were higher than appropriate and should have been adjusted downward. Even so, this would have resulted in a lower valuation, making the $3.8bn purchase price seem even more unreasonable.

5.3 Project Bankruptcy

In addition to the roughly $3.1bn borrowed to fulfill the lease's $3.8bn purchase price, ITRCC borrowed approximately $1bn in incremental debt to comply with additional road improvements required by the lease agreement. With 2013 EBITDA of $158.6mm, the international JV was in danger of defaulting on 2013 interest charges of $209mm. Additionally, net debt stood at approximately $4.4bn as of year-end 2013. This debt load represented a staggering 27.7x multiple of Net Debt to EBITDA, far higher than what is generally acceptable. This was particularly true for infrastructure projects, which are meant to be lower-risk. In April 2014, one European bank sold a half-billion dollar position in the ITR project-financing loans for 60 cents on the dollar - a clear sign that the market had little faith the project would recover so as to be capable of repaying its debts. Such predictions would soon prove prescient, as ITRCC filed for Chapter 11 in September of 2014, declaring nearly $6bn in debt.

As part of the prepackaged bankruptcy filing, two restructuring avenues were to be pursued. Under the first, ITRCC would sell the rights to operate the toll road, with proceeds to be used to repay creditors whose claim values were impaired. Alternatively, senior creditors would swap their claims for an aggregate 95.75% stake in a reorganized ITRCC. The existing lenders had also agreed to lend $2.75bn in order to help the restructured entity back to operational and financial viability. In May of 2015, the international infrastructure investment firm Industry

Funds Management ("IFM") purchased the remaining years on the lease from the defunct ITRCC for $5.7bn. The resolution from Chapter 11 may close this chapter on the Indiana Toll Road, but the P3 and original privatization will have far-reaching impacts on transportation infrastructure investment for years to come. In particular, the way in which this concession was purchased, financed, and ultimately operated illustrates many lessons for optimizing P3 performance into the future.

6. CONCLUSION & KEY TAKEAWAYS

Hypothesis 1a suggested that improper valuation of a P3 deal would ultimately lead to project failure. This was shown to be only partially true: the private sector *did* overpay for the ITR concession and the project *did* fail, but the former was not the only cause of the latter. When the bid for a P3 greatly exceeds the underlying asset's intrinsic value, the project is undoubtedly much more likely to fail. To support a higher bid price, the private sector has to take on more leverage, increasing the risk of project failure. In the case of the ITR, Hypothesis 1b predicted that the value paid by ITRCC was, in fact, significantly greater than the value of the toll road concession. This proved to be true, as the valuation model came up with a base case valuation that was equal to approximately half of the investment consortium's final bid. Hypothesis 1c continued this logic, positing that ITRCC's overbidding resulted in an unsustainable debt load that made project failure inevitable. This also proved true, as the debt load generated by the purchase price was shown to be so high that, even if the overly optimistic traffic forecasts had materialized, bankruptcy could not have been avoided.

Based on valuation of the project using data from the time of investment and over the course of its brief life, the data clear shows that ITRCC overpaid for the toll road concession. The valuation model utilized extremely conservative predictions, and still produced a present value equal to approximately 50% of the bid value. However, to use this data to improve future P3 agreements, it is important to understand why ITRCC, and many other infrastructure investors, are incentivized to serially overbid for contracts.

One of the partners in the ITRCC deal, Macquarie, manages one of the largest infrastructure asset funds in the world. Holdings range from domestic assets such as the Indiana Toll Road and the Goethals Bridge in New York to international assets including China's Hua Nan Expressway and the United Kingdom's M6 Toll. In aggregate, Macquarie manages 50 funds controlling approximately $105bn in infrastructure assets. The problem lies with the structure under which Macquarie is compensated. The firm is paid in two parts: a management fee based on the amount of assets under management and a performance fee based on profit. As firms grow – in this case to sizes over $100bn – the amount of revenue from management fees greatly exceeds that from performance fees. Furthermore, firms that have investment banking arms (like Macquarie) earn fees based on the size and number of deals completed. Consequentially, firms are incentivized to add as many assets as possible to their holdings to increase management fees. In many cases, this means overpaying for assets.

This is particularly problematic because private firms often bear little of the risk associated with overpaying for an asset. The assets held by an infrastructure fund are not owned by the private entity, but by the shareholders whose money was invested. In turn, firms can collect massive management fees even if deals do not perform well. However, when firms overpay for deals, these deals ultimately drag on performance. In order to satisfy investors and boost returns, many private funds have devised a particularly dangerous strategy. The strategy is modeled after the dividend recapitalization process often used by private equity firms. Rather than sell their holdings in successful investments, they take on incremental leverage to fund additional shareholder dividends and increase their equity returns. In this case, the private sector parties involved in a P3 take on additional debt – even, in many cases, when the projects are unsuccessful – using the toll road revenue stream as collateral. Rather than use this money to make leasehold improvements or reduce toll rates for consumers, investors pay out dividends to shareholders.

Governments have expanded the use of P3 agreements in hope of increasing the public welfare. However, the private entities in many P3 agreements are incentivized to behave in ways contrary to this goal. Rather than pass savings along to customers, private firms have primarily chosen to juice shareholder returns and increase the size of their management fee streams. As shown in the case of Macquarie and the Indiana Toll Road Concession, misaligned incentives led to drastic overbidding for the asset.

For the private sector, the key takeaway from this deal is that project success requires strict pricing discipline. The incentives to overbid may be strong, but it is important to make a bid in-line with the underlying asset's value. This is true for all asset classes, but is particularly important for infrastructure investment. While government tax-breaks and subsidies related to P3's may make them seem less risky, these projects can still incur significant losses. Ultimately, Macquarie and Cintra suffered the worst of these losses, as they both lost nearly the entirety of their $374mm equity investments. In the end, both firms have large enough portfolios that this individual investment had a muted impact on their overall performance. Still, there are lessons that can be learned from their mistakes that can be used to improve P3 deal structure in the future.

On the government side, the most important principle taken from the ITR case is that projects must not be allowed to take on excessive debt burdens. In practice, however, the government is incentivized to allow higher debt levels. Increasing project leverage increases the amount private firms are able to bid for a project; ultimately, the purchase price the government receives is how much incremental funding it then has to spend on other projects. Therefore, governments are motivated to obtain as high as purchase price as possible. This must be balanced with the government's responsibility to the public. That is, the government must weigh the risk-reward tradeoff when considering what bid to accept – in P3 deals, the highest bid is not always the best. The government must also consider its responsibility to provide reliable public goods and maximize social welfare. When considering bids, the government must consider the factors that went into developing the bid valuation, including projected toll rates and leverage levels. If it fails to do so, it cannot truly optimize the P3 model with regard to the level of overall social welfare and the quality of public goods. Additionally, the government should be cognizant of dealing with firms that have investment banking arms incentivized to do as many transactions as possible at the highest valuations they can obtain.

Surprisingly, neither hypothesis 2a nor 2b proved to be true. With regard to 2a, the provision of the public good was not ultimately driven by project performance. This P3 ended in bankruptcy, but the data showed that the quality of public good was not only protected, but it increased. With regard to 2b, neither the P3 deal nor the bankruptcy negatively impacted consumer welfare.

Due to specific characteristics of this deal, the poor project performance did not impact the government's ability to ensure the reliability or quality of the public good. Traffic volumes and toll revenues failed to meet expectations, and the private consortium filed for bankruptcy. By any definition, this constitutes poor project performance. However, the quality of the road improved. This was due to the fact that the initial lease agreement mandated road improvements during the pre-bankruptcy period in which the toll was operational. In addition to the $3.8bn upfront payment, Macquarie and Cintra agreed to over $4bn in additional capital expenditures over the course of the lease. These improvements included: the installation of electronic tolling, over 1,000 miles of additional centerline[7] miles and over 600 bridges repaired or replaced. Furthermore, the lease contained tight stipulations regarding road operation. For example, the private party had maximum time limits to respond to incidents such as vehicle crashes, road-kill, snowfall, etc. The Indiana Toll Road Oversight Board closely monitored adherence to these standards. When the lease was purchased out of bankruptcy by a new private firm, these same requirements were kept in place. Despite the turbulent performance of the toll road and its investors, the ITR has improved significantly via continuing modernization and expansion.

Additionally, despite the original hypothesis that project failure would incur significant deadweight loss, the bankruptcy did not have a deleterious impact on social welfare. In fact, the data shows that the public actually benefitted from the ITR deal. This was a result of three primary factors: (1) transfer of revenue risk to the private party via a real-toll pricing mechanism, (2) state ownership of the road, and (3) government decision to not use Transportation Infrastructure Financing and Innovation Act (TIFIA) loans.

[7] The term 'centerline miles' refers to all miles of highway built, independent of lane additions. For example, a ten-mile two-lane addition would represent 10 centerline miles, but 20 lane-miles.

Under the real toll system used for the ITR P3 project, the concessionaire charged consumers for road usage. Therefore, the risk of lower traffic volumes and consequently lower toll revenue was borne by the private parties. By transferring traffic risk to the private sector, the government was able to protect consumer interests in the event that traffic volumes did not grow; ultimately, this turned out to be the case. Under other mechanisms – such as availability-based pricing (ABP) – the government would have been liable to make the concessionaire whole on its losses incurred due to insufficient traffic volume. When using the ABP framework for a P3 agreement, the sponsoring governmental agency pays the concessionaire based on how many lane-miles are open during a set time period, regardless of road usage. This means that if road usage is very low, the government will have to compensate the private party just for making the road available. This exposes the government to meaningful traffic risk, which is not socially optimal. The takeaway from the ITR case is that the government is served best by instituting real-toll pricing mechanism rather than ABP or other availability-related payment structures. However, the private sector should be keen to making realistic traffic projections and demanding adequate compensation for bearing traffic risk.

The hypotheses also predicted that consumers would experience significant deadweight loss. The data shows that this would have been the case, had the government not subsidized toll increases. Due to the intense public debate surrounding this deal, the Indiana state government chose to subsidize the lease's stipulated toll increases to protect consumers. Recall that the deadweight loss is equal to the shaded area *B* in Figure 1. The area of this triangle is given by the formula $\frac{1}{2}\Delta P\Delta Q$; in terms of price elasticity, this is represented by $\frac{1}{2}\frac{\partial Q}{\partial P}P^2$. From 2006 to 2013, therefore, the deadweight loss that would have been incurred if not for government subsidies is given by (0.5)(8.54-2.75)(24.2-27.4), a magnitude of $9.26mm vehicle-dollars. The implied toll rates change (from $2.75 to $8.54) and corresponding drop in road usage (from 27.4mm to 24.2mm) are the primary drivers of this drop in consumer welfare. The important lesson to be taken from this is that the participation of private actors in P3 deals can result in significant deadweight loss if the government does not intervene. However, there was still deadweight loss (although not directly measurable) in the sense that the government is forced to use money allocated for other projects for consumer toll road subsidies.

The fact that the state retained ownership of the road was vital to protecting social welfare in this case. In the bankruptcy, the only asset that ITRCC could declare was the concession agreement – not the road itself. This meant that the state was able to keep the $3.8bn upfront payment it received, and project-loan holders took over control of the lease. Most of these holders were large international banks, and they eventually sold their positions when IFM bought the remaining concession period. Going forward, the government must make sure to retain control of state assets so that it does not lose control over public goods in potential bankruptcy scenarios.

Under the TIFIA program, the federal government provides funding to support transportation infrastructure projects. This funding can come in a variety of forms, including direct loans, loan guarantees, and standby lines of credit. Total federal assistance for any given project can cover up to a maximum of 80% of a project's total cost. For example, the Southbay Expressway project discussed earlier utilized a $140mm TIFIA direct loan as part of the project's $658mm total cost. However, the deal ended in bankruptcy, resulting in a restructuring. In exchange for the TIFIA loan claim, the government was given a reconstituted mix of new debt and equity in the newly formed road operator. This package was worth approximately $81.2mm, 42% less than the initial loan value. The ITR project did not use TIFIA loans, which meant that all of the project financing was held by private entities (again, large banks). As a result, bankruptcy losses accrued to these lenders – not to federal taxpayers. This is a key differentiator that must be applied to P3 deals in the future. The government should be very hesitant to use TIFIA loans – particularly via direct lending – given the risk of taxpayer loss in bankruptcy. Future transactions should follow ITR in relying on private funding to cover deal costs. On the private side, debt investors have to be aware that infrastructure assets are potentially riskier than they first appear and be sure to appropriately price the risks that they are bearing.

The significance of this analysis is in both what it can teach about structuring P3's in the future and what it implies about the future of P3 transportation deals. From this research, it seems as though the factors determining overall success of a P3 deal are the price paid for the asset, the risk-transfer mechanisms in place, and the extent of government subsidies. If the price is too high, as in the ITR case, the project will take on too much debt. Revenue risk-transfer is particularly important because it allows the government to ensure the reliability of the public good in the event of decreased traffic volume. In this vein, real tolls are preferable to shadow tolls and ABP mechanisms. The private actors, however, must ensure that they are adequately charging the government for bearing this risk. Finally, the government must be aware of the subsidies involved with P3 transportation deals. This comes in one form via TIFIA loans, which should be avoided to protect taxpayers in bankruptcy. It also comes in another form as direct toll subsidies, which were used to shield consumers from increased toll rates in the ITR case.

As far as future P3 deals, the ITR case may seem like an ominous sign. One would expect that this would damper the appetite for partnerships in transportation investment. However, this is not the case. The government showed that when structured properly, P3 deals can protect the public interest even when projects fail. Private investors may be turned off by the deal, as both private parties lost their equity investments. Going forward, investors must be disciplined in valuation and asset selection; they also must be sure that they are charging the government sufficient returns for the risks they are being allocated. With estimated highway spending needs at $1.6tn over the next five years, private appetite for infrastructure investment is still strong; billions of dollars are being still raised for this purpose by private funds. Furthermore, the current pipeline of projects already is robust, with 400% as many projects under development as in operation. The success of these future deals will ultimately determine the fate of P3 deals in funding the nation's transportation infrastructure; hopefully, the lessons learned from the Indiana Toll Road case can be used to structure these and other deals to optimize results for all parties.

APPENDIX

Figure 1

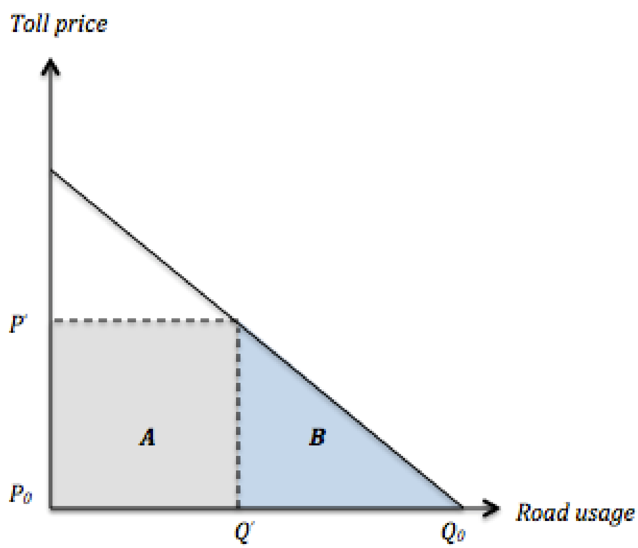


Figure 2

Exhibit 1 - Basic Assumptions	
Input	**Assumption**
Operating expense growth	5.1%
Repairs and renovation expense growth	2.5%
Discount rate for future cash flows	6.0%
Concession revenue growth	2.0%

Exhibit 2 - Toll Revenue Assumptions

Numbers in Millions (except toll rates)	2006-2010	2011-2030	2031-2081
Annual Traffic Volume			
Lower Range Bound	47.2	47.2	58.9
Upper Range Bound	56.6	58.6	77.5
Average	50.5	52.8	67.8
Median	49.3	52.8	67.5
Toll Revenues ($)			
Lower Range Bound	90.3	164.5	365.0
Upper Range Bound	162.3	363.0	1,931.8
Average	133.3	256.9	989.3
Median	139.7	268.3	927.5
Implied Toll Rate ($)			
Lower Range Bound	1.60	3.41	6.20
Upper Range Bound	3.41	6.20	24.94
Average	2.68	4.82	14.14
Median	2.83	5.08	13.73

Exhibit 3 - Historical Financial and Toll Revenue Data

(numbers in millions)	2001	2002	2003	2004	2005
Toll Revenues:					
Passenger vehicle	$ 32.7	$ 34.8	$ 34.8	$ 35.4	$ 34.7
% total	*39.9%*	*42.3%*	*42.4%*	*41.6%*	*39.4%*
Commercial vehicle	49.2	47.5	47.2	49.6	53.3
% total	*60.1%*	*57.7%*	*57.6%*	*58.4%*	*60.6%*
Total toll revenue	81.9	82.3	82.0	85.0	88.0
Operating Expenses	(28.9)	(30.4)	(32.0)	(33.6)	(35.3)
Operating Income	$ 53.0	$ 51.9	$ 50.0	$ 51.4	$ 52.7
Operating Margin	*64.7%*	*63.1%*	*61.0%*	*60.5%*	*59.9%*
Total Revenue Growth					
Passenger Vehicle	*0.8%*	*6.4%*	*0.0%*	*1.7%*	*-2.0%*
Commercial vehicle	*-5.5%*	*-3.5%*	*-0.6%*	*5.1%*	*7.5%*
Total vehicle mix revenue	*-3.1%*	*0.5%*	*-0.4%*	*3.7%*	*3.5%*
Vehicle Traffic (in millions)					
Passenger	43.3	46.1	44.7	45.0	45.0
Commercial	9.1	9.0	8.5	9.0	9.7
Revenue per Vehicle Trip					
Average passenger revenue per trip	$0.76	$0.75	$0.78	$0.79	$0.77
Average commercial revenue per trip	$5.41	$5.28	$5.55	$5.51	$5.49
Average vehicle mix revenue per trip	$1.56	$1.49	$1.54	$1.57	$1.61
Operating Expenses Growth		*5.2%*	*5.3%*	*5.0%*	*5.1%*
CAGR					*5.1%*

Exhibit 4 - Financial Analysis of Revenues and Expenditures

Cash Flows (in millions)		FYE 6/30/2004		FYE 2005
Revenues:				
Tolls	$	85.0	$	88.0
Concessions		7.0		7.0
Investment income		1.4		2.8
Other		0.7		0.8
Total Revenues	**$**	**94.1**	**$**	**98.6**
Expenses:				
General operating		(32.2)		(35.2)
Repairs and renovations		(25.1)		(32.7)
Interest		(15.3)		(15.4)
Depreciation		(3.1)		(3.6)
Total Expenses		**(75.7)**		**(86.9)**
Revenues less expenses	**$**	**18.4**	**$**	**11.7**
Margin		*19.6%*		*11.9%*

Exhibit 5 - Summary Statement of Cash Flows

Cash Flows (in millions)		FYE 6/30/2004		FYE 2005
Casjh flows from operating activities				
Cash received from tolls	$	84.9	$	88.2
Cash received from concessionaires		7.6		7.5
Cash paid to employees for payroll and benefits		(22.7)		(25.3)
Cash paid to contractors and suppliers		(34.0)		(42.0)
Net cash from Operating Activities		**35.8**		**28.4**
Cash flows from investing activities				
Net purchases of investments		(8.3)		(0.3)
Investment Income		1.4		2.8
Net Cash from Investing Activities		**(6.9)**		**2.5**
Cash flows from capital and financing activities				
Capital expenditures		(20.5)		(24.1)
Proceeds from sale of fixed assets		-		0.1
Principal payment on revenue bonds		(12.4)		(13.0)
Interest paid on revenue bonds		(12.9)		(10.0)
Net cash from capital and financing activities		**(45.8)**		**(47.0)**
Net change in cash and cash equivalents	**$**	**(16.9)**	**$**	**(16.1)**

Exhibit 6 - Financial Analysis of Revenues and Expenditures

Cash Flows (in millions)	2006-2015	2016-2025	2026-2035	2036-2045	2046-2055	2056-2065	2066-2075	2076-2081	Total Gross Cash Flows
Revenues	$ 1,746.6	$ 2,604.6	$ 3,908.2	$ 5,453.6	$ 7,588.6	$ 10,749.0	$ 14,656.2	$ 11,797.9	$ 58,504.7
Expenditures:									
General operating	(468.8)	(771.0)	(1,267.8)	(2,084.9)	(3,428.6)	(5,638.3)	(9,272.1)	(8,227.9)	(31,159.4)
Repairs and renovations	(577.8)	(705.2)	(839.4)	(1,011.2)	(1,231.2)	(1,512.7)	(1,873.1)	(1,337.8)	(9,088.4)
Debt service	(248.3)	0.8	-	-	-	-	-	-	(247.5)
Total Expenditures	(1,294.9)	(1,475.4)	(2,107.2)	(3,096.1)	(4,659.8)	(7,151.0)	(11,145.2)	(9,565.7)	(40,495.3)
Revenues less Expenditures	**$ 451.7**	**$ 1,129.2**	**$ 1,801.0**	**$ 2,357.5**	**$ 2,928.8**	**$ 3,598.0**	**$ 3,511.0**	**$ 2,232.2**	**$ 18,009.4**

Exhibit 7 - NPV Analysis

Cash Flows (in bilions)	Gross Cash Flows	NPV
Revenues	$ 58.50	$ 5.30
Expenditures:		
General operating	(31.16)	(1.97)
Repairs and renovations	(9.09)	(1.23)
Debt service	(0.25)	(0.18)
Total Expenditures	(40.50)	(3.38)
Revenues less Expenditures	**$ 18.01**	**$ 1.92**

Exhibit 8 - Revenue & EBITDA Growth from 2006 to 2013

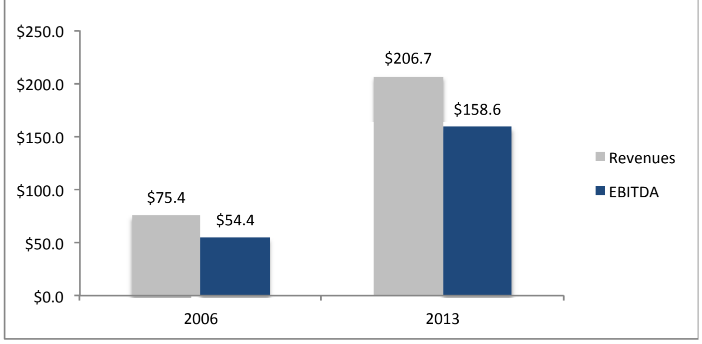
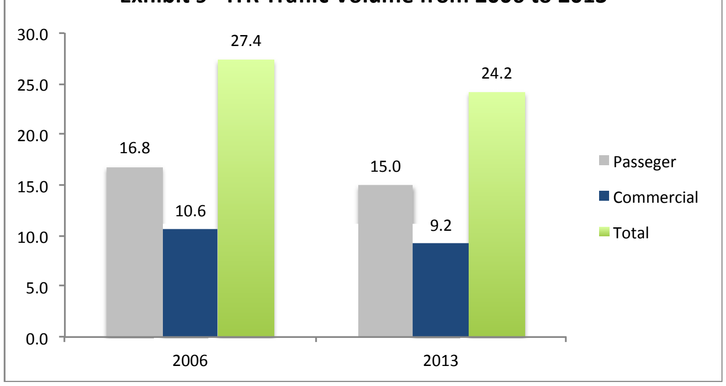


Exhibit 9 - ITR Traffic Volume from 2006 to 2013



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