

# Analyzing the Fiscal Impact of Investment Subsidies

By Jim Stanford, Economist  
Canadian Auto Workers Union

## Major Methodological Issues:

### 1. *Defining a Labour Market “Base Case” (Ref Table 1 – Base Case)*

Previous numerical estimates of “job multiplier” studies have been criticized because of the assumption that all the taxes paid by workers employed in a subsidized facility represent a net gain to government. In fact, most of those workers – had the subsidized facility not been built – would have ended up working somewhere (albeit probably in an inferior position). A more appropriate approach is to define a “base case” scenario in which most of those workers are employed, but earning less than they would in an auto facility. In this case, the value of the auto industry is not that it creates jobs (since most Canadians will find work in any event), but rather that it creates *good* jobs.

The current model defines this base case as follows:

- Assume an “average” unemployment rate (eg. 7%).
- Assume “average” earnings for the 93% of workers who are employed (average annual earnings for employed Canadians in 2004 were just over \$35,000).
- Calculate the fiscal take by government from those “average” workers (including federal and provincial income taxes on \$35,000 income, plus various payroll and statutory costs).

The model calculates the fiscal “take” for all three types of positions (average earnings with 7% unemployment; employed auto parts; and employed auto assembly) on the basis of 2004 tax returns for Ontario and current payroll tax rates. CPP premiums are excluded from the analysis since they fund a program which is not integrated with government finances. As with income taxes, only the incremental payroll taxes associated with moving from an “average” labour market experience to an auto parts or assembly job are considered in the analysis.

Then the model can calculate the net fiscal benefit to government of a job created in the auto industry by calculating the *incremental* government revenues from an auto job (paying \$65,000 per year in assembly, and \$45,000 per year in auto parts and second-order supply industries).

### 2. *Assembly Jobs (Ref Table 2 - Revenue Model)*

The spreadsheet assumes 2000 new assembly jobs are created, consistent with a high-productivity 2-shift assembly operation (200,000 units per year; productivity under 20 HPV). Average wholesale price of the finished vehicles is assumed to be \$20,000, resulting in total shipments of finished vehicles from the plant of \$4 billion per year. The

model is indifferent as to whether the subsidized facility is greenfield or brownfield; the only assumption required is that the facility would not exist (or continue to exist) without the government investment support.

### *3. Measuring Auto Parts Inputs to the Assembly Plant*

The spreadsheet estimates the value of purchases of Canadian-made auto components on the basis of average shipments data for the Canadian parts industry in 2004. Total Canadian parts shipments in 2004 equalled \$33 billion, \$20 billion of which was exported. That leaves \$13 billion worth of parts sales to Canadian assembly plants (the apparent demand within Canada for Canadian-made parts). That works out to about \$5000 of Canadian-made parts in each Canadian-assembled vehicle. (That value has been growing over time, doubling in the last decade.) Thus, the new assembly plant will support \$1 billion per year in new parts purchases from Canadian suppliers.

The model then estimates the parts jobs stimulated by those purchases on the basis of the average employment content of Canadian parts shipments. On average, each \$1 million worth of auto parts shipments in Canada supports just over 3 jobs in the parts industry (3.08 positions, to be precise). Thus, the incremental purchases of Canadian-made parts by the subsidized assembly plant stimulates a certain value of new shipments of Canadian-made parts, and a certain number of Canadian auto parts jobs, according to the real aggregate experience of the industry. Just over 3000 auto parts positions are thus created in Canada as a result of the new assembly plant.

### *4. Other Spin-Off Job Creation*

Two other sources of spin-off job creation related to the assembly plant are considered. 70 jobs related to transportation of both components and assembled vehicles are incorporated. Secondly, additional jobs are created in second-order industries which supply the broad auto parts sector (including steel, fabricated metal products, plastics, rubber, electrical components, etc.). This source of new jobs is harder to pin down. The spreadsheet assumes that two-thirds of the value of auto parts shipments is represented by purchases of second-order inputs (from firms outside of the auto parts industry), and that one-third of those purchases are made in Canada; the jobs content of second-order supply industries is assumed to be somewhat more labour-intensive than in the parts industry (4 jobs per million dollars in shipments). Earnings in both transportation and second-order supply industries are assumed to equal the average in the auto parts industry.

It is likely that other spin-off jobs would be created or supported as a result of the assembly plant, on the basis of broader multiplier effects (both upstream through supply industries, and downstream through consumer industries). For example, U.S. studies have indicated that a total of 7.5 jobs are supported by each job in an OEM auto facility; this spreadsheet only explicitly captures about 3 of those 7.5 jobs (2000 in assembly, and 4000 more in parts, second-order suppliers, and transportation). However, it is difficult to explicitly model those broader effects using the “base case” labour market methodology described above: many or most of these broader spin-off jobs are likely to

encompass qualities that are similar to the overall “average” labour market experience of Canadians, and hence provide little identifiable incremental fiscal benefit to government (on the assumption that they would eventually be employed in some other capacity reflecting the “average” Canadian labour market experience). Nevertheless, by excluding these broader spin-off effects the present model errs on the conservative side of a full estimate of the overall economic and fiscal benefits of a new auto investment.

#### 5. *Corporate Income Tax Payments*

It is often neglected that the auto industry (both assemblers and parts makers) pay substantial amounts of corporate income tax to Canadian governments. In the 5 years ending in 2003 (most recent Statistics Canada data available), auto assemblers paid over \$7 billion in CIT (equal to almost 2 percent of their total shipments during this time), and parts makers paid \$3.5 billion (equal to over 2 percent of their total shipments). Tax payments declined in later years, due both to declining CIT rates and declining profits in the auto industry. In 2003, assemblers paid about \$800 million (over 1 percent of shipments) and parts makers paid \$600 million (almost 2 percent of shipments). Needless to say, these payments constitute a substantial fiscal benefit to Canadian government; about two-thirds of the revenues are collected by the federal government, the rest by the provincial government.

This spreadsheet does not estimate a full corporate financial model. However, the likely corporate income tax revenues to government resulting from the new plant can be proxied on the basis of the past relation between corporate taxes and the total value of shipments. The spreadsheet assumes that corporate income tax payments are 0.5 percent of the combined shipments of assembled vehicles and components resulting from the new plants. (This is less than one-quarter as much as was the average 1999-2003 experience, and less than half the rate experienced in 2003).

Corporate income taxes are probably the “riskiest” of the positive fiscal effects which result from the new investment (since they depend on profitability, not just on production). Hence, the model estimates the full fiscal take of government both including and excluding corporate income taxes.

#### 6. *Downstream Consumer Spending*

Another important fiscal benefit from a new assembly plant results from the incremental consumer spending (and resulting consumption tax payments) of workers employed in the assembly plant and various related parts operations. As with personal income tax and payroll taxes, the net fiscal impact must be measured against a base case in which those workers would still make significant purchases. It is only the taxes collected on *incremental* consumer spending that can be considered a net fiscal benefit from the new plant. The spreadsheet assumes that assembly and parts workers spend 90 percent of their incremental disposable income on goods and services, and that their consumption “bundle” reflects the same mixture of taxable and non-taxable goods and services as the overall economy. This results in an effective consumption tax rate,

relative to all consumer spending, of about 4.5 percent for both levels of government (the PST is collected at a higher rate than the GST, but on a slightly narrower bundle of goods and services, resulting in an equivalent effective rate).

## 7. *Timeframe*

The model assumes two 4-year product cycles, with a 6-month hiatus for re-tooling after the first 4 years. The government subsidy (assumed to equal \$200 million, split evenly between the federal and provincial governments) is paid out one year before production begins. The spreadsheet allows for variation in some of the key parameters over time (such as annual growth in wages, productivity growth in both assembly and parts production, etc.), if we wish to experiment with that level of detail; at present, these parameters are fixed over the 9-year planning horizon.

### **Fiscal Results:** (*Ref Table 3. Return on Investment*)

The spreadsheet calculates an NPV series for government (including separate series for the federal and provincial sectors) on the basis of an assumed discount rate (currently 5 percent). It also calculates a “payback” year for this NPV series, and an internal rate of return (IRR) – that is, the discount rate that results in a cumulative NPV of zero.

The main findings of the model are summarized in the table below. When all sources of fiscal benefit (including corporate income taxes) are considered, as shown in the top table, the fiscal payoff for government of the subsidized plant is both strong and fast: the federal contribution is repaid (in NPV terms) in 3 years, the provincial contribution in 5 years. Even if corporate income taxes are excluded (bottom table), both governments generate a clear positive return from their investment: the federal government “breaks even” in 5 years, the province in 7.

In either case, the federal payoff is significantly larger than for the province, reflecting the larger federal tax share in the new revenues generated by the subsidized plant. However, this analysis likely understates the overall net benefit resulting from broad multiplier effects (for reasons explained above), and most of those broader effects will be experienced within the provincial or regional economy. For this reason, the provincial payback from the investment is almost certainly stronger than indicated.

<b>Fiscal Payoff: \$200 Million Subsidy for an Assembly Plant (including corporate income taxes)</b>			
	<b>Federal</b>	<b>Provincial</b>	<b>Total Gov't</b>
<b>NPV</b>	\$195 m	\$86 m	\$281 m
<b>Payback Year</b>	3	5	4
<b>IRR</b>	40%	22%	31%

<b>Fiscal Payoff: \$200 Million Subsidy for an Assembly Plant (excluding corporate income taxes)</b>			
	<b>Federal</b>	<b>Provincial</b>	<b>Total Gov't</b>
<b>NPV</b>	\$83 m	\$30 m	\$113 m
<b>Payback Year</b>	5	7	6
<b>IRR</b>	21%	11%	17%

###

## Table 1. Base Case Labour

<b>Base Fiscal Effect per 100 Jobs:</b>	<b>AVG</b>	<b>PARTS</b>	<b>ASSBLY</b>
Unemployment Rate	7	0	0
Average Salary	\$35,000	\$45,000	\$65,000
Fed Inc Tax	\$2,910	\$5,013	\$9,413
Prov Inc Tax	\$1,090	\$2,040	\$3,962
Prov Health Premium	\$300	\$450	\$600
EI (both)	\$1,663	\$1,853	\$1,853
EHT	\$683	\$878	\$1,268
WSIB	\$903	\$1,161	\$1,677
Total Federal (adj for UE)	\$4,252	\$6,866	\$11,266
Total Provincial (adj for UE)	\$2,767	\$4,529	\$7,507
Total	\$7,020	\$11,394	\$18,772
Federal Marginal Gain		\$2,613	\$7,013
Provincial Marginal Gain		\$1,761	\$4,739
Total Marginal Gain		\$4,374	\$11,752
Personal Disposable Income	\$30,007	\$36,725	\$50,253
Incremental Disposable Income		\$6,718	\$20,246

MEMO: PIT reflects 2004 tax rates in Ontario, taxpayer with dependent spouse, no kids.

MEMO: Incremental consumer spending assumes 10% personal saving on incremental income.

**Table 2. Revenue Model**

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Annual output	200,000	200,000	200,000	200,000	100,000	200,000	200,000	200,000	200,000
Unit Wholesale Value	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total Value (\$m)	\$4,000	\$4,000	\$4,000	\$4,000	\$2,000	\$4,000	\$4,000	\$4,000	\$4,000
<b>Assembly Jobs</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>	<b>1,000</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>
Hours	3,840,000	3,840,000	3,840,000	3,840,000	1,920,000	3,840,000	3,840,000	3,840,000	3,840,000
HPV	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2	19.2
Avg Assembly Salary	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000	\$65,000
Years Program Life	8	8	8	8	8	8	8	8	8
<b>ASSEMBLY</b>									
Fed PIT & Stat (\$m)	\$14.026	\$14.026	\$14.026	\$14.026	\$7.013	\$14.026	\$14.026	\$14.026	\$14.026
Prov PIT & Stat (\$m)	\$9.479	\$9.479	\$9.479	\$9.479	\$4.739	\$9.479	\$9.479	\$9.479	\$9.479
<b>PARTS</b>									
Cdn-Made Parts per Vehicle	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Demand (\$m)	\$1,000	\$1,000	\$1,000	\$1,000	\$500	\$1,000	\$1,000	\$1,000	\$1,000
Parts Job Ratio (per \$m)	\$3.08	\$3.08	\$3.08	\$3.08	\$3.08	\$3.08	\$3.08	\$3.08	\$3.08
Parts Jobs	3,080	3,080	3,080	3,080	1,540	3,080	3,080	3,080	3,080
Avg Parts Salary	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
Fed PIT & Stat (\$m)	\$8.048	\$8.048	\$8.048	\$8.048	\$4.024	\$8.048	\$8.048	\$8.048	\$8.048
Prov PIT & Stat (\$m)	\$5.425	\$5.425	\$5.425	\$5.425	\$2.712	\$5.425	\$5.425	\$5.425	\$5.425
<b>TRANSPORTATION</b>									
Transportation Jobs	70	70	70	70	35	70	70	70	70
Avg Trans Salary	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
Fed PIT & Stat (\$m)	\$0.183	\$0.183	\$0.183	\$0.183	\$0.091	\$0.183	\$0.183	\$0.183	\$0.183
Prov PIT & Stat (\$m)	\$0.123	\$0.123	\$0.123	\$0.123	\$0.062	\$0.123	\$0.123	\$0.123	\$0.123
<b>2nd ORDER SUPPLIERS</b>									
Purchases/Shipments	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Made in Canada Ratio	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33

**Table 2. Revenue Model**

Jobs Ratio (per \$m)	4	4	4	4	4	4	4	4	4
2nd Order Jobs	884	884	884	884	442	884	884	884	884
Avg Salary	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
Fed PIT & Stat (\$m)	\$2.311	\$2.311	\$2.311	\$2.311	\$1.156	\$2.311	\$2.311	\$2.311	\$2.311
Prov PIT & Stat (\$m)	\$1.558	\$1.558	\$1.558	\$1.558	\$0.779	\$1.558	\$1.558	\$1.558	\$1.558
<b>CIT</b>									
Combined Rate (% shipmts)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Federal CIT (\$m)	\$16.667	\$16.667	\$16.667	\$16.667	\$8.333	\$16.667	\$16.667	\$16.667	\$16.667
Provincial CIT (\$m)	\$8.333	\$8.333	\$8.333	\$8.333	\$4.167	\$8.333	\$8.333	\$8.333	\$8.333
<b>INDIRECT: INCREMENTAL CONSUMER SPENDING (ASSY, PARTS, TRANS, 2nd ORDER WORKERS)</b>									
GST (\$m)	\$2.738	\$2.738	\$2.738	\$2.738	\$1.369	\$2.738	\$2.738	\$2.738	\$2.738
PST (\$m)	\$2.738	\$2.738	\$2.738	\$2.738	\$1.369	\$2.738	\$2.738	\$2.738	\$2.738
<b>TOTAL REVENUE</b>									
Total Fed Rev	\$43.973	\$43.973	\$43.973	\$43.973	\$21.986	\$43.973	\$43.973	\$43.973	\$43.973
Total Prov Rev	\$27.655	\$27.655	\$27.655	\$27.655	\$13.828	\$27.655	\$27.655	\$27.655	\$27.655
Total Govt Rev	\$71.628	\$71.628	\$71.628	\$71.628	\$35.814	\$71.628	\$71.628	\$71.628	\$71.628
<b>EXCLUDE CIT</b>									
Total Fed Rev	\$27.306	\$27.306	\$27.306	\$27.306	\$13.653	\$27.306	\$27.306	\$27.306	\$27.306
Total Prov Rev	\$19.322	\$19.322	\$19.322	\$19.322	\$9.661	\$19.322	\$19.322	\$19.322	\$19.322
Total Govt Rev	\$46.628	\$46.628	\$46.628	\$46.628	\$23.314	\$46.628	\$46.628	\$46.628	\$46.628

**Table 3. Return on Investment**

Discount Rate: 5

<b>INCLUDING CIT</b>											
Year	Fed	Prov	Combined	Disc Fac	DISCOUNTED			NPV BREAK-EVEN YEAR			
					Fed	Prov	Combined	Fed	Prov	Combined	
0	-100	-100	-200	1	-100	-100	-200	-100	-100	-200	
1	\$43.973	\$27.655	\$71.628	1.0500	\$41.879	\$26.338	\$68.217	(\$58.121)	(\$73.662)	(\$131.783)	
2	\$43.973	\$27.655	\$71.628	1.1025	\$39.884	\$25.084	\$64.968	(\$18.237)	(\$48.578)	(\$66.815)	
3	\$43.973	\$27.655	\$71.628	1.1576	\$37.985	\$23.890	\$61.875	\$19.748	(\$24.688)	(\$4.940)	
4	\$43.973	\$27.655	\$71.628	1.2155	\$36.176	\$22.752	\$58.928	\$55.924	(\$1.936)	\$53.988	
5	\$21.986	\$13.828	\$35.814	1.2763	\$17.227	\$10.834	\$28.061	\$73.151	\$8.898	\$82.049	
6	\$43.973	\$27.655	\$71.628	1.3401	\$32.813	\$20.637	\$53.450	\$105.964	\$29.535	\$135.499	
7	\$43.973	\$27.655	\$71.628	1.4071	\$31.250	\$19.654	\$50.904	\$137.215	\$49.189	\$186.404	
8	\$43.973	\$27.655	\$71.628	1.4775	\$29.762	\$18.718	\$48.480	\$166.977	\$67.907	\$234.884	
9	\$43.973	\$27.655	\$71.628	1.5513	\$28.345	\$17.827	\$46.172	\$195.322	\$85.734	\$281.056	
IRR	40%	22%	31%								
NPV					\$195.322	\$85.734	\$281.056				

<b>EXCLUDING CIT</b>											
Year	Fed	Prov	Combined	Disc Fac	DISCOUNTED			NPV BREAK-EVEN YEAR			
					Fed	Prov	Combined	Fed	Prov	Combined	
0	-100	-100	-200	1	-100	-100	-200	-100	-100	-200	
1	\$27.306	\$19.322	\$46.628	1.0500	\$26.006	\$18.402	\$44.407	(\$73.994)	(\$81.598)	(\$155.593)	
2	\$27.306	\$19.322	\$46.628	1.1025	\$24.767	\$17.525	\$42.293	(\$49.227)	(\$64.073)	(\$113.300)	
3	\$27.306	\$19.322	\$46.628	1.1576	\$23.588	\$16.691	\$40.279	(\$25.639)	(\$47.382)	(\$73.021)	
4	\$27.306	\$19.322	\$46.628	1.2155	\$22.465	\$15.896	\$38.361	(\$3.175)	(\$31.486)	(\$34.660)	
5	\$13.653	\$9.661	\$23.314	1.2763	\$10.697	\$7.570	\$18.267	\$7.523	(\$23.916)	(\$16.393)	
6	\$27.306	\$19.322	\$46.628	1.3401	\$20.376	\$14.418	\$34.794	\$27.899	(\$9.498)	\$18.401	
7	\$27.306	\$19.322	\$46.628	1.4071	\$19.406	\$13.732	\$33.137	\$47.305	\$4.234	\$51.538	
8	\$27.306	\$19.322	\$46.628	1.4775	\$18.482	\$13.078	\$31.559	\$65.786	\$17.312	\$83.098	
9	\$27.306	\$19.322	\$46.628	1.5513	\$17.602	\$12.455	\$30.057	\$83.388	\$29.767	\$113.155	
IRR	21%	11%	17%								
NPV					\$83.388	\$29.767	\$113.155				