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Theory and Evidence

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PUBLIC-PRIVATE PARTNERSHIPS IN CANADA: THEORY AND EVIDENCE

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Abstract

This paper develops some theory and examines the implementation and performance of Canadian public-private partnerships (P3s). It focuses primarily on infrastructure projects and addresses four questions: (1) What goals do governments expect to achieve through the use of P3s? (2) How effective are P3s likely to be at delivering value to governments and citizens? (3) How effective have they been at this? (4) Are there lessons that can be derived from Canadian P3 evidence? The paper reviews posited government normative rationales for P3s and considers their efficacy. It then formulates a more comprehensive normative framework. It then outlines a "positive theory" perspective of P3s taking into account the divergent goals of the partners. Then it reviews and evaluates ten Canadian P3 case studies, summarizes the findings and draws implications. The appropriate test of success, from a social perspective, is whether P3s have lower total social costs, including production costs, (negative) externalities *and* all of the transaction costs associated with the project. The case studies indicate that the potential benefits of P3s are often outweighed by high contracting costs and opportunism. These costs are particularly high when construction or operating complexity is high, revenue uncertainty (use risk) is high, both of these risks have been transferred to the private sector partner, and contract management effectiveness is poor. In infrastructure projects it rarely makes sense to try to transfer large amounts of use risk to the private sector.

Key words: Public-private partnerships, transaction costs, public choice, hold-up, opportunism, asset specificity, complexity, uncertainty.

Introduction

This paper examines the emerging issues regarding the implementation and performance of P3s in Canada, focussing primarily on infrastructure projects. A number of projects with public-private partnership characteristics began to emerge across Canada in the 1980s, but it was not until the mid-1990s that P3s really began to take hold. From a public policy perspective, the important questions for potential initiating governments are: (1) What goals do they expect to achieve through the use of P3s? (2) How effective have implemented P3s been at delivering value to governments and citizens? (3) Are there lessons that can be learned and, more importantly, generalized? These questions are important for Canadian policy because emerging evidence from a number of countries suggests considerable dissatisfaction with the outcomes of many P3s. These countries include the United Kingdom (Broadbent and Laughlin, 2004; Grout and Stevens, 2003: 230; Pollitt, 2005; Shaoul, 2005), Ireland (Reeves, 2003), the Netherlands (Klijn and Teisman, 2003), Denmark (Greve and Ejersbo, 2003) and Australia (English, 2005; Hodge, 2005).

The paper proceeds as follows. First, it reviews posited government rationales for P3s. Second, it proposes a "positive theory" perspective on P3s, that is, one that attempts to explain actual P3 behaviour and outcomes. This perspective is based on an eclectic mix of public choice theory, transaction cost economics, and past experience with contracting-out government services, "mixed" enterprises and P3s. Third, ten Canadian P3s are reviewed and evaluated in light of this positive theory perspective. Fourth, this evidence is synthesized and summarized.

Although risk transfer is a major posited goal of many public sector governments, at least initially, our review of the Canadian evidence suggests that, in negotiating (and renegotiating) P3s, government has often failed to achieve significant risk transfer, especially related to use

risk. Use risk is usually, but not always, equivalent to revenue risk. Additionally, the transaction costs of many P3s appear to be high. These transaction costs include *ex ante* contracting and negotiation costs, as well as *ex post* (i.e. after formal contract agreement) costs, such as monitoring, renegotiation and termination costs. These costs may be borne either by government, by the private sector, or both. But, no matter whom these costs are borne by, they represent real social costs that must be considered in assessing the benefits of P3s.

The multiple case-study findings that we report in this paper are generally consistent with the positive theory perspective that we outline below. The case studies suggest that Canadian governments have generally found it difficult to *effectively* reduce either their total costs (that is, the sum of production and transaction costs) or their budgetary risk exposure (by transferring revenue risk) through the use of P3s. At the same time, the for-profit, private sector partners have sometimes had difficulty generating adequate profitability, although this is a tentative conclusion as they have usually had incentives to publicly emphasize losses, or potential losses, and to be secretive about profits. One surprisingly common occurrence is the dissolution of the P3 more quickly than envisioned in the original contract, either through government buy-out, redesign of the contract, bankruptcy of the private entity, or some mix of these. A more common outcome, however, is protracted conflict, with high contracting costs borne by one party, or both.

Our findings throw into doubt the social utility of P3s as a widely replicable mechanism for delivering public infrastructure. More encouragingly, however, P3s in Canada have worked reasonably in certain specific circumstances; namely, where: (1) governments have not attempted to transfer use or revenue risk to the private sector; (2) projects have required specialized knowledge or proprietary technology that is only held by private sector firms (usually a small number of large global firms), and (3) governments were able to transfer construction risk at

something close to a fixed price. We suspect that unless governments recognize that P3s should be limited to projects that meet these conditions, they will be unlikely to be more successful in the future. Most governments will be doomed to repeat high contracting costs and poor outcomes.

Government Rationales for P3s

There has been a long history of public subsidies for large-scale, private-sector infrastructure in Canada; railroads are one example of this subsidization (Hardin, 1974; Mylvaganam and Borins, 2004). Close linkages between the public and private sectors re-emerged in Canada in the mid-1990s in the form of P3s. Canadian governments, like those in Europe and Australia, have been most attracted to P3s in capital-intensive areas, which can loosely be labeled as infrastructure, especially in transportation, and water and wastewater treatment.

Governments have articulated three major rationales for engaging in P3s (Vining, Boardman, and Poschmann, 2006). The first is the minimization of on-budget government expenditures and/or the desire not to increase current debt levels. The second derives from the private sector's ability to provide both infrastructure and services at lower cost due to economies of scale, more experience, better incentives and greater ability to innovate. The third rationale relates to the government's desire to reduce risk, especially during the design and construction phase, but also during the operating phase.

Concerning the first rationale for P3s—eliminating up-front capital expenditures and keeping capital projects off current government balance sheets—there are often political benefits from keeping capital expenditures off the government's official budget (Marlow and Joulfaian, 1989; Joulfaian and Marlow, 1991). However, it is important to emphasize that the underlying economic reality of the investment is not altered if it is not on the books. No matter how a project

is financed, the government or users ultimately have to pay for its construction and operation (Quiggin, 2005). By using a P3, government can spread its cost obligations over a longer time period. As this mainly affects the timing of the payments and is not likely to reduce costs, the normative basis of this rationale is weak. In some cases, though, time shifting can be justified on legitimate intergenerational efficiency and distributional grounds. It is most justifiable for long-lived infrastructure projects that provide benefits over a number of generational cohorts. The need to use P3s for this purpose may also represent the presence of institutional barriers within governments that result in an unwillingness or inability to create adequate capital financing mechanisms. However, these versions of this argument are rarely articulated in detail. Rather, it appears that governments have a desire to provide services, but not have the costs show-up in the budget. This is consistent with a public choice interpretation for the adoption of P3s: current politicians can provide voters with the benefits of projects can defer the costs to future politicians and/or future (myopic) users. It does not provide a fundamental normative economic rationale for the adoption of P3s.

The second rationale for P3s is that such partnering can provide both infrastructure and services at lower cost. There are a number of strands to this cost-superiority argument. The major argument is that private sector firms have superior scale, scope or learning economies because they are more specialized, larger and have more experience in the construction and operation of the relevant businesses. Indeed, private sector infrastructure firms may be global in scope. In contrast, governments engage in much more diverse activities and usually have less specific expertise or experience with the relevant technology or activity. This cost difference is likely to be especially applicable in comparison to smaller provincial, regional and municipal governments. Any such cost advantages are likely to be most substantial for design and

construction. Another cost-superiority argument is that the private sector has superior incentives to minimize costs and, as a result, to squeeze out and lower potential agency costs (Jensen and Meckling, 1976). Because of cost-reduction incentives, the private sector may have more cost-efficient operations, such as procurement policies, and better project management skills, holding scale constant. These superior incentives are likely to become most evident in the dynamic aspects of projects; for example, in a greater willingness to alter project specifications or to utilize new technologies to reduce costs (Dosi, 1988). Also, the private sector may also have lower wage costs, possibly due to hiring non-union labor (Hundley, 1991; Gregory and Borland, 1999). A final strand of this argument that focuses on the public sector is that monopoly public sector bureaucracies are particularly prone to X-inefficiency.

Many would argue that technical efficiency considerations are the normatively best argument for P3s. It makes sense on *a priori* grounds and there is considerable evidence from a wide variety of jurisdictions that large government-produced infrastructure projects often cost far more than budgeted (Merrow, 1988; Boardman, Mallery and Vining, 1994; Taylor, 1995; Flyvbjerg, Holm and Buhl, 2002; Altshuler and Luberoff, 2003; USGAO 2003; UKNAO 2003). However, it is important to bear in mind that the first-order outcome of private sector cost-superiority is higher private sector returns rather than lower public sector costs.

A third rationale is that, through the use of P3s, the public sector can reduce the risk associated with its financial exposure to construction costs, maintenance costs and usage levels (revenue). The private sector partner often engages in many similar projects simultaneously and can, therefore, spread the risk of a particular project over a number of other similar projects, although governments may have more ability to spread risks over a large number of projects in total (Perold, 2004: 6-12). Either way, however, this is not a strong normative justification for

P3s as it does not reduce risk *per se*, it only transfers and spreads it more broadly. The private sector may also be able to price risk more effectively and thereby lower it. Usually, the private sector does have (or can more easily access) more expertise with sophisticated financial instruments and better access to markets that can allocate risks to parties most able to price and bear it efficiently. And, finally, of course, the private sector is less susceptible to political risk, although this can impact them adversely. The U.K. government has been a leader in arguing that the various dimensions of risk transfer should be the primary goal of P3s—usually called Private Finance Initiatives, or PFIs, in the U.K (UKNAO 1999; NHS 1999; HM Treasury 2000). From a normative perspective, the key question is: at what price?

Governments have variously articulated all three of these rationales for engaging in P3s, especially the first and third rationales. All three, whether correct or not, have at least some patina of normative justification. The second rationale is clearly the strongest as it is backed by extensive empirical evidence of governments' underestimating project costs. The major problem with it from a normative perspective is that the argument is incomplete in two respects. First, as Williamson (1975) and others have emphasized, such a criterion ignores transaction costs. Transaction costs include the cost of negotiating, monitoring and, if necessary, re-negotiating contracts with private sector partners, both *ex ante* (prior to the award of a contract) and *ex post* (after the contract has been let). In practice, these costs are usually excluded from the project budget as a project cost, although they are often captured in other government budgets, for example, in government legal and procurement departments. Williamson implies that governments should minimize the sum of production costs and transaction costs. Second, however, even this broader criterion excludes non-governmental social costs, some of which should obviously be included in a comprehensive social accounting. Globerman and Vining

(1996) suggest that ultimately the effectiveness and desirability of P3s and related instruments depends on their ability to meet the needs of society as a whole, that is, whether the net social benefits of P3s are likely to be higher (or are actually higher) than government provision. This criterion has a strong normative rationale and has been used to evaluate the privatization of state-owned enterprises (Jones et al., 1990). Following Globerman and Vining (1996), Boardman and Hewitt (2004) argue governments should also consider externalities and adjust for quality differences when assessing alternative institutional forms for the provision of services. Thus, their broader formulation suggests that governments should minimize the sum of total social costs: production costs, plus transaction costs, plus (net) negative externalities, holding quality constant. One drawback of this criterion for some will be that it treats payments to private sector partners as a transfer: the net social benefits of a project are unchanged even if a government over-pays for a project. Despite this, we argue here that this criterion is the most appropriate normative criterion by which to judge the efficacy of P3s.

A fourth rationale, which is usually not articulated, is that governments believe (or at least want to believe) that private-sector operation makes it politically more feasible to impose user fees, resulting in lower net expenditures for government. The reasoning is that users (and voters) are more willing to accept that the private sector needs revenue to cover its costs, repay its debt or make a profit than they will accept the argument that the public sector needs to do so. Even this rationale has some normative justification when there are positive marginal social costs from public use, for example, where highways are tolled to prevent overuse.

A number of critics of P3s argue that the potential cost-efficiency advantages of P3s are offset by the fact that financing costs will generally be lower for the public sector. On their face, government bonds generally carry a lower interest rate than corporate bonds. Also, governments

may have more ability to spread risk over a larger number of projects (Perold, 2004: 6-12). However, after a comprehensive review of the issues, de Bettignies and Ross (2004: 146-7) conclude that it is not at all clear that governments are generally able to borrow at a lower cost than the private sector.[1] Furthermore, there is a trend for some governments to provide equivalent tax-exempt status to P3 projects, further levelling the playing field on the financing dimension. (Of course, from a social efficiency perspective, taxes primarily represent a transfer.)

A Positive Theory Perspective: Incorporating Partners' Objectives and Contracting Costs

This section sketches a positive theory perspective for both the adoption and evaluation of P3s. It is presented as a "perspective" rather than a fully articulated theory because we do not develop a formal model. Furthermore, our purpose is narrower than a full theory–we draw on theory to consider (and hopefully predict) P3 behaviour and outcomes. However, it is important to emphasize that a positive perspective is not necessarily antithetical to a normative perspective (therefore the use of the word "primarily"). We follow Cordes (1997: 169) who argues that a "good case can be made that the normative and positive traditions are best viewed as complements rather than substitutes to each other in the evaluation…of a variety of public policies."

Above, we argued that from a normative perspective governments should seek to minimize the sum of total social costs: namely, production costs plus transaction costs plus (net) negative externalities, holding quality constant. Therefore, in assessing the expected costs and benefits of P3s versus government production or standard contracting, one must include transaction costs and externalities. We argue that to assess the sum of these costs, it is essential to consider the goals of the "partners", especially the reality that they conflict. Divergent goals are likely to raise transaction costs and externalities. While the language of partnership is

endemic to P3s, the basic premise of this paper is that the public and private participants have conflicting goals (Teisman and Klijn, 2002; Reeves, 2003; Trailer *et al.,* 2004). Private sector participants wish to *maximize risk-adjusted profits over the contract period*. In contrast, the public sector, or more precisely the current government, wishes to *minimize the sum of current on-the-budget public expenditures and political costs*. The details in these objective functions are important, as they foreshadow the reasons for conflict and high transaction costs, both before, and after, contract agreement in P3s. We consider each objective function in more detail.

Private Sector Objective Function

Private sector participants wish to maximize profits *over the contract period*. The point here is that if they find new profit opportunities as the contract unfolds, they will seek to capture them. Of course, if contracts are written very tightly, there will be no opportunity to do so. However, there is usually some scope to engage in this form of behaviour or opportunism. (The evidence certainly suggests that governments often perceive these efforts as opportunistic.) It seems to particularly be a problem when the private sector partner changes ownership, perhaps because new owners perceive themselves as being less bound by tacit agreements.

Additionally, private sector participants are *risk-adjusted* profit maximizers, so that they are willing to forego some expected profits if they can reduce risk sufficiently. Indeed, private sector participants may be considerably more risk-averse than public sector participants, at least *ex ante*. One reason is that private sector actors typically bear the consequences more directly and personally of taking risks that turn out badly. As a result, the private sector requires high premia to accept risk, especially the various dimensions of use risk (also often called revenue or demand risk). Private partners are less familiar with the use risks associated with government projects. However, they usually do know that they often have little control over them. For

example, if they construct and operate a toll highway, they know they will have little influence over regional transportation policy that might dramatically affect their toll revenues. Furthermore, use risk is almost always potentially subject to *ex post* manipulation by their political partners. Of course, in the end, the private sector will formally accept use risk if the contract premium is high enough; just as we all can get a fixed-price contract for our house renovation if we are prepared to pay a high enough price. In the end, though, this price is usually so high that we opt for the contract where the price is not fixed.

In order to minimize their risk generally, even when use risk has been avoided, sophisticated private sector partners are likely to: (1) form stand-alone P3 corporations (Brown, 2005), thereby reducing their worst-case costs by declaring the stand-alone corporation bankrupt, if necessary (Quiggin, 2005), and/or (2) limit their capital exposure through the utilization of extensive third-party debt financing (Roll and Verbeke, 1998; Brown, 2005).

Finally, the likelihood that P3s will deliver projects at lower production cost depends on a private sector partner having the appropriate incentives to equate their profit maximization with project cost minimization. If, for example, firms are *de facto* remunerated on a "cost-plus" basis because of poorly written contracts they will have an incentive to increase, rather than lower, project costs (McAfee and McMillan, 1988). Similarly, if firms form stand-alone corporations or limit their equity participation, as suggested above, they may have opportunities to minimize losses (a form of profit maximization) even though this raises costs for government.

Public Sector Objective Function

To reiterate, the specific governmental objective function that we propose is: minimize the sum of expected current on-the-books expenditures and political costs. This positive theory goal implies they are not as concerned with minimizing social costs (perhaps because they

recognize the weakness of the argument that removing expenditures from the budget is a real cost saving) as with the minimization of current on-budget expenditures. Thus, governments normally prefer off-budget expenditures to on-budget expenditures (Marlow and Joulfaian, 1989; Joulfaian and Marlow, 1991). In a limited number of circumstances on-budget government expenditures can sometimes generate political benefits (i.e., reduce political costs) or may have lower political costs than off-budget expenditures, for example, when the project is proximate to an election (Frey and Schneider, 1978a, 1978b). Furthermore, this objective function pertains to the *current* government, incorporating the reality that current governments prefer future expenditures in future budgets (with potentially different politicians) to current expenditures.

However, government must trade-off current, or on-budget, expenditures against political costs that any off-budget mechanism, such as a P3, generates. Political costs have high saliency. Governments', especially politicians' expenditure-costs-versus-political-costs equation can change, often unpredictably (at least as seen from the private sector perspective). Indeed, political costs can shift from a weighting of "0" *ex ante* (i.e., before construction) to a weighting of "1" *ex post* (i.e., some period after construction completion, but before the expiration of the P3 contract). In these circumstances, the private sector participant may be able to "hold-up" government and extract additional payments of various kinds because governments (specifically, elected politicians) often panic when faced with political risk: voter discontent is most directly provoked by rising user fees.

Each of these factors introduces a public choice overlay to the transaction cost approach (Hartle, 1988; Sproule-Jones, 1996). We posit that, in general, this vote-maximizing behaviour by politicians further raises transaction costs.

The Drivers of Transaction Costs in P3s

The reality that public and private participants' goals conflict is not a surprise. Still, if the potential "gains from trade" are sufficiently large due, for example, to superior private sector efficiency, P3s could produce "win-win" outcomes. However, a number of factors associated with infrastructure projects, especially larger projects that embody technological innovation (and therefore involve greater complexity and uncertainty), both reduce the likelihood that the public sector will achieve its goal and raise the costs of utilizing the P3 format to deliver these projects. Studies have shown that in other inter-organizational contexts, with similar kinds of conflicting interests, the result can be high contract bargaining costs, opportunistic behaviour by one or both sides, failure to achieve goals, and partnership dissolution. For example, mixed enterprises (firms that are jointly owned by private shareholders and government) can result in "the worst of both worlds", achieving neither high profitability nor worthwhile social goals (Eckel and Vining, 1985; Boardman and Vining, 1989; Sueyoshi, 1998). Contracting-out by government is also prone to the risk of hold-up and high bargaining costs (Globerman and Vining, 1996; Brown and Potoski, 2003; Boardman and Hewitt, 2004). Even private sector joint ventures, where both partners have profit goals, also experience high conflict, extensive opportunism and high failure rates (Geringer and Herbert, 1991; Inkpen and Beamish, 1997; Shenkar and Yan, 2002).

Transaction costs in P3s are likely to be high because almost all infrastructure projects present relatively complex contracting situations. Indeed, one way of thinking of P3s is simply government contracting-out under relatively unfavourable conditions. Transaction cost theory suggests that contracting costs are likely to be raised when projects exhibit high asset specificity, high complexity/uncertainty and low competitiveness (Williamson, 1975; Globerman and Vining, 1996; Broadbent, Gill and Laughlin, 2003). Public sector infrastructure—such as roads, hospitals and schools—usually involves considerable asset specificity. Most design work for a

particular project is not useable for any other project and is, therefore, sunk (although knowledge and expertise that can be used elsewhere is not sunk). The value of infrastructure in other uses is very low and often negative.

There is some complexity/uncertainty in all P3 infrastructure projects because they are unique to some degree, if only in terms of topography. Many major projects are complex and may be unique on multiple dimensions. Uniqueness also raises the uncertainty around future usage and future willingness-to-pay for use. Finally, in circumstances where the project involves new or proprietary technology, there may be few alternative private sector choices for construction, or even maintenance, so that competitiveness, or contestability, is absent.

The difficulty in managing these potential transaction cost issues is greater if the government initiating the P3 has poor contract management skills (Boardman and Hewitt, 2004; Leiblein and Miller, 2003). Governments with weak contracting ability and experience will not have the skill to anticipate these contracting problems and write appropriate contract provisions for them *before* the contract is finalized.

Canadian P3 Case Studies

There has been a substantial increase in the use of P3s in Canada over the last decade. Table 1 provides basic information about the major P3s in Canada. It includes the term of the contract, the dollar value of the contract, and the public and private sector participants. It does not include projects that are effectively contacting-out (although the distinction is somewhat arbitrary).

Table 1 shows that P3s have been used for quite a few major infrastructure projects in Canada. These have been in many different areas, including transportation (roads, airports and bridges), water and wastewater, hospitals, recreation facilities, power and energy, and for other

facilities. In addition to the projects listed above, P3s have been used to deliver many other smaller projects.

****Insert Table 1 about here***

Independent studies of P3 performance are rare, and admittedly difficult. However, we were able to review ten Canadian P3 projects in depth. Here, we update the three Canadian P3 cases examined in Boardman, Poschmann and Vining (2005) and in Vining, Boardman and Poschmann (2006) and add seven additional case studies, thereby providing a fairly broad range of empirical evidence. These studies were selected because of the availability of information, the size and profile of the projects, the jurisdictional coverage that they present and the lessons they offer for P3 contract theory, design and implementation. They are: Alberta Special Waste Management System (Alberta), Confederation Bridge (Federal), Highway 407 (Ontario), Highway 104 Western Alignment Project (Nova Scotia), Evergreen Park School (New Brunswick), O'Connell Drive Elementary School (Nova Scotia), Britannia Mine Water Treatment Plant (British Columbia), Moncton Water Treatment Facility (New Brunswick), Cranbrook Multiplex (British Columbia) and Waterloo Landfill Gas Power Plant (Ontario).

The Alberta Special Waste Management System

The Alberta Special Waste Management System (ASWMS) was created in 1987 to build an integrated hazardous waste-treatment facility at Swan Hills, Alberta. It was 40% owned by a provincial crown corporation and 60% by a private firm (BOVAR Inc.). BOVAR invested $30 million (60% of the plant's $50 million cost) and was to collect 60% of the profits and all of the net earnings of the operator, Chem-Security. Under the agreement, BOVAR received a guaranteed minimum return on capital of 3% over the current prime rate, depreciated at 10% per year for 10 years (Sherbaniuk, 1998: 30), regardless of the profitability of the venture (Mintz,

1995). The province provided debt guarantees for BOVAR, as well as indemnity against future remediation or insurance liabilities in excess of $1 million. It also agreed to assume liability for clean up at Swan Hills, which was estimated at $30 - $57 million (Sherbaniuk, 1998: 30).

Alberta adopted a P3 because it believed that the private sector could build and operate the plant more efficiently than the public sector, although it recognized that the plant would not be commercially viable without subsidies. The parties later modified the agreement to permit a large capacity expansion. Partly as a result of this expansion, the subsidy turned out to be considerably larger than expected—approximately $445 million in total between 1986 and 1995 (Mintz, 1995: 17). However, the plant has operated at about only 50% of its capacity through most of its life and the additional capacity turned out to be excessive. In 1996, the Alberta government ended the joint venture by paying $140 million for full ownership of the facility (Sherbaniuk, 1998: 32).

Currently, Swan Hills is the only integrated hazardous waste management plant in Canada. It has, however, remained at the centre of controversy. In 1996, as a result of a PCB leak, and several other environmental issues, BOVAR was charged with six environmental infractions and served with a lawsuit. In 1997, the U.S. removed a ban on the import of PCB waste, and BOVAR immediately faced stiff competition from U.S. facilities. By 1997, Swan Hills' profit had declined to $5.2 million (Sherbaniuk, 1998: 32). In 2000, BOVAR issued a notice of intent to cease operations due to its inability to make a profit. In 2001, the facility was returned to the province, and capital assets of approximately $34 million were written off by BOVAR (BOVAR, 2000). In 2003, the government signed a 10-year operations contract with Earth Tech Inc., a division of Tyco International Ltd.

The contract's provisions provided a strong incentive for overcapitalization because

BOVAR's profits were a function of its capital investment rather than its cost-efficiency. As a result, BOVAR received a high guaranteed rate of return and its risk exposure was minimal (Mintz, 1995). In this P3, there was no effective transfer of risk during the first 10 years, the contract was poorly designed in terms of incentives, there were enormous contracting costs and the project was eventually terminated. Swan Hills cannot be counted as a P3 success.

The Confederation Bridge

Prince Edward Island (P.E.I.) joined federation under a constitutional agreement that guaranteed ferry service to the island in perpetuity (Loxley, 1999a). In 1988, a plebiscite approved a fixed link to replace the ferry service. Later that year, the federal government selected three bids for further development. Strait Crossing Development Inc. (SCDI), a multinational consortium submitted the winning bid. The selected bid was essentially a BOT agreement. The contract specified a $41.9 million (1992 Canadian dollars) per annum payment from the federal government to the operator, notionally representing the avoided cost of ferry operation. SCDI was entitled to the toll revenues for 35 years, after which bridge ownership and revenues reverted to the federal government. The government provided an annual $13.9 million revenue guarantee and agreed to bear a number of the residual risks. Principal financing was secured in 1993 through the sale of $640 million real return bonds by Strait Crossing Finance Inc (SCFI), which was established as a special purpose crown corporation of New Brunswick (N.B.). However, these bonds were guaranteed by the federal government. SCDI initially took on most of the construction and operational risk, as well as toll revenue risk beyond the guarantee. SCDI was required to post performance bonds and guarantees for specified contingencies. The bridge opened in 1997. Initial tolls were set at the ferry price for comparable vehicles and passengers. Annual increases are permitted at 75% of the rate of consumer price inflation. The Canadian

government estimated its incremental costs for project management to be $46 million.

This P3 is clearly a success to the extent that it delivered a functioning bridge on schedule. While there have been weather closures and some unexpected repairs, the bridge itself is functioning as expected. However, the project had high financing costs: the bonds were sold at a 4.5% interest rate, at a time when similar federal issues were priced at 4.1%. SCFI also paid a sales commission of 1.75%, compared to a rate of 0.6% for federal real return bonds. The major problem with describing this P3 as a success is that the bonds were guaranteed by the federal government and thus there was no net reduction in risk exposure relative to on-budget financing (Receiver General for Canada, 1995). It is difficult to escape the conclusion that the P3 was chosen primarily to achieve off-balance sheet financing.

The Highway 407 Express Toll Route

Highway 407 is a 108 km highway across the north of metro Toronto. The request for proposals (RFP) was announced in 1993, when the Province of Ontario was emerging from a recession which had left it in an extremely weak financial position (Mylvaganam and Borins 2004). The recession and the province's high debt load made a toll road politically attractive. The original RFP proposed that the province would be responsible for land assembly and related costs while the private partner would provide financing, guarantee a maximum construction price and operate the highway. The private partner would be remunerated from toll revenues, but neither traffic levels nor toll revenues were guaranteed. Consequently, the private partner was financially exposed to the operating risk. The RFP specified few characteristics of the highway in order to encourage innovation.

In the responses to the RFP, it emerged that credible private partners were unwilling to assume the financing risks in addition to construction and operating risks. Indeed, both of the

two qualified consortia sought extensive provincial backing for the project debt. Without a toll-revenue guarantee, a private firm would have been required to pay at least 75 basis points more for debt financing than would the province (Hambros, 1999). As a result, the province assumed financing of the project. The province also retained the operational risk during the first eighteen months. This risk was only reduced when it sold the highway's operating concession to a Canadian-Spanish-Australian consortium for $3.1 billion (Mendoza et al., 1999). The deal included a 99-year lease agreement, control of the highway and tolls (but with an initial year toll restriction provision). The operator was required to maintain the facility, meet all Ontario Ministry of Transportation safety standards and undergo random audits. It was also required to add lanes once pre-set traffic triggers were met (Hennum, 2004).

The 1999 contract set maximum tolls for the first year of operation. However, the tolling agreement changed with the opening of eastern and western extensions. Over the first year of operations of the extended highway, a "base traffic flow" was set based on the peak-hour traffic volume; it was assumed this would grow by one to three percent a year. If traffic volumes exceeded this threshold, tolls could be raised without restriction; if volumes were lower than the threshold, and tolls exceeded the threshold, the province could impose a penalty equal to twice the surplus of toll revenue charges above the threshold (Hrab, 2003). Since 1999, tolls have been raised six times and in 2004 the consortium announced that it intended to raise tolls again, claiming it was losing money (Mackie, 2004). The toll increases dampened 407 demand, leading to congestion on adjacent roads. In February 2004, the government took legal action against 407 ETR, claiming that it had breached its contract by raising tolls without government permission. The court sided with 407 ETR and an independent arbitrator affirmed that 407 ETR had the authority to raise tolls without consulting the government (Erwin, 2006). After two unsuccessful

legal attempts to have the contract redrawn, the province was granted permission to take the case to the Ontario Court of Appeal. In March 2005, however, Ontario and 407 ETR came to an agreement. The consortium agreed to implement a $40 million "customer-benefit program", reducing tolls by up to 15% for 100,000 frequent users over the next four years, and providing discounts for truck drivers during evening and weekends. In exchange, the government withdrew its demand for a toll rate rollback. The agreement allows 407 ETR to raise tolls once the rebate program for regular users is in place, which is scheduled for 2007 (Erwin, 2006).

The 407 was constructed quickly, without major cost overruns. It generates 300,000 daily vehicle trips. The design process did appear to save substantial provincial expenditures during the construction phase, perhaps in the order of $300 million (Hambros 1999). However, some of these savings were not realized because design changes were instituted before the highway opened. These changes were paid for by Ontario, as they were not part of the initial contract; the actual extent of any savings is therefore unclear. Land assembly and construction costs were reduced by innovative design features, such as short entrances and narrow radius ramps, though there were concerns in the early stages that these changes could jeopardize safety (Mylvaganam and Borins, 2004). The concerns stemmed from issues such as conversion of dual exit lanes to a single exit lanes and the use of asphalt paving rather than concrete (Kuzeljevich, 2002).

The major weakness of 407 as a P3 was the failure of the government to effectively transfer financing risks: the construction phase became a conventional develop, design and build contract with the private partner tendering a fixed-price construction project. Even so, ongoing transaction costs have been extremely high. The 407 operator, not surprisingly, has been interested in maximizing profits rather than optimizing metropolitan Toronto traffic flows. At the same time, Ontario appears to have behaved opportunistically when political costs escalated

because of the toll increases. Those who focus on the lack of risk transfer, such as Bose (1993), regard it as a P3 failure. Mylvaganam and Borins (2004), more charitably, present a mixed assessment.

Highway 104* (*Western Alignment Project)

Highway 104 (Cobequid Pass) is a 45 km toll highway through the Cobequid Mountains in northern Nova Scotia (N.S.). It was built to replace an aging, congested portion of the Trans Canada Highway that had claimed the lives of 50 people over a 10-year period (Highway 104, 2004). The (Liberal) government's primary objectives were to retain ownership of the highway and to finance it solely from toll revenue, without having to guarantee debt. In 1995, the province created the Highway 104 Western Alignment Corporation (104WAC) to allow for "non-recourse" financing. An RFP was issued to three qualified groups. Atlantic Highways Management Corporation Ltd. (AHMC), a subsidiary of Atlantic Highways Corporation Inc., was selected as the P3 private partner (Dept. of Transportation and Public Works, 1996).

AHMC received a management fee to cover the cost of operations, while 104WAC was responsible for the financing and oversight of the design, construction, and operation of the highway. 104WAC's only source of revenue was to be from tolls for 30 years. The financing included $121 million for construction, operations and maintenance costs. Private sector bondholders provided $61 million, the federal and provincial governments $27.5 million each, and Sydney Steel Corporation pension fund invested $5 million in subordinated notes (Government of Canada, 2004). The highway was designed and completed in less than 20 months. Although 104WAC was to be responsible for traffic shortfalls, in fact, "traffic…has exceeded all expectations" (Dept. of Transportation and Public Works, December 7, 2005). This is not totally surprising because, although the province would not formally guarantee traffic

volumes, "the final agreement required the Province to compel large trucks to use the road, to maintain a 30 km per hour speed differential between the old and new road, and to agree to several obligations regarding traffic enforcement" (Auditor General, 1997: 127). In 1999, the Conservatives won the provincial election and premier-elect John Hamm claimed that he would "love" to eliminate tolls completely (Daily Commercial News and Construction Record, 1999: A1). Although the new government did not in fact eliminate tolls, it has "negotiated" with 104WAC to ameliorate previously scheduled toll increases following intense pressure from the N.S. Trucker's Association to do so (Sylvain, 2001).

The N.S. Auditor General (AG) argues that the highway project did deliver some benefits to N.S. The AG argued that debt service charges for the loan would have been lower if the province had borrowed the funds directly, rather than using a P3, but the province would have assumed greater risk. As mentioned earlier, however, the AG also argued that the project debt should be treated as ordinary provincial debt. The province, not surprisingly, did not agree, as this would have negated the whole purpose of the exercise.

Although 104 is usually touted as a P3, the main "private partner"—104WAC—is actually a government entity; so much so that the Auditor General argued that the debt should be regarded as provincial debt. Given that it is a government entity, it not surprising that 104WAC agreed to give up previously mandated toll increases. In December 2005, 104WAC signed an agreement with the province given it discretion to hold back future toll increases. Furthermore, 104WAC is expected to use any "surplus" revenues to reduce future toll increases or pay down the corporation's debt provided it "maintains certain financial targets" (Dept. of Transportation and Public Works, December 7, 2005). One normally does not have to incentivize a private partner in a P3 to maintain financial targets. Clearly, by 2006, the balance of expenditure costs and political

costs had changed considerably. It could be argued that the main purpose of the 104WAC exercise was to allow the province to access private debt—but in a manner that, at least in hindsight, has involved moderately high transaction costs.

Evergreen Park School

In 1994, New Brunswick (N.B.) decided to structure the Evergreen Park School project as a P3. In 1995, Greenarm Corporation of Fredericton was selected to negotiate a final agreement (Auditor General, 1998: 183). Greenarm formed a separate subsidiary named Greenarm Schools Ltd. to manage the project. The contract included a 25-year lease-purchase arrangement, with an option to purchase at that time for $2.5 million, renew the lease for a further 10-year term or walk away (Loxley 1999: 9). Greenarm was responsible for constructing, insuring, maintaining, and operating the school for the length of the lease; however, the company contracted out the construction. Financing was obtained at 9.065% per annum (Loxley 1999). The school opened in the fall of 1996 and accommodated approximately 800 students. Greenarm handles the garbage collection, cleaning, grounds maintenance, snow removal, and painting. Greenarm has the exclusive right to use the school's plant and technology after 3 p.m. From 3 p.m. to 6 p.m., it operates a for-profit remedial and enrichment program for children. After 6 p.m., it runs similar programs for adults (Fuller 2003: 12). These activities all involve some opportunity cost, but it is not obvious what the appropriate counterfactual should be in assessing this cost.

Evergreen was essentially a Finance-Build-Operate-Transfer project. In order to assess the "value for money" of this P3, N.B. attempted to estimate the costs that it would have incurred if it had undertaken the project. The province claimed that its capital costs would have been $9.4 million, while Greenarm's costs had come in at roughly $10 million. The N.B. AG, however, argued that the province's capital costs would have been closer to $9.2 million (Auditor General,

1999). Higher capital costs would be offset by lower operating costs; N.B. estimated that these would be $64,000 less per annum. In contrast, the AG argued the two modes of operations would yield the same costs (Auditor General, 1998: 187). The province had included transaction costs associated with administering the P3 in projecting its costs, which the AG argued were not incremental. Also, the AG claimed that although the province had projected its cleaning labor costs under an assumption that it would use the local union, the province was under no obligation to do so for a new school (Auditor General 1998: 189). This is debatable, as the province had agreed to waive its right to use contracted staff. Excluding the deduction in staffing costs, the province would have had higher operating costs by roughly $34,000 per year (Auditor General, 1998: 189).

This case study illustrates some of the difficulties of even calculating the costs of P3 provision compared to direct government provision, especially when the private sector partner engages in uses that the public sector would not. On one hand, these activities may be innovative; on the other hand, they may involve social opportunity costs (in this case, foregone use of school property outside of regular school hours).

O'Connell Drive Elementary School

O'Connell Drive school was opened in 1997. It was a pilot for 39 schools that were to be built under N.S.'s P3 program for school development. The developer, Nova Learning, purchased the land from the province, and leased it to Canapen Limited, a pension fund, for 20 years. Canapen constructed the building and purchased the equipment. In 1998, the province and Canapen entered into a 20-year lease for the facility for an annual payment of approximately $700,000 (Trottier and Maguire, 2001: 51). The Halifax School Board signed an operations agreement with an independent contractor, Oxford Atlantic, for property management and maintenance. In

addition to monthly payments, the School Board pays an annual administration fee of 15% of expenses (Trottier and Maguire, 2001: 51). The province is responsible for costs incurred from operations, as well as repairs and capital improvements (Trottier and Maguire, 2001: 52).

The private partners' combined purchase price was roughly $8 million (Industry Canada, 2001), approximately the same amount it would have cost N.S. if it had financed the school with provincial debt (Salmon, 1998). At the end of the contract, Nova will retain the land, building, and equipment unless the province either: (1) purchases the facility from Nova for $3,950,000 (the N.S. AG estimates that the present value of this amount is $1.1 million) or (2) renew the lease for up to two 5-year terms at an amount that will amortize the $3,950,000 (plus interest) over 10-years.

The extent of risk transfer in the agreement is quite limited. Nova will have recovered almost all of its initial investment if the N.S. government walks away after 20-years' and it will still own the land and buildings (Trottier and Maguire. 2001: 52). The province retains the usage risk for 20-years and the public sector is responsible for capital improvements. The risk of construction cost overruns was held by Nova, as there was a fixed price construction agreement (Salmon, 1998). As in the Evergreen case, Nova retains the right to use the schools after hours, on weekends and during summers for programmes, such as technology-related training courses (Robertson, 2002).

O'Connell Drive was to be a model to create "schools of the future." As the project unfolded, however, problems arose. First, the provincial government could not come to an agreement with Nova regarding the financial terms of the lease. The province was initially unable to negotiate the financial terms that would allow it to finance the school off its balance sheet. Nonetheless, the province proceeded with the project without a signed lease agreement, which was eventually

signed more than a year after the school was opened. This gave the consortium considerable leverage over the province when negotiating the terms. There were claims that developers were locating schools adjacent to property that they already owned, rather than where needs were greatest (Robertson, 2003).

Ultimately, the N.S. AG argued that, given the modest risk exposure of the private sector, the lease should be recorded as a capital lease and the liabilities recorded as a provincial debt (Fuller, 2003). The Provincial AG further concluded that the government's goal had primarily been to remove new school building costs from the balance sheet in order to reduce the apparent size of the deficit (Fuller, 2003). There was also a widespread perception that the contract terms were primarily advantageous to the private partners, which gradually raised political costs for the government (Fuller, 2003). In June 2000, the N.S. government bowed to political pressure and abandoned the P3 approach for school construction. The 38 schools that were built under the plan cost $32 million more than projected (Nehra, 2005).

In this P3, as noted by several sources, the degree of risk transfer was minimal. Transaction costs also appear to have been high. While it is difficult to conclusively conclude that there were no construction cost savings (an appropriate counterfactual on direct government procurement would necessarily be speculative), it is certainly unlikely that were major cost savings. Clearly, O'Connell Drive was not successful from a political perspective. While political costs of the P3 appeared low *ex ante*, they certainly turned out to be high *ex post* and essentially forced the abandonment of P3 for school construction.

Britannia Mine Water Treatment Plant

The Britannia Mine is located 48 km north of Vancouver on Howe Sound. Mining over many years had resulted in acid rock drainage flowing into the Sound. As a result, the mine site was

one of the largest heavy-metal pollution sources in North America (EPCOR, 2006). In 2001, the Province of British Columbia (B.C.) entered into an agreement with the former mine operators whereby they contributed $30 million toward the remediation of the site in exchange for a guarantee that they would not be held liable for further site clean-up. A key component of the Britannia Mine Remediation Project was a water treatment plant (MSRM, 2005). In October 2003, the province decided to structure the treatment plant as a P3. EPCOR was selected as the P3 partner, based primarily on cost, technical criteria, and qualitative assessment (MSRM, 2005).

The contract was to design and build the plant within a year, along with a 20-year maintenance contract. The total cost (discounted at 8.12%) was $27.2 million, plus cash allowances of $1.9 million (estimated public expenditure was $39.7 million). Payments are based on water volume, water quality, input prices, and actual capital costs. The province retains ownership of the facility and residual environmental liabilities. EPCOR financed and built the plant. Financing, construction, operations, and maintenance are borne by EPCOR. The facility treats about 12 million litres of mine run-off/day, removing about 66,000 kilograms of copper per year. Electricity produced from the mine's discharge flow is used to help power the treatment plant (EPCOR, 2006). The province shares in revenue generated from future innovation. In the event of default, the province retains the right to intellectual property stemming from the plant, which can be used only in the plant (MSRM, 2005).

There have been no significant issues with EPCOR to this point in time. Many of the key milestones were completed safely and on time. The Plant was started up in compliance with Interim operating requirements in October 2005. The project has been fully operational since early in 2006. There have been some delays, such as a delay in successfully completing high flow tests to demonstrate maximum system flow capacity, as well as minor operational glitches.

The net present value life cycle cost of the project is $27.2 million, which has been estimated to be $10 million less than the estimated cost of completing the plant by traditional methods (Partnerships BC, 2005: 7).

Britannia appears to represent a reasonably successful P3. Indeed, given the specialized technical requirements of the project, it is hard to conceive of this project being conducted in-house by government. On the other hand, this is the kind of project that has traditionally been contracted-out in one form or another.

Moncton Water Treatment Facility

In the 1990s, the City of Moncton needed a new water filtration plant. The City was unable to obtain provincial or federal funding and decided to go with a P3 (Brubaker, 2003: 3). In 1996, the City began a competitive bid process to select a firm to design, build, operate, and maintain a new water treatment facility. Three consortia submitted final proposals. In April 1998, Greater Moncton Water Ltd., a N.B.-incorporated company owned by USFilter Canada, Inc. (USF) (85%) and Hardman Group Limited (15%), was awarded the 20-year contract. USF had significant experience and expertise building and maintaining such plants, as it manages over 260 facilities across North America and is a subsidiary of Vivendi (Brubaker, 2002: 13).

USF contracted to build the plant within 500 days, lease the facility back to the city, and to maintain the facility. Moncton had an option to purchase the plant by requiring that USF pay the lease and licensing fees up front in an amount equal to the $23.1 million cost of the plant. Moncton has legal ownership of the facility, but pays USF $3,362,263 per year to cover lease costs, including capital costs (fixed at $223,417 per year), operating costs, capital repair, and replacement reserves. Moncton also pays for chemical costs, electricity and sludge handling, which brings the total annual payment to over $4 million (CUPE, 2001). USF provides a $15

million guarantee to the City. A repair and replacement program was built into the contract to ensure that the facility would be in good repair once returned to the city. User costs are determined by City council, except where related to factors outside of the control of either partner, such as the cost associated with sediment removal. The treatment facility must meet specified performance targets, which it has not yet failed to meet. USF assumed all construction and design risk associated with the project.

The water treatment plant construction was completed in 18 months. The cost of the facility represents $91 per residential unit per year, compared to the city's projected cost of $111 per residential unit per year. To date, there have been no complaints about the system. The water is high quality, but residents pay higher water fees than they were paying prior to 1999. Between 1995 and 1999, water fees increased by up to 7% on an annual basis. Between 1999 and 2000, however, water charges increased by 75%. Proponents argued, however, that the rate represent an 11.2%, savings to taxpayers, as the cost was expected to be $33 million if the facility had been built as a public sector initiative (City of Moncton, 2002). Moncton also claimed that the total costs of the water treatment plant would be $23.1 million compared to $32.8 million if the City had financed the plant, although the $32.8 million was based on a proposal to build a plant that would have had three times the water capacity of the one built. It is likely that significant savings were realized as a result of USF's Trident water filtration process, which allowed the company to reduce the facility's size by 40% (U.S. Water News, 1999).[2]

Cranbrook Multiplex

In the mid-1990s, Cranbrook decided that it needed a new recreational facility that included a hockey arena, swimming pools and other facilities (Cranbrook Rec Plex, 2002). The project was projected to cost over $20 million. The City decided on a P3 (Government of Canada, 2004). In a

1999 referendum on the P3, a narrow margin voted in favour. Cranbrook signed a 30-year design, build, finance, lease, operate and transfer agreement with KeenRose Technology Group (CUPE, June 2002). The contract stipulated that private financing rate was not to exceed 7.25% (Government of Canada, 2004). However, securing such financing proved to be difficult. After a three-month delay, Sunlife Financial Service and Pacific Insurance split the loan with KeenRose and construction began in October 1999. The City provided the land and leased back the aquatic centre for $800,000 per year. There was a variable revenue guarantee of $700,000, and the operator was guaranteed the first $142,000 of its costs. KeenRose assumed the risk associated with the operating costs of approximately $1.5 million and guaranteed the capital cost of the facility at $22.6 million. The following year, KeenRose was purchased by Cinergy Corporation, which formed a separate subsidiary, Vestar, to manage the complex (CUPE, May 2002).

Under the operations agreement, the city was allocated 1,500 hours per year of arena time, with the balance available to Vestar to sell at $125 per hour (Government of Canada, 2004). In 2001, the Mayor announced a further 10.9% tax increase linked to a $500,000 construction cost overrun at the multiplex. In October 2001, Vestar complained that its costs were higher than anticipated and its revenue lower. For example, revenues from concerts and special events were far below projections. Faced with Vestar's weak financial position, the city agreed to cover revenue shortfalls beyond $140,000 (CUPE, May 2002). In 2002, the City auditor decided to include the $22 million lease on the city's financial statements, resulting in a substantial decrease in the city's borrowing power.

After dealing with legal disputes, cost overruns and construction delays, five years after the project began, the P3 was terminated. Vestar withdrew in 2004 after paying the city $1.7 million to take ownership of the complex (Cloutier 2004). The complex proved to be much more costly

than projected and the City was not effectively able to protect itself against this eventuality through the use of a P3. Cranbrook found itself with the highest debt level in the province.

Waterloo Landfill Gas Power Plant

Waterloo Landfill has been owned and operated by the Regional Municipality of Waterloo (RMOW) since its opening in 1972. The landfill has the capacity to produce methane gas until the middle of the 21st century. A plan developed in 1993 included a landfill gas (LFG) utilization facility (Ontario Power Generation, 2001). The RMOW elected not to own or operate the facility, primarily due to a lack of relevant expertise. Following a RFP in 1995, RMOW awarded Toromont Energy the contract to design, build, own and operate the facility. Toromont provided the financing for design and construction ($7 million). In exchange, Toromont has the right to utilize the LFG for 22 years. There is an annual royalty to RMOW, based on the revenue from the sale of electricity to OPG. RMOW does not guarantee the supply of LFG. The contract requires that the facility is to be on-line 90% of the time that the RMOW is supplying LFG to the facility. If this guarantee is not met, Toromont must pay the RMOW an amount equivalent to the royalty that would have resulted if the plant had been running at 90% capacity.

Toromont was not able to sign the contract until 1997 due to difficulty in obtaining an agreement with Ontario Hydro on selling the energy to the power grid (Conestoga-Rovers & Associates, 2004). Construction began in December 1998 and the plant was operational in September 1999. Since the facility became fully operational, the system has been running 99% of the time (Conestoga-Rovers & Associates, 2004). It is expected that the royalties may grow to approximately $500,000 as greater amounts of LFG are collected. The project is expected to have a capital payback of less than ten years (Conestoga-Rovers & Associates, 2004). To date, no concerns have been reported with regard to the partnership. Since the facility is located on

leased crown land, it is unclear which of the two partners will retain ownership of the facility at the end of the contract.

Analysis of Canadian P3 Case Studies

Earlier, we argued that the major potential benefit of P3s derives from the private sector's ability to deliver projects at lower cost. However, we also pointed out that the appropriate test from a social perspective is whether P3s have lower total social costs, including production costs *and* all transaction costs and externalities associated with managing external suppliers (including construction). The case studies clearly indicate that the transaction costs associated with *ex ante* or *ex pos*t contracting often make it difficult for society to actually realize lower *total* costs.

It is useful to consider those factors that are likely to affect transaction costs and externalities. These factors are described in detail in Vining, Boardman and Poschmann (2006). Table 2 summarizes our assessment of the values of these transaction cost factors in each of the case studies. The factors are: the degree of asset specificity, construction complexity (essentially whether the project involved a standard production technology), construction cost risk transferred to the private partner, use risk uncertainty, use risk transferred to the private partner, contract management skills of the government partner, the extent to which externalities were imposed on third parties. The table also includes an estimate of the level of transaction costs in each P3 and an overall assessment of "success" as a P3.

****Insert Table 2 about here***

We review each transaction cost factor in turn. In practice, all of these projects have high asset specificity. Thus, the likelihood of hold-up was high in all of these projects. We next consider the construction (cost) side and then the use (revenue) side. Complexity refers to the difficulty of the project itself (e.g. whether it requires a new technology) and to the measurement

of performance outcomes (e.g. whether construction was performed according to specifications). In infrastructure P3s, complexity pertains primarily to construction complexity. None of the projects studied here were unique (i.e., especially different from previous projects), and quality was reasonably straightforward to monitor and measure. Thus, no project was highly complex. The school and building construction projects were low in complexity, while the highway projects, the bridge, and the water treatment plants were moderately complex. One might, therefore, expect that the public sector would be able to transfer all of the construction risk to the private sector, but this did not occur in two of the case studies. In the Alberta Special Waste Management System, the government retained some construction cost risk due to poor contract management skills. In the Cranbrook Multiplex case, the government ended up paying for cost overruns, presumably because of a combination of poor contract management skills and changes in political costs.

Consideration of revenue risk is more complicated. While most of these projects appear to have been relatively predictable from a construction cost perspective, they were highly uncertain from a usage, and consequently, revenue perspective. Part of government's motivation for P3s has certainly been to transfer this risk to the private sector. However, it is not clear that the private sector is any more willing or able to accept this risk than the public sector. Also, the operating risk may be higher for the private sector than for government. This is because it is relatively easy for the government to affect usage, either positively or negatively. For example, the government compelled large trucks to use Highway 104, thereby helping its partner. But government can hurt its private sector "partner".

Given that the private sector is not keen to take on revenue risk, it is not surprising that government has been unsuccessful in transferring this risk. While this is summarized in table 2, it

is shown in more detail in Figure 1; it shows that the higher the revenue uncertainty (on the vertical axis), the lower the actual transfer of risk to the private sector (the horizontal axis). For example, the government was able to transfer most of the risk to the private sector for the Evergreen Park School and the Waterloo Landfill Gas Power plant, but the level of revenue uncertainty in both of these projects was low. Where the level of revenue uncertainty is high, as in the two highway projects and the confederation bridge, the private sector will simply not take on revenue risk. The two projects in the middle of Figure 1 (Alberta Waste Management and Moncton Water treatment) have medium uncertainty and some risk transfer. There is a tendency, therefore, for projects to lie close to a line running from the top left hand part of the diagram to the bottom right. According to this view, the two outliers are Britannia Mine and O'Connell Drive School. The Britannia mine is in relatively early days and we do not yet have full information about this project. The O'Connell Drive school project clearly had poor contract management.

****Insert Figure 1 about here***

The three projects with the highest use uncertainty (those in the top left hand corner) also happen to be the largest projects, as indicated by the size of the "circles". The private sector may be especially unwilling to take on revenue risk when projects are large.

Transactions costs are likely to be high when asset specificity is high, construction complexity is high, revenue uncertainty is high and contract management effectiveness is poor. This is exacerbated when, in addition, government tries to transfer construction cost risk and operating revenue risk. It appears that problems are compounded and transactions costs are high if the construction risks and revenue risks are high *and* these costs are transferred to the private sector.

The Alberta Special Waste Management example exhibited high transactions costs. These came about because asset specificity was high, complexity was moderate, use uncertainty was moderate and contract management was poor. These factors, combined with attempts to pass on some but not all of the construction risk and use risk, led to negative externalities and high transactions costs. It is a clear failure from a social perspective. The Confederation Bridge was of high asset specificity, moderate complexity and high use risk. Thus, there was the potential for high transaction costs. However, contract management effectiveness was fairly good and while the construction risk was transferred to the private sector, the use risk was not. As a result, the transaction costs were moderate and this project can be considered a qualified success. Highway 407 had high asset specificity, moderate complexity and high use uncertainty; consequently, like the Confederation Bridge, it potentially had high transaction costs. In this case, contract management effectiveness was also poor. The result was significant negative impacts on users of the highway and adjacent highways which led to high transaction costs. Although the production costs were reasonable, the negative externalities and high transaction costs lead us to conclude that this project was "poor" from a social perspective.

Conclusion

Some of reasons why governments are drawn to P3s clearly have some validity—especially lower construction costs. However, even if valid, it is important to emphasize that from a social perspective the key issue is whether the total cost, including production costs and all contracting costs, is lower for the P3 than the total cost of government provision. To investigate this issue we developed a positive theory perspective of P3s, based primarily on analysis of partners' goals and transaction cost economics. We then partially tested this theory on ten Canadian infrastructure P3s -- all those for which we could gather reasonable information from secondary

sources. The evidence suggests that the benefits are often outweighed by contract costs and externalities. The reality that "there are no free lunches" applies to P3s as much as it does to anything else.

One note of caution is that our analysis is based on the availability of public information, whether in journals, newspapers or on the Internet. Conflict and problems are inherently more newsworthy than cooperation and everyday delivery of services; thus, we cannot claim that this is an unbiased sample of P3s. However, it does include all P3s for which we could draw upon reasonably independent information.

Our analysis of the Canadian P3 evidence indicates that the willingness of private sector firms to bear user risk declines with the level of user risk. Private sector firms will not participate in a P3 if it bears cost risk and large revenue risk. Thus, it is not surprising that emerging case study evidence from the U.K. (Asenova and Beck, 2003; Edwards and Shaoul, 2003) and Australia (English and Guthrie, 2003) have found that governments have not been particularly successful at shifting risk to private sector partners. Nor is it surprising that contract negotiations associated with attempts to shift risk were extremely costly (Li, 2003).

Our analysis suggests that in a sense effective P3s are not P3s! Private sector participation in a project makes the most sense when the private sector bears cost risks, but not revenue risks. In such circumstances, there is not that much difference between such a project and what has traditionally been described as a construction contract or a "build-operate-transfer" contract. While the private sector often has cost advantages over the private sector for the construction part of the contract, they may not have cost advantages for the operating part of the contract. Indeed, during the operating phase, the private sector is more likely to face opportunistic behavior from its partner (the government) than would government itself face if it operated the

project. Thus, we suggest limiting the scope of future P3 contracts. Of course, if the private sector partner is being compensated for risk, public sector managers must *then ensure that they actually bear it*.

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Table 1: Major Canadian P3 Projects

Project	Start Year	Term	Design	Build/ Buy/ Lease	Operate	Finance	Contract Size	Public Partner	Private Partner
Abbotsford Regional Hospital and Cancer Center [1, 2]	2004	30 years	Y	Y	Y	Y	$ 355 million plus $40.6 million/year	Ministry of Health, Fraser Health, Provincial Health Services, BC Cancer Agency, Fraser Valley Regional Hospital, Partnerships BC	Access Health Abbotsford Ltd.
Aurora College Family Student Housing [3]	2000	20 years	Y	Y	Y	Y	$4.7 million plus $745,000/year	NWT Provincial Government	Aurora Building Developers
Brampton Centre for Sports & Entertainment (PowerAde Centre) [4]	1997	34 years	Y	Y	Y	Y	$26.5 million plus $230,000/year	City of Brampton	Realstar & Edilcan Groups (Brampton Sports Centre Inc.)
Britannia Mine Water Treatment Plant [5, 6]	2005	21 years	Y	Y	Y	Y	$27.2 million	Province of British Columbia	EPCOR Water Services
Centracare Psychiatric Care Facility [4]	1997	25 years		Y	Y	Y	$6.5 million	Province of New Brunswick	Pomerleau Inc. & Cardinal Construction Inc.
Charleswood Bridge [4]	1995	30 years	Y	Y	Y	Y	$15 million	City of Winnipeg	DBF Ltd.
Cobequid Pass [7]	1997	30 years	Y	Y	Y	Y	$113 million	Province of Nova Scotia	Highway 104 Western Alignment Corporation
Confederation Bridge [4]	1997	30 years	Y	Y	Y	Y	$730 million	Government of Canada	Strait Crossing Development Inc
Cranbrook Recreational Complex [3, 4]	1999	30 years	Y	Y	Y	Y	$22.6 million plus $801, 000/year	City Of Cranbrook	Vestar Inc.
Evergreen Park School [8]	1995	25 years	Y	Y	Y	Y	$14.8 million	Province of New Brunswick	Greenarm Corporation
Goderich Harbour Revitalization [4]	1996	15 years		Y	Y	Y	$650000 plus $1.4 million annual trust fund	Town of Goderich	Sifto Canada Ltd.
Guelph Sports & Entertainment Complex [4, 9]	1998	35 years	Y	Y	Y	Y	$21 million	City of Guelph	Nustadia Developments (Recreation) Inc.
Halifax Harbor Solutions [10]	2004	30 years	Y	Y	Y	Y	$133 million	Government of Canada, Province of Nova Scotia	Harbour Solutions Consortium
Hamilton-Wentworth Water & Wastewater [11]	1999	5 years	Y	Y	Y	Y	$7.5 million	City of Hamilton	Azurix
Highway 407 [4]	1999	99 years	Y	Lease	Y	Y	$3.1 billion	Province of Ontario	407 International Inc.
Moncton Water Treatment [4]	2005	20 years	Y	Y	Y	Y	$85 million	City of Moncton	US Filter Canada
O'Connell Drive Elementary School [4, 11]	1994	35 years	Y	Y	Y	Y	$8 million plus $59,000/month	Province of Nova Scotia	Nova Learning Inc.
Ottawa Superdome [12]	2003	25 years	Y	Y	Y	Y (Shared)	$3.5 million	City of Ottawa	Thunderbird Management Services Inc.
RAV Line/Canada Line [13, 14]	2005	35 years	Y	Y	Y	Y	$1.8 billion	Greater Vancouver Transportation Authority, Govt. of Canada, Province of BC, YVRAA	Intransit BC
Royal Ottawa Hospital [11, 15]	2004	23 years	Y	Y	Y	Y	$120 million	Province of Ontario	The Healthcare Infrastructure Company of Canada
Sarnia Sports and Entertainment Facility [4]	1997	20 years	Y	Y	Y	Y	$15.9 million	City of Sarnia	Nustadia Developments Inc.
The Secure Channel [16]	2001	5 years	Y	Y	Y	Y	$57 million	Government of Canada	Team BCE
Toronto Union Station Revitalization [17]	2003	100 years	Y	Restore	Y	Y	$5 million	City of Toronto	The Union Pearson Group Inc.
Waterloo Landfill Gas Power Plant [18, 19]	1998	22 years	Y	Y	Y	Y	$7.5 million	Regional Municipality of Waterloo	Toromont Energy
William Osler Health Centre 20	2001	25 years	Y	Y	Y	Y	$550 million	Province of Ontario	The Healthcare Infrastructure Company of Canada

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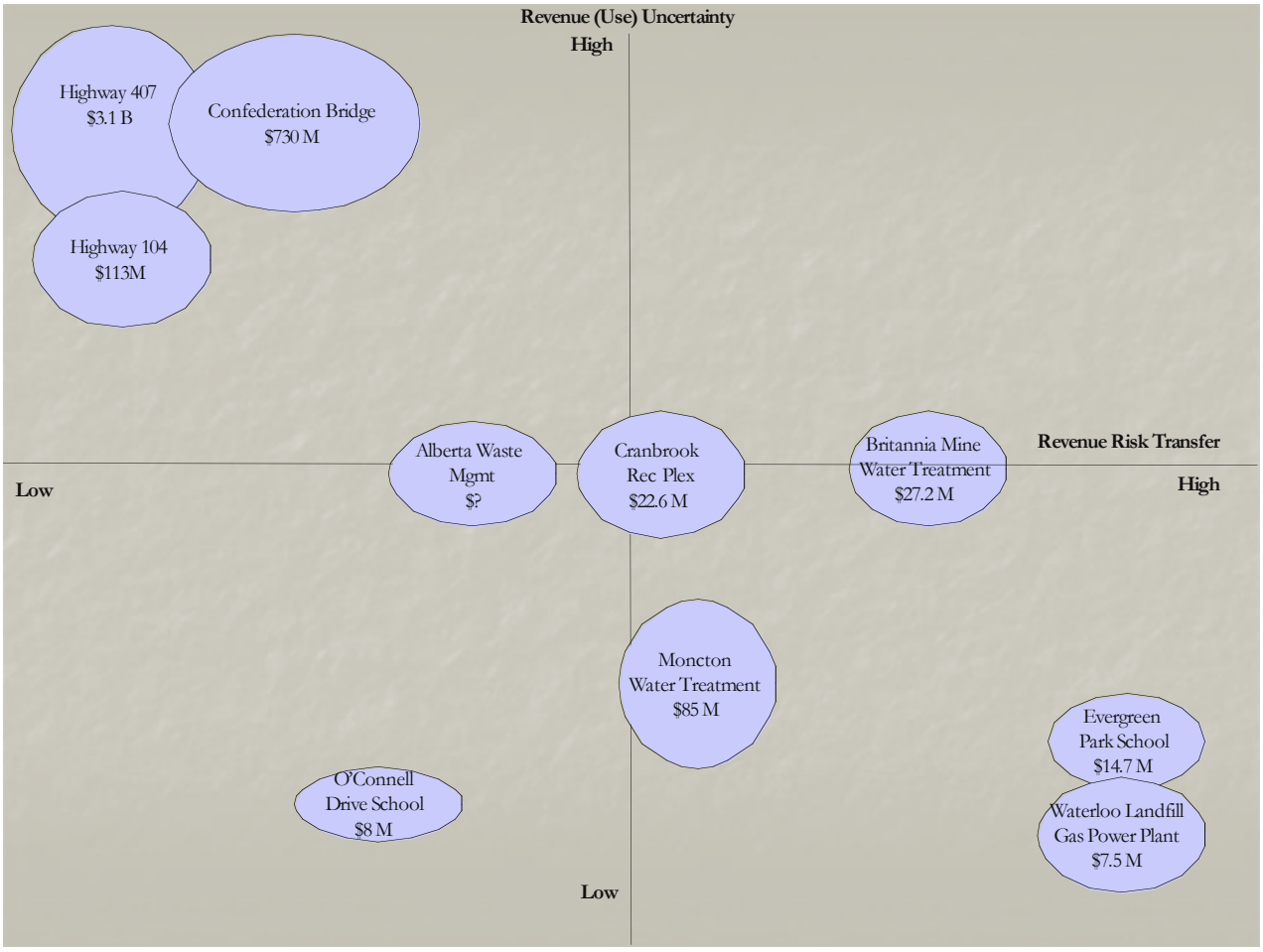
Table 2: Key Factors in Assessing P3 Case Studies

Project P3	Asset Specificity	Construction Complexity	Cost Risk Transferred	Use (Revenue) Uncertainty	Use Risk Transferred	Gov. Contract Management Skills	Externalities or other Negative Events	Transaction Costs	S
Alberta Special Waste Management System	Yes	Moderate	Partially	Moderate	Not for first 10 years	Poor	Yes	High	
The Confederation Bridge	Yes	Moderate	Yes	High	Small (revenue guarantees)	Fair		Moderate	(
Highway 407	Yes	Moderate	Yes	High	No	Poor	Yes	High	
Highway 104	Yes	Moderate	Yes	High-Moderate	No	Fair	Toll level problems	Moderate	(
Evergreen Park School	Yes	Low	Yes	Low	Yes	Fair		Moderate	
O'Connell Drive Elementary School	Yes	Low	Yes, but costs high	Low	No	Poor	High	High	
Britannia Mine Water Treatment Plant	Yes	Moderate	Yes	Moderate	Yes	Good		Low	
Moncton Water Treatment Facility	Yes	Moderate	Yes	Low	Partially	Good		Low	
Cranbrook Multiplex	Yes	Low	No, in effect	Moderate	Partially	Fair-Poor		High	
Waterloo Landfill Gas Power Plant	Yes	Low	Yes	Low	Yes	Good		Average	

Figure 1: Revenue Uncertainty and Effective Revenue Risk Transfer



Notes

[1] Governments cannot borrow infinite amounts of capital without affecting their credit rating. Raising funds for a P3 project may raise the cost borrowing for subsequent projects. Such costs should be included in the "full" cost of the P3.

[2] After winning the contract for the water treatment plant, USF offered to take over the entire water distribution system. The proposed deal would have given USF a 20-year contract to operate and maintain the water distribution system and the wastewater and storm water systems. The union and the public raised strong opposition to the deal when the details were leaked (CUPE, May 2002). Provincial officials argued the project violated the Public Purchasing Act, which requires municipalities to issue RFPs for major infrastructure projects (CUPE, 2002). In March 2002, city council voted against the deal.