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Public-private partnerships in Canada: Theory and evidence

Abstract: This article develops some theory on and examines the implementation and performance of Canadian public-private partnerships (P3s). It focuses primarily on infrastructure projects and addresses three questions: 1) What goals do governments expect to achieve through P3s? 2) How effective are P3s likely to be at delivering value to governments and citizens? 3) What lessons can be derived from the use of P3s? The article reviews the government's intended social goals for P3s and evaluates how effective P3s have been in fulfilling them. It then formulates a more comprehensive framework and outlines a ''positive theory'' perspective of P3s that takes into account the divergent goals of the partners – profit maximization goals of private-sector participants and the political goals of the public sector. The article evaluates and summarizes the findings and implications of ten Canadian P3s. The appropriate test of success, from a social (normative) perspective, is whether P3s have lower total social costs, including production costs *and* all of the transaction costs and externalities associated with the project. The ten case studies indicate that the potential benefits of P3s are often outweighed by high contracting costs due to opportunism generated by goal conflict. 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 risk to the private sector.

Sommaire: Le présent article élabore une théorie et examine la mise en œuvre et la performance de partenariats des secteurs public/privé canadiens (P3). Il se penche essentiellement sur des projets d'infrastructure et aborde quatre questions : 1) quels objectifs les gouvernements prévoient-ils atteindre en ayant recours aux P3 ? 2) Dans quelle mesure les P3 seront efficaces à fournir de la valeur aux gouvernements et aux

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citoyens ? 3) Quelles leçons peut-on tirer des P3? L'article passe en revue les justifications normatives avancées par le gouvernement pour les P3 et examine leur efficacité. Ensuite, il formule un cadre normatif plus exhaustif. Puis, il présente les grandes lignes d'une perspective de « théorie positive » des P3 en tenant compte des objectifs divergents des partenaires : à savoir, les objectifs de maximisation des profits pour les participants du secteur privé et les objectifs politiques du secteur public. Par la suite, l'article passe en revue et évalue dix études de cas de P3 canadiens. Le test du succès, selon une perspective (normative) sociale, consiste à déterminer si les P3 ont des coûts sociaux totaux inférieurs, y compris les coûts de production, *et* tous les coûts de transactions et coûts externes associés au projet. Les dix études de cas indiquent que les avantages potentiels des P3 sont souvent surpassés par les frais élevés de passation de contrats dûs à l'opportunisme généré par les conflits en matière d'objectifs. Ces coûts sont particulièrement élevés lorsque la complexité de la construction ou de l'exploitation est élevée et que l'incertitude des revenus (le risque d'utilisation) est forte, que ces deux risques ont été transférés au partenaire du secteur privé, et que l'efficacité de la gestion du contrat est médiocre. Dans les projets d'infrastructure, il est souvent absurde d'essayer de transférer de grands montants de risque d'utilisation au secteur privé.

This article examines the emerging issues regarding the implementation and performance of public-private partnerships (P3s) in Canada, focusing primarily on infrastructure projects. A number of projects with P3 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, there are three important questions for potential initiating governments: 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,[1] Ireland,[2] the Netherlands,[3] Denmark[4] and Australia.[5]

The article first reviews posited government rationales for P3s. Second, we propose a ''positive theory'' perspective on P3s 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, we review and evaluate ten Canadian P3s in light of this positive theory perspective. Finally, we synthesize and summarize this evidence.

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 re-negotiating) P3s, government has often failed to achieve significant risk transfer, especially that which is related to use-risk.

Use-risk is usually, but not always, equivalent to revenue risk. Additionally, we find that 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, re-negotiation and termination costs. These costs may be borne by government, by the private sector, or both. But, no matter by whom these costs are borne, they represent real social costs that must be considered in assessing the benefits of P3s.

The case-study findings on which we report are generally consistent with the positive theory perspective outlined below. They suggest that Canadian governments have sometimes 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, since they have usually had incentives to publicly emphasize losses, or potential losses, and to be secretive about profits. One surprising occurrence is the dissolution of the P3 more quickly than envisioned in the original contract, through government buy-outs, re-design 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.

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

Our findings throw into doubt the social desirability 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-risk 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. These circumstances are close to traditional ''design-build-transfer'' or ''build-transfer'' contracts. Government must either recognize that P3s should be limited to projects that meet these conditions or they must do much better at reducing the potential for high transaction costs in contract

design. Ideally, this means writing contracts that bind their own future behaviour as well as that of private-sector participants.

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.[6] Close linkages between the public and private sectors reemerged 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 labelled as infrastructure, especially in transportation and in water and wastewater treatment.

Governments have articulated three major rationales for engaging in P3s.[7] The first rationale 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.[8] 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.[9] 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 inter-generational 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.[10] The situation in Canada can be contrasted with that in the U.S., where there is a well-developed municipal bond market.[11] However, these versions of the financing advantage 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 but 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 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.[12] 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.[13] Also, the private sector may also have lower wage costs, possibly due to hiring non-union labour.[14] A final strand of this argument that focuses on the public sector is that monopoly public-sector bureaucracies are particularly prone to technical or X-inefficiency.

While the language of partnership is endemic to P3s, our premise is that the public and private participants have conflicting goals and that this divergence is likely to raise transaction costs and externalities

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.[15] 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 similar projects simultaneously and can, therefore, spread the

risk of a particular project among a number of similar projects, although governments may have more ability to spread risks over a larger number of projects in total.[16] Either way, however, this is not a strong normative justification for P3s, since it does not reduce risk *per se*; it only transfers and spreads risk 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 affect 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" (PFIs) in the U.K.[17] From a normative perspective, the key question is this: 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, since 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, Oliver Williamson and others have emphasized that such a criterion ignores transaction costs.[18] 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 project costs are usually excluded from the project budget, 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. Steven Globerman and Aidan Vining suggest that ultimately the effectiveness and desirability of P3s and related instruments depend 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.[19] This criterion has a strong normative rationale and has been used to evaluate the privatization of state-owned enterprises.[20] 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. Following Williamson, but recognizing the importance of externalities and quality differences, Anthony Boardman and Erica Hewitt argue that governments should minimize the sum of total social costs defined as production costs incurred by government

or paid to third parties, plus transaction costs, plus (net) negative externalities, holding quality constant.[21] 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 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 reduce 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. However, Jean-Etienne de Bettignies and Thomas Ross convincingly argue that governments are generally not able to borrow at a lower cost than the private sector.[22] Furthermore, some governments are now providing equivalent tax-exempt status to P3s, further levelling the playing field on the financing dimension (from a social efficiency perspective, of course, taxes are primarily transfers).

A positive theory perspective: incorporating partners' objectives and transaction costs

This section sketches a positive theory perspective that attempts to throw light on both the adoption and evaluation of P3s: "The primary concern of [positive] perspectives is . . . explanation and prediction, not . . . evaluation and improvement."[23] It is presented as a "perspective" rather than a fully articulated theory because our purpose is narrower than a full theory. We draw on positive theory to explain at least some aspects of P3 outcomes that normative theory does not. However, it is important to emphasize that this positive perspective is not necessarily antithetical to normative theory (therefore the use of the word "primarily"). We follow Joseph Cordes, 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."[24]

Above, we argued that, normatively, governments should seek to minimize the sum of total social costs: namely, production costs plus transaction costs plus (net) negative externalities, holding quality constant. 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'' in a P3.

While the language of partnership is endemic to P3s, our premise is that the public and private participants have conflicting goals[25] and that this divergence is likely to raise transaction costs and externalities. Studies have shown that in other inter-organizational contexts with conflicting goals the result is high contract bargaining costs, opportunistic behaviour by one or both sides, failure to achieve goals, and partnership dissolution. For example, firms that are jointly owned by private shareholders and government can lead to ''the worst of both worlds,'' achieving neither high profitability nor worthwhile social goals.[26] Contracting-out by government is also prone to the risk of hold-up and high bargaining costs.[27] Even private-sector joint ventures, where both partners have profit goals, also experience high conflict, extensive opportunism and high failure rates.[28]

Private-sector participants wish to *maximize risk-adjusted profits over the contract life*. The public sector wishes to *minimize the sum of the current government's expected short-term expenditures, on-the-budget expenditures and political costs*. The details in these objective functions are important, because they foreshadow the reasons for conflict and high transaction costs, both before and after, contract agreement in P3s. We now consider each objective function in more detail.

Private-sector objective function

Private-sector participants wish to maximize profits *over the contract life*. The point we emphasize here is that profit maximization is not a one-period phenomenon: if private-sector actors find new profit opportunities as the contract unfolds, they will seek to capture them. Of course, if contracts are written very tightly, they will have little 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 many contract renegotiation efforts as opportunistic.) It seems to be a particular problem if the private-sector partner changes ownership, perhaps because new owners are less bound by tacit ''understandings.''

Additionally, private-sector participants are *risk-adjusted* profit maximizers: 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 participants require high premiums to accept risk, especially the various dimensions of use-risk (also often called revenue or demand risk). Many private partners are relatively unfamiliar with the particular use-risks asso-

ciated with government projects. This is less true with global firms that specialize in P3-type projects. But, as a corollary, these firms are more aware that they often have little control over many of the factors that drive demand. 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 the political partners. Of course, the private sector will formally accept use-risk if the premium is high enough, just as we 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 variable labour-and-materials 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,[29] thereby reducing their worst-case costs by declaring the stand-alone corporation bankrupt, if necessary, and/or 2) limit their capital exposure through the utilization of extensive third-party debt-financing.[30]

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.[31] 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 to minimize the sum of current government expected short-term expenditures, on-the-books expenditures and political costs. This implies that governments 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 they are with the political benefits that result from the minimization of both present expenditures and on-budget expenditures.[32] This explicitly introduces a public choice overlay to transaction costs,[33] because, in general, vote-maximizing behaviour by politicians raises transaction costs and, therefore, aggregate social costs.

Governments normally prefer off-budget expenditures to on-budget expenditures, because voters receive infrastructure benefits, but are less likely to perceive the costs, a form of fiscal illusion. Furthermore, this objective function focuses on the goals of the *current* government. Holding all else

constant, a current government prefers future expenditures that appear in future budgets (with potentially different politicians) to present expenditures. While we would argue that this is a fairly pervasive preference, current governments' discount rates do vary – a government that expects to stay in power over several electoral cycles will weight the cost of future expenditures more heavily. But, in sum, again holding everything else constant, a current government prefers infrastructure delivery mechanisms that involve future expenditures *and* off-budget expenditures.

When considering P3s, government must trade-off the political benefits that ''future and off-budget'' expenditures generate against other political costs and benefits. Other political costs could relate to eventual public dissatisfaction with subsequent private-sector ''gouging,'' poor service, high user-prices or whatever. The objective function focuses on the *expected* costs for the *current* government. The governments', especially politicians', expenditure-costs versus political-costs equation can change unpredictably. 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). Additionally, future political costs do not have high saliency for current politicians. If they do arise, however, they have high saliency for the new cohort of politicians. When they arise, the private-sector participant may be able to ''hold up'' government and extract additional payments of various kinds because governments (especially elected politicians subject to voter discontent) often panic when faced with rising political costs. Rising user-fees most often provoke voter discontent.

The drivers of transaction costs in P3s

The fact that the goals of public and private participants are in conflict is not surprising. Still, if the potential gains from trade (i.e., ''doing business'') 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 transaction costs of utilizing the P3 format to deliver these projects.

Transaction costs in P3s are likely to be high because almost all infrastructure projects present relatively complex contracting situations. Indeed, one can think of P3s as simply government contracting-out, but 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.[34] Public-sector infrastructure – such as roads, hospitals and schools – usually involves considerable

asset specificity. Most design work for a particular project is not usable 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 each is 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 even 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.[35] 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 contracts, the dollar value of the contracts, and the public-sector 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.

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 previously by Anthony Boardman, Finn Poschmann and Aidan Vining[36] 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. The case studies examined are as follows: Alberta Special Waste Management System (Alberta), Confederation Bridge (Federal), Highway 407 Express Toll Route (Ontario), Highway 104 Western Alignment Project (Nova Scotia), Evergreen Park School (New Brunswick), O'Connell Drive

Table 1. *Major Canadian P3 Projects*

Project	*Start year*	*Term (years)*	*Design*	*Build/ Buy/ Lease*	*Operate*	*Finance*	*Contract size*	*Public Partner*	*Private Partner*
Abbotsford Regional Hospital and Cancer Centre	2004	30	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	2000	20	Y	Y	Y	Y	$4.7 million plus $745,000/year	NWT Provincial Government	Aurora Building Developers
Brampton Centre for Sports & Entertainment (PowerAde Centre)	1997	34	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	2005	21	Y	Y	Y	Y	$27.2 million	Province of British Columbia	EPCOR Water Services
Centracare Psychiatric Care Facility	1997	25		Y	Y	Y	$6.5 million	Province of New Brunswick	Pomerleau Inc. & Cardinal Construction Inc.
Charleswood Bridge	1995	30	Y	Y	Y	Y	$15 million	City of Winnipeg	DBF Ltd.
Highway 104 Western Alignment Project (Cobequid Pass)	1997	30	Y	Y	Y	Y	$113 million	Province of Nova Scotia	Highway 104 Western Alignment Corporation
Confederation Bridge	1997	30	Y	Y	Y	Y	$730 million	Government of Canada	Strait Crossing Development Inc.
Cranbrook Civic Arena Multiplex	1999	30	Y	Y	Y	Y	$22.6 million plus $801,000/year	City of Cranbrook	Vestar Inc.

Table 1. (*Continued*)

Evergreen Park School	1995	25	Y	Y	Y	Y	$14.8 million	Province of New Brunswick	Greenarm Corporation
Goderich Harbour Revitalization	1996	15		Y	Y	Y	$650,000 plus $1.4 million annual trust fund	Town of Goderich	Sifto Canada Ltd.
Guelph Sports & Entertainment Complex	1998	35	Y	Y	Y	Y	$21 million	City of Guelph	Nustadia Developments (Recreation) Inc.
Halifax Harbour Solutions	2004	30	Y	Y	Y	Y	$133 million	Government of Canada, Province of Nova Scotia	Harbour Solutions Consortium
Hamilton-Wentworth Water & Wastewater	1999	5	Y	Y	Y	Y	$7.5 million	City of Hamilton	Azurix
Highway 407 ETR	1999	99	Y	Lease	Y	Y	$3.1 billion	Province of Ontario	407 International Inc.
Moncton Water Treatment Facility	2005	20	Y	Y	Y	Y	$85 million	City of Moncton	USFilter Canada
O'Connell Drive Elementary School	1994	35	Y	Y	Y	Y	$8 million plus $59,000/month	Province of Nova Scotia	Nova Learning Inc.
Ottawa Superdome	2003	25	Y	Y	Y	Y (Shared)	$3.5 million	City of Ottawa	Thunderbird Mgmt. Services Inc.
RAV Line/Canada Line	2005	35	Y	Y	Y	Y	$1.8 billion	Greater Vancouver Transportation Authority, Govt. of	Intransit BC

Table 1. (*Continued*)

Project	*Start year*	*Term (years)*	*Design*	*Build/ Buy/ Lease*	*Operate*	*Finance*	*Contract size*	*Public Partner*	*Private Partner*
Royal Ottawa Hospital	2004	23	Y	Y	Y	Y	$120 million	Canada, Province of BC, YVRAA Province of Ontario	The Healthcare Infrastructure Company of Canada
Sarnia Sports and Entertainment Facility	1997	20	Y	Y	Y	Y	$15.9 million	City of Sarnia	Nustadia Developments Inc.
The Secure Channel	2001	5	Y	Y	Y	Y	$57 million	Government of Canada	Team BCE
Toronto Union Station Revitalization	2003	100	Y	Restore	Y	Y	$5 million	City of Toronto	The Union Pearson Group Inc.
Waterloo Landfill Gas Power Plant	1998	22	Y	Y	Y	Y	$7.5 million	Regional Municipality of Waterloo	Toromont Energy
William Osler Health Centre	2001	25	Y	Y	Y	Y	$550 million	Province of Ontario	The Healthcare Infrastructure Company of Canada

Elementary School (Nova Scotia), Britannia Mine Water Treatment Plant (British Columbia), Moncton Water Treatment Facility (New Brunswick), Cranbrook Civic Arena (British Columbia), and Waterloo Landfill Gas Power Plant (Ontario).

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 forty-per-cent owned by a provincial Crown corporation and sixty per cent by a private firm (BOVAR Inc.). The private firm invested $30 million (sixty per cent of the plant's $50 million cost) and was to collect sixty per cent 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 three per cent over the current prime rate, depreciated at ten per cent per year for ten years, regardless of the profitability of the venture.[37] 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 between $30 and $57 million.[38]

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.[39] However, the plant has operated at about only fifty per cent 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.[40]

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 multiple environmental infractions. 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. 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.[41] In 2003, the government signed a ten-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.[42] In this P3, there was no effective transfer of risk during the first ten 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.

Confederation Bridge

Prince Edward Island joined federation under a constitutional agreement that guaranteed ferry service in perpetuity.[43] 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 (''build-operate-transfer'') 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. Strait Crossing Development Inc. was entitled to the toll revenues for thirty-five 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. However, the federal government provided a guarantee for these bonds. Strait Crossing Finance Inc. initially took on most of the construction and operational risk, as well as toll revenue risk beyond the guarantee. Strait Crossing Development Inc. 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 seventy-five per cent 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-per-cent interest rate, at a time when similar federal issues were priced at 4.1 per cent. Strait Crossing Finance Inc. also paid a sales commission of 1.75 per cent, compared to a rate of 0.6 per cent 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.[44] It is difficult to escape the conclusion that the P3 was chosen primarily to achieve off-balance sheet financing.

Highway 407 Express Toll Route (ETR)

Highway 407 is a 108-kilometre highway across the north of Metropolitan Toronto. The request for proposals (RFP) was announced in 1993, when the Province of Ontario was emerging from a recession that had left it in an extremely weak financial position.[45] 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 seventy-five basis points more for debt-financing than would the province.[46] 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.[47] The deal included a ninety-nine-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.

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 per cent 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.[48] 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.[49] The toll increases dampened Highway 407 volumes, resulting in

congestion on adjacent roads. In February 2004, the government took legal action against Highway 407 Express Toll Route (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.[50] After two unsuccessful legal attempts to have the contract re-drawn, 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 fifteen per cent for 100,000 frequent users over the next four years and providing discounts for truck drivers during evenings 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 was scheduled for 2007.[51]

Highway 407 was constructed quickly, without major cost overruns and now generates approximately 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.[52] However, some of these savings were not realized because design changes were instituted before the highway opened. These changes were paid for by Ontario, since 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.[53] The concerns stemmed from issues such as conversion of dual exit lanes to a single exit lane and the use of asphalt paving rather than concrete.[54]

The initial 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 operators, not surprisingly, have 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 Joan Price Boase, regard it as a P3 failure.[55] Chandran Mylvaganam and Sandford Borins present a more charitable, mixed assessment.[56]

Highway 104 Western Alignment Project

Highway 104 (Cobequid Pass) is a forty-five-kilometre toll highway through the Cobequid Mountains in northern Nova Scotia. It was built to replace a congested portion of the Trans Canada Highway that had claimed the lives

of fifty people over a ten-year period. 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 (104 WAC) 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.[57]

Atlantic Highways Management Corporation received a management fee to cover the cost of operations, while 104 WAC was responsible for the financing and oversight of the design, construction, and operation of the highway. The only source of revenue for 104 WAC was to be from tolls for thirty years. The financing included $121 million for construction, operations and maintenance costs. Private-sector bondholders provided $61 million; the federal and provincial governments provided $27.5 million each; and Sydney Steel Corporation pension fund invested $5 million in subordinated notes.[58] The highway was designed and completed in 1997, in less than twenty months. Although 104 WAC was to be responsible for traffic shortfalls, in fact, ''traffic . . . has exceeded all expectations.''[59] 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.''[60] In 1999, the Conservatives won the provincial election, and the premier-elect claimed that he would ''love'' to eliminate tolls completely.[61] Although the new government did not in fact eliminate tolls, it has ''negotiated'' with 104 WAC to ameliorate previously scheduled toll increases, following intense pressure from the N.S. Trucker's Association to do so.[62]

The auditor general of Nova Scotia argued that the highway project did deliver some benefits to the province and 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 auditor general 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 Highway 104 is usually described as a P3, the main ''private partner'' – 104 WAC – is actually a government entity; so much so that the auditor general argued that its debt should be regarded as provincial debt. Given that it is a government entity, it not surprising that 104 WAC agreed to give up previously mandated toll increases. In December 2005, 104 WAC signed an agreement with the province giving it discretion to hold back future toll increases. Furthermore, 104 WAC 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.''[63] 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 104 WAC 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, the Government of New Brunswick decided to structure the Evergreen Park School project as a P3. In 1995, Greenarm Corporation of Fredericton was selected to negotiate a final agreement.[64] Greenarm formed a separate subsidiary, named Greenarm Schools Ltd., to manage the project. The contract included a twenty-five-year lease-purchase arrangement, with an option to purchase at that time for $2.5 million, renew the lease for a further ten-year term or walk away.[65] 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 cent per annum.[66] 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.[67] 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, New Brunswick 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 auditor general, however, argued that the province's capital costs would have been closer to $9.2 million.[68] He argued the two modes of operations would yield the same costs in aggregate.[69] The province had included transaction costs associated with administering the P3 in projecting its costs, which the auditor general argued were not incremental. Also, he claimed that although the province had projected its cleaning labour costs under an assumption that it would use the local union, the province was under no obligation to do so for a new school.[70] 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.[71]

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 Elementary School was opened in 1997. It was a pilot for thirty-nine schools that were to be built under Nova Scotia's P3 program for school development. The developer, Nova Learning Inc., purchased the land from the province and leased it to Canapen Limited, a pension fund, for twenty years. Canapen constructed the building and purchased the equipment. In 1998, the province and Canapen entered into a twenty-year lease for the facility, for an annual payment of approximately $700,000.[72] 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 fifteen per cent of expenses.[73] The province is responsible for costs incurred from operations, as well as repairs and capital improvements.[74]

The private partners' combined purchase price was approximately $8 million,[75] roughly the same amount it would have cost the province to finance the school with provincial debt.[76] 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. auditor general estimates that the present value of this amount is $1.1 million) or 2) renews the lease for up to two five-year terms at an amount that will amortize the $3,950,000 (plus interest) over ten years.

The extent of risk transfer in the agreement was quite limited. Nova will have recovered almost all of its initial investment if the N.S. government walks away after twenty years and it will still own the land and buildings.[77] The province retains the usage risk for twenty 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.[78] As in the Evergreen case, Nova retains the right to use the schools after hours, on weekends and during summers for programs, such as technology-related training courses.[79]

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.[80]

Ultimately, the provincial auditor general argued that the lease should be recorded as a capital lease and the liabilities recorded as a provincial debt and 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.[81] 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. In 2000, the Nova Scotia government bowed to political pressure and abandoned school P3s. The thirty-eight P3 schools that were built cost $32 million more than projected.[82]

In these P3s, the degree of risk transfer was minimal. Transaction costs also appear to have been high. While it is difficult to decisively conclude that there were no construction cost-savings (an appropriate counterfactual on direct government procurement would necessarily be speculative), it is certainly unlikely there 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 forty-eight kilometres north of Vancouver, on Howe Sound. Mining over many years had resulted in acid rock drainage into the sound and heavy-metal pollution.[83] In 2001, the Government of British Columbia entered into an agreement with the former mine operators whereby they contributed $30 million towards 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 mine remediation project was a water treatment plant.[84] In October 2003, the province decided to structure this treatment plant as a P3, and EPCOR was selected as the P3 partner, based primarily on cost, technical criteria and qualitative assessment.[85]

The contract was to design and build the plant within a year, together with a twenty-year maintenance contract. The total discounted cost 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. P3 partner EPCOR financed and built the plant, and it bore financing, construction, operations and maintenance. The facility treats about twelve million litres of mine runoff per 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.[86] 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.[87]

There have been no significant issues with EPCOR to this point. 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 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.[88]

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.[89] In 1996, Moncton 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 New Brunswick-incorporated company owned by USFilter Canada, Inc. (USF) (eighty-five per cent) and Hardman Group Limited (fifteen per cent), was awarded the twenty-year contract. USFilter Canada 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.[90]

USFilter Canada 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.[91] USFilter Canada provides a $15-million guarantee to the City of Moncton. 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 met so far. USFilter Canada assumed all construction and design risk associated with the project.

In practice, all of these projects have high asset specificity; thus, the likelihood of opportunistic hold-up was high in all of these projects

The water treatment plant construction was completed in eighteen months and began operation in 2005. 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 seven per cent on an annual basis. Between 1999 and 2000, however, water charges increased by seventy-five per cent. Proponents argued, however, that the rate represents an 11.2-per-cent saving for taxpayers, since the cost was expected to be $33 million if the facility had been built as a public-sector initiative.[92] Moncton also claimed that the total cost 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 forty per cent.[93]

Cranbrook Civic Arena Multiplex

In the mid-1990s, Cranbrook decided that it needed a new recreational facility that included a hockey arena, swimming pools and other amenities. The project was estimated to cost over $20 million. The city decided on a P3.[94] In a 1999 referendum on the P3, a narrow margin voted in favour. Cranbrook signed a thirty-year "design-build-finance-lease-operate-and-transfer" agreement with KeenRose Technology Group.[95] The contract stipulated that the private financing rate was not to exceed 7.25 per cent.[96] 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 Inc.) to manage the complex.[97]

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.[98] In 2001, the mayor announced a further 10.9-per-cent 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.[99] 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 over ownership of the complex.[100] 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.[101] The RMOW elected not to own or operate the facility, primarily due to a lack of relevant expertise. Following an 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 twenty-two years. There is an annual royalty to the RMOW, based on the revenue from the sale of electricity to Ontario Power Generation. The municipality does not guarantee the supply of LFG. The contract requires that the facility be on-line ninety per cent of the time that the RMOW is supplying LFG to the facility. If this guarantee is not met, Toromont must pay the municipality an amount equivalent to the royalty that would have resulted if the plant had been running at ninety-per-cent 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.[102] Construction began in December 1998, and the plant was operational in September 1999. Since the facility became fully operational, the

system has been running ninety-nine per cent of the time.[103] 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.[104] 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 in P3s often make it difficult for society to actually realize lower *total* social costs.

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

It is useful to consider the specific dimensions and externalities of transaction costs discussed earlier.[105] Table 2 summarizes our assessment of the values of these transaction cost factors in each of the case studies. The factors are as follows: 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; and the extent to which externalities were imposed on third parties. The table also includes an estimate of the level of transaction costs for each of the ten P3 and an overall assessment of ''success'' as a P3.

We review each transaction cost factor in turn. In practice, all of these projects have high asset specificity; thus, the likelihood of opportunistic 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 as well as to the difficulty of performance measurement. For infrastructure P3s, complexity pertains primarily to construction complexity. None of the projects studied here were 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,

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*	*Success*
Alberta Special Waste Management System	Yes	Moderate	Partially	Moderate	Not for first ten years	Poor	Yes	High	No
Confederation Bridge	Yes	Moderate	Yes	High	Small (revenue guarantees)	Fair		Moderate	Qualified Yes
Highway 407 ETR	Yes	Moderate	Yes	High	No	Poor	Yes	High	No
Highway 104	Yes	Moderate	Yes	High-Moderate	No	Fair	Toll-level problems	Moderate	Qualified No
Evergreen Park School	Yes	Low	Yes	Low	Yes	Fair		Moderate	Yes
O'Connell Drive Elementary School	Yes	Low	Yes, but costs high	Low	No	Poor	High	High	No
Britannia Mine Water Treatment Plant	Yes	Moderate	Yes	Moderate	Yes	Good		Low	Yes
Moncton Water Treatment Facility	Yes	Moderate	Yes	Low	Partially	Good		Low	Yes
Cranbrook Civic Arena Multiplex	Yes	Low	No, in effect	Moderate	Partially	Fair-Poor		High	No
Waterloo Landfill Gas Power Plant	Yes	Low	Yes	Low	Yes	Good		Average	Yes

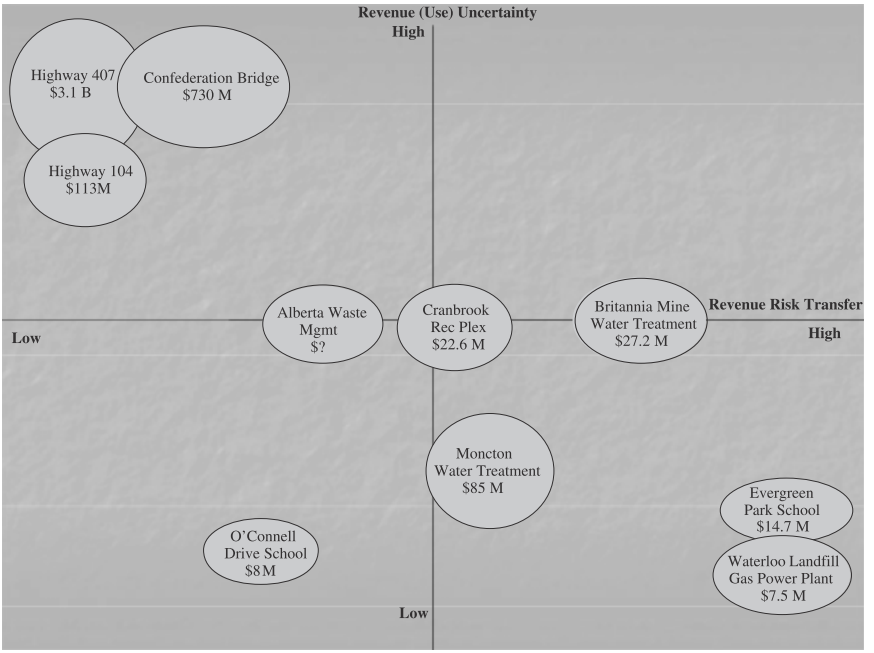
the bridge, and the water treatment plants were moderately complex. One might, therefore, expect that the public sector would be able to transfer all of the construction risk to the private sector, but this did not occur in two of the cases. In the Alberta Special Waste Management System, the government retained some construction cost risk due to poor contract management skills. In the Cranbrook Arena case, the government ended up paying for cost overruns, presumably because of a combination of poor contract management skills and changes in political costs.

The evidence from Canadian P3s indicates that the willingness of private-sector firms to bear use-risk declines with the level of use-risk. Private-sector firms will not participate in a P3 if it bears cost risk and large use-(revenue) risk

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 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 suggests 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 projects was low. Where the level of revenue uncertainty was higher, as in the two highway projects and Confederation Bridge, the private sector simply would not take on revenue risk. The two projects in the middle of Figure 1 (Alberta Special Waste Management and Moncton Water Treatment Facility) 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 portion of the diagram to the bottom right. According to this view, the two outliers are Britannia Mine and O'Connell Drive School. Britannia Mine is in relatively early days and we do

Figure 1. *Revenue Uncertainty and Effective Revenue Risk Transfer*



not yet have full information about this project. The O'Connell Drive School project clearly had poor contract management.

> *[D]uring the operating phase, the private sector is more likely to face opportunistic behaviour from the government than would a government agency if it operated the project*

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. These problems are compounded and transactions costs are higher if the construction risks and revenue risks are high *and* these costs are transferred to the private sector.

The Alberta Special Waste Management System exhibited high transactions costs – 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 of the construction risk and use-risk, resulted in negative externalities and high transactions costs. It is a clear failure from a social perspective. The Confederation Bridge project 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. Still, while construction risk was transferred to the private sector, use-risk was not. As a result, the transaction costs were moderate, and this project can be considered a qualified success. Highway 407 ETR had high asset specificity, moderate complexity, and high use-uncertainty; consequently, like Confederation Bridge, it potentially had high transaction costs. In this case, contract management effectiveness was also poor. The result was significant negative impacts on highway users and adjacent highways, resulting in 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.

A note of caution is that our case selection is based on the availability of public information. 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 where we could draw upon reasonably independent information.

The evidence from Canadian P3s indicates that the willingness of private-sector firms to bear use-risk declines with the level of use-risk. Private-sector firms will not participate in a P3 if it bears cost risk and large use- (revenue) risk. Thus, it is not surprising that emerging evidence from the U.K.[106] and Australia[107] have also found that other governments have not been very successful at shifting risk to the private partners. Nor is it surprising that

contract negotiations associated with attempts to shift risk were extremely costly.[108]

Our analysis suggests that, in some sense, effective P3s are not P3s! Private-sector project participation makes the most sense when it bears cost risks, but not revenue risks. In such circumstances, there is not that much difference from what has traditionally been described as a ''build-operate-transfer'' contract. While the private sector often has potential cost advantages for the construction part of the contract, these may not extend to the operating part of the contract. Indeed, during the operating phase, the private sector is more likely to face opportunistic behaviour from the government than would a government agency 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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