



Economic Impact Assessment



FINAL

—

May 2017

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Glossary

BC	British Columbia
BCIOM	BC Input-Output Model
The City	City of Richmond
FTE	Full-time Equivalent Jobs
Games, 2010 Winter Games	2010 Olympic and Paralympic Winter Games
GDP	Gross Domestic Product
The Oval	Richmond Olympic Oval
Sport Hosting	Richmond Sport Hosting
STEAM	Sport Tourism Economic Assessment Model



Executive Summary



Executive Summary

This report is an assessment of the economic impacts associated with the construction and operation of the Richmond Olympic Oval. The objective is to assess the economic impacts as a result of:

1. Pre-Games construction activities (2004-2009);
2. Tourism visitors during the 2010 Olympic and Paralympic Winter Games (2010);
3. Ongoing capital investments (2008-2016);
4. Annual Operations (benchmarked for 2015);
5. Annual Sport Hosting events at the Oval (benchmarked for 2016); and
6. Changes in property values and taxes related to the re-development of the Oval Area (2006 and 2016).

The following results are for total impacts (direct, indirect, and induced) on the British Columbia economy.

Executive Summary

Pre-Games construction costs

Local economic activities from the construction of the Oval generated \$145 million in total GDP, over 1,600 FTEs, and \$34 million in taxes.

Tourism visitors during the 2010 Olympic and Paralympic Winter Games

Economic activities resulting from tourism generated from hosting the 2010 Olympic and Paralympic Winter Games at the Oval generated \$66 million in total GDP, over 1,100 FTEs, and \$32 million in taxes.

Ongoing capital investments

Economic activities as a result of ongoing capital investments at the Oval generated \$23 million in total GDP, over 280 FTEs, and \$5 million in taxes over the period 2008 to 2016.

Activity	GDP	Jobs	Taxes
Pre-Games (2004-2009)	\$145 M	Employment 1,609 FTE Wages \$109 M	\$34 M
2010 Winter Games (2010)	\$66 M	Employment 1,184 FTE Wages \$44 M	\$32 M
Ongoing Capital Investments (2008-2016)	\$23 M	Employment 283 FTE Wages \$19 M	\$5 M

Executive Summary

Illustrative Annual Operations

Economic activities as a result of annual operations at the Oval generate an estimated annual impact of \$13 million in total GDP, over 310 FTEs, and \$2 million in taxes based on 2015.

Illustrative Annual Sport Hosting events

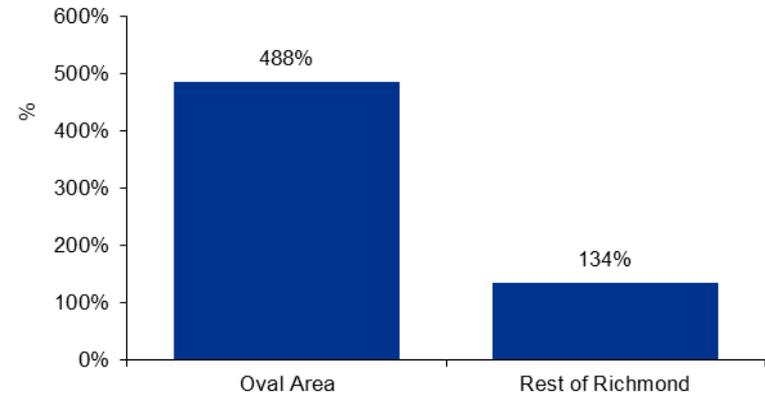
Activities from annual Sport Hosting events held at the Oval generate an estimated annual impact of \$6 million in total GDP, close to 89 FTEs, and \$3 million in taxes based on 2016.

Activity	GDP	Jobs	Taxes
Operations (2015)	\$13 M	Employment 311 FTE Wages \$11 M	\$2 M
Sport Hosting Events (2016)	\$6 M	Employment 89 FTE Wages \$4 M	\$3 M

Change in property values and taxes related to re-development of the Oval Area

Assessed values in the Oval Area have increased significantly (488%) more than the rest of Richmond (134%). As a result, property taxes collected from the Oval Area also grew significantly more compared to the rest of Richmond.

% Increase in Assessed Values from 2006 to 2016



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Background



About the Richmond Olympic Oval

“The Richmond Oval was a world-class Olympic venue that is now a cutting-edge, multi-use facility for sports and recreation. The iconic venue made a great impression on all those who visited it and the millions more watching the Vancouver 2010 Olympic Winter Games around the world. Built with legacy in mind, the Richmond Oval has been greatly received by the local community and we have no doubt it will continue to spread the Olympic spirit for many years to come.”

Gilbert Felli
*IOC Executive Director for
the Olympic Games*

Built for the Games. Designed for Legacy.

The Richmond Olympic Oval (the “Oval”) opened its doors to the public on December 12, 2008, offering fitness facilities on the mezzanine, 4 hardwood courts and the 400m oval ice. The Oval was then closed from December 1, 2009 to April 1, 2010 to host the long-track speed skating competitions for the 2010 Olympic and Paralympic Winter Games (the “Games” or “2010 Winter Games”), during which the Oval welcomed over 100,000 guests. Since the Games, the Oval has undergone its Legacy transformation, adding two hardwood courts, two ice rinks, two yoga studios, a track and field zone, climbing wall, café, high performance training room, athlete testing lab, sport medical facilities, pharmacy, and a doctor’s office. Today, the Oval is also home to the Richmond Olympic Experience – Canada’s only Olympic museum – and welcomes approximately 1 million visitors per year.

Since the completion of the 2010 Winter Games, the Oval has evolved into one of the most heavily used Olympic Legacy facilities in the world generating ongoing annual economic impacts through supporting:

- a) High performance programs – providing ongoing support for Canadian sport teams’ success in excelling from local to international arenas;
- b) National teams – directly supporting high-performance and high-profile athletes of four sports – Volleyball, Hockey, Speed Skating, and Table Tennis;
- c) Special events and tournaments;
- d) Community recreational and fitness use; and
- e) Tourism in Richmond as a special attraction.

About this Study

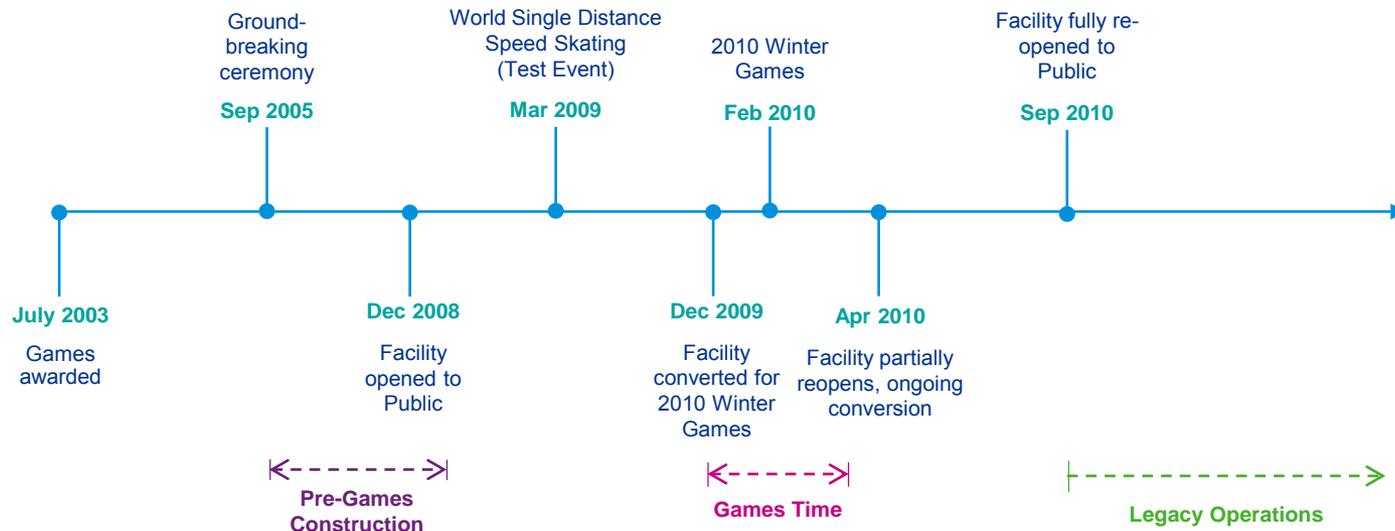
The City of Richmond (the “City”) commissioned this Study to understand the Oval’s benefits and accrued to British Columbia (“BC”) and the local region over three general time periods:

1. **Design and construction of the Oval** - In July 2003, the 2010 Olympic and Paralympic Winter Games bid was awarded to Vancouver, BC. The Vancouver Olympic Committee (“VANOC”) was established to manage planning and operations of the Games. In total, seven venues were constructed in anticipation of the Games, of which the City of Richmond was selected to host long track speed skating competitions at the Oval.
2. **Games-time operations** - As an official Venue City for the Games, the City of Richmond hosted the Games through 12 speed skating medal events at the Richmond Olympic Oval.
3. **Legacy operations** – Following the conclusion of the Games and conversion of the Oval to its current operating form, The Richmond Olympic Oval has continued to contribute economic impacts and benefits from four aspects:
 - Ongoing capital investments;
 - Annual operating expenditures;
 - Annual Sport Hosting events; and
 - Changes in assessment values and property taxes in the Oval’s surrounding area.

These activities, and their resulting economic impacts and benefits, are detailed in the balance of this report.

About this Study

The timeline below provides an overview of major milestones related to the construction, conversion, and operations of the Oval.



The economic impacts are assessed as the:

- Direct, indirect, and induced impacts on output, gross domestic product (“GDP”), employment wages, and full-time equivalent jobs (“FTEs”) and taxes across the province and the local region.
- Community economic benefits through property value appreciation and increase in taxes.



Methodology



Methodology

Measurement of the economic impacts of the Oval on the provincial and local economies involved the use of three streams of analysis:

- **Impacts of Oval construction and operations** – The BC Input-Output Model (“BCIOM”), administered by BC Stats, was used to assess the economic impacts of the construction and operations of the Oval. The BCIOM uses Input-Output multipliers to assess the incremental effects of activities (and associated costs) at the Oval on the economy in BC and Greater Vancouver. These multipliers reflect average interdependencies between industries and the Province’s economy, based on the type of activity under analysis;
- **Impacts of tourism activity associated with the Oval** – The Sport Tourism Economic Assessment Model (“STEAM”), maintained by the Canadian Sport Tourism Alliance, was used to assess the economic impacts associated with sport events hosted at the Oval (during the 2010 Winter Games and legacy operations of the Oval). STEAM assesses the incremental effects of visitors and tourism to the province and Greater Vancouver as a result of sport events held at the Oval. The assumptions of visitor origins and expenditure profiles of visitors are key inputs to the model and are based on information provided by Tourism Richmond and other sources.
- **Impacts on economic development in Richmond** – Property assessment values and municipal taxes generated from the portion of the city of Richmond defined as the Oval Area were used to illustrate the scope of broader economic development impacts associated with the Oval. As a result of the development, property assessment values have changed and municipal taxes collected have changed accordingly. The change in assessment values and taxes generated between 2006 and 2016 are used to illustrate the broader economic development impacts associated with the Oval.

Key assumptions in the analyses described above are contained in Appendix A of this document. The economic impacts are assessed at the province-wide level and where indicated, either at the Greater Vancouver or Richmond level.

Results of Input-Output Models

IO models measure economic impacts in terms of:

- **Output**
- **GDP**
- **Employment Income**
- **Employment**
- **Tax Revenues**

While economic output is included, it overstates true economic impact and is usually not used in presenting the results of an economic impact assessment.

Both BCIOM and STEAM are input-output models, which examine the effects of a business operation or project on the economy. They include assessment of the direct, indirect and induced impacts in terms of changes to economic output, gross domestic product, employment income, employment, and tax revenues.

Direct Economic Impact	Indirect Economic Impact	Induced Economic Impact
Output – a measure of the total value of expenditure on goods and services	<ul style="list-style-type: none"> • Impacts to output, GDP, employment income, employment and tax revenues • Associated with the suppliers to Oval purchasing goods and services, employing workers and paying taxes that would not occur but for the operation of the Oval 	<ul style="list-style-type: none"> • Impacts to output, GDP, employment income, employment and tax revenues • Associated with expenditures by employees of the Oval and suppliers purchasing goods and services at a household level
GDP – a measure of the value added to the provincial economy from the construction and operation of the Oval and is the most commonly used measure of economic impact		
Employment Income - a measure of the wages, salaries, benefits and other income earned by workers at the Oval		
Employment – a measure of the number of employees and/or full-time equivalent employees employed by the Oval		
Tax Revenues – a measure of the taxes paid to federal, provincial and municipal governments from the construction and operation of the Oval		

Note: Based on the data, econometric tools used and level of detail available for this Study, a minor overlap is understood to exist among the impacts calculated.



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Pre-Games Impacts

Pre-Games Construction Impacts

512,000 sf
Facility Size

LEED Silver
Certification

6.5 acres
Size of roof made of salvaged pine-beetle damaged BC wood

This analysis covers the design and construction of the Oval during the pre-Games period from 2005 to 2009. Construction of the Oval created economic activity, jobs, and tax revenues as a result of the \$178 million initial capital expenditure, including the \$118 million contribution from the City. The specific economic impacts from this expenditure were assessed using the BCIOM model.

The economic impacts are illustrated below, presented in 2015 dollars:

	GDP	Jobs	Taxes
British Columbia	\$145 M	Employment 1,609 FTE Wages \$109 M	\$34 M
Greater Vancouver	\$117 M	Employment 1,307 FTE Wages \$89 M	N/A

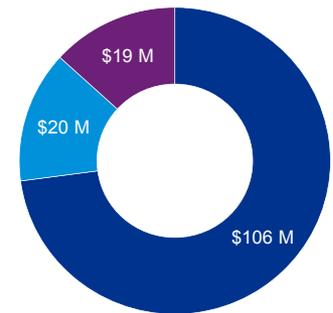
Further details of the specific economic impacts can be found in Appendix B of this Report.

\$ 145 million

Total GDP impact from construction

Total GDP Impact

■ Direct ■ Indirect ■ Induced



1,609 FTEs

Employment generated

\$ 34 million

Total tax revenues



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Games Time Impacts

Impacts of Sport Tourism - Games Time

In February 2010:

87.5%
Hotel Occupancy

95,000+
Total Richmond Hotel Room Nights

120,000+
Total Hotel Guests

6.45 nights
Average Length of Stay

Over 100,000 people visited the Oval during the Games. This generated additional economic activity, jobs, and tax revenues. The incremental impact of tourism expenditures over the 12 event days that spectators visited the Oval was estimated using the STEAM model.

	GDP	Jobs	Taxes
British Columbia	\$66 M	Employment 1,184 FTE Wages \$44 M	\$32 M
Richmond	\$41 M	Employment 976 FTE Wages \$31 M	\$24 M

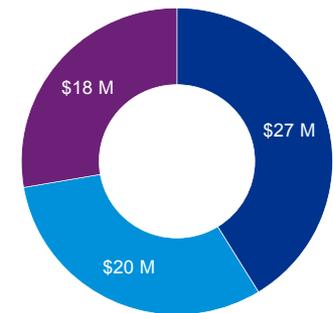
Additional economic impacts were generated in Richmond as a result of the O Zone, an official celebration site for the Games, and the 500,000+ visitors that it attracted. While the O Zone would not have existed without the Oval and the Games, these economic impacts are not included in this analysis as they are not directly attributed to the Oval and beyond the scope of this Study.

\$ 66 million

Total GDP impact from incremental tourism

Total GDP Impact

■ Direct ■ Indirect ■ Induced



1,184 FTEs

Employment generated

\$ 32 million

Total tax revenues



Legacy Operations Impacts



Impacts from Ongoing Capital Investments

The Oval has grown significantly since the 2010 Winter Games. Capital investments made since have brought online:

- Richmond Olympic Experience
- ROX Shop Retail Store
- Richmond Sports Wall of Fame
- O Café
- YYoga Studios
- Climbing Wall
- Beach Volleyball Courts

At the outset of constructing the Oval, plans were in place to ensure the facility would be converted to its legacy configuration after the Games. The City and the Oval have invested in capital expansion and additions to the facility (starting in 2008) in order to accommodate post-Games conversion and community use, and new lines of business and attractions.

The economic impacts from ongoing capital expenditures (\$37 million, 2008 - 2016) were assessed using the BCIOM model.

The economic impacts are illustrated below, presented in 2015 dollars:

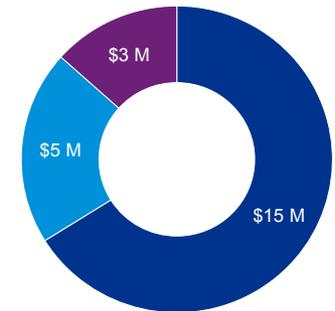
	GDP	Jobs	Taxes
British Columbia	\$23 M	Employment 283 FTE Wages \$19 M	\$5 M
Greater Vancouver	\$19 M	Employment 230 FTE Wages \$16 M	N/A

\$ 23 million

Total GDP impact from ongoing capital investments

Total GDP Impact

■ Direct ■ Indirect ■ Induced



283 FTEs

Employment generated

\$ 5 million

Total tax revenues

Impacts from Annual Operations

140+
Sport Activities Offered to the Public

1,000,000
Approximate Annual Visits

5,000
Long Term Members, 78% from Richmond

66
Oval Athletes Competed in Olympic Games

50+
Major Sport, Cultural, and Entertainment Events per year

2015 has been used as the benchmark year to assess the ongoing annual operation impacts of the Oval. Generating a province-wide impact of approximately \$13 million, including the costs associated with salaries, maintenance, purchased services and goods, utilities, and other expenditures.

The economic impacts from these expenditures were assessed using the BCIOM model and are summarized for one fiscal year (2015):

	GDP	Jobs	Taxes
British Columbia	\$13 M	Employment 311 FTE Wages \$11 M	\$2 M
Greater Vancouver	\$11 M	Employment 294 FTE Wages \$10 M	\$1 M

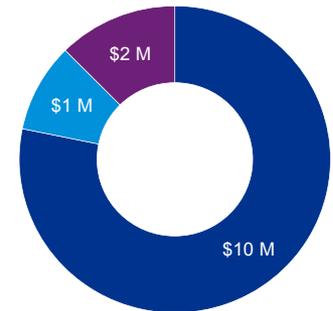
These impacts are representative of the legacy benefits that accrue from Oval operations on an annual basis.

\$ 13 million

Total GDP impact from 2015 operations

Total GDP Impact

■ Direct ■ Indirect ■ Induced



311 FTEs

Employment generated

\$ 2 million

Total tax revenues

Impacts from Annual Sport Hosting Events

In 2016, the Oval hosted:

32

Sport Hosting Events

19,000+

Spectators and Participants

The economic impacts are generated by participants, spectators and officials that come from outside the region and contribute to the local economy through expenditures on accommodation, meals, transportation, entertainment and shopping.

2016 has been used as the benchmark year to assess the ongoing annual impacts as a result of Sport Hosting events held at the Oval. The economic impact of tourism expenditures as a result of the 32 sport events held in 2016 were estimated using the STEAM model.

The economic impacts for Sport Hosting events over one fiscal year (2016) are summarized below:

	GDP	Jobs	Taxes
British Columbia	\$6 M	Employment 89 FTE Wages \$4 M	\$3 M
Richmond	\$4 M	Employment 73 FTE Wages \$3 M	\$2 M

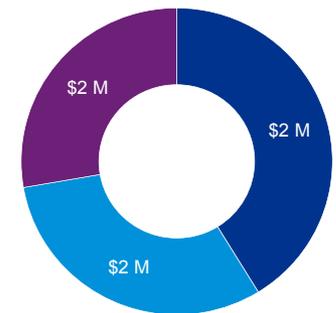
These impacts are representative of the legacy benefits that accrue on an annual basis from Sport Hosting events held at the Oval.

\$ 6 million

Total GDP impact from incremental tourism in 2016

Total GDP Impact

■ Direct ■ Indirect ■ Induced



89 FTEs

Employment generated

\$ 3 million

Total tax revenues



Oval Area Impacts



Oval Area

The Oval Area, as shown within the yellow boundary on the adjacent map, has seen significant changes since the start of the Oval's construction in 2005. Additional economic activities and substantial benefits have accrued to Richmond from the significant development in this area as a result of the Oval and the adoption and implementation of the City Centre Area Plan.

The Oval was secured through a land sale agreement with a private developer to develop the 18.6 acres adjacent to it (orange boundary on the map). Proceeds from the land sale resulted in contributions of approximately \$40 million towards Oval construction costs, and \$100 million towards the creation of a community endowment fund.

Since, mixed-use development in the area has flourished to include the multi-phase River Green Development, and a number of projects in the area further to the South and East of the Oval. This has resulted in the creation of a complete waterfront community on the banks of the Fraser River, as envisioned by the City Centre Area Plan

This Study compares the economic impacts of Oval Area development (yellow boundary on the map) to the economic impacts of Richmond-wide development, as measured by changes in property assessments and taxes collected, across all property tax classes.



Definition of areas for this Study:

- Oval Area
- Oval
- - - River Green Development

Source: City of Richmond

Oval Area Impacts

488%
Increase in Assessed Values in Oval Area

\$ 4.5+ Billion
Assessed Value of Properties in Oval Area in 2016

149%
Increase in Property Tax Revenues since 2006 in the Oval Area

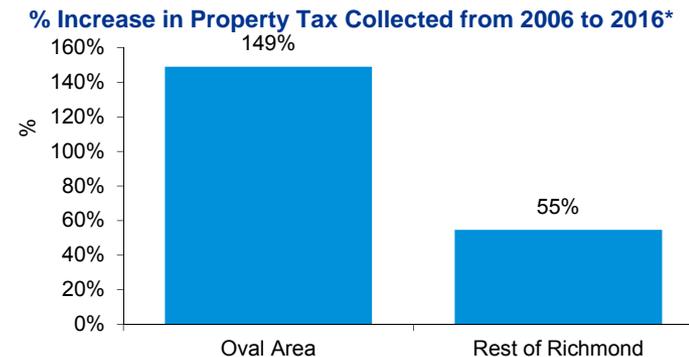
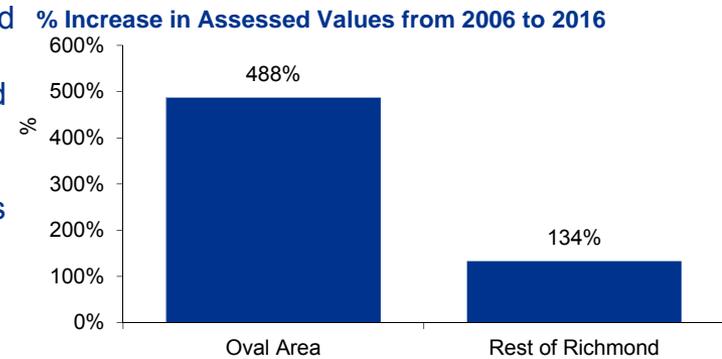
\$ 19.3+ Million
Property Tax Revenues for 2016

Assessed property values and tax revenues across all property tax classes collected from the Oval Area were examined for 2006 and 2016 to determine relative changes compared to the city of Richmond as a whole.

The assessed values in the Oval Area, as defined earlier, have increased significantly more than the rest of Richmond over that time period.

As a result of the increase in assessed values, property taxes collected from the Oval Area also grew significantly compared to the rest of Richmond.

*Property taxes collected include portions from municipal and external agencies (school district, transportation systems, and others). Municipal rates have increased at an annual rate of growth plus CPI, while external agencies have increased at higher rates over the same period.





Appendix A



RICHMOND OLYMPIC OVAL
ANNEAU OLYMPIQUE DE RICHMOND

Detailed Methodology and Sources of Data

Assessment	Tools	Key Sources of Data
Pre-Games Construction Impacts	BC Input-Output Model	<ul style="list-style-type: none"> Capital costs from City of Richmond
Tourism visitors during the 2010 Olympic and Paralympic Winter Games	Sport Tourism Economic Assessment Model	<ul style="list-style-type: none"> Information from Richmond Oval Communications and publicly available information; Richmond Commercial Accommodation Survey by Tourism Richmond
Ongoing Capital Investment	BC Input-Output Model	<ul style="list-style-type: none"> Capital investment and its breakdown from City of Richmond Finance and Richmond Oval Finance
Operations-related Impact	BC Input-Output Model	<ul style="list-style-type: none"> Most recent audited Income Statement from 2015 Annual Report
Sport Hosting Impact	Sport Tourism Economic Assessment Model	<ul style="list-style-type: none"> Information from Richmond Sport Hosting and data from a sample of host organizations
Change in assessed value and property taxes between 2006 and 2016	N/A	<ul style="list-style-type: none"> City of Richmond

KPMG has accepted the information as provided and has not audited or otherwise reviewed the quality or accuracy of the data. KPMG takes no responsibility for the quality or accuracy of this data.

KPMG has prepared this report based on information provided by the various sources as indicated. As such, KPMG's analyses are caveated on the quality and accuracy of such inputs and results should only be interpreted within the context of this Study.

Detailed Methodology

In developing this Study, two primary econometric tools, developed by two sources, are used:

- **Province of British Columbia** – BC Input-Output Model (“BCIOM”) selects Input-Output multipliers to assess the incremental effects of activities at the Oval, on the economy in British Columbia and Greater Vancouver. These multipliers reflect an average interdependence between industry and the Province’s economy, based on the type of activity under analysis;
- **Sport Alliance Canada** – Sport Tourism Economic Assessment Model (“STEAM”) calculates the incremental effects of visitors and tourism to British Columbia and Richmond, as a result of Sport Hosting events held at the Oval. The assumptions of visitor demographics are confirmed with the Oval, and expenditure profiles of such visitors are generated by the STEAM model.

The impacts measured by BCIOM and STEAM are defined as below:

- The **direct impact** measures the impact on BC industries supplying goods and services directly used by the project. Direct impacts for a typical construction project would include impacts in industries supplying goods and services such as cement, lumber, or engineering. Direct impacts from tourism visitors would include impacts on businesses that initially receive the operating revenue or tourist expenditures during the event, this includes hotels, restaurants, retail stores, transportation carriers, and attraction facilities.
- The **indirect (supplier industry) impact** measures the impact on BC industries that are further back in the supply chain. The indirect impact is cumulative, and includes transactions going all the way back to the beginning of the supply chain. Indirect impacts for a typical construction project would include impacts in industries supplying a wide range of goods and services, such as janitorial services, accounting, transportation, logging and mining. Indirect impacts from tourism visitors would include impacts from all immediate rounds of production in the supply of goods and services to industry sectors identified in the direct impact phase. For example, the supply and production of bed sheets to a hotel.
- The **induced impact** measures the effect that spending by workers (those employed by the project, or by direct and indirect supplier industries) has on the economy. Induced impacts for a typical construction project would include impacts in industries that sell goods and services to consumers (e.g., retailers, food services, accommodation and so on). Induced impacts from tourism visitors would include impacts from directly or indirectly from the initial expenditure. For example, impacts generated by hotel employees on typical consumer items.

Key Assumptions

Key assumptions were developed in order to generate impact results through each econometrics tool:

1. BC Input-Output Model:

- a) When assessing pre-Games construction impacts, assumptions were developed on the split on hard costs and soft costs identified from the capital cost breakdown provided by the City.
- b) When assessing ongoing capital investment, construction cost expenditures were assumed as repair construction, to reflect the fact that modifications to an existing structure involve different activities than completely new construction.
- c) When assessing operations-related impacts, assumptions were derived from line items of Oval financial statements in the 2015 annual report.

2. The Sport Tourism Economic Assessment Model calculates approximate value of economic impact from sport events on the basis of number of out of town, overnight participants and spectators, origin, and average length of overnight stays:

- a) When assessing tourism impacts from the 2010 Winter Games, tourism impacts from spectators were generated using publicly available information and information provided by the Oval. It was also assumed that the origin of spectators and average length of overnight stays are identical to those provided by the Richmond Commercial Accommodation Survey for February 2010, collected by Tourism Richmond.
- b) When assessing impacts from Sport Hosting events, visitor profile assumptions were developed based on a sample of event data collected from the respective host organizations. Events held at the Oval attracted various levels of attendance due to the diverse nature of the events. Estimates of expenditures of sport event visitors were based on Tourism Richmond data on typical daily expenditures.

The breakdown of the visitor profiles are presented on the following pages.

Key Assumptions - 2010 Winter Games

Spectators	Assumption
Number of unique out-of-town spectators	73,440
% of overnight spectators from Canada	53.30%
% of Canadian spectators travelling from out of town up to 320km, regardless of province of origin	7.13%
% of Canadian spectators travelling from more than 320km and the same province as the event	7.13%
% of Canadian spectators travelling from more than 320km and a different province as the event	85.74%
% of overnight spectators from U.S.	24.20%
% of overnight spectators from Overseas	22.50%
Average overnight length of stay	6.45

**Based on Richmond Commercial Accommodation Survey for February 2010 provided by Tourism Richmond.*

Key Assumptions – 2016 Sport Events – Participants

Participants	Regional Event	Provincial Event	National Event	International Event
Number of unique out-of-town participants	300	1,479	3,401	1,639
% of overnight participants from Canada	100%	98%	90%	6%
% of Canadian participants travelling from out of town up to 320km, regardless of province of origin	100%	50%	5%	0%
% of Canadian participants travelling from more than 320km and the same province as the event	0%	50%	15%	15%
% of Canadian participants travelling from more than 320km and a different province as the event	0%	0%	80%	85%
% of overnight participants from U.S.	0%	2%	10%	5%
% of overnight participants from Overseas	0%	0%	0%	89%
Average overnight length of stay	1.3	2.1	3.6	2.4

**Based on Sport Hosting events and sample event data provided by respective host organizations.*

Key Assumptions – 2016 Sport Events – Spectators

Spectators	Regional Event	Provincial Event	National Event	International Event
Number of unique out-of-town spectators	0	1,109	4,065	1,188
% of overnight spectators from Canada	100%	98%	90%	6%
% of Canadian spectators travelling from out of town up to 320km, regardless of province of origin	100%	50%	5%	0%
% of Canadian spectators travelling from more than 320km and the same province as the event	0%	50%	15%	15%
% of Canadian spectators travelling from more than 320km and a different province as the event	0%	0%	80%	85%
% of overnight spectators from U.S.	0%	2%	10%	5%
% of overnight spectators from Overseas	0%	0%	0%	89%
Average overnight length of stay	1.1	1.4	2.6	1.5

**Based on Sport Hosting events and sample event data provided by respective host organizations.*

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Appendix B



BC Input-Output Model Report

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BC Input-Output Model Report: Economic Impact of Richmond Oval Construction, Conversions and Operating Costs

PREPARED FOR KPMG CONSULTING
BY BC STATS – APRIL 2017



BC STATS 

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Background

This report summarizes the results of an input-output analysis of the economic impact of the construction, operation and recent capital improvements at the Richmond Oval.

The British Columbia Input-Output Model (BCIOM) was used to generate the estimates. The following section provides an overview of input-output analysis and explains some of the key concepts used in the BCIOM. A more detailed explanation of input-output modelling in general and the BCIOM in particular, including the assumptions underlying input-output analysis, is included in the Appendix.

About the BCIOM

The BCIOM can be used to determine the extent to which expenditures made by industries, consumers, or businesses (i.e., project-specific expenditures) affect overall economic activity in the province. This is done by tracing through the steps involved in producing goods and services that are purchased in the province. Data on the production, consumption and origin of goods and services comes from input-output (also called supply-use) tables for British Columbia which have been compiled by Statistics Canada.

Whether the input data represents consumer or producer spending, the results are reported in terms of the impact on British Columbia industries.

Three Types of Impacts

Three different types of impacts are calculated in an input-output analysis:

- The **direct impact** measures the impact on B.C. industries supplying goods and services directly used by the project. For example, direct impacts for a typical construction project would include impacts in industries supplying goods and services such as cement, lumber, or engineering.
- The **indirect (supplier industry) impact** measures the impact on B.C. industries that are further back in the supply chain. The indirect impact is cumulative, and includes transactions going all the way back to the beginning of the supply chain. Indirect impacts for a typical construction project would include impacts in industries supplying a wide range of goods and services, such as janitorial services, accounting, transportation, logging and mining.
- The **induced impact** measures the effect that spending by workers (those employed by the project, or by direct and indirect supplier industries) has on the economy. Induced impacts for a typical construction project would include impacts in industries

that sell goods and services to consumers (e.g., retailers, food services, accommodation and so on).

Key Measures of Economic Impacts

Output, gross domestic product, household income, employment and tax revenues are the key measures used to assess the economic impacts associated with a project. In order to properly interpret the results of a BCIOM analysis, some background information about what these measures represent and how they are calculated may be helpful. A brief explanation of terms and concepts follows.

Output

Output measures the total value of industry production in British Columbia that is associated with a project.

In an *industry-based analysis*, output is equal to the value of goods and services produced by the B.C. industry or industries that are affected by a specific project.

In an *expenditure-based analysis*, output is equal to total spending on goods and services produced in British Columbia.

Gross Domestic Product (GDP)

GDP is a measure of the value added (the unduplicated total value of goods and services) to the British Columbia economy by current productive activities attributable to the project. It includes household income (wages, salaries and benefits, as well as income earned by proprietors of unincorporated businesses) as well as profits and other income earned by corporations. Only activities that occur within the province are included in GDP.

Output or GDP: which measure should be used to evaluate economic impacts associated with a project?

Output and GDP are both valid economic measures. However, there are some important differences between them that should be kept in mind when analyzing or reporting on the results of an input-output analysis.

If one is only looking at direct effects, output is a meaningful measure since it shows the total dollar value of production associated with a particular project or industry. However, output data should not normally be used to describe the total impact of a project, since the value of goods or services used in production is counted each time a product changes hands.

For example, the selling price of newly-constructed housing includes the following imbedded costs:

- the cost of the land on which it is built;
- the cost of inputs (lumber, shingles, cement, carpets, paint, hardware, plumbing fixtures, architectural services and so on) purchased and used by the builder; and
- the value of the work done by the construction company that built the house.

The direct output of the construction industry would be the value of the finished house (the cost of the inputs used to build the house, plus the value of the work done by the construction company).

The indirect output impact would include:

- the value of the architectural services as an indirect impact on the engineering and architectural services industry;
- the value of the lumber as an indirect output impact on the wood industry;
- the value of the logs used by the sawmill as an indirect output impact on the logging industry; and
- similar impacts associated with other materials and services used in constructed

In this example, the value of the logs used to produce the building materials is counted at least three times: once in the direct output impact and twice in the indirect output impacts on the sawmill and logging industries. The value of goods or services used in production is counted in indirect output impacts every time a product changes hands.

GDP is calculated by subtracting the cost of purchased goods, services and energy from the total value of an industry's output. As a result, the value of the work done by a producing industry is only counted once.

In the construction example:

- the direct GDP impact would only include the value of the work done by the construction firm;
- the indirect GDP impact on the sawmill industry would only include the value of the work done to transform the logs into lumber; and
- the indirect GDP impact on the logging industry would be a measure of the value of the work done by the loggers.

Output measures correspond to total spending or production, but may overstate the economic impact of a project because the value of a good or service used in production is counted each time a product changes hands.

Relationship between GDP and Output

The relationship between GDP and output is a useful analytical measure since it shows the extent to which industries rely on labour and capital as opposed to material and service inputs in production. The analysis of economic impacts relies on this relationship, since output is more easily and directly measured than GDP. In fact, the starting point for most input-output analyses is a measure of the direct output associated with a project. From this, known relationships between output and other indicators such as GDP and employment can be used to estimate the economic impact associated with a specific project.

Household income

Household income includes wages, salaries and benefits (e.g., employer contributions to Employment Insurance (EI) and Canada Pension Plan (CPP)), as well as an estimate of mixed income received by self-employed workers or unincorporated businesses.

Employment

Two different employment estimates are presented in the report tables: employment (jobs) and full-time equivalent (FTE) measures.

The **employment** estimates reflect the wages paid and annual hours spent on the job by a typical worker in each industry. In an industry where most employees work full time, the numbers will be very similar to FTE counts. In an industry where part-time work is more common, the job counts will be quite different from FTEs.

The **full-time equivalent estimates** are calculated based on the assumption that a full-time employee works 35 hours a week, for 50 weeks of the year (a total of 1,750 hours a year). This assumption can be modified when the model is run. In an industry where workers typically spend more than 1,750 hours on the job annually, the FTE estimate will exceed the employment estimate. In an industry where workers typically spend less than 1,750 hours on the job, the FTE estimate will be less than the employment estimate.

Tax revenues

Government tax revenue estimates generated by the model include federal, provincial and local income and commodity taxes. The revenue estimates are calculated based on tax rates in effect in 2015.

In other words, there is no double counting in GDP measures. Indirect output impacts provide useful information about the total amount of money that has changed hands as goods and services are transformed into final products.

However, GDP is a better measure of the total economic impact since the value of the work done by each industry is attributed only to the producing industry, and is counted only once.

Provincial and federal tax revenues include federal and provincial personal and corporation income taxes. Also included are PST, GST and other **commodity** taxes. These include taxes on products (e.g., gas taxes, environmental taxes, liquor and lottery taxes and profits, air transportation taxes, duties and excise taxes) and taxes on factors of production (e.g., licences, permits, fees and property taxes).

Municipal tax revenues include taxes on products (primarily accommodation taxes) and taxes on production (business taxes, developer's fees, licences, permits, fees and property taxes).

Regional Impacts

The BCIOM is a provincial model, based on the structure of the British Columbia economy in 2011. Impact estimates are calculated at the provincial level.

Regional impact estimates reported in the model outputs are derived from the provincial impacts using information about the regional composition of the province's labour force in each industry. This information comes from two sources: the National Household Survey (NHS) and the Labour Force Survey (LFS). The NHS data are available for detailed geographies (development region, regional district, census subdivision, etc.) and industries. They show the composition and industrial structure of the province's work force in 2010. Information from the LFS is not as detailed (at either the industry or geography level), but is more timely than the NHS information (the current version of the model uses LFS data for 2014).

When calculating regional impacts, the NHS data for the selected region is extrapolated based on trends in the LFS data for the more aggregated region or industry. NHS-based estimates are then used to calculate the share of total British Columbia employment, by detailed industry, in the selected region. These shares are then applied to the detailed industry impacts generated by the model to estimate the percentage of total activity in each affected industry that could potentially be allocated to the study region. The regional shares are applied to the detailed industry impact estimates.

Information on the regional labour force and employment is used to determine whether the local area could potentially supply the number of workers needed by each industry affected by the project. For some industries (e.g., resource industries, construction, accommodation and food services), it is assumed that the pool of potentially available workers is not restricted to those who were previously employed in these industries. For other industries, the region's share of total employment is based on the existing pool of workers in the affected industry.

It is assumed that for each industry, the ratio of output to employment is consistent across regions. This assumption would not be reasonable if the ratios were applied to aggregate industries (e.g., manufacturing) because the output to employment ratio varies considerably within manufacturing industries. However, the regional ratios are calculated at the most detailed level possible (e.g., sawmills and wood preservation) for each industry, so inter-regional differences due to economic structure are less likely to be an issue.

Input Data

The results presented in this report are derived from information provided to BC Stats by KPMG Consulting. The data inputs used included details of the costs incurred when the facility was originally constructed prior to the 2010 Olympics, as well as information on subsequent capital improvements (conversion costs) to the facility, and data on annual operating expenditures.

The original construction of the facility, and subsequent conversion costs occurred over a number of years. In order to ensure that the results would be comparable, and consistent, the construction and conversion costs provided by the client were restated in 2015 dollars. This was done using implicit price indices (IPIs) for non-residential building construction and machinery and equipment, taken from System of National Accounts data for British Columbia. Each broad expenditure category was identified as either spending on non-residential building construction, or spending on machinery and equipment, and the appropriate IPI for each year (rebased to 2015) was used to convert the expenditures to 2015 dollars. Because the numbers are restated in 2015 dollars, the expenditure amounts used to shock the model are higher than the dollar amounts spent at the time the construction occurred. They are estimates of what it would have cost to build, or make improvements to, the facility using the same inputs in 2015.

The data provided by the client included detailed budget information for each of the main components of the construction project. This information was used to code the expenditures to the categories used in the BCIOM. Construction costing is usually categorized based on the various stages of the project (e.g., site preparation, excavation, underground services, structural and mechanical components, and so on). Each cost component includes labour, materials and purchased services. These are treated as separate costs in the BCIOM. Information from the BCIOM, together with the details included in the budget materials provided to BC Stats, was used to allocate the expenditures to the BCIOM categories used to shock the model. This involved estimating the labour, operating surplus, materials and service components included in each phase of the project using model information.

The results of this analysis are summarized in the following sections.

Summary of Results, Richmond Oval Construction

Project Expenditures (Restated in 2015 dollars)

The cost of constructing the Richmond Oval, restated in 2015 dollars, was \$197.1 million. The model analysis summarized below describes the economic impact that would be generated if these expenditures had been made in 2015. The model is based on the existing tax regime, so income tax and other revenues calculated by the model reflect current tax rates.

Of the \$197.1 million used to purchase goods and services for the project, it is estimated that \$23.7 million was spent on goods or services imported from other countries while \$18.0 million was used to purchase goods or services imported from the rest of Canada. The value of goods withdrawn from inventories held by producers is estimated at \$2.5 million.

TABLE 1: ALLOCATION OF PROJECT EXPENDITURES

Allocation of Project Expenditures Construction				
Total construction expenditures (\$M)				197.1
<i>minus leakages:</i>				
<i>imports from other countries</i>				23.7
<i>imports from other provinces</i>				18.0
<i>other leakages (e.g. withdrawals from inventory)</i>				2.5
<i>Equals:</i>				
Purchases of goods & services (including labour and profits) produced in BC (\$M)				152.8
<i>Of which:</i>				
<i>Wages, benefits, mixed income and operating surplus (\$M)</i>				59.6
<i>Taxes on products net of subsidies (\$M)</i>				5.2
<i>Taxes on factors of production net of subsidies (\$M)</i>				1.8
Direct BC supply (\$M)				86.3
<i>(the change in BC supplier industry output associated with construction)</i>				
Project employment, construction (#)				653
Household income, construction (\$M)				49.1
Tax revenue derived from direct project expenditures Construction				
	Federal	Provincial	Local	Total
Total, all sources	7.8	8.8	1.1	17.7
Taxes on products (\$M)*	0.0	5.2	0.0	5.2
Taxes on factors of production (\$M)	0.0	0.7	1.1	1.8
Personal income taxes (\$M)	7.0	2.5		9.5
Corporate income taxes (\$M)	0.8	0.4		1.2
<i>(income taxes paid on worker's wages and returns to capital reported in project expenditure)</i>				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Purchases of goods and services produced in British Columbia (including profits and wages paid to workers) are estimated at \$152.8 million. This amount includes \$59.6 million in wages, benefits, and operating surplus and an estimated \$7.0 million in taxes net of subsidies on products and factors of production. Personal income tax revenues associated with direct expenditures are estimated at \$9.5 million.

The direct BC supply (the change in BC industry output associated with construction of the Richmond Oval is estimated at \$86.3 million. This is the amount that was used to shock the model.

Summary of Results

For an \$86.3 million change in B.C. industry output (primarily manufacturing and professional, scientific and technical services used by the construction project), it is estimated that another \$46.8 million of output would be generated in industries further back in the supply chain, with an additional \$30.8 million of output associated with spending by workers.

In addition to the project's direct GDP of \$61.3 million¹, another \$44.5 million in GDP is attributable to the activities of direct suppliers, with \$20.2 million coming from industries further back in the supply chain. The GDP impact associated with spending by workers is estimated at \$19.2 million.

The \$197.1 million of construction expenditures would provide 653 jobs for people working directly on the project, with another 484 jobs in supplier industries such as manufacturing and engineering services. The activities of industries further back in the supply chain would support an additional 213 jobs, with 189 jobs associated with spending by workers.

Tax revenue impacts are estimated at \$34.5 million. This amount includes \$17.7 million directly generated by the construction activities, with another \$13.4 million associated with supplier industries and \$3.4 million resulting from spending by workers. It should be noted that the allocation of tax revenue estimates by level of government is based on provincial averages for the model year.

Table 2 summarizes the results of the BCIOM analysis.

¹ Note that this amount includes \$1.8 million in taxes net of subsidies on factors of production.

TABLE 2: SUMMARY OF RESULTS

Richmond Oval Construction Costs (Restated in 2015 dollars)
Construction

Total impact, including Construction, supplier industry & induced effects					
	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total project expenditures, Construction (\$M)	197.1				
Supplier industry & induced impacts (\$M)	86.3	46.8	133.1	30.8	163.9
GDP at basic prices (\$M)					145.2
Construction***	61.3				61.3
Supplier industry & induced impacts	44.5	20.2	64.7	19.2	83.9
Employment (#)****					1,538
Construction (Model estimate)	653				653
Supplier industry & induced impacts	483	213	697	189	885
Employment (FTES)					1,609
Construction (Model estimate)	728				728
Supplier industry & induced impacts	494	214	707	173	881
Household income (\$M)					108.8
Construction	49.1				49.1
Supplier industry & induced impacts	33.1	12.8	45.9	13.9	59.7
Average annual household income (\$ per employee)					
Construction	75,233				
Supplier industry & induced impacts *****	68,405	59,980	65,830	46,617	67,450
Tax revenue (\$M)					34.5
Construction	17.7				17.7
Supplier industry & induced impacts	8.9	4.4	13.4	3.4	16.8

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2013. Includes total employment over the life of the project

***** Average household income (induced impact) is based on income excluding imputed rent estimate

Table 3 shows, in more detail, the indirect and induced impacts associated with the direct BC supply.

TABLE 3: INDIRECT AND INDUCED IMPACTS

Indirect & Induced Impacts resulting from Construction expenditures					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced Impact**	Total indirect & induced impacts
Output (\$M)	86	47	133	31	164
GDP at basic prices* (\$M)	45	20	65	19	84
Employment (#)*	483	213	697	189	885
FTEs (#)	494	214	707	173	881
Household income (\$M)	33	13	46	14	60
Total tax revenue (\$M)	8.9	4.4	13.4	3.4	16.8
Federal (\$M)	5.5	2.4	7.8	1.6	9.5
<i>Personal income tax</i>	4.6	1.8	6.4	1.3	7.7
<i>Corporation income tax</i>	0.7	0.5	1.2	0.3	1.5
<i>Net taxes on products</i>	0.1	0.1	0.2	0.1	0.2
Provincial (\$M)	3.0	1.7	4.8	1.1	5.9
<i>Personal income tax</i>	1.7	0.6	2.3	0.5	2.8
<i>Corporation income tax</i>	0.4	0.3	0.7	0.2	0.9
<i>Net taxes on products</i>	1.0	0.8	1.8	0.5	2.3
Local (\$M)	0.4	0.4	0.8	0.7	1.4

* Includes wages, benefits, mixed income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impacts

The regional impacts associated with the construction project are most significant in the Greater Vancouver area. In addition to those directly employed on the construction site, it is estimated that 345 of the direct supplier industry jobs, and 124 of the jobs in industries further back in the supply chain, would be in the local area, for a total supplier industry employment impact of 469. Another 228 jobs (138 in direct suppliers and 89 in indirect supplier industries) would be supported in other parts of the province.

It should be noted that the regional impact estimates are calculated based on the assumption that local suppliers will provide at least 40% of the goods and services that could potentially be purchased in the local area, provided that these suppliers have the capacity to do so.

TABLE 4: REGIONAL IMPACTS

**Regional Impact Estimates based on Supplier Industry Output,
Census Employment Data, and Labour Force Statistics
(experimental data)**

Estimated Impact, Supplier Industries in Greater Vancouver					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	65.4	25.1	90.5	18.2	108.7
Total GDP (\$M)	33.6	11.0	44.5	11.4	55.9
Total household income (\$M)	24.2	7.3	31.4	8.2	39.6
Total employment	345	124	469	110	579

Estimated Impact in Rest of BC					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	20.9	21.7	42.6	12.6	55.2
Total GDP (\$M)	11.0	9.2	20.2	7.8	28.0
Total household income (\$M)	8.9	5.5	14.4	5.7	20.1
Total employment	138	89	228	79	307

Summary of Results, Richmond Oval Conversion Costs

In contrast to the analysis of the Richmond Oval construction project (where construction costs were itemized and treated as direct project expenditures) for the conversion projects it was assumed that all of the construction activity would be subcontracted. The construction cost expenditures were treated as repair construction, to reflect the fact that modifications to an existing structure involve different activities than completely new construction. For example, modifications normally do not involve activities such as excavation. They tend to be somewhat more labour intensive than new building construction.

Project Expenditures (Restated in 2015 dollars)

TABLE 5: ALLOCATION OF PROJECT EXPENDITURES

Allocation of Project Expenditures Conversion Costs				
Total conversion costs expenditures (\$M)				40.0
<i>minus leakages:</i>				
<i>imports from other countries</i>				11.1
<i>imports from other provinces</i>				1.1
<i>other leakages (e.g. withdrawals from inventory)</i>				0.2
<i>Equals:</i>				
Purchases of goods & services (including labour and profits) produced in BC (\$M)				27.7
<i>Of which:</i>				
<i>Wages, benefits, mixed income and operating surplus (\$M)</i>				0.0
<i>Taxes on products net of subsidies (\$M)</i>				0.1
<i>Taxes on factors of production net of subsidies (\$M)</i>				0.0
Direct BC supply (\$M)				27.5
<i>(the change in BC supplier industry output associated with conversion costs)</i>				
Project employment, conversion costs (#)				0
Household income, conversion costs (\$M)				0.0
Tax revenue derived from direct project expenditures Conversion Costs				
	Federal	Provincial	Local	Total
Total, all sources	0.0	0.1	0.0	0.1
Taxes on products (\$M)*	0.0	0.1	0.0	0.1
Taxes on factors of production (\$M)	0.0	0.0	0.0	0.0
Personal income taxes (\$M)	0.0	0.0		0.0
Corporate income taxes (\$M)	0.0	0.0		0.0
<i>(income taxes paid on worker's wages and returns to capital reported in project expenditure)</i>				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

The cost of the Richmond Oval Conversion Costs, restated in 2015 dollars, was \$40.0 million. The model analysis summarized in this section describes the economic impact that would be generated if these expenditures had been made in 2015. The model is based on the existing tax regime, so income tax and other revenues calculated by the model reflect current tax rates.

Of the \$40.0 million used to purchase goods and services for the project, it is estimated that \$11.1 million was spent on goods or services imported from other countries while \$1.1 million was used to purchase goods or services imported from the rest of Canada. The value of goods withdrawn from inventories held by producers is estimated at \$0.2 million.

Purchases of goods and services produced in British Columbia are estimated at \$27.7 million. This amount includes \$0.1 million in taxes net of subsidies on products and factors of production and \$27.5 million spent on repair construction contracts and other purchases of goods and services produced by British Columbia industries. This is the amount that was used to shock the model.

Summary of Results

Table 6 summarizes the results of the BCIOM analysis.

TABLE 6: SUMMARY OF RESULTS

Richmond Oval Conversion Cost (Restated in 2015 dollars)
Conversion Costs

Total impact, including Conversion Costs, supplier industry & induced effects					
	Direct	Other suppliers	Total Indirect*	Induced**	Total impact
Total project expenditures, Conversion Costs (\$M)	40.0				
Supplier industry & induced impacts (\$M)	27.5	10.0	37.5	4.9	42.4
GDP at basic prices (\$M)					22.8
Supplier industry & induced impacts	15.1	4.7	19.7	3.0	22.8
Employment (#)****					272
Supplier industry & induced impacts	179	62	242	30	272
Employment (FTES)					283
Supplier industry & induced impacts	195	60	255	28	283
Household income (\$M)					19
Supplier industry & induced impacts	13	3	17	2	19
Average annual household income (\$ per employee)					
Supplier industry & induced impacts *****	74,315	52,195	68,610	46,617	69,140
Tax revenue (\$M)					5.3
Supplier industry & induced impacts	3.6	1.0	4.6	0.5	5.2

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2013. Includes total employment over the life of the project

***** Average household income (induced impact) is based on income excluding imputed rent estimate

For a \$27.5 million change in B.C. industry output (primarily construction services), it is estimated that another \$10.0 million of output would be generated in industries supplying goods and services used by the construction project, with an additional \$4.9 million of output associated with spending by workers.

The direct GDP in supplier industries (primarily construction) is estimated at \$15.1 million, with another \$4.7 million in GDP attributable to industries further back in the supply chain. The GDP impact associated with spending by workers is estimated at \$3.0 million.

The estimated conversion expenditures would support 179 jobs, most (168) of which would be in construction activities. Another 62 jobs would be supported in industries further back in the supply chain, while 30 jobs would be supported in industries benefitting from spending by workers.

The tax revenue impacts are estimated at \$5.3 million, including \$3.6 million directly associated with conversion expenditures, and \$1.0 million associated with activities in industries further back in the supply chain. The induced impact, generated by worker spending, is estimated at \$0.5 million. It should be noted that the allocation of tax revenue estimates by level of government is based on provincial averages for the model year.

Table 7 shows, in more detail, the indirect and induced impacts associated with the direct BC supply.

TABLE 7: INDIRECT AND INDUCED IMPACTS

Indirect & Induced Impacts resulting from Conversion Cost expenditures					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced Impact**	Total indirect & induced impacts
Output (\$M)	28	10	38	5	42
GDP at basic prices* (\$M)	15	5	20	3	23
Employment (#)*	179	62	242	30	272
FTEs (#)	195	60	255	28	283
Household income (\$M)	13	3	17	2	19
Total tax revenue (\$M)	3.6	1.0	4.6	0.5	5.2
Federal (\$M)	2.2	0.6	2.7	0.3	3.0
<i>Personal income tax</i>	2.0	0.4	2.5	0.2	2.7
<i>Corporation income tax</i>	0.1	0.1	0.2	0.0	0.3
<i>Net taxes on products</i>	0.0	0.0	0.0	0.0	0.0
Provincial (\$M)	1.4	0.4	1.8	0.2	1.9
<i>Personal income tax</i>	0.7	0.2	0.9	0.1	1.0
<i>Corporation income tax</i>	0.1	0.1	0.1	0.0	0.1
<i>Net taxes on products</i>	0.6	0.1	0.8	0.1	0.8
Local (\$M)	0.1	0.1	0.2	0.1	0.3

* Includes wages, benefits, mixed income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impacts

The regional impacts associated with the conversion projects are most significant in the Greater Vancouver area. It is estimated that 176 of the direct supplier industry jobs, and 36 of the jobs in industries further back in the supply chain, would be in the local area, for a total supplier industry employment impact of 213. Another 29 jobs (3 in direct suppliers and 26 in indirect supplier industries) would be supported in other parts of the province.

It should be noted that the regional impact estimates are calculated based on the assumption that local suppliers will provide at least 40% of the goods and services that could potentially be purchased in the local area, provided that these suppliers have the capacity to do so.

TABLE 8: REGIONAL IMPACTS

**Regional Impact Estimates based on Supplier Industry Output,
Census Employment Data, and Labour Force Statistics
(experimental data)**

Estimated Impact, Supplier Industries in Greater Vancouver					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	27.1	5.6	32.8	2.9	35.6
Total GDP (\$M)	14.9	2.7	17.6	1.8	19.4
Total household income (\$M)	13.2	1.9	15.1	1.3	16.4
Total employment	176	36	213	17	230

Estimated Impact in Rest of BC					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	0.4	4.4	4.8	2.0	6.8
Total GDP (\$M)	0.2	2.0	2.2	1.2	3.4
Total household income (\$M)	0.2	1.4	1.5	0.9	2.4
Total employment	3	26	29	13	41

Summary of Results, Richmond Oval Operating Costs

Operating Costs in 2015

Annual operating expenditures for the Richmond Oval are estimated at \$13.2 million in 2015. Of this total, it is estimated that \$0.3 million was spent on goods or services imported from other countries while \$0.6 million was used to purchase goods or services imported from the rest of Canada.

TABLE 9: ALLOCATION OF PROJECT EXPENDITURES

Allocation of Project Expenditures Operating expenditures (2015)				
Total opex expenditures (\$M)				13.2
<i>minus leakages:</i>				
<i>imports from other countries</i>				0.3
<i>imports from other provinces</i>				0.6
<i>other leakages (e.g. withdrawals from inventory)</i>				0.0
<i>Equals:</i>				
Purchases of goods & services (including labour and profits) produced in BC (\$M)				12.3
<i>Of which:</i>				
<i>Wages, benefits, mixed income and operating surplus (\$M)</i>				7.9
<i>Taxes on products net of subsidies (\$M)</i>				0.1
<i>Taxes on factors of production net of subsidies (\$M)</i>				0.0
Direct BC supply (\$M)				4.4
<i>(the change in BC supplier industry output associated with opex)</i>				
Project employment, operating expenditures (2015) (#)				300
Household income, operating expenditures (2015) (\$M)				7.9
Tax revenue derived from direct project expenditures Operating expenditures (2015)				
	Federal	Provincial	Local	Total
Total, all sources	1.1	0.4	0.0	1.5
Taxes on products (\$M)*	0.0	0.1	0.0	0.1
Taxes on factors of production (\$M)	0.0	0.0	0.0	0.0
Personal income taxes (\$M)	1.1	0.4		1.4
Corporate income taxes (\$M)	0.0	0.0		0.0
<i>(income taxes paid on worker's wages and returns to capital reported in project expenditure)</i>				

*Small differences between this figure and the value for taxes on products net of subsidies reported in the allocation of project expenditure are due to rounding and/or the inclusion of net taxes paid on some goods purchased by subcontractors which are not reflected in the indirect & induced impacts given below.

Purchases of goods and services produced in British Columbia are estimated at \$12.3 million. This amount includes \$0.1 million in taxes net of subsidies on products and factors of production and \$7.9 million in wages and benefits paid to workers. Federal, provincial and local government revenues associated with the operating costs are estimated at \$1.5 million,

most (\$1.4 million) of which is an estimate of income taxes paid by workers. Purchases of goods and services produced by B.C. industries are estimated at \$4.4 million. This is the amount that was used to shock the model to determine the overall impact of operating costs on the provincial economy.

Summary of Results

Table 10 summarizes the results of the BCIOM analysis.

TABLE 10: SUMMARY OF RESULTS

Richmond Oval Operating expenditures (2015)

	Total impact, including Opex, supplier industry & induced effects				Total impact
	Direct	Other suppliers	Total Indirect*	Induced**	
Total project expenditures, Opex (\$M)	13.2				
Supplier industry & induced impacts (\$M)	4.4	2.5	6.9	2.5	9.4
GDP at basic prices (\$M)					12.5
Opex***	7.9				7.9
Supplier industry & induced impacts	1.9	1.2	3.1	1.6	4.7
Employment (#)****					358
Opex (Model estimate)	300				300
Supplier industry & induced impacts	25	17	43	15	58
Employment (FTES)					311
Opex (Model estimate)	256				256
Supplier industry & induced impacts	24	16	40	14	54
Household income (\$M)					11.2
Opex	7.9				7.9
Supplier industry & induced impacts	1.3	0.8	2.2	1.1	3.3
Average annual household income (\$ per employee)					
Opex	26,213				
Supplier industry & induced impacts *****	53,395	47,805	51,105	46,617	57,010
Tax revenue (\$M)					2.4
Opex	1.5				1.5
Supplier industry & induced impacts	0.4	0.3	0.7	0.3	0.9

* The total indirect impact is the sum of the effect on direct suppliers and other supplier industries

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

*** Project expenditure data provided by clients may not include all components of GDP (e.g., operating surplus)

**** Employment estimates are based on average annual wages in 2013. Includes total employment over the life of the project

***** Average household income (induced impact) is based on income excluding imputed rent estimate

The direct GDP associated with the operation of the Richmond Oval is estimated at \$7.9 million, which is equal to the wage bill in this case.

Another \$1.9 million in GDP is associated with the activities of supplier industries that provide goods and services used by the Richmond Oval, with another \$1.2 million of GDP

attributable to activities in industries further back in the supply chain. An additional \$1.6 million of GDP is associated with activities in industries benefitting from spending by workers.

The number of jobs associated with a wage bill of \$7.9 million in the amusement and recreation industry is estimated at 300. It should be noted that this figure was derived based on average annual wages in the industry, which are relatively low (\$26,213). Annual wages reflect both average hourly remuneration, and average number of hours spent on the job in each industry. If wages at the Richmond Oval are higher than this, the employment numbers may be overstated.

In addition to the direct employment at the Richmond Oval, another 25 jobs are supported in industries supplying goods and services used by the Richmond Oval, while 17 jobs are supported in industries further back in the supply chain. The induced employment impact is estimated at 15.

Tax revenue impacts are estimated at \$2.4 million, including \$1.5 million directly associated with operating costs, and \$0.7 million associated with activities in industries further back in the supply chain. The induced impact, generated by worker spending, is estimated at \$0.3 million. It should be noted that the allocation of tax revenue estimates by level of government is based on provincial averages for the model year.

Table 11 shows, in more detail, the indirect and induced impacts associated with the direct BC supply.

TABLE 11: INDIRECT AND INDUCED IMPACTS

Indirect & Induced Impacts Resulting from Operating Expenditures					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced Impact**	Total indirect & induced impacts
Output (\$M)	4.4	2.5	6.9	2.5	9.4
GDP at basic prices* (\$M)	1.9	1.2	3.1	1.6	4.7
Employment (#)*	25.1	17.4	42.6	15.3	57.9
FTEs (#)	24	16	40	14	54
Household income (\$M)	1.3	0.8	2.2	1.1	3.3
Total tax revenue (\$M)	0.4	0.3	0.7	0.3	0.9
Federal (\$M)	0.2	0.1	0.4	0.1	0.5
<i>Personal income tax</i>	<i>0.2</i>	<i>0.1</i>	<i>0.3</i>	<i>0.1</i>	<i>0.4</i>
<i>Corporation income tax</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.1</i>
<i>Net taxes on products</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>
Provincial (\$M)	0.2	0.1	0.3	0.1	0.3
<i>Personal income tax</i>	<i>0.1</i>	<i>0.0</i>	<i>0.1</i>	<i>0.0</i>	<i>0.1</i>
<i>Corporation income tax</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>	<i>0.0</i>
<i>Net taxes on products</i>	<i>0.1</i>	<i>0.0</i>	<i>0.1</i>	<i>0.0</i>	<i>0.2</i>
Local (\$M)	0.0	0.0	0.1	0.1	0.1

* Includes wages, benefits, mixed income, operating surplus and net taxes on factors of production

** Assumes a social safety net is in place. Includes effects generated by project spending and activities of supplier industries

Regional Impacts

The regional impacts associated with operating costs are most significant in the Greater Vancouver area. In addition to the estimated 300 jobs at the Richmond Oval, 18 of the direct supplier industry jobs, and 10 of the jobs in industries further back in the supply chain would be in the local area, for a total supplier industry employment impact of 28. Another 14 jobs (7 in direct and 7 in indirect supplier industries) would be supported in other parts of the province.

It should be noted that the regional impact estimates are calculated based on the assumption that local suppliers will provide at least 40% of the goods and services that could potentially be purchased in the local area, provided that these suppliers have the capacity to do so.

TABLE 12: REGIONAL IMPACTS

**Regional Impact Estimates based on Supplier Industry Output,
Census Employment Data, and Labour Force Statistics
(experimental data)**

Estimated Impact, Supplier Industries in Greater Vancouver					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	3.2	1.5	4.7	1.5	6.2
Total GDP (\$M)	1.4	0.7	2.1	0.9	3.0
Total household income (\$M)	1.0	0.5	1.5	0.7	2.1
Total employment	18	10	28	9	37

Estimated Impact in Rest of BC					
	Direct suppliers	Other suppliers	Total indirect impact (all suppliers)	Induced	Total indirect & induced
Total output (\$M)	1.1	1.0	2.2	1.0	3.2
Total GDP (\$M)	0.6	0.5	1.1	0.6	1.7
Total household income (\$M)	0.4	0.3	0.7	0.5	1.2
Total employment	7	7	14	6	21

Interpreting the BCIOM Results

BCIOM model results are summarized in the tables included in this report. This section explains how some of the variables are calculated.

Variables that are derived from information supplied by clients

Allocation of Project Expenditures

The information summarized in Table 1 (allocation of expenditures) is calculated directly from data supplied by the client. Total project expenditure is usually provided by the client, and includes all direct expenditures associated with the project. The expenditure data are first coded to BCIOM commodities (goods and services). Model information is then used to break down the expenditures (by commodity) into the following categories:

- Leakages: purchases of goods and services that have been imported into British Columbia from other provinces or countries (import leakages) or withdrawn from inventories held by businesses (inventory leakages);
- Taxes net of subsidies on products and factors of production (included in the purchase price of goods and services used by the project);
- Wages paid to workers directly hired by the project;
- Purchases of goods and services made in British Columbia (the direct B.C. supply); and
- Purchases of existing assets.

Leakages

Some types of expenditures do not generate any economic impacts in the province. For example, the jobs, GDP and tax revenues associated with the production of goods and services that have been imported into British Columbia are attributable to the province or country where those goods or services are produced. In the case of goods withdrawn from inventories held by businesses, the jobs, GDP and tax revenues associated with their production would have been generated in the period in which those goods were produced. Estimated leakages (imports and inventory withdrawals) are generated from model information about BC production of each commodity, and the value of imports of each commodity, in the model year. These leakages are deducted from project expenditure data when determining the direct B.C. supply.

Taxes net of subsidies on products and factors of production

Taxes on products are a transfer from consumers (or businesses) to government, but there is no direct economic activity generated by these taxes. Similarly, subsidies represent a

transfer from government to business, and do not directly generate economic impacts. Taxes and subsidies on products and factors of production directly associated with project expenditures were calculated using effective tax rates for each good or service used by the project. This amount is included in the net tax revenue directly generated by the project.

All of the tax revenue impacts have been calculated based on the current tax structure, which assumes a PST of 7% is applied to items subject to the tax.

Wages paid to workers directly hired by the project

Labour costs for the project are assumed to include pre-tax wages, salaries and benefits (e.g., the employer's share of contributions to EI or CPP). Wages do not include embedded costs such as transportation or accommodation costs for workers at remote job sites.

Wages paid to workers directly hired by the project are used to estimate project direct employment, federal and provincial income tax revenues, and induced expenditures directly generated by the project. However, they are not part of the Direct B.C. Supply, a measure which only includes industry output (wages are not produced by industries, they are paid to individuals).

Income tax revenues are calculated by estimating income taxes associated with a given wage.

Similarly, if the input data supplied by the client includes an estimate of operating surplus, this amount is used to estimate federal and provincial corporate income tax revenues. However, it is not part of the Direct B.C. Supply since profits, like wages, are not produced by a particular industry. Instead, they are a payment for the use of capital in production.

Direct B.C. Supply

The direct B.C. supply is the change in output in all British Columbia industries directly supplying goods and services used by the project. This value is calculated by deducting leakages, taxes and wages paid to workers directly hired by the project from the expenditure data. It is used to shock the model in order to determine supplier industry and induced impacts.

Purchases of existing assets

The purchase cost of land, existing buildings, infrastructure or transfers of other assets (such as financial assets) represents a transfer of ownership from one agent to another. There are no current jobs or GDP associated with the value of these transactions. The only current economic activity associated with the transfer relates to the value of the work done by real estate agents, lawyers, or others involved in expediting or recording the transfer that has occurred.

If they are included in the input data, expenditures related to purchases of existing assets are deducted from the input data before any of the coding is done.

Retail, wholesale and transportation margins

Costs embedded in the final selling price of each commodity (e.g., transportation, wholesaling and retailing services) are identified, and allocated to the appropriate industry using information in the model.

Project Direct GDP Estimates

Project direct GDP figures are derived from information provided by clients. These figures are usually project-specific, but they are not always based on complete information. For example, it is often possible to get good data on wages and salaries associated with a project or activity. Labour costs are the largest component of GDP, but other variables which ought to be included in the estimate (such as operating surplus) are not always known. When the GDP figures generated by the BCIOM are based on partial information, they may understate the project's direct contribution to GDP.

Project Direct Employment and Household Income

Project direct employment is derived based on the project's wage bill and estimates of average annual wages in the affected industry. In some cases, the reported project direct employment estimates have been supplied by clients.

Employment estimates generated by the model are derived from estimated wage costs using data on average annual wages and hours worked in each industry in 2013 (the latest year for which this information was available when the model was last updated). In some industries, most workers are employed full time, but in others (e.g., accommodation and food services) the typical work week is usually shorter.

The model output also includes full-time equivalent (FTE) estimates, calculated using the assumption that a full-time employee would work 1,750 hours per year (50 weeks, at 35 hours per week).

Household income is calculated based on project direct wages, benefits and mixed income.

The reported project direct GDP is based on input data provided by clients. Corporation profits (normally included in GDP) and associated corporate income tax revenues are only included in the reported direct expenditures if this information has been supplied by clients, or if the input data used was based on model averages.

BCIOM impact estimates

The model is shocked using the direct BC supply calculated from the information provided by the client. The total economic impact of the project on the BC economy is reported in terms of direct, indirect and induced impacts. The results of the model shock are summarized in Tables 2 and 3.

Direct supplier industry impacts

The direct supplier industry impact measures the change in economic activity in British Columbia industries that is required to satisfy the initial change in demand.

The direct output impact is equal to the direct BC supply-the change in the economic activity of the industries producing the goods and services purchased by the project.

The direct GDP impact is the GDP generated as a result of the activities of the industries that produce the goods and services directly used by the project.

The direct employment impact shows total employment in these industries, and the direct household income impact is a measure of the wages, salaries, benefits and other income earned by these workers.

The direct tax revenue impact includes personal, corporation, sales and other taxes generated as a result of the activities of the industries that supply the goods and services used by the project.

The allocation of tax revenues to federal, provincial and local governments is based on model information.

Other supplier industry impacts

Other supplier industry impacts measure the cumulative impact on B.C. industries that are further back in the supply chain. This includes industries producing goods and services used by direct suppliers.

Induced Impacts

The induced effect, which measures the impact associated with expenditures by workers (those directly employed by the project as well as workers in supplier industries), includes purchases of a variety of goods and services, including housing.

For the calculation of induced impacts, it is assumed that 80% of workers' earnings will be used to purchase goods and services in the province (the remaining 20% goes to taxes, payroll deductions, and savings).

BC STATS

It is assumed that a social safety net is in place, and that workers who are newly hired as a result of the project previously had some income from EI or other safety net programs.

Appendix

Some Background on Input-Output Models and Analysis

Input-output analysis is based on statistical information about the flow of goods and services among various sectors of the economy. This information, presented in the form of tables, provides a comprehensive and detailed representation of the economy for a given year. An input-output model is essentially a database showing the relationship between commodity usage and industry output. It consists of three components:

- a table showing which commodities-both goods and services-are consumed by each industry in the process of production (the input matrix)
- a table showing which commodities are produced by each industry (the output matrix)
- a table showing which commodities are available for consumption by final users (the final demand matrix).

These data are combined into a single model of the economy that can be solved to determine how much additional production is generated by a change in the demand for one or more commodities or by a change in the output of an industry. Changing the usage or production of a commodity or group of commodities is often referred to as shocking the model. The known relationship between goods and services in the economy is used to generate an estimate of the economic impact of such a change.

If a change in demand is met by increasing or decreasing imports from other jurisdictions, there is no net effect on domestic production. All of the benefits or costs associated with employment generation or loss, and other economic effects, will occur outside the region. Therefore, it is important to identify whether or not a change in the demand for a good or service is met inside or outside a region.

Assumptions and Caveats

Commodities made in BC have a much bigger impact than those imported into the province. The analysis presented here is based on using default import ratios for most commodities: i.e., assuming they are purchased locally, but allowing for the fact that they may have been manufactured elsewhere.

All tax data were generated using the model structure, and are based on averages for an industry or commodity.

Economic modelling is an imprecise science, and the precision of the figures in the tables should not be taken as an indication of their accuracy.

The British Columbia Input-Output Model

The BCIOM is based on 2011 data. It is derived from inter-provincial input-output tables developed by Statistics Canada and includes details on 481 commodities, 235 industries, 280 "final demand" categories, and a set of computer algorithms to do the calculations required for the solution of the model. It can be used to predict how an increase or a decrease in demand for the products of one industry will have an impact on other industries and therefore on the entire economy.

Limitations and Caveats Associated with Input-Output Analysis

Input-output analysis is based on various assumptions about the economy and the inter-relationships between industries. These assumptions are listed below:

Input-output models are linear. They assume that a given change in the demand for a commodity or for the outputs of a given industry will translate into a proportional change in production.

Input-output models do not take into account the amount of time required for changes to happen. Economic adjustments resulting from a change in demand are assumed to happen immediately.

It is assumed that there are no capacity constraints and that an increase in the demand for labour will result in an increase in employment (rather than simply re-deploying workers).

It is assumed that consumers spend an average of 80% of their personal income on goods and services. The remaining 20% of personal income is consumed by taxes, or goes into savings.

The BCIOM is based on a "snapshot" of the BC economy in 2011. It is assumed that relationships between industries are relatively stable over time, so that the 2011 structure of the economy continues to be applicable today. However, it should be noted that employment estimates have been adjusted to reflect wage levels for the year of the expenditures in each case.

BC STATS

BC Stats is the provincial government's leader in statistical and economic research, information and analysis essential for evidence-based decision-making. BC Stats, the central statistics agency of government, is excited to be taking a lead role in the strategic understanding of data sources and analysis across government. The goal is to increase overall business intelligence—information decision makers can use. As part of this goal, BC Stats is also developing an organizational performance measurement program. For more information, please contact Elizabeth Vickery.



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