University of Toronto
Department of Economics

Working Paper 344

Bidding for Investment Projects: Smart Public Policy or Corporate Welfare?

By Johannes Van Biesebroeck

November 16, 2008

Bidding for Investment Projects:

Smart Public Policy or Corporate Welfare?

Johannes VAN BIESEBROECK[1]
Department of Economics, University of Toronto and NBER

June 24, 2008

Abstract:

Recently, several governments in Canada have shown an increased willingness to subsidize private investment projects, especially in the manufacturing sector, to the dismay of tax conservatives. I evaluate under what circumstances these government subsidies make sense, paying particular attention to interjurisdictional competition. I show what governments should expect to pay when they join a bidding war and derive the expected welfare gain. The analysis looks in detail at the efforts of the Ontario and federal governments to attract new investments in the automobile sector.

Keywords: Foreign Direct Investment; government competition; subsidies; investment incentives; automobile industry; opportunity cost

[1] Department of Economics, University of Toronto, 150 St. George Street, Toronto, ON M5S 3G7, Canada, E-mail: Johannes.vanbiesebroeck@utoronto.ca, Phone: +1 416 946 5795, Fax: +1 416 978 5519

"*That C$100 million will not only be worth its value, but will transform into many more hundreds of millions of dollars for the economy of our province and our country,"*

Joe Volpe, federal Human Resources Minister

"The federal politicians have misplaced their brains regarding subsidies to the auto sector,"

John Williamson, federal director of the Canadian Taxpayers Federation

1. Motivation

In recent years, Canadian governments have showered the automotive industry with subsidy money. Newspapers headlines like the above—when the federal government announced in late 2004 that it would match the Ontario government's investment subsidy for the modernization of Ford's Oakville assembly plant—underscore that this policy is highly controversial.

Criticism has intensified recently as the economic growth slowdown, the appreciating loonie, and rising gasoline prices have led to numerous layoffs in the Canadian automotive industry. Employment at Ford and GM, two of the largest beneficiaries of the subsidies, has been hit particularly hard. Critics allege that the government dished out a lot of money without receiving any employment guarantees. To this, the government has responded that the employment picture would be even grimmer without the seven billion dollars of investments attracted by the subsidies.

As an economist studying this industry, I am often asked by journalists, but also by colleagues, students, and even government officials, whether these subsidies are a good deal for the Canadian taxpayer. In the general debate, and to some extent also in the academic literature, the strategic nature of this decision is often underemphasized. The counterfactual, what would have happened in the absence of the subsidies, is not obvious.

When Canada or Ontario offers an investment subsidy, the issue is less whether an investment will be made, but rather whether Canada is able to attract it away from competing jurisdictions, mostly U.S. states. The location choice for a new investment can best be viewed as a Nash equilibrium in a game where different jurisdictions compete. Even though Ontario might be the ideal location, offering no subsidies at all might very

well lead to the loss of a project to a more aggressive jurisdiction. Strategic issues, notably subsidy responses of competitors and the risk of the winner's curse should be considered explicitly.

A contribution of this article is to introduce an intuitive graphical analysis of the equilibrium of the bidding game. Under a number of plausible assumptions for the situation considered, it illustrates optimal bids and predicts 'ex ante' welfare outcomes. This reveals that, in sharp contrast with the public debate and many previous studies, it is not the absolute size of benefits that matters, but the *relative* private attractiveness for the investing firm and the *relative* size of externalities in each location.

I start with an overview of the different Canadian incentive programs in Section 2 to highlight the baffling amount of money involved. Next, in Section 3, I review the usual case for intervention and list the externalities that proponents often anticipate, with some cautionary notes. It is widely appreciated in the academic literature that for these interventions to be welfare improving, they should not be zero-sum. There need to be externalities that raise the value of the resources devoted to these projects over and above their value in alternative uses. In Section 4, the optimal strategies are analyzed which suggests there could be a severe risk of overbidding if benefits are uncertain.

In Section 5, I discuss a novel approach to evaluate the welfare impact of projects 'ex post.' It sidesteps the measurement of opportunity costs and externalities, which have been major challenges in cost-benefit analyses of subsidy programs. The evidence on past U.S. subsidies suggests that on average overbidding was not a problem. This finding has to be qualified by the existence of two more strategic considerations. First, jurisdictions bidding to attract an investment project can try, often successfully, to shift some of the cost to a higher jurisdiction. Second, firms can increase competition between jurisdictions to extract subsidies by making their projects more mobile.

Section 6 concludes with an assessment of current practice and a couple of suggestions how Canadian subsidy policies could be improved to avoid some of the pitfalls discussed.

2. Investment incentives in Canada: 1984 – 2008

Molot (2005) summarizes two waves of foreign direct investment into the North American automotive industry – summary statistics are in Table 1. The initial wave in the 1980s first established production capacity for Japanese firms on the continent. $4.81 billion (in constant 1983 U.S. dollars) was invested over eight U.S. and four Canadian projects, creating 23,600 direct assembly jobs. Because reports of incentives vary considerably and often include hard to quantify infrastructure spending by local governments, Molot (2005) lists a low and high estimate. The total value of the incentive packages offered in the United States is estimated to lie between $429 and $858 million and in Canada between $243 and $273 million. This amounts to a subsidy of between $28,475 and $47,924 per job.[2]

[Table 1 approximately here]

These large sums of money, often awarded in an ad hoc fashion, generated a lot of criticism, but also attracted attention to the likely benefits associated with these investment projects. Even more North American jurisdictions competed to attract any of the foreign plants established in the second wave in the 1990s, raising the average subsidy to $54,486–$76,667 per job created (still in constant 1983 U.S. dollars). The conservative estimate of the incentive package for the Mercedes-Benz plant in Alabama amounts to 84% of its initial capital cost. While Canada received more than its fair share of the early investments, no greenfield investments were attracted in the next wave. Political economy considerations of foreign owners, hesitant to antagonize the United States, were one important factor, but the Canadian government's stated reluctance to compete with incentives was another.[3]

The competition to attract new plants continued into the next decade. Toyota's new pickup truck plant in Texas attracted a $133 million subsidy (in current U.S. dollars) from the state. The first Kia plant in North America, announced in 2006 for West Point, GA,

[2] The per-job subsidy varies tremendously by plant. The Toyota plant in Georgetown, KY is estimated to have benefited from at least $55,750 of subsidies per job and the amount could have been as high as $173,300. Note that the phrase "jobs created" only refers to this particular industry, as there is no evidence of net employment gains for the economy as a whole.

[3] DaimlerChrysler did consider assembling the Sprinter van in its Pillette Road, Windsor facility, but eventually decided on a new South Carolina facility in 2005. The year before, it had already cancelled plans for a new Ontario plant to build small pickups because of "business viability" issues.

came with a state incentive package of $258 million and a further $151 million from local governments and utilities.

In April 2004, the Ontario government announced the *Ontario Automotive Investment Strategy* (OAIS), plunging itself into the bidding game to attract new investments. A total of $500 million Canadian dollars was committed to subsidize up to 10% of the capital cost. The federal *Canadian Skills and Innovation Project* doubled the available subsidies for the industry. The complete list of funded projects is in Table 2.

[Table 2 approximately here]

These are only two of a long list of programs that firms can draw on for investment support. As of January 2008, the Ontario government's web portal for initiatives to attract foreign investors lists 73 programs offering subsidies or tax credits.[4] The *Advanced Manufacturing Investment Strategy* ($500 million over five years) is geared towards innovation and advanced technologies; *Strategic Manufacturing Investment* grants (average annual budget of $63 million) provide support under the Ministry of Economic Development and Trade's general "Investment and Trade Strategy"; projects involving clean automotive and other green technologies can draw on the *Next Generation Jobs Fund* ($650 million over five years). Total support from just the four largest Ontario programs has recently averaged a staggering $400 million per year, much of it for automotive investments – see Table 3. In addition, there are infrastructure funds at the provincial or federal level that provide accompanying financing.

[Table 3 approximately here]

Entries for the Quebec and federal governments illustrate that support for manufacturing investments is not limited to Ontario.[5] For example, measures announced in the 2007 budgets will lead to the phased abolishment of the Capital Tax in Quebec and an increase in the federal Capital Cost Allowance rate to 50%.

[4] http://www.2ontario.com/software/government_programs.asp

[5] The Investissement Québec corporation has been very active, averaging more than a thousand financing transactions per year, mostly through its *Strategic International Intervention* and *Regional Economic Intervention Funds*, which received initial government contributions of $75 and $210 million when launched in 2004.

The decision problem for Ontario, with a stock of existing plants with aging equipment, is similar to that of Michigan. The investment projects supported lately by the Michigan Economic Development Corporation, at the top of Table 2, illustrate a similar willingness to subsidize refurbishing of existing plants, as long as something unique was on offer, e.g. the first American-owned flexible assembly plant (GM) or a green roof and other environmental innovations (Ford). It also succeeded in attracting Hyundai's technical research centre and securing an expansion to Toyota's technical centre in Ann Arbor, cementing Michigan's prominence for the high-tech activities in the industry.[6]

A recurring theme in the debate over subsidies is whether to favour a general or targeted approach. For example, automotive firms are lobbying to expand the Manufacturers and Processors Tax Deduction, which would effectively reduce their corporate income tax rates to 17% federally and 8% provincially. Rather than award this selective benefit, the federal government chose to lower income tax rates for all firms in its 2008 budget. Instead of targeting specific investments it is providing funding according to well-defined criteria, e.g. for training and apprenticeships and a *Scientific Research and Experimental Development Fund*. Similarly, the 2008 federal *Economic Hardship Fund* provides broad-based support for single-industry towns affected by volatility in commodity, currency, and financial markets. This contrasts with the similarly motivated aid package in Quebec, which provides tax measures and training and direct assistance specifically for the manufacturing sector.

3. The case for incentives

In 2004 and 2005, the federal and Ontario governments pledged $910 million dollars to build or modernize automotive assembly plants. What makes it so desirable to attract these plants? A few things stand out. Jobs in this industry, especially in assembly plants, are well paid and there are a lot of them. The industry is R&D intensive, uses a lot of advanced equipment and workers receive training in high-tech manufacturing techniques, enhancing

[6] While no explicit subsidies were given for the latter project, the state sold the land to Toyota for $16 million less than a private developer was willing to pay. The Michigan Court of Appeals upheld the state's right to consider other factors than the price, including whether use of the property would attract skilled jobs.

both the supply and demand for skilled labour. There is a guaranteed multiplier effect as assembly plants generate additional demand for the parts sector and business services.

Still, for all these benefits to warrant government intervention there need to be some externalities. Only if markets fail to price inputs correctly or if the firm is unable to capture all benefits associated with its activities can we justify handing over taxpayers' money to attract the investment. Proponents of these investment subsidies tend to stress agglomeration effects, technology spillovers, human capital formation, market power rents, and tax or regulatory distortions.[7] We discuss them in turn with some cautionary remarks.

3.1 Agglomeration effects

A large economic geography literature studies agglomeration effects that lead to clustering of economic activity. It is assumed that a firm's productivity is higher or its costs lower if it locates closer to other firms (Head, Ries, and Swenson, 1999).[8] Possible reasons are information sharing, technology spillovers, and the availability of specialized workers, suppliers, or infrastructure.

Success in attracting one project will thus boost the location's attractiveness for all future investments. The 2005 decision by Toyota to locate its seventh North American assembly plant in Woodstock was certainly influenced by the proximity of its existing Cambridge operation. The two plants will share many of the existing suppliers and Toyota's increased scale in Ontario makes it feasible to bring more of its preferred suppliers to the province.

Attracting early investments also has a defensive function. Agglomeration economies make it difficult for firms to unilaterally switch locations if an area becomes less attractive, for example because of adverse exchange rate movements (Holmes, 1999).[9]

---

[7] Glaeser (2001) discusses several other factors unrelated to externalities that often lead to incentives, e.g. corruption or lobbying.

[8] Head, *et al.* (1999) find evidence of significant agglomeration effects in a sample of 760 Japanese manufacturing plants of which one third is active in the automotive industry.

[9] Exactly half of the 40 most "localized" industries in Holmes (1999) are textile related, but the list does include Automotive Stampings, Motor Homes, and Motor Vehicles and Car Bodies.

Agglomeration effects are especially important in the automotive industry, because assembly plants generate demand for parts. Just-in-time inventory systems make it difficult for suppliers to locate more than 400 miles away (Klier, 1999). Increasingly automakers outsource the subassembly of entire modules, e.g. seats, bumper assemblies, or entire dashboards. As these modules are produced in the same order as the cars into which they will be installed, suppliers have to locate in the immediate vicinity. A nearby location will lower transportation costs and avoid costly delays—externalities from the perspective of suppliers.

Research by the *Center for Automotive Research* suggests that in 1998 for every job created in a U.S. assembly plant a further 2.9 jobs are created in U.S. supplier plants (McAlinden, Hill, and Swiecki, 2003). They further estimate that the expenditures of these workers create additional "expenditure-induced" jobs elsewhere in the economy. The economic multiplier they highlight is that each additional worker at an automaker corresponds to 7.6 more workers in the economy. The move to increased outsourcing by automakers made them revise this number upward to 10.6 for 2006.

It would seem then that spending some incentive money to attract an assembly plant could generate a big return. However, this makes the crucial mistake of counting all employment as net gains. Most of the workers counted in these calculations are likely to have had alternative employment in the absence of the automotive investment. There is scant evidence that employment is actually boosted by attracting these projects. Benefits are only realized to the extent that these jobs create more value, which is certainly not the case for the expenditure-induced employment effects. This type of analysis ignores that resources have opportunity costs which are forfeited by employing them in the proposed way.

3.2 Technology spillovers

Another supposed benefit of attracting an innovative firm is the generation of technology spillovers, either directly through knowledge sharing or demonstration effects, or indirectly through the labour market. The automotive industry is becoming increasingly high-tech,

spending more on R&D than any other industry (Hashmi and Van Biesebroeck, 2007). It is also unrivalled in its use of robots and other advanced manufacturing equipment.

Previous research has shown that knowledge and technology spillovers are larger between firms that are geographically close (Jaffe, Trajtenberg, and Henderson, 1993). Greenstone, Hornbeck, and Moretti (2007) exploit a natural experiment to identify a positive effect of a large investment project on total factor productivity of nearby firms. They find the strongest effect on firms that are likely to share workers and use the same technologies.

Two caveats are in order. First, while the automotive industry as a whole is very technologically intensive, this applies less to assembly plants, which are the main recipients of investment incentives. Increasingly governments add conditions for local R&D and co-location of higher value added activities to incentive contracts, but these are hard to monitor and enforce. Second, while potential spillovers can be large, they might not materialize. Blomström and Kokko (2003) survey evidence, often from developing countries, that local firms have limited ability to absorb the advanced technology from multinationals attracted by investment incentives.

3.3 Human capital formation

Wage rates in the automotive industry exceed average manufacturing wages in the same locations and the difference is partly explained by human capital differences. The widespread adoption of lean manufacturing techniques and advanced machinery gives employers an incentive to invest in complementary worker training (Milgrom and Roberts, 1990). Attracting a modern manufacturing plant shifts some of the burden of (re-)training the workforce to the new employer. Training subsidies invariably figure prominently in incentive packages.

However, firms are often surprisingly capable at internalizing externalities. To the extent that workers acquire skills that are not firm-specific, wage differences will not reflect human capital differences as workers are willing to work for a high-tech firm for lower pay because it constitutes an investment in valuable skills. The secular decline of manufacturing

also limits the usefulness of many skills acquired in manufacturing firms. Incentives might only postpone the eventual transition into the service sector.

3.4 Market power rents

An alternative explanation for high automotive sector wages is the ability of labour unions to extract rents in an oligopolistic industry. Entry barriers in this industry are high and incumbents as a group are expected to earn positive profits (Helper, 1991). If workers are able to appropriate some of these economic profits, the accounting profits of the firms will suffer, without diminishing the attractiveness of these projects. A rational government should be willing to pay for the privilege of having its citizens employed in such industry.

This mirrors an argument from the strategic trade literature. As there are economic profits in oligopolistic or monopoly industries, the value created exceeds the resource costs and the country hosting these industries will benefit (Brander and Spencer, 1981). However, just as was recognized in that literature, we expect different jurisdictions (countries) to compete for these industries, which will transfer some of the rents back to the companies.

3.5 Tax distortions

Finally, existing government interventions in the economy create distortions that may lead to inefficient outcomes. For example, the average cost pricing of public services through taxation often exceeds the marginal cost of providing the services. This provides a role for subsidies, in terms of tax cuts or free additional service provision, to achieve efficient location decisions and optimal investment levels (Black and Hoyt, 1989).

Alternatively, employment insurance or excessive workplace regulations can lead to an undervaluation of employment benefits. If the shadow wage—the opportunity cost of time—is below the nominal wage, economic activity attracted through investment subsidies can provides a net welfare benefit (Barros and Cabral, 2000). Neven and Siotis (1993) propose this mechanism as a way to overcome “strong distortions” in the E.U. labour market.

This argument clearly has merit, but such distortions are ubiquitous. Detractors from discretionary incentive packages sensibly argue that it is more efficient to lower distortionary taxes or regulations uniformly rather than selectively for one industry.

4. Competition for projects

If an investment project is expected to generate local benefits over and beyond its resource costs, it is likely to be pursued by many, especially if externalities are large and not too certain and the previous concerns carry less weight. In such a competitive situation, it is not the total size of externalities, the focus of most of the literature, that matters most. The net welfare gain is determined by the fraction of externalities and private benefits that are unique to the winning location.

Jurisdictions will engage in a bidding war, offering competing incentive packages to increase the relative attractiveness of their locality. As a result, some of the social benefits will be competed away, or rather, will be transferred to the firm making the investment decision. To study the equilibrium of such a bidding game, I simply posit differences in relative costs and externalities for two jurisdictions and illustrate the optimal bids and location choice.

The following assumptions are made: (i) at least two jurisdictions enter the bidding game, (ii) both the project and subsidies are lump sum amounts, (iii) all participants know the size of their own and their opponents' private and social benefits associated with the project. While these will not be satisfied in every situation, they are quite plausible for automotive investments. As indicated in Table 1, the number of jurisdictions actively wooing investors ranged from 3 to 43, averaging more than 8. The size of the plant, in terms of dollars invested and jobs involved, is always specified in advance and subsidies are committed contractually before construction starts. [10]

The most ambitious assumption relates to the observability of the benefits in advance, as an analysis with uncertainty would be much more complicated. [11] While this assumption

[10] Barros and Cabral (2000) consider a model where subsidies also affect the investment size decision.
[11] King, McAfee, and Welling (1993) consider a model with uncertainty and endogenous participation. Such an approach also allows for situations where bidding is costly, e.g. when cities compete to host the Olympics.

is obviously violated in practice, at least three factors facilitate the collection of information. First, assembly plants are built over and over, allowing participants to learn over time. Second, given the public money involved, governments worldwide regularly evaluate their subsidy programs and they make the findings public most of the time. [12] Third, the high visibility of automobile assembly plants in the public eye and the large size of investment projects guarantee a lot of attention with information being uncovered and disseminated by pressure groups, regular and trade press, consulting firms, and academic researchers. Finally, the results are still valid with subsidy offers based on expected benefits, but only if participants are risk-averse and their expectations coincide.

Figure 1 provides a graphical analysis. Consider a situation where Canada and the United States compete to attract an assembly plant. In this hypothetical example, I assume that the private value of the project is higher in Canada, for example because of lower labour costs.[13] The difference in private benefits is denoted by *A* on the horizontal axis. In the absence of subsidies, the carmaker would prefer a Canadian location.

The project generates local externalities, indicated on each country's axis, which exceed the intrinsic cost difference *A*. As a result, the U.S. government has an incentive to attract the plant by offering a subsidy package of at least *A*. In the first case considered, I assume that these externalities (social benefits) are highest in Canada ($SB_C > SB_{US}$), perhaps because the shadow price of labour is lower, such that the Canadian government will trump any rational U.S. bid.

The best response function for the U.S. government—its optimal bidding strategy as a function of the Canadian bid—is indicated by the solid black line. It bids *A* more than Canada up to the value of its own local externalities, the vertical solid line at SB_{US}. Canada will only offer incentives if the U.S. package is sufficient to outweigh its own intrinsic advantage of *A*. Above this level it matches its rival's offer cent for cent, indicated by the

---

Note that without uncertainty and costly participation, only the best placed jurisdiction would enter and no subsidies would be required. Of course, the second placed jurisdiction would then prefer to enter ex post. If decisions are made sequentially, the equilibrium would again resemble the one we consider.

[12] For example, Industry Canada hired a consulting firm to analyze the benefits of the OAIS ex post.

[13] This is consistent with a study carried out by the Canadian Automotive Partnership Council, see http://www.capcinfo.ca/english/news/exec_summ.html.

short-dashed line, up to its own social benefit level SB_C^1, the horizontal section of the Canadian best response function.

The intersection of the two best response functions gives the equilibrium subsidy. The winning jurisdiction does not have to offer its entire surplus, only enough to make the firm indifferent between itself and the next best alternative. The runner-up jurisdiction, however, only drops out of the bidding war after offering the entire surplus it could have expected from the project.

In this example, the equilibrium is for Canada to attract the investment, offering an incentive package of $SB_{US} - A$ (indicated by the arrow on the vertical axis). The net welfare gain for the Canadian economy equals SB_C^1 diminished by its bid, or $(PB_C - PB_{US}) + (SB_C^1 - SB_{US}) = A + B^1$. In equilibrium, it only retains the difference between its own private and social benefits and the corresponding benefits in the runner-up location.

Two crucial insights can be taken away. First, even though the value of the project to the local economy might be large, a fraction is transferred to the investing firm through the incentive package. The net welfare gain falls short of the full social surplus by the amount of social surplus that would potentially be generated elsewhere, minus any intrinsic private cost advantage. At the same time, the net expected welfare gain for the winning jurisdiction does not fall all the way to zero if there are some unique benefits.

Second, even if one jurisdiction is the logical place for the project in the absence of competition, abstaining from the bidding war is not optimal. Even though Canada has an intrinsic cost advantage and larger spillovers, without a Canadian bid a U.S. incentive package worth A would succeed in attracting the project, for a net U.S. welfare gain.

An additional insight can be gained by considering a minor change to the example, namely a situation where U.S. externalities exceed Canadian ones. The relative size of the private difference, favouring Canada, and the social difference, favouring the United States, will then determine which country succeeds in attracting the project. As long as the difference in social benefits is less than A, Canada still prevails for a net welfare gain of $A + B$, or $A - |B|$ in this case, as $B = SB_C - SB_{US}$ is now negative.

The situation represented by 'Case 2' in Figure 1 is for the U.S. advantage in externalities outweighing the intrinsic private advantage of locating in Canada. The new best response curve for Canada, indicated by the long-dashed line, now turns horizontal much earlier, at SB_C^2. The winning U.S. bid becomes $SB_C^2 + A$, indicated by the arrow on the horizontal axis, and the net U.S. welfare gain is $-(A + B^2)$ or $|B^2| - A$. Crucially, while the surplus generated might still be large, only a minor fraction will accrue to the local economy of the winning bidder. The majority is now transferred to the firm.

This leads to the third insight. As the net welfare gain is determined by the difference in valuations for the two jurisdictions, overbidding even by a small percentage can lead to a reduction in local welfare. Especially given that benefits will be somewhat uncertain in practice and that the highest bidder wins, participants should heed the winner's curse. The optimal bidding strategy under uncertainty will surely be more cautious than the strategies I derived without uncertainty.

If externalities are generated endogenously, the following equilibrium can exist. A new investment creates positive externalities that are increasing in the level of local activity, for example through technology spillovers on existing firms. At the same time, the induced labour demand pushes up local wages more if the local activity level is high, for example because of shortages in the labour market. Compared to locating an investment project in a sparse area, a firm that chooses a dense area generates higher social benefits $(B>0)$, but incurs larger private costs $(A<0)$.

To entice any firm to the dense area, the local government needs to offer some of the externalities as an incentive package. In equilibrium, the optimal bid equals the full value of $B = |A|$ and firms will be indifferent where to locate. The distribution of economic activity is then determined by the way demand effects and spillovers increase with the local activity level. Head, *et al.* (1999) is one illustration of such an equilibrium.

5. Evaluating past subsidies

5.1 A natural experiment approach

Even if one expects a project to generate positive externalities, they need to be quantified to know one's willingness to pay. This is tricky, as externalities by their very nature are not captured in prices. Greenstone and Moretti (2003) developed an ingenious way to indirectly evaluate spillovers on the regional economy, avoiding the need to distinguish between the market price and shadow cost of input factors. While their approach is of no help for a province or state trying to determine how much subsidy to offer for a new project, it helps in evaluating past subsidy offers. By providing evidence for or an absence of past overbidding, jurisdictions can evaluate their existing policies.

By matching locations that were selected as the site of a large industrial project with those that narrowly lost out in the final round of the site selection process, Greenstone and Moretti (2003) construct a natural experiment. The maintained assumption is that the final choice between the 'winning' county and the runner-up 'losing' county is random, due to idiosyncratic factors. If after an extensive search a company narrowed the choice down to only two counties, excluding thousands of potential locations, those final two must be quite similar in all relevant aspects. In the absence of the investment project, we expect them to have had similar future prospects.

They then exploit that local property values will capture on an ongoing basis the collective judgment of existing and potential residents on the present discounted value of the expect profit stream of living in a locality.[14] In a sample of 92 counties, the authors find that property values are increased by approximately 1.1% to 1.7% in winning versus losing counties and that the difference is statistically significant. Some net benefits, taking all relevant costs into account, seem to exist. They also find a 1.5% trend break in labour earnings in the new plant's industry in winning counties, suggesting one channel for the positive externalities. These results undermine the view that the provision of local subsidies to attract large industrial plants reduces local residents' welfare.

[14] This approach mirrors the use of stock prices in event studies used to evaluate a host of issues in the finance literature.

Clearly, this approach only works ‘ex post’ after investments are made and cannot provide guidance whether to subsidize a new project or not. It can be used, however, to evaluate past interventions and therefore also the methods used to predict externalities ‘ex ante’. The authors expected jurisdictional competition to have competed away all local welfare benefits. They were surprised to find some remaining positive effects, suggesting that governments are not overbidding. Our preceding analysis illustrates how this outcome occurs naturally if locations are heterogeneous.

5.2 Jurisdictions try to extracting cross-subsidies

Greenstone and Moretti (2003) assume that their empirical strategy controls adequately for any real heterogeneity, but they leave open the possibility of heterogeneity in the ability to attract subsidies from a higher level of government. While their evidence points to some local benefits, these might simply derive from the cross-subsidization of a local investment project by a wider group of taxpayers, who derive no benefits. If a locality is able to secure contributions from a higher level of government, it might very well benefit, while the nation as a whole loses. The importance of federal and state or provincial subsidies in the automotive industry, see Table 1, makes this a distinct possibility. The positive effects identified above should thus be treated as an upper bound.

The solution is straightforward, at least in theory: the incidence of the subsidy cost should be matched to the area where the externality benefits will be realized. Just as Dahlby (2005) concludes that a provincial R&D tax subsidy is not warranted for Alberta, automotive investment subsidies are only warranted for Ontario to the extent that there are province-wide spillovers.

Determining the optimal area at which to construct policy raises a further issue. It is sometimes suggested that NAFTA should have been accompanied with coordination to avoid “wasteful” tax competition. From an efficiency perspective, subsidies can play an important role in steering investment to the ideal location in the presence of externalities. Global welfare will be enhanced by subsidies, but if Japanese multinationals are able to extract most of the externalities they generate, North America might benefit by coordinating not to offer any subsidies.

5.3 Firms try to make projects mobile

While jurisdictions will try to shift some of the subsidy burden to a higher level of government, firms will try to enhance competition for their projects and hence subsidies. Some of the incentives under the OAIS will go to the new Toyota assembly plant in Woodstock, projected to start production in late 2008, but the bulk of the money has been committed to refurbish existing General Motors, Ford, and Chrysler plants—so-called brownfield investments.

This highlights a dynamic. Once a jurisdiction acquires a reputation for subsidizing investments, it will be tapped by existing producers to subsidize ongoing investments using the threat of relocating. In some cases, for example the Ford Oakville plant, it is possible that the plant would have closed without the new subsidies.[15] In contrast, the incentive package for General Motors' *Beacon Project* involved all its Ontario assembly and engine plants.

To minimize crowding out of private investment, only projects exceeding $300 million or generating 300 jobs qualified for support under the OAIS. This allowed the government to focus on larger projects, which are likely to be more internationally mobile. While the Toyota and Ford assembly plants and the Honda engine plant in Alliston are well-defined and delineated projects, many others are more open-ended or the combination of several investments programs to reach the minimum scale. Often it was impossible to identify a well-defined number of positions the investment project involved, let alone jobs created or saved.

A related political problem is that large firms are able to extract subsidies for one project, while maintaining freedom to decide independently on other projects. Even though General Motors was the largest beneficiary of the OAIS, it still announced the closure of two of its Oshawa assembly plants in 2005 and 2008, the first one only a couple of months after the government support was finalized.

To protect itself against this type of exploitation, the federal government insisted at times on a number of conditions. For one, incentives would be clawed back if subsequent

[15] The adjacent Ontario truck plant did close permanently in August 2004. The future of the Oakville minivan plant was also in doubt, as sales were in freefall and it operated on a single shift for most of 2005.

investment and employment levels would fall below a certain (undisclosed) level. This might have contributed to Ford's decision to close its Michigan plant in Wixom in its 2006 restructuring rather than its Ontario plant in St. Thomas—both factories assembled full-size rear-drive sedans.

Another condition, pushed especially by the provincial government, is for subsidy levels to depend on other factors than just the amount invested. The five criteria for maximum OAIS awards include innovation and R&D, infrastructure, energy efficiency, environmental technology, and training and skills development. In the Ford Oakville case, the company started an R&D fuel-cell centre to convert paint-shop emissions into hydrogen fuel. General Motors started an Automotive Centre of Excellence at the University of Ontario Institute of Technology in Oshawa. Still, the funding levels in Table 2 imply that somehow each beneficiary managed to qualify under the maximum subsidy level of 10%.[16]

6. Improving industrial subsidy policy

The paper has highlighted several concerns with the externalities often attributed to large investment projects. The illustration of optimal subsidy strategies and expected welfare when jurisdictions compete further suggests that overbidding is a real risk even for rational bidders. This risk is compounded by jurisdictions trying to extract cross-subsidies from higher levels of government and by companies trying to make their projects mobile to spur competition.

At the same time, the flurry of new programs highlights that investment subsidies are not disappearing from the Canadian policy landscape. In this final section, I discuss how to adjust these programs, in light of the earlier analysis, to make them more likely to be welfare-improving for Canada. I also assess how well current Canadian policy is performing. The analysis has highlighted that it is rational to pursue a project if the location-specific externalities are sufficient to outweigh any intrinsic cost-disadvantage. To make this a credible and worthwhile strategy, governments contemplating to offer subsidies should (i) identify externalities, (ii) measure their size, (iii) assert their location-specificity.

[16] One explanation is that sometimes, e.g. for Linamar, the funded project represents only a fraction of the total investment program, for example the most innovative or environmental aspects.

First, from an individual jurisdiction's perspective, offering an investment subsidy can make sense, but only if demonstrable externalities are at stake. While offering no incentives is certainly superior if the project is not lost to a competing jurisdiction, any package up to the full value of expected externalities is rational if it is needed to retain the project.

To make sure these programs are not seen as mere transfers to companies, they should be accompanied by an explicit indication of the type of externalities that are expected, and an ex post evaluation whether these were actually realized. Few doubt that without the subsidies the automotive industry would have seen greater employment losses. At the same time, few think that aggregate employment has been boosted. The case why it is worthwhile to keep these particular jobs, rather than helping workers transition to other sectors, is seldom made.

The emphasis in Ontario government press releases on the number of jobs and investment dollars involved when new funding is announced is largely besides the point. As it applies the same percentage subsidy to all projects, greenfield or brownfield, large or small, assembly or parts, it is almost certainly overpaying for some. The Ontario policy would receive more widespread support if a more sophisticated justification was provided, identifying and quantifying specific externalities.

As it is currently implemented, the subsidy strategy looks very much like pre-election vote-grabbing. This is not only true for the Ontario liberal government, but also the Conservative Prime Minister Stephen Harper performed an astonishing turnaround on the eve of the October 14, 2008 election. After continuingly refusing to provide earmarked support for the automotive industry during his time in office, he suddenly announced an $80 million repayable grant to Ford Canada on September 15, 2008 and suspended a penalty levied against General Motors for a violation of its loan provision.

Second, even though the absolute level of the optimal incentive package can be as large as the total value of externalities, the winning jurisdiction will only capture the fraction of externalities that corresponds to its unique local advantages. Overestimating the value of externalities can easily lead to a welfare loss. Unless a government is committed to getting the estimates right, it should stay out of the bidding game.

Given the flurry of investment programs announced, a retroactive evaluation is the least to hope for. When New Zealand undertook a broad evaluation of its FDI attraction program in 2007 it ended up abolishing the "loans and grants" component of the program (Van Biesebroeck 2008). The total amount of externalities potentially at stake was asserted to have been insufficient to cover the program's high cost. The least the Canadian government should do is publish the evaluation it commissioned of its matching subsidies to OAIS.

The government should also communicate more explicitly to pressure groups what an attractive project should look like. For example, the Canadian Automotive Partnership Council, in which both the federal and provincial governments are involved, has argued repeatedly that government subsidies for automotive investments would generate a high return. Invariably, all personal and business income taxes associated with the investment project are counted as net gains, even though evidence of net employment creation is never included.

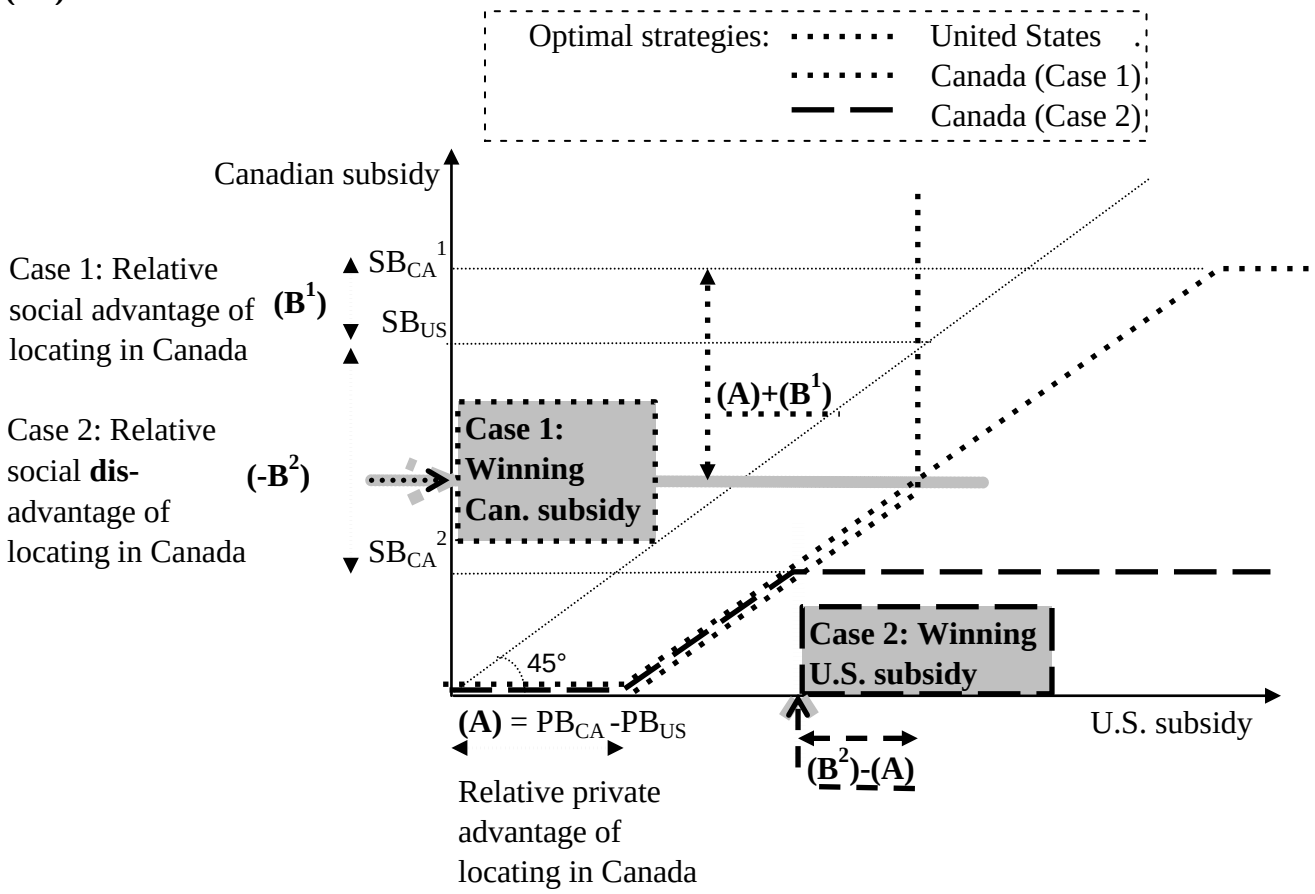
Third, while government discretion is often viewed with suspicion on political economy grounds, it is unlikely that a pure rules-based approach will generate many benefits here. The net welfare gain from the subsidy game amounts to the location-specific portion of the private and social benefits. It is hard to imagine a fixed set of rules being able to identify projects in which a locality has a particular advantage and to determine the optimal bidding strategy. Quite the contrary, if government discretion is not tolerated, offering subsidies in competition with another jurisdiction can easily lead to the winner's curse. Only those projects will be attracted for which the *ex post* externalities fall below those predicted by the *ex ante* rules.

This task could be performed by requiring any government agency or pressure group advocating subsidies to demonstrate why existing programs that are intended to align private and social benefits and costs are insufficient. There already exist several programs addressing some of the externalities discussed in Section 3, both in Canada and in competing jurisdictions. These include the Scientific Research and Experimental Development tax credit, Industrial Research Assistance Program, and Technology Partnerships for Canada to facilitate investments with potential technological spillovers. As

most countries, the federal government and the provinces administer and support a variety of training programs, e.g. the Workplace Skills Initiative, Next Generation Jobs Fund, Apprenticeship Incentive Grants, and Apprenticeship Training Tax Credit. Incremental support for a new investment project should be backed up with well-defined incremental externalities.

The opposite stance of the liberal Ontario government, largely in favour of subsidies, and the conservative federal government, largely opposed, is likely to be reflective of a split public opinion. The challenge is clear: Is it possible to identify and measure sufficiently high externalities that are unique to Canada to enter the admittedly risky bidding game? The government agencies and departments in charge of these subsidy programs, notably Industry Canada, could move the debate forward by putting in a serious effort to answer this exact question.

Figure 1: Equilibrium subsidies when Canadian (Case 1) or U.S. (Case 2) externalities (SB) dominate



(A)+(B^1): Case 1: spillovers that Canada can hold on to

(B^2)-(A): Case 2: spillovers that the U.S. can hold on to

Table 1: Greenfield automotive investment projects in North America by foreign firms (1980-2000)

Number of plants[1]					Announced	Other bids	Average project size			Total incentives[2]			Support[3]		
Tot.	Jap	JV	EU	SK			empl.	veh./year	US$ mil.	US$ mil.	% of Inv.	US$/job	F	S/P	L
United States															
8	5	3			1980-1987	5	2,338	182,500	426.3	643.4	18.9	34,406	3	6	3
6	3		2	1	1992-2000	5.5	2,400	189,667	512.1	914.7	29.8	63,517	3	6	5
Canada															
4	2	1		1	1984-1986	18.3	1,225	107,500	351.3	258.2	18.3	48,098	2	3	2

Source: Calculations based on statistics in Molot (2005)

Notes: Dollar values are in 1983 constant U.S. dollars. [1] JVs are joint ventures between U.S. and Japanese firms [2] Average of the high and low estimates; [3] F = Federal, S/P = State or Provincial, L = Local government .

Table 2: Recently subsidized automotive investment projects in Michigan and Ontario (2002-2006)

Firm	Location	What	Opened	Project size		Incentives (US$ mil.)			Return[3]
				Empl.	(US$ mil.)	Total[2]	per job	MI tax exp	($US)
United States - Michigan Economic Development Corporation									
General Motors	Lansing Gr. River	assembly	2002	1,500	500	169.0	112,667	108.0	19.4
Ford	Dearborn (Rouge)	assembly	2004	3,800	1,000	222.0	58,421	156.0	8.5
Global Engine All	Dundee	engines	2005	400	375	55.0	137,500	26.8	2.8
Hyundai	Ann Arbor	technical ctr.	2005	400	117	28.7	71,750	22.0	4.7

Firm	Location	What	An-nounced	Project size		Incentives (C$ mil.)		
				Empl.	(C$ mil.)	Total[4]	per job	ON contrib.
Canada - Ontario Automotive Investment Strategy								
Ford	Oakville	assembly	2004	3000	1,000	200.0	66,667	100.0
General Motors	Beacon project	assembly, engin	2005	4 plants	2,500	400.0		235.0
DaimlerChrysler	Windsor, Brampton	assembly, R&D	2005	2 plants	768	122.8		76.8
Toyota	Woodstock	assembly	2005	2000	1,100	125.3	62,650	70.0
Navistar[5]	Catham, Windsor	assembly, R&D	2005	hundreds	270	62.0		32.0
Linamar	Guelph	ctr.	2006	3000	1,100	51.0	17,000	44.5
Honda	Alliston	engines	2006	340	154	15.4	45,294	15.4
Valiant Corp.	Windsor	assembly sys.	2006		93	7.1		7.1
Nemak	Windsor	engine techn.	2006	hundreds	100	6.0		6.0
AGS Automotive	Oshawa, other	bumpers	2006	344	62	6.0	17,442	6.0

Source: U.S.: Donaldsen (2003); Canada: Ontario Ministry of Economics and Trade at http://www.ontariocanada.com

Notes: All statistics refer to the original announcements, subsequent capacity additions were often made. [1] Joint venture of DaimlerChrysler, Hyundai, and Mitsubishi; [2] Total incentives are combination of Job Retention MEGA, high technology MEGA, Property Tax Abatement, Public Infrastructure, Job Training, SBT brownfield credit; [3] Ratio of expected new state revenue (over following 20 years) to MI tax expenditure; [4] Federal and provincial grants; [5] International Truck and Engine Corporation (Navistar).

Table 3: Principal subsidy and incentive programs for manufacturing investments in Canada (2003-2008)

Program	Announced	Duration (years)	Value (C$ mil.)	Focus
Ontario				
Large Scale Strategic Investment Initiative	2/2003	axed	650	R&D, skills training, and infrastructure
Strategic Manufacturing Investment		indef.	63/year[1]	Support for general Investment & Trade Strat.
Ontario Automotive Investment Strategy	4/2004	5	500	Automotive assembly & Tier 1 suppliers[2]
Advanced Manufacturing Investment Strategy	12/2005	5	500	Investments in technology & innovation[2]
Next Generation Jobs Fund	6/2007	5	650	Clean automotive and green technology (+other)
Quebec				
Agreement with GM	2/2003	5	290	Developing a network of automotive suppliers
Strategic Investment Support Program	10/2004	indef.	75	Investment support for manufacturing (+ other)
Regional Economic Intervention Funds	12/2004	indef.	210	(i) direct support, (ii) regional inv. fund, (iii) VC[3]
Capital Tax Credit	budget 2007	4	N/A	Gradual elimination of tax on capital by 2011
Aid package (cope with dollar appreciation)	11/2007	5	620	70% training & direct assistance, 30% tax breaks
Federal				
Canadian Skills & Innovation Project	6/2004	5	1,000	Investment support for automotive & aerospace
Capital Cost Allowance increased to 50%	budget 2007	3	N/A	General investment incentive
Economic hardship fund	1/2008	1	1,000	Single-industry towns suffering market volatility

Source: Government and media web site

Notes: [1] Average for the last 3 budget years (2005-2008); [2] These programs are subject to minimum scale requirements: $300m or 300 jobs for the first, $25m or 100 jobs for the second; [3] VC is venture capital.

References

Barros, Pedro P. and Luis Cabral. 2000. "Competing for Foreign Direct Investment," *Review of International Economics, 8*(2), pp. 360-371.

Black, Dan A. and William H. Hoyt. 1989. "Bidding for Firms," *American Economic Review, 79*(5), December, pp. 1249-1256.

Blomström, Magnus and Ari Kokko. 2003. "The Economics of Foreign Direct Investment Incentives," NBER Working Paper No. 9489, February.

Brander, James and Barbara Spencer. 1981. "Tariffs and the Extraction of Foreign Mono-poly Rent under Potential Entry," *Canadian Journal of Economics, 14*, pp. 371–89.

Dahlby, Bev. 2005. "A Framework for Evaluating Provincial R&D Tax Subsidies," *Canadian Public Policy*, 31(1), pp. 45-58.

Donaldsen, Jim. 2003. "Retention of Michigan's Auto Industry," presentation at Geography of Auto Production conference, organized by Chicago Fed. Available at http://www.chicagofed.org/news_and_conferences/conferences_and_events/files/geography_of_auto_production_retention_of_michigans_auto_industry.pdf.

Glaeser, Edward L. 2001. "The Economics of Location-Based Tax Incentives," Harvard Institute of Economic Research, Discussion Paper No. 1932.

Greenstone, Michael, Richard Hornbeck, and Enrico Moretti. 2007. "Identifying Agglomeration Spillovers: Evidence from Million Dollar Plants," M.I.T. Department of Economics, Working Paper Series No. 31, December.

Greenstone, Michael and Enrico Moretti. 2003. "Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare?" NBER Working Paper No. 9844, July.

Hashmi, Aamir and Johannes Van Biesebroeck. 2007. "Market Structure and Innovation: A Dynamic Analysis of the Global Automotive Industry," University of Toronto, Economics Department, Working Paper.

Helper, Susan. 1991 "Strategy and Irreversibility in Supplier Relationships: The Case of the U.S. Automobile Industry," *Business History Review, 65*(4), pp. 781-824.

Head, C. Keith, John C. Ries, and Deborah L. Swenson. 1999. "Attracting Foreign Manufacturing: Investment Promotion and Agglomeration," *Regional Science and Urban Economics, 29,* pp. 197–218.

Holmes, Thomas J. 1999. "How Industries Migrate When Agglomeration Economies Are Important," *Journal of Urban Economics, 45*, pp. 240-263.

Jaffe, Adam B., Manuel Trajtenberg and Rebecca M. Henderson. 1993. "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citation," *Quarterly Journal of Economics, 108,* August, pp. 577-598.

King, Ian P., R. Preston McAfee, and Linda Welling. 1993. "Industrial Blackmail: Dynamic Tax Competition and Public Investment," *Canadian Journal of Economics,* 26(3), pp. 590-608.

Klier, Thomas H. 1999. “Agglomeration in the U.S. Auto Supplier Industry,” *Federal Reserve Bank of Chicago Economic Perspectives*, *23*(1), pp. 18-34.

McAlinden, Sean P., Kim Hill, and Bernard Swiecki. 2003 “Economic Contribution of the Automotive Industry to the U.S. Economy – An Update,” Research Report, Center for Automotive Research, Fall.

Milgrom, Paul and John Roberts. 1990. “The Economics of Modern Manufacturing: Technology, Strategy, and Organization,” *American Economic Review*, *80*(3), June, pp. 511-528.

Molot, Maureen Appel. 2005. “Location Incentives and Inter-state Competition for FDI: Bidding Wars in the Automotive Industry,” in Loraine Eden and Wendy Dobson (eds.), *Governance, Multinationals and Growth*, Edward Elgar.

Neven, Damien and Georges Siotis. 1993. “Foreign Direct Investment in the European Community: Some Policy Issues,” *Oxford Review of Economic Policy*, *9*(2), pp. 72-93.

Van Biesebroeck, Johannes. 2008. “Governments at the Bidding Table,” *New Zealand Economic Papers*, *42(2)*, December, pp. 1-22.