

**FOCUS ON
JOBS &
INNOVATION
REPORT #1**

HIGH IMPACT

The Importance of Natural Resources to the Economy of British Columbia

Philip Cross

April 2014



Resource Works

JOBS FOR BC. INNOVATION FOR THE WORLD.

High Impact

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A project of the Resource Works Society

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About the Author

Philip Cross spent 36 years at Statistics Canada, the last few as its Chief Economic Analyst. He has written extensively on the natural resource sector, with over a dozen articles just in the last decade appearing in Statistics Canada's flagship publication for economics, the Canadian Economic Observer. Since leaving government, he has continued to study the natural resource sector in three papers for the Macdonald-Laurier Institute. He is a founding Senior Research Fellow of the Resource Works Society.



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High Impact: The Importance of Natural Resources on the Economy of BC

Executive Summary

Since 2003, natural resources have returned to the forefront of growth in the Canadian economy—throughout Canada. Yet many Canadians view resources as irrelevant to their everyday lives, believing they benefit mostly rural areas close to mines, forests, farms or the sea. In British Columbia, the attitude of many is that resource development is a matter for the interior and northern regions, and only of tangential interest to residents of the Lower Mainland centred on Vancouver.

On the contrary, this report shows that the benefits of resource development are province-wide. It summarizes the results of Statistics Canada's Input/Output model that details how an initial boost to natural resources in BC spreads to other industries through increased demand for inputs or more spending induced by higher incomes. The income and jobs this generates enrich all regions of BC, especially the Lower Mainland. It is the cities that provide the wide range of financial, business and even transportation services used by the resource sector. It is also in the cities where the higher incomes in the resource sector and its spin-off industries are spent on a wide range of retail and personal services.

This paper explains how the study was conducted, and details its finding that every industry and region in BC benefits in higher GDP and employment from resource extraction. Some readers may want to skip the more technical component to focus on the main results. A companion paper examines how these results expose many fallacies that surround resource development. The content of that “myth-busting” paper has been designed for the general public.

Methodology

Evaluating the economic impact of natural resources in BC is done in two stages, using two of Statistics Canada's most comprehensive databases.

In the first stage, this paper details how an increase in natural resource output impacts total GDP and jobs in BC and in the rest of Canada. The impact is measured with Statistics Canada's Input/Output Accounts, which are widely used to study how changes in one industry affect the rest of the economy.

In the second stage, the paper calculates the impact on regional employment within BC using data from the Labour Force Survey, which most Canadians know as the source of data on unemployment.

The Input/Output (I/O) Accounts is one of the most meticulous and rigorous aggregations of information on purchase and production decisions by all industries. The rigour comes from the source of the data; that is, the detailed tax records of the inputs firms buy and the sales of their outputs. For example, the records detail what goods (such as machinery or timber) a mine or sawmill located in BC buys to produce coal or lumber as well as the services (such as accounting or advertising) they need to balance their books or sell their products. These data provide a precise accounting of all the inter-relationships among industries needed to produce all goods and services in Canada.¹

Whereas most economic models are a simplification of reality—a major drawback—the I/O model is a duplication of reality, but aggregated from the firm level to the industry level. However, because of the time needed to compile and process the voluminous income tax data, the most recent year available is 2010. The Labour Force Survey is more timely, with annual data up to 2013. While it does not match the I/O's level of industry detail, it has the advantage of producing estimates for regions within a province. It is benchmarked every five years to Census results, which confirm the high degree of accuracy of these regional estimates.

The natural resource sector in BC is defined as all primary industries (agriculture, forestry, fishing, hunting and trapping, support to primary industries² and mining, which includes oil and natural gas) plus utilities, oil and gas pipelines and manufacturers of wood, pulp and paper, and primary metals.³ These latter manufacturers are included because they are inextricably linked to the extraction and processing of resources in BC. Utilities, mostly electricity generation from BC's rivers, is clearly resource-based. Statistics Canada has often used this definition of the resource sector.⁴

Two manufacturing industries were excluded from the resource sector due to restrictions protecting the confidentiality of individual firms. Data for petroleum refining are confidential because there is only one refinery in BC. Since it is one of the smallest in Canada, its exclusion is not significant.⁵ Food and beverage manufacturing is not

included because of restrictions protecting the confidentiality of seafood and dairy processors and wineries. The restrictions mean that only 46 percent of the data for this industry are publicly available. Of the remainder, 84.4 percent of the industries are related to meat, sugar and bakeries, all of which buy most of their inputs outside BC.⁶ Therefore, they cannot be considered an extension of BC's agricultural industry.

The "shock" introduced to the I/O model is to increase the value of the outputs in all the resource industries by a uniform 10 percent. The 10 percent change is arbitrary, selected for ease of computation and to represent a realistic and significant boost in BC's resource economy. Twice since 2002, real output (excluding price changes) in BC's resource sector has expanded by 10 percent or more in one year.⁷ The total impact of this expansion includes the direct effect of the 10 percent boost to output, the indirect impact of increased demand for suppliers (who in turn demand more inputs), and the induced impact of higher consumer spending from the growth in jobs and wages generated by meeting this increased demand. For the purposes of this paper, the indirect and induced changes are combined.

The impact is measured for a number of variables, including how much GDP (total income) is generated, by how much labour income rises, how many jobs are added, and the increase in demand for imports.⁸ Employment estimates are made for total jobs (reflecting the mix of full- and part-time jobs in each industry in 2010) and "full-time equivalent" (FTE) jobs created.

To clarify, FTE jobs are calculated by converting part-time jobs into the equivalent number of full-time jobs and adding this to the number of full-time jobs. This calculation is relevant because simply stating that the retail industry would add 1,000 jobs, for example, ignores that some of these jobs are part-time. This inflates the perceived benefits of the added retail jobs, compared to industries such as manufacturing and construction that hire mostly full-time workers.

"Multiplier" is another concept that requires clarification. A multiplier compares the total impact on the economy from a change in output in one specific industry. For example, if boosting forestry output by \$1 billion creates \$2 billion in total GDP after counting all the direct, indirect and induced benefits, then the multiplier for forestry output is 2.0. Multipliers differ depending on whether GDP or employment is used as a measure, reflecting how every industry uses different combinations of labour and capital to produce its output.

Investment induced by the growth of output is not included in the I/O model. While the impact of changes in investment spending can be measured, the decision to increase investment cannot. So while it would be reasonable to expect that the higher output of resources and of overall GDP in the BC economy would lead to firms investing more to meet increased demand, these numbers are not included since the exact increase in future investment is unknown. Similarly, a 10 percent increase in resource output would probably lead the government to spend more

on infrastructure, but this is not included since the precise amount would be a political decision, not a technical inevitability (unlike the smelting of more metal, which inevitably requires a higher output from mining).

As such, the estimates in this paper are a lower-bound estimate of the likely benefits flowing from increased resource output. This is reinforced by the exclusion of some small resource-based industries in food processing and oil refining, as outlined above.

Output in BC's natural resource industries totalled \$21.371 billion or 11.2 percent of the province's total GDP in 2010.

Increasing resource output by 10 percent, therefore, automatically means expanding it by \$2.137 billion. This reflects increases of \$904.7 in mining, \$439.8 million in resource-based manufacturing, \$400 million

in utilities, \$150.1 million in forestry, \$110.1 million in agriculture, \$75.3 million in pipeline transport, and \$57 million in other primary industries (such as fishing and support). This is the baseline "shock" referred to above, which then traces the ripple effect of these increases on other industries and overall GDP throughout Canada.

The impact of expanding output in BC's resource sector is quite significant. It boosts total GDP in Canada by \$4.5 billion, or 0.3 percent, in 2010. This is more than twice the initial shock of \$2.1 billion (the uniform 10 percent), reflecting the extensive linkages the natural resource sector has to the rest of the domestic economy. The ratio of the total increase in output to the initial \$2.1 billion shock implies a multiplier of 2.12 for natural resources.

Table 1: Total increase in GDP from 10 percent more output in BC's resource sector, by province and industry, 2010 (000 \$)

Total Canada	<u>4,523,328</u>		
<i>By Province</i>		<i>By Industry</i>	
Newfoundland	4,109	Agriculture	142,371
PEI	575	Forestry	305,760
Nova Scotia	6,687	Mining	1,096,459
New Brunswick	6,728	Other primary	91,784
Quebec	104,664	Utilities	504,782
Ontario	307,304	Manufacturing	658,782
Manitoba	31,259	Construction	67,822
Saskatchewan	38,422	Trade	258,550
Alberta	444,899	Transportation	249,424
BC	3,814,941	FIRE	626,327
North	3,191	Professional Service	154,327
		Business Service	95,119
		Accomod & food	39,799
		Art & recreation	13,473
		Info & culture	80,936
		Other services	54,527
		Education	18,233
		Health	33,022
		Public Admin	33,570

Source: Special tabulation, Input/Output Division, Statistics Canada

Several reasons explain the high multiplier for output of natural resources. One is its extensive outsourcing of work to other industries, especially services. Another is the high income generated by resource industries, which stimulate more consumer spending. A third is that very few inputs are imported. While GDP in Canada rises by \$4.5 billion as a result of the expansion of resources, imports rise by only \$909 million, implying the share of imports in the total increase of spending of \$5.4 billion is 16.7 percent.

Of this \$909 million rise in imports, \$621 million are required by manufacturers, who

have the highest propensity to import of any industry in Canada. The natural resource sector increases its imports by \$262 million, 50 percent of them destined for the three resource-based manufacturing industries. Services altogether increase imports by just \$149 million. Statistics Canada has documented that natural resource industries buy relatively few imports, and manufacturers the most.⁹ Partly, this is a function of geography, as resource industries in the hinterland are far from major trade routes, while manufacturing in central Canada is close to major US suppliers (nearly half of auto parts used in Canadian

factories come from the US). Most of the difference, however, reflects the increased exposure of manufacturers to international competition. This forces them to relentlessly search out the latest technology and the lowest cost inputs, which provides other benefits to Canada's economy even if some spending is diverted to imports.

To meet the increase in total GDP, 37,177 jobs are added across the country, equal to

0.2 percent of total employment in the 2010 Labour Force Survey. This gain in jobs includes 12,214 jobs (direct and indirect) in the natural resource sector and 27,137 in other industries (all indirect) fuelled by increased demand from the resource sector and the spending of higher incomes from the growth in natural resources. The multiplier for jobs is 2.32, larger than the multiplier for output.

Table 2: Increase in employment, by province and by industry, 2010

Total Canada		37,177	
By province		By industry	
Newfoundland	24	Agriculture	3,621
PEI	8	Forestry	2,460
Nova Scotia	84	Mining	2,022
New Brunswick	87	Other Primary	1,435
Quebec	1,174	Utilities	1,957
Ontario	3,294	Construction	928
Manitoba	392	Manufacturing	6,011
Saskatchewan	297	Trade	4,457
Alberta	2,231	Transportation	2,154
BC	29,561	FIRE	2,979
North	25	Professional Service	2,171
		Business Services	2,029
		Accomod & food	1,409
		Art & recreation	361
		Info & culture	503
		Other services	1,450
		Education	315
		Health	595
		Public Admin	323

Source: Special tabulation, Input/Output Division, Statistics Canada

After accounting for part-time work, this employment gain represents 35,249 FTE jobs. The fact that this estimate is 95 percent of the combined total of 37,177 for full- and part-time work reflects that most of the jobs created are full-time positions. Over 50 percent of the jobs created are in the primary and manufacturing industries, which are almost exclusively full-time positions (partly because these capital-intensive operations with high fixed costs squeeze down-time to a minimum). Even most service jobs are full-time: the ratio of the change in FTE jobs to the change in total employment by industry exceeds 90

percent in transportation, professional services and other personal services, and is close to that mark in finance. Only retail trade and accommodation and food have significant amounts of part-time work, although even in these industries, the ratio of FTE jobs to all jobs is above 70 percent.

The jobs created in response to the increase in resource output pay well, with an average income of \$61,230 a year in wages, salaries and benefits.¹⁰ The highest wages are in the natural resource sector itself, with an average labour income of \$69,068. Overall, boosting resource output lifts labour income by

\$843.6 million in the natural resource sector and by \$2.2 billion for the whole economy.

The multipliers for FTE jobs (2.89) and labour income (2.56) are higher than the multiplier for GDP (2.12). While natural resources are a capital-intensive business, the labour-intensive goods and services (see below) they buy from the rest of the economy gives a larger boost to jobs and labour income than to output.

BC reaps the lion's share of the benefits of output, jobs and incomes, taking into account the multiplier effect on other industries. The province receives 82.1 percent of the Canada-wide total increase in GDP, 79.5 percent of total jobs, 84.4 percent of all FTE jobs, and 80.2 percent of total labour income. This is not surprising, since the boost to output in BC's natural resource sector directly accounts for just over 50 percent of the gain in the province's total GDP.

Apart from the direct benefit of more output in natural resources, the ripple effect on other industries is almost exactly 67 percent (\$886 million) for BC and 33 percent (\$427 million) for the rest of Canada.

The largest beneficiary outside BC is Alberta, whose industries expand output by \$330 million in response to the boost in output from BC's resource sector. Oil and gas account for nearly 50 percent this increase, with important gains also in finance, professional services and transportation. Next in line is Ontario, where GDP rises \$292 million, about 25

percent of which is driven by finance. Manufacturing in Ontario records a significant gain, while the goods-handling services in trade and transportation also post a marked increase. Notable increases are also felt in Quebec (\$100 million), led by manufacturing and finance. Saskatchewan's \$37 million benefit is driven by its resource base, notably mining and agriculture. Conversely, Manitoba's \$30 million is led by finance, followed by manufacturing and transportation. The Atlantic provinces together receive a \$17.1 million boost to their economies.

The benefits to the BC economy

The total benefit from the 10 percent expansion of its natural resource sector adds \$3.7 billion to GDP in BC (see Table 3).

This represents a significant 1.9 percent boost to GDP in 2010, especially in the current environment of low growth worldwide. In 2012, for example, BC only posted nominal GDP growth of 2.3 percent, so a 1.9 percent boost would almost double that year's growth rate.

Just over 50 percent of the increase in BC's GDP originates in the \$2.1 billion boost to output in natural resources from the initial shock (but not the ripple effect of more forestry output, for example, requiring higher mining output to be used as inputs by the machinery industry). Another \$1.6 billion of output in BC occurs after the initial spurt in resource production. The total increase of \$3.7 billion in GDP establishes its multiplier as 1.74: that is, every extra dollar of output in natural resources generates a total increase of \$1.74 in GDP in BC. This multiplier for BC is necessarily less than the 2.12 for all of Canada, since some spending inevitably occurs outside the province.

Table 3: Projected Increase in GDP in BC, by industry (000 \$)

Total	3,712,888
Goods	
Agriculture	128,867
Forestry	300,615
Fishing	18,180
Other primary	71,066
Mining	950,056
Utilities	487,086
Manufacturing	542,376
Construction	58,858
Services	
Trade	166,837
Transportation	184,585
FIRE	456,181
Professional service	97,511
Business services	55,428
Accommod & food	29,118
Information	49,843
Art & recreation	10,021
Other services	41,846
Education	13,591
Health	24,472
Public Admin	25,899

Source: Statistics Canada, Input/Output Accounts, special tabulation based on a 10% increase in resource output

Mining posts the largest increase of any industry at \$950 million, largely due to a combined expansion of almost \$800 million in natural gas and coal mining. Forestry adds \$301 million. The expansion of forestry and mining drives the growth of manufacturing, where wood, paper and primary metals (mostly aluminum) account for over 75 percent of the total increase of \$542 million. Resources clearly dominate growth in the goods-producing sector.

The bulk of the indirect increases occur in industries outside the resource sector. In particular, demand for services expands by

almost \$1.2 billion, compared with \$0.4 billion in spin-off effects in the goods-producing sector. Of the ten industries that indirectly benefit the most from the initial shock, only two are natural resource industries (forestry and utilities). In fact, the industry that benefits most is finance, insurance and real estate with a gain of \$456 million. Transportation (excluding the increase in pipeline output) gets a boost of \$185 million, reflecting how the additional output from farms, forests and mines often has to be carried long distances to markets, either elsewhere in Canada or to export hubs. Professional, scientific and technical services see a \$98 million expansion, as the increase in economic activity spurs more demand for everything from lawyers, architects and engineers to computer designers. Retailers also feel a significant boost in spending from the additional jobs and incomes for all the workers in the above categories. The increase in demand for a wide range of services has important benefits for Vancouver and the Lower Mainland, as most of these services are centred in large urban areas (see below).

The impact on employment in BC is much larger than for Canada as a whole. The 10 percent boost to output in natural resources creates an extra 29,561 jobs in BC—equal to a 1.3 percent increase in employment in BC. These are mostly full-time positions. Of these new jobs, 11,913 are the direct result of more output. The share of the total increase solely due to the shock and not to spill-over effects is slightly less for jobs than for GDP (40.3 percent versus 57.6 percent),

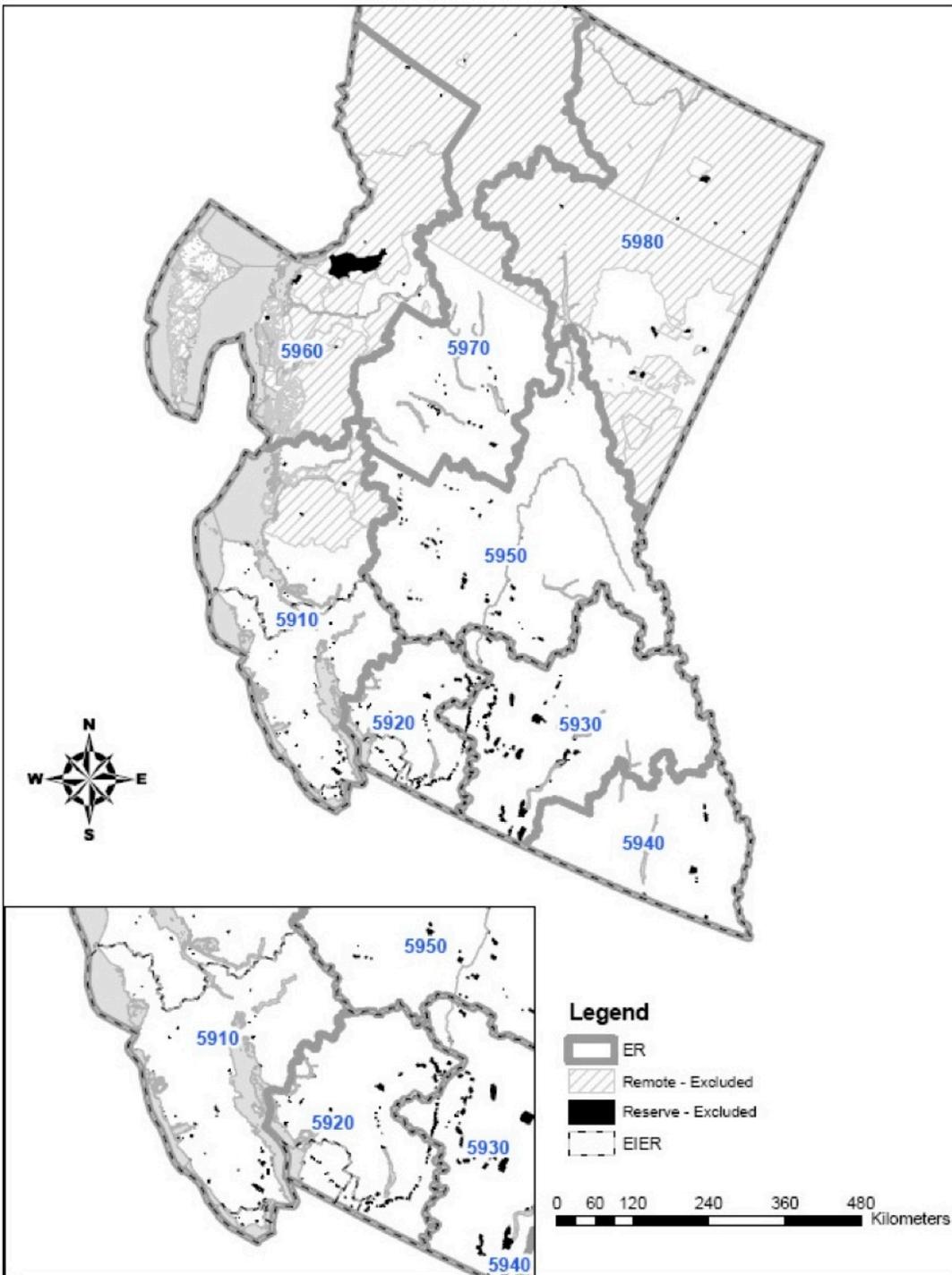
reflecting the more capital-intensive nature of exploiting natural resources. But the share of indirect benefits to non-resource industries is almost exactly the same at 71 percent. Furthermore, industries that produce services now move to the forefront of job creation, reflecting how services tend to use more labour than capital to produce their product. Business and professional services lead job growth, with the addition of 2,771 jobs. Retail is not far behind with 2,220, followed by financial services with 1,942. Transportation spawns 1,387 new jobs. All of these industries record larger employment gains than even forestry, the resource industry that posts the most indirect gains with 1,200 (forestry still leads with a total of 2,398 direct and indirect job gains). Accommodation and food services are at 1,073. Other personal post a notable gain of 1,157 jobs, just ahead of 954 in wholesale and 820 in construction.

Regional benefits within BC

The I/O model tells us exactly which industries will expand employment and by how much. While sub-provincial estimates are not available in the I/O data, the Labour Force Survey (see Figure 1) collects regional data for eight economic regions in BC. The region labelled 5910 in Figure 1 covers Vancouver Island and the Coast; 5920 is the Lower Mainland, including Vancouver; region 5930 covers Thompson and Okanagan; 5940 is the Kootenay; 5950 covers the Cariboo; 5960 the North Coast; 5970 Nechako; and 5980 the North East.

The published estimates are combined for the North Coast and Nechako (5960 and 5970) because of the small sample size for Nechako. This combined region is labelled NorthWest in this paper.¹¹ These regional employment estimates are available for the 16 industries that the Labour Force Survey covers.¹² Occasionally, some industry detail is not available for some remote Northern regions with sparse populations, but this is inconsequential for the broad conclusions in this paper.¹³

Figure 1: Labour Force Survey data, 2013



Source: Methodology of the Canadian Labour Force Survey, Statistics Canada Catalogue 71-526, p 116.

The following example states how the results from the I/O model are mapped into the Labour Force Survey's sub-regional data. The I/O model shows that the 10 percent increase in output in the resource sector leads to 1,387 additional jobs in BC's transportation industry. The Labour Force Survey data show that 69.4 percent of transportation jobs in BC in 2013 were in the Lower Mainland (region 5920). Another 13.2 percent were on Vancouver Island and the Coast, 6.6 percent in the Okanagan, 3.3 percent in the Kootenay, 3.3 percent in the Cariboo, 1.7 percent in the North East (regions 5960 and 5970), and 2.5 percent in

the NorthWest. So 69.4 percent of the 1,387 additional jobs allocated to the Lower Mainland represents 963 jobs. The rest of the transportation jobs are allocated to the regions depending on their share of employment in transportation in BC. The Labour Force Survey does this exercise for all eight regions for all 16 industries using 2013 data so that the geographic detail reflects BC's most recent reality. At the end, we obtain a comprehensive picture of how many jobs are added in each region and in each industry. The results are summarized in Table 4.

Table 4: Regional distribution in BC of jobs added, by industry, 2013

Region	BC	Lower						
		Victoria	Mainland	Okanagan	Kootenay	Cariboo	NW	NE
<i>Total jobs</i>	2,257,000	384,000	1,388,000	257,000	69,000	80,000	40,000	37,000
<i>Jobs added by industry</i>								
Agriculture	3,397	486	1,699	727	241	241	0	0
FFM	5,396	971	1,295	971	648	755	324	432
Utilities	1,903	293	1,170	293	147	0	0	0
Construct	820	127	486	106	34	30	17	21
Manufacture	5,001	520	3,200	610	185	305	120	60
All goods	16,517	2,397	7,850	2,707	1,255	1,331	461	513
Trade	3,174	495	1,996	359	111	111	51	51
Transport	1,387	183	963	92	46	46	24	35
FIRE	1,942	223	1,383	200	37	37	25	37
PST	1,517	218	1,088	121	32	24	17	17
Admin	1,254	229	809	135	28	28	14	14
Education	246	42	156	24	7	8	6	4
Health	481	95	281	55	20	18	5	5
Info & Culture	569	80	389	41	25	10	7	7
Acc & food	1,073	196	644	117	43	43	12	18
Other	1,157	197	717	116	35	35	23	35
PA	247	62	137	20	7	9	9	4
Services	13,047	2,020	8,563	1,280	391	369	193	227
Total	29,561	4,417	16,413	3,987	1,646	1,700	654	740

Source: Labour Force Survey, Cansim Table 282-0061, using job growth projected by the I/O model. FFM is Forestry, Fishing and Mining; FIRE is Finance, Insurance and Real Estate; PST is Professional, Scientific and Technical Services; PA is Public Administration.

The most striking result is that the Lower Mainland receives 55.5 percent of all the resource-based jobs created in BC. Of the 29,564 jobs added from all the benefits of the shock to resource output, 16,413 are located in the Lower Mainland, which reflects the dominance of this region in providing services. Of the 12,778 additional jobs in services, the Lower Mainland garners 8,563 or 67.0 percent. This reflects how this region consistently accounts for most of all

private sector services in BC, ranging from 60 percent in accommodation and food, 62 percent in trade, 63 percent in other services (mostly personal services), 65 percent in business services, 68 percent in information and culture, 69 percent in transportation, 71 percent in finance, to a high of 72 percent in professional, scientific and technical services. By contrast, public services are slightly less concentrated in the Lower Mainland, which accounts for only 55 percent of public

administration and 58 percent of health care jobs in BC. Education jobs are an exception, with 63 percent located in the region, reflecting its universities.

Jobs in the goods-producing sector grow less in the Lower Mainland than do services-based jobs. Overall, 47.5 percent of goods-producing jobs added are in the Lower Mainland. Although two goods-producing industries create as many jobs as most services (manufacturing at 64 percent and utilities at 62 percent), most employment in goods industries takes place in other regions. This is especially true for forestry, fishing and mining, where only 24.0 percent of jobs in BC are in the Lower Mainland, with the other six regions sharing the remaining 76 percent. Similarly, the majority of agricultural jobs are outside the Lower Mainland, notably in the Okanagan and on Vancouver Island (conversely, the two Northern regions have virtually no agricultural employment). Just over 60 percent of all construction jobs in BC are in the Lower Mainland. The exceptional concentration of utilities employment in the Lower Mainland is explained by the location of BC Hydro's head office and management operations in Vancouver.

In the Lower Mainland, three services industries add over a 1,000 people to their payrolls. The trade industry leads the way with nearly 2,000; mostly retailers who hire more employees to meet the spending induced by higher incomes and employment after the shock to resource output. The finance, insurance and real estate industry add 1,383 jobs, mostly in finance, as a result

of everything from more banking transactions to increased mortgage lending. Professional, scientific and technical services increase employment by 1,088. This industry is one of the highest paying, as it includes professionals such as lawyers, accountants, engineers, architects, surveyors, consultants, graphic designers and marketers. Other significant job gains in the Lower Mainland services occur in transportation (963), business services (809), accommodation and food (644) and other personal services (717).

However, the Lower Mainland has a significant presence in a couple of resource industries. Just over 50 percent of agricultural jobs in BC are located here. Manufacturers also have a significant presence (for this regional analysis, the resource sector is modified to include all manufacturing, since the wood, paper and primary metals industries that dominate job growth cannot be split out in the Labour Force Survey data). Together, farms and factories account for nearly 33 percent of the overall increase in employment in the Lower Mainland.

The Vancouver Island and Coastal region reaps 4,417 jobs, or 14.9 percent of the employment gains in BC: just over 50 percent of them in the resource sector itself. Unlike all the other regions, nearly 50 percent of the increase in services occurs in industries where the public sector dominates (education, health and public administration), reflecting the presence of Victoria, the provincial capital.

Beyond the big cities that dominate the results for the Lower Mainland and Vancouver Island, the resource sector, not services, drives employment growth. The Okanagan nearly matches the overall gain for Vancouver Island with 3,987 more jobs or 13.5 percent of BC's total increase, with 65.2 percent of its growth in the resource sector. The trade industry posts the only significant increase in either private or public services, with a gain of 359 positions.

The Kootenay reaps 1,646 more jobs, or 5.6 percent of the total, of which 74.2 percent are in the resource sector. Activity in the resource sector drives the increase in services, as nearly 50 percent of its gains are in the goods-handling industries of trade and transportation.

The Cariboo fares slightly better than the Kootenay, with 1,700 additional jobs, or 5.8 percent of the total. Its industrial pattern is quite similar to the Kootenay, with 71.8 percent of jobs in the resource sector and only 21.7 percent in services, the smallest share of services of all the regions.

The two Northern regions have similar responses. The NorthEast gains slightly more jobs, reflecting its large natural gas industry, with 740 versus 654 in the NorthWest. In both regions, almost exactly 70 percent of these job gains are in the resource sector, and the remaining 30 percent in services.

Conclusion

Increased resource extraction would significantly boost both the Canadian and BC economy. A 10 percent increase in output of natural resources in BC would trigger \$4.5 billion of increased GDP across Canada. The lion's share, \$3.7 billion, would stay in BC. This represents a 1.9 percent boost to incomes in that province, almost matching all growth in BC in 2012.

The increase in jobs also is significant, with 37,177 added across Canada, of which 29,561 are in BC. These are lower-bound estimates because they do not capture the increases in business investment and government spending that higher demand would likely induce, and they exclude two resource-based manufacturing industries because of confidentiality constraints.

The large multipliers for output and employment arising from higher output in natural resources in BC reflect the province's extensive linkages to the services sector.

Most of these service jobs are in large urban areas, with the Lower Mainland alone benefiting from over 50 percent of BC's employment increase.

This reflects how a wide range of professions, from lawyers and architects to business services to finance and even transportation, converge on large cities.

As well, the increase in jobs and incomes leads to more spending at retailers and for personal services. The rural regions in central and northern BC mostly garner the benefit of more jobs in the natural resource sector, but relatively few in services.

¹ It should be noted that the Input/Output model uses the technology and purchasing patterns that existed in 2010. It cannot anticipate how these will change in the future; in other words, the model is static, not dynamic. However, experience shows that these changes tend to be quite small on an annual basis.

² Support to the agricultural and forestry industries includes activities such as services that plant, harvest, sort, and clean produce or breed animals.

³ The simulated 10 percent increase in the pipeline industry refers to a 10 percent increase in the amount of oil and gas carried by pipeline. It does not reflect the impact of a 10 percent increase in investment in pipeline capacity, so does not reflect the impact that a project like Northern Gateway could have on BC's economy.

⁴ See Philip Cross, "The role of natural resources in Canada's economy." *Canadian Economic Observer*, Statistics Canada Catalogue No 11-010-X, Vol 21, No 11, November 2008.

⁵ BC only has one main refinery, so publishing estimates for the industry would allow people to identify a firm, which is a breach of confidentiality. BC also has a minor 11,000 barrels/day refinery, but its main role is to produce asphalt. It therefore is not comparable with other refineries, and does not alter the fact that published estimates for this industry would essentially be publishing the books of the dominant refiner.

⁶ All data in this paragraph are publicly available from Statistics Canada, Cansim Table 379-0030.

⁷ Data from Statistics Canada, Cansim Table 379-0030.

⁸ One variable not included in this paper is government tax revenue. While estimates of the labour income and consumer spending from more resource output are available, and the tax on these activities could be estimated, it is more difficult to estimate the potential tax raised from profits, particularly since small and large firms pay different rates.

⁹ Less than 10 percent of the inputs used by the natural resource sector were imported, according to Philip Cross, "Loonie tunes: Industry exposure to the rising exchange rate." *Canadian Economic Observer*, Statistics Canada Catalogue No 11-010-X, March 2008.

¹⁰ This is calculated by dividing the increase in labour income by the increase in the number of jobs.

¹¹ From *Guide to the Labour Force Survey*, 2013, Statistics Canada Catalogue 71-543-G.

¹² The industry classifications in I/O and the Labour Force Survey are not exactly the same, although the differences are easily reconciled by combining industries in the I/O to match the Labour Force Survey. Forestry, fishing and mining are aggregated in the Labour Force Survey. However, its definition of information and culture includes the arts, entertainment and recreation industry which is a separate industry in I/O. As well, non-profit household services in the I/O are allocated to other services when using the Labour Force Survey data.

¹³ For utilities, employment is publicly available only for the Lower Mainland and the Okanagan. So the 3,000 remaining utilities jobs were allocated among the other five regions based on their share of total employment. Data are not available for employment in the Northeast and Northwest regions for business services, information and culture services, so the small number of jobs added in these industries was split evenly between the two regions. Data on manufacturing and public administration jobs for the Northeast are not available, but were calculated residually from the difference between the sum of the rest of the regions and the BC total.