McNair
BUSINESS DEVELOPMENT INC.

Great Plains College

Economic Impact – Students and Graduates

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I. Executive Summary

McNair Business Development Inc. (McNair) was engaged by Great Plains College (GPC) to assess the economic impact of the College's students and graduates on the region it serves and provincial economies for the 2011-2012 school year. Impacts were assessed across 3 dimensions: 1) student spending while enrolled 2) spending of salaries once students are graduated and in the workforce and 3) productivity impacts of graduates working in their fields.

The Saskatchewan Input-Output Model was used to measure the provincial economic impacts associated with students and graduates and a regional-level economic model was constructed for the GPC region to assess student and graduate impacts at the regional level. These impacts were stated in terms of gross output, gross domestic product (GDP), employment and labour income.

GPC services a region that includes more than 100,000 square kilometers and 115,000 potential students. A decentralized campus region system, consisting of three campuses and subsidiary program and training centres, provides a broad array of programs in western Saskatchewan. These include:

- Kindersley Campus Region
- Swift Current Campus Region
- Warman Campus Region

A comprehensive economic impact study is a critical way to gain an understanding of how the student and graduates of the College benefit the regional economies with GPC campuses and the province as a whole.

Summary of Regional Level Results

In the 2011-2012 school year, at the regional level, GPC students and graduates added the following to the economy of the region served by the college (GPC Region) in millions of current (2013) dollars and jobs:

GPC Region	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Student Impacts	15.9	140	6.4

Note: Gross Domestic Product (GDP) is the measure of the sum of all goods and services produced within a geographic area and is the measurement of the "size" of an economy.

Summary of Provincial Level Results

In the 2011-2012 school year, GPC students and graduates added the following to the Saskatchewan economy in millions of current (2013) dollars and jobs:

Provincial Impacts	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Student Impacts	42.9	458	18.8

Impacts on the Rest of the Province

A significant feature of the GPC regional economic impact model is the inclusion of estimated imports to the region from within the rest of the province. It follows that activity within the GPC region will have impacts on other areas of the province, notably those with industries providing inputs to GPC region businesses which cannot be sourced locally and where some degree of out-shopping occurs outside of the region but still within the province. An additional simulation was undertaken to estimate the impacts of GPC students and graduates on the rest of the province, outside of the GPC region:

Rest of Province Impacts	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Student Impacts	27.0	318	12.4

Impacts on the rest of the province totaled $26.7 million in GDP and created or maintained 318 jobs.

Provincial Fiscal Impacts

At the provincial level, GPC generated the following provincial fiscal impacts:

Government Fiscal Impacts 2012	Personal Income Tax (PIT)	Corporate Income Tax	Taxes Unincorporated Business Profits	Non-Renewable Resource Revenue	Sales and Excise Taxes	Total Revenue
Federal ($M)	3.7	0.8	0.8	na	0.3	**5.6**
Provincial ($M)	2.1	0.6	0.6	na	0.4	**3.7**
Total ($M)	**5.9**	**1.4**	**1.4**	**na**	**0.7**	**9.3**

In total, GPC generated $9.3 million in federal and provincial government revenues in 2011-2012.

Note: these figures exclude resource revenues and are not adjusted for equalization payment impacts.

Combined Student, Graduate and Operational Benefits

A previous study by McNair outlined the impact of GPC spending within the regions it serves and the province. Combining these impacts with student and graduate impacts provided a more complete picture of the importance of GPC to the province and region. Combined student, graduate and operational spending impacts are illustrated below:

GPC Region	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Total Impacts Including Operational	26.6	370	14.7

Provincial Impacts	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Total Impacts Including Operational	57.1	742	28.8

Rest of Province Impacts	Gross Domestic Product ($M)	Employment (Positions)	Labour Income ($M)
Total Impacts Including Operational	30.5	372	14.1

In addition, operational spending added another $4.3 million to federal and provincial government coffers, bringing the total government fiscal impact to $13.6 million.

Conclusion

GPC students and graduates generated a significant economic contribution to the GPC region and provincial economies. Over the course of 2011-2012 school year, students and graduates maintained/added the following to the regional and provincial economies:

- 140 positions within the region;
- $15.9 million in regional gross domestic product;
- $6.4 million in new wages and salaries (included in GDP) in the region;
- 458 jobs within the province;
- $42.9 million in provincial gross domestic product;
- $18.8 million in new wages and salaries (included in GDP) in Saskatchewan;
- $9.3 million in federal, provincial, and municipal government revenues; and,
- In the province outside of the GPC region, GPC student and graduates added $27 million to rest-of- province gross domestic product, including $12.4 million in wages and salaries, and 318 jobs.

Total student, graduate, and operational spending impacts are even higher. Combined annual impacts show that the GPC maintained/added the following to the regional and provincial economies:

- 370 positions within the region;

- $26.6 million in regional gross domestic product;
- $14.7 million in new wages and salaries (included in GDP) in the region;
- 742 jobs within the province;
- $57.1 million in provincial gross domestic product;
- $28.8 million in new wages and salaries (included in GDP) in Saskatchewan;
- $13.6 million in federal, provincial, and municipal government revenues; and,
- In the province outside of the GPC region, GPC student and graduates added $30.5 million to rest-of- province gross domestic product, including $14.1 million in wages and salaries, and 372 jobs.

II. Approach and Methodology

Data Sources

Impacts were assessed across 3 dimensions: 1) student spending while enrolled 2) spending of salaries once students are graduated and in the workforce and 3) productivity impacts of graduates working in their fields.

Student spending impacts were estimated using 2011-2012 GPC student enrollments. Excluded from these figures were Skills & Safety Training (short course of 1-5 days provided to industry) because of the temporary nature of this program. Total enrollment, less Skills and Safety Training, was 807 and included Institutional Credit, Basic Education and University courses. Annual living costs per student were adapted from Statistics Canada Survey of Tuition and Living Accommodation Costs for Full-time Students at Canadian Degree-granting Institutions for Saskatchewan. These totaled $6,160 for rent, $2,675 for food, $1,600 for entertainment, and $880 for transportation. Excluded from these figures are tuition costs. These have already been included in the impacts of GPC operations, once converted to GPC revenues and re-spent in the region and province.

Student spending amounts were multiplied by enrollment of 807 and converted to input-output industries: Finance, Insurance, Real Estate and Rental and Leasing (which includes rental dwellings) for rent, Manufacturing for food spending, Arts, Entertainment and Recreation for entertainment spending, and Transportation and Warehousing for transportation spending. It was assumed all expenditures could be met from local sources with the exception of food manufacturing in the GPC region.

Data about the prevalence of paying rent was unavailable. Therefore, it is implicitly assumed that all students pay rent in some form, either real or imputed. Furthermore, for students that live rent free, there are still costs that must be absorbed by the shelter provider (food, utilities, etc.) that would otherwise be spent elsewhere in the economy.

Graduate spending impacts were estimated by first deriving an estimated annual salary for GPC graduates. GPC conducted a survey of salaries of graduates' earnings and location of work. Survey results showed an average annual starting graduate salary (both full and part-time) of just over $26,000. The survey also showed 599 graduates from the institutional credit and basic education programs. Of these, 89% were employed with 54% of the employed working in south west Saskatchewan and 45% in the rest of the province. Given employment, average salaries, and location, the amount of graduate spending was determined using the ratio of personal expenditures to personal income of just over 75% from the latest Saskatchewan economic accounts. This amount

was allocated across components of personal expenditure based on the provincial average of expenditure by type after adjusting for leakages from imports and inventory withdrawals and used as the economic impact model input.

The productivity impact of employed GPC graduates working in their field of study (48% of graduates) was estimated by converting positions into economic output using industry averages of output per employee and "shocking" the model in terms of this derived output. Induced impacts of this incremental output were also used to calculate additional consumer spending in the region and province. Power Engineering graduates were assigned to Other Services which includes building maintenance. Welders were assigned to Manufacturing. Wind Turbine graduates were assigned to the Utility industry. Electricians and carpenters were assigned to Construction. Office administration graduates were assigned to Administration. Early Education and Practical Nursing graduates were assigned to the Government sector which includes all publicly funded education and health industries.

The region served is assumed to correspond to Saskatchewan census divisions 3, 4, 7, 8, 12, 13 and 11 (excluding the city of Saskatoon) and includes the larger centers of Swift Current, Kindersley, Eston, Gull Lake, Macklin, Maple Creek, Rosetown, Shaunovan, Warman, Biggar, Outlook, Gravelbourg, Assiniboia as well as the surrounding smaller centers and RMs.

Model Description

For provincial level impacts, McNair's input-output model of the provincial economy was used. The provincial model is based on Statistics Canada's 2009 Saskatchewan input-output table, the latest available. The model is rectangular with 35 industries and 66 commodities. Please note that provincial model results were aggregated to 25 industries for this study to allow for industry to industry comparisons with regional results. A complete model description and definitions are available in Appendix A.

A separate economic impact model was developed to represent the economy of the GPC Region. This is based on a regional share of the 2009 provincial economy and is square in dimension with 25 industries. A detailed discussion on the development of sub-provincial input-output models is available in Appendix B.

III. Detailed Results

Direct, Indirect and Induced Impacts

Direct impacts typically represent total project expenditures, usually construction costs or, in this case, student and graduate spending and output attributed to graduates working in their field. Indirect impacts represent the secondary impacts that include inter-industry transactions and the purchases of inputs from industries that support directly impacted industries. Induced impacts are additional impacts from changes in household spending as incremental employees spend their wages in the region and province.

Direct, indirect and induced regional impacts are below.

Student Spending Impacts - GPC Region	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact

Student Spending Impacts - GPC Region	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	4.7	33	1.4
Indirect Impacts ($M)	0.7	6	0.3
Induced Impacts ($M)	0.5	5	0.2
Total Impacts ($M)	**5.9**	**44**	**1.8**

Graduate Spending Impacts - GPC Region	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	1.2	12	0.4
Indirect Impacts ($M)	0.2	1	0.1
Induced Impacts ($M)	0.2	1	0.1
Total Impacts ($M)	**1.5**	**15**	**0.6**

Productivity Impacts - GPC Region	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	6.0	62	3.1
Indirect Impacts ($M)	1.4	9	0.4
Induced Impacts ($M)	1.0	10	0.4
Total Impacts ($M)	**8.5**	**81**	**4.0**

The identical procedure was repeated using the provincial impact model to derive impacts at the provincial level. With the calculation of imports to a sub-provincial region from within the rest of the province (intra-provincial imports), impacts at the regional level are, as expected, less than those occurring at the provincial level. Provincial impacts are summarized below:

Student Spending Impacts - Province	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	4.8	34	1.3
Indirect Impacts ($M)	1.4	14	0.6
Induced Impacts ($M)	1.3	15	0.5
Total Impacts ($M)	**7.5**	**63**	**2.4**

Graduate Spending Impacts - Province	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	3.7	47	1.6
Indirect Impacts ($M)	1.1	10	0.4
Induced Impacts ($M)	1.4	16	0.6
Total Impacts ($M)	**6.1**	**73**	**2.6**

Productivity Impacts - Province	GDP at Basic Prices Impact	Employment Impact (Jobs)	Labour Income Impact
Direct Impacts ($M)	16.3	187	8.6
Indirect Impacts ($M)	5.7	49	2.1
Induced Impacts ($M)	7.4	87	3.1
Total Impacts ($M)	**29.3**	**323**	**13.8**

Detailed Results by Industry

The following tables provide total impacts (direct, indirect and induced) by industry of GPC students and graduates on the GPC regional economy. In the case of student spending, the bulk of impacts occur in the directly impacted industries of Finance, Insurance, Real Estate and Rentals, Transportation, and Arts, Entertainment, and Recreation. Graduate spending impacts are concentrated in the Retail and the Service sectors. Productivity impacts are concentrated largely in directly impacted industries (Construction, Manufacturing, Government, Administrative Support and Other Services). There is also a smaller induced impact, which represents the additional impacts of consumer spending of wages earned, which is concentrated within the retail trade and service industries.

Total Impacts ($M) Student Spending – GPC Region	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.0	0.0	0	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0
Mining and Oil and Gas Extraction	0.1	0.1	0	0.0
Utilities	0.1	0.0	0	0.0
Construction	0.1	0.1	0	0.0
Manufacturing	0.1	0.0	0	0.0
Wholesale Trade	0.0	0.0	0	0.0
Retail Trade	0.1	0.1	2	0.1
Transportation and Warehousing	0.9	0.5	4	0.2
Information and Cultural Industries	0.0	0.0	0	0.0

Total Impacts ($M) Student Spending – GPC Region	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Finance, Insurance, Real Estate and Rental and Leasing	5.7	4.1	13	0.8
Professional, Scientific and Technical Services	0.1	0.1	1	0.0
Administrative and Support, Waste Management and Remediation Services	0.1	0.0	1	0.0
Educational Services	0.0	0.0	0	0.0
Health Care and Social Assistance	0.0	0.0	0	0.0
Arts, Entertainment and Recreation	1.3	0.7	18	0.5
Accommodation and Food Services	0.1	0.0	1	0.0
Other Services (Except Public Administration)	0.1	0.0	1	0.0
Operating, Office, Cafeteria and Laboratory Supplies	0.3	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.2	0.0	0	0.0
Transportation Margins	0.0	0.0	0	0.0
Non-Profit Institutions Serving Households	0.0	0.0	0	0.0
Government Sector	0.1	0.1	1	0.0
Total	**9.3**	**5.9**	**44**	**1.8**

Total Impacts ($M) Graduate Spending – GPC Region	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.1	0.0	0	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0
Mining and Oil and Gas Extraction	0.1	0.1	0	0.0
Utilities	0.1	0.1	0	0.0
Construction	0.0	0.0	0	0.0
Manufacturing	0.2	0.1	1	0.0
Wholesale Trade	0.0	0.0	0	0.0
Retail Trade	0.2	0.2	4	0.1
Transportation and Warehousing	0.1	0.0	0	0.0
Information and Cultural Industries	0.1	0.0	0	0.0
Finance, Insurance, Real Estate and Rental and Leasing	1.0	0.7	2	0.1
Professional, Scientific and Technical Services	0.0	0.0	0	0.0
Administrative and Support, Waste Management and Remediation Services	0.0	0.0	0	0.0
Educational Services	0.0	0.0	0	0.0
Health Care and Social Assistance	0.0	0.0	0	0.0
Arts, Entertainment and Recreation	0.1	0.0	1	0.0
Accommodation and Food Services	0.1	0.1	3	0.1
Other Services (Except Public Administration)	0.1	0.1	1	0.0
Operating, Office, Cafeteria and Laboratory Supplies	0.0	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.0	0.0	0	0.0
Transportation Margins	0.0	0.0	0	0.0
Non-Profit Institutions Serving Households	0.0	0.0	0	0.0
Government Sector	0.1	0.1	1	0.1
Total	**2.4**	**1.5**	**15**	**0.6**

Total Impacts ($M) Productivity – GPC Region	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.3	0.1	1	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0
Mining and Oil and Gas Extraction	0.8	0.5	1	0.1
Utilities	1.0	0.6	1	0.1
Construction	3.3	1.5	12	0.8
Manufacturing	2.0	0.7	4	0.3
Wholesale Trade	0.0	0.0	0	0.0
Retail Trade	0.2	0.1	4	0.1
Transportation and Warehousing	0.2	0.1	1	0.0
Information and Cultural Industries	0.1	0.0	0	0.0
Finance, Insurance, Real Estate and Rental and Leasing	2.6	1.9	6	0.4
Professional, Scientific and Technical Services	0.3	0.2	2	0.1
Administrative and Support, Waste Management and Remediation Services	0.9	0.6	13	0.4
Educational Services	0.0	0.0	0	0.0
Health Care and Social Assistance	0.0	0.0	0	0.0
Arts, Entertainment and Recreation	0.0	0.0	1	0.0
Accommodation and Food Services	0.1	0.1	2	0.0
Other Services (Except Public Administration)	0.7	0.5	12	0.3
Operating, Office, Cafeteria and Laboratory Supplies	0.3	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.2	0.0	0	0.0
Transportation Margins	0.0	0.0	0	0.0
Non-Profit Institutions Serving Households	0.3	0.2	4	0.1
Government Sector	1.8	1.3	16	1.0
Total	**15.1**	**8.5**	**81**	**4.0**

At the provincial level, the industry breakdown of direct and indirect impacts exhibits much the same patterns of regional impacts. However, indirect and induced impacts (concentrated in Retail and Service industries) tend to be much larger as a smaller regional economy is expected to exhibit higher levels of import leakages, especially for consumer goods, than the province as a whole.

Total Impacts ($M) Student Spending – Saskatchewan	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.1	0.0	0	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0

Total Impacts ($M) Student Spending – Saskatchewan	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Mining and Oil and Gas Extraction	0.2	0.1	0	0.0
Utilities	0.2	0.1	0	0.0
Construction	0.3	0.1	1	0.1
Manufacturing	0.5	0.2	1	0.1
Wholesale Trade	0.2	0.1	1	0.0
Retail Trade	0.5	0.3	8	0.2
Transportation and Warehousing	0.9	0.5	5	0.2
Information and Cultural Industries	0.2	0.1	1	0.1
Finance, Insurance, Real Estate and Rental and Leasing	6.5	4.6	15	0.9
Professional, Scientific and Technical Services	0.2	0.1	1	0.1
Administrative and Support, Waste Management and Remediation Services	0.1	0.1	2	0.1
Educational Services	0.0	0.0	0	0.0
Health Care and Social Assistance	0.1	0.0	1	0.0
Arts, Entertainment and Recreation	1.4	0.7	19	0.4
Accommodation and Food Services	0.2	0.1	3	0.1
Other Services (Except Public Administration)	0.1	0.1	2	0.1
Operating, Office, Cafeteria and Laboratory Supplies	0.4	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.2	0.0	0	0.0
Transportation Margins	0.0	0.0	0	0.0
Non-Profit Institutions Serving Households	0.0	0.0	1	0.0
Government Sector	0.2	0.1	2	0.1
Total	**12.4**	**7.5**	**63**	**2.4**

Total Impacts ($M) Graduate Spending – Saskatchewan	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.2	0.1	1	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0
Mining and Oil and Gas Extraction	0.2	0.1	0	0.0
Utilities	0.4	0.3	1	0.1
Construction	0.2	0.1	1	0.0
Manufacturing	0.6	0.2	1	0.1
Wholesale Trade	0.4	0.3	2	0.1
Retail Trade	1.4	0.9	23	0.6
Transportation and Warehousing	0.3	0.2	1	0.1
Information and Cultural Industries	0.4	0.2	2	0.1
Finance, Insurance, Real Estate and Rental and Leasing	3.6	2.5	8	0.5
Professional, Scientific and Technical Services	0.2	0.1	2	0.1
Administrative and Support, Waste Management and Remediation Services	0.1	0.1	2	0.1
Educational Services	0.0	0.0	1	0.0
Health Care and Social Assistance	0.3	0.2	3	0.1
Arts, Entertainment and Recreation	0.2	0.1	3	0.1

Total Impacts ($M) Graduate Spending – Saskatchewan	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Accommodation and Food Services	0.6	0.3	11	0.2
Other Services (Except Public Administration)	0.3	0.2	5	0.1
Operating, Office, Cafeteria and Laboratory Supplies	0.3	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.2	0.0	0	0.0
Transportation Margins	0.0	0.0	0	0.0
Non-Profit Institutions Serving Households	0.1	0.1	2	0.1
Government Sector	0.5	0.3	4	0.2
Total	**10.6**	**6.1**	**73**	**2.6**

Total Impacts ($M) Productivity – Saskatchewan	Gross Output Impact	GDP @ Basic Prices Impact	Employment Impact (Positions)	Labour Income Impact
Crop and Animal Production	0.6	0.3	2	0.0
Forestry and Logging	0.0	0.0	0	0.0
Fishing, Hunting and Trapping	0.0	0.0	0	0.0
Support Activities for Agriculture and Forestry	0.0	0.0	0	0.0
Mining and Oil and Gas Extraction	2.0	1.4	2	0.2
Utilities	4.1	2.6	6	0.6
Construction	10.6	4.2	40	2.3
Manufacturing	4.5	1.4	10	0.6
Wholesale Trade	1.0	0.7	5	0.3
Retail Trade	2.0	1.3	34	0.9
Transportation and Warehousing	0.8	0.4	4	0.2
Information and Cultural Industries	0.8	0.5	4	0.2
Finance, Insurance, Real Estate and Rental and Leasing	10.7	7.3	25	1.5
Professional, Scientific and Technical Services	1.0	0.7	8	0.4
Administrative and Support, Waste Management and Remediation Services	2.0	1.3	28	0.9
Educational Services	0.0	0.0	2	0.0
Health Care and Social Assistance	0.7	0.4	6	0.2
Arts, Entertainment and Recreation	0.3	0.1	4	0.1
Accommodation and Food Services	0.9	0.4	15	0.3
Other Services (Except Public Administration)	2.5	1.5	42	1.0
Operating, Office, Cafeteria and Laboratory Supplies	1.4	0.0	0	0.0
Travel, Entertainment, Advertising and Promotion	0.9	0.0	0	0.0
Transportation Margins	0.1	0.0	0	0.0
Non-Profit Institutions Serving Households	1.6	0.9	28	0.8
Government Sector	6.5	4.0	58	3.3
Total	**55.1**	**29.3**	**323**	**13.8**

IV. Fiscal Impacts

Fiscal Module Description

An expansion in economic activity, especially when wages and salaries comprise a significant portion of incremental gross domestic product, is expected to generate incremental government revenues. The economic impact model's fiscal module is based on the latest federal, provincial, and municipal budgets and estimates government revenues as follows:

- Personal income tax is calculated by using the provincial and federal personal income tax rate that would apply to average industry annual income. This is applied to model-generated labour income.
- Corporation income tax is calculated by applying the provincial and federal corporate tax rates to incremental corporate profits before taxes calculated by the model.
- Unincorporated business income taxes are calculated by applying the small business tax rate to incremental unincorporated business profits calculated by the model.
- Sales tax calculation is based on the ratio of provincial and federal sales taxes collected to retail trade gross output applied to incremental retail trade output calculated by the model.
- Fuel and tobacco revenues are calculated as a fixed ratio (based on budget figures of tobacco and fuel tax revenues to total sales tax revenue) multiplied by estimated sales tax revenues.

Provincial government royalties from non-renewable resources are excluded from this analysis. Estimates are not adjusted for any reduction in equalization.

At the provincial level, GPC students and graduates generated the following provincial fiscal impacts:

Government Fiscal Impacts 2012	Personal Income Tax (PIT)	Corporate Income Tax	Taxes Unincorporated Business Profits	Non-Renewable Resource Revenue	Sales and Excise Taxes	Total Revenue
Federal ($M)	3.7	0.8	0.8	na	0.3	**5.6**
Provincial ($M)	2.1	0.6	0.6	na	0.4	**3.7**
Total ($M)	**5.9**	**1.4**	**1.4**	**na**	**0.7**	**9.3**

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Appendices

Appendix A - Definitions and Model Description

Final Demand: sum of personal expenditure, government purchases of goods and services, business and government investment, and net exports.

Gross Output: total expenditures on local goods and services as well as payments to labour and business profits. Gross output includes double counting because it includes the value of inputs used in production rather than net value added alone.

GDP at Factor Cost: measure of net economic activity within a prescribed geographic area. It represents the payments made to final factors of production: labour, unincorporated business profits, and other operating surplus (corporate profits, interest income, inventory valuation adjustments, and capital consumption allowances). GDP at factor cost excludes the value of intermediate goods and services used in production.

GDP at Market Prices: GDP at factor cost plus indirect taxes less subsidies.

Employment: measured in positions.

Direct Impact: total project expenditure, usually construction or operating outlays.

Indirect Impact: the secondary impact that includes inter-industry transactions, purchases of inputs from supporting industries.

Induced Impact: the additional impact from changes in household spending as industries modify labour input requirements in response to altered levels of demand for output.

Industry outputs are calculated as $(I-D(I-\mu-\alpha-\beta)B)^{-1}D((I-\mu-\alpha-\beta)e^*+(I-\mu-\beta)X_d+(I-\mu)X_r)=X$

Where:
I = an identity matrix of industry by industry dimension
D = a matrix of coefficients representing commodity output proportions
B = a matrix of coefficients representing commodity input proportions (technical coefficients) by industry
μ = a diagonal matrix whose elements represent the ratio of imports to use
α = a diagonal matrix whose elements represent the ratio of government production to use
β = a diagonal matrix whose elements represent the ratio of inventory withdrawals to use
e^* = final demand categories of consumption, government purchases of goods and services, business and government investment, and inventory additions
X_d = final demand category of domestic exports
X_r = final demand category of re-exports.

Employment is calculated as a fixed number of positions per dollar of industry output.

Appendix B - Developing Community Level Input-Output Models

The latest available provincial input-output tables at the S-Level from Statistics Canada were used as the starting point. The table represents 25 industries and 18 components of final demand (based on the 2009 S-level aggregation). The tables were converted into industry-by-industry space.

In a square input-output table, each industry in the table can be represented as a column. For example industry 1 can be represented as follows:

z_{11}
z_{12}
.
.
.
z_{125}
w_1
X_1

z_{ij} = purchases by industry i of products from industry j. The transactions matrix consists of z_{11} to z_{2525} comprise the transactions matrix of 625 (25 x 25) elements.
W_1 = value added or gross domestic product component of industry 1's output which includes wages, salaries, supplementary labour income, unincorporated business profits, incorporate income profits, other income, and depreciation.
X_1 = industry 1's total output, which equals W_1 plus the sum of z_{11} to z_{25}.

To create sub-provincial models, four challenges must be overcome:

1) Allocation of provincial gross output by community/region;
2) Estimation of technical coefficients by industry at a community/regional level;
3) Estimation of components of gross domestic product by industry at a community/regional level; and,
4) Allocation of provincial final demand output by community/region.

Census data on labour force by industry will be used to allocate gross output by industry for the region/community. Regional gross output for industry i is estimated:

$$X^R_i = \text{Labour Force}^R_i / \text{Labour Force}^{Sk}_i \times X^{Sk}_i$$

Where:
X^R_i = regional gross output for industry i
Labour Force^R_i = regional labour force for industry i
$\text{Labour Force}^{Sk}_i$ = provincial labour force for industry i
X^{Sk}_i = provincial gross output for industry i

To estimate items in each regional transaction matrix (z_{ij}) it will be assumed in all cases that the provincial input structure will apply to regional industries. The components of the regional transaction matrix are estimated:

$$z^R_{ij} = z^{Sk}_{ij} / X^{Sk}_i \times X^R_i$$

Where:

z^{R}_{ij} = an element of the regional transactions matrix.
z^{Sk}_{ij} = the corresponding element of the provincial transactions matrix.

The same methodology is used for estimating the components of GDP.

$$W^{R}_{i} = W^{Sk}_{i}/X^{Sk}_{i} \times X^{R}_{i}$$

Where:
W^{R}_{i} = regional value added or gross domestic product component of industry i's output
W^{Sk}_{i} = provincial value added or gross domestic product component of industry i's output

The components of final demand are estimated as follows. Personal expenditures are based on a per capita allocation of provincial spending.

$$PE^{R}_{i} = PE^{Sk}_{i}/Pop^{Sk} \times Pop^{R}$$

Where:
PE^{R}_{i} = Regional personal expenditure on industry i's output
PE^{Sk}_{i} = Provincial personal expenditure on industry i's output
Pop^{Sk} = Provincial population
Pop^{R} = Regional population
Gross capital formation (GFCF) or investment by industry is estimated applying the regional share industry output to total provincial gross capital formation for each industry. The same approach is used to estimate exports (Xd), imports (M), and inventory changes by industry (VPC).

$$GFCF^{R}_{i} = X^{R}_{i}/X^{Sk}_{i} \times GFCF^{Sk}_{i}$$

$$Xd^{R}_{i} = X^{R}_{i}/X^{Sk}_{i} \times Xd^{Sk}_{i}$$

$$M^{R}_{i} = X^{R}_{i}/X^{Sk}_{i} \times M^{Sk}_{i}$$

$$VPC^{R}_{i} = X^{R}_{i}/X^{Sk}_{i} \times VPC^{Sk}_{i}$$

Where:
$GFCF^{R}_{i}$ = Regional investment spending on industry i's output.
$GFCF^{Sk}_{i}$ = Provincial investment spending on industry i's output
Xd^{R}_{i} = Regional exports of industry i's output
Xd^{Sk}_{i} = Provincial exports of industry i's output
M^{R}_{i} = Regional imports of industry i's output
M^{Sk}_{i} = Provincial imports of industry i's output
VPC^{R}_{i} = Regional inventory changes of industry i's output
VPC^{Sk}_{i} = Provincial inventory changes of industry i's output

Regional public administration employment is used to allocate provincial government current expenditures by region.

$$GCE^{R}_{i} = PAE^{R}/PAE^{Sk} \times GCE^{Sk}_{i}$$

Where:
GCE^{R}_{i} = Regional government current expenditures on industry i's output
PAE^{R} = Regional public administration labour force
PAE^{Sk} = Provincial public administration labour force

GCE^{Sk}_i = Provincial government current expenditures on industry i's output

It is also necessary to adjust for leakages for intra-provincial imported factors of production.

In Saskatchewan's case, Dr. Jack Stabler's work on community level multipliers and hierarchical communities will be incorporated to estimate intra-provincial imports and exports.
In the Stabler methodology there are six levels of Trade Centre Functional Classification:

1. Primary Wholesale-Retail (PWR)
2. Secondary Wholesale-Retail (SWR)
3. Complete Shopping Centre (CSC)
4. Partial Shopping Centre (PSC)
5. Full Convenience Centre (FCC)
6. Minimun Convenience Centre (MCC)

There are only 2 Primary Wholesale-Retail communities in the province: Regina and Saskatoon. Moose Jaw, Prince Albert, Yorkton, Lloydminster, Battlefords, Swift Current, Weyburn, and Estevan are among the eight communities that presently classify as Secondary Wholesale-Retail. The communities classifying as PWR and SWR have been unchanged since 1961 to 1995.

Dr. Stabler has estimates of the marginal propensity for out-shopping in other communities (m2) and local expenditures on goods and services that have been imported by local firms for resale or as intermediates inputs used in production for local consumption (m1). Both of these have been estimated by functional level of community. The marginal propensity to import industry i's output (ms) is already available at the provincial level from the provincial input-output table.

Once m1 and m2 are estimated, intra-provincial imports can be estimated as:

m1 – ms = marginal propensity to import intra-provincial intermediate goods
m2 – ms = marginal propensity to import intra-provincial consumer goods (out-shopping)

To add intra-provincial imports to the regional table the following is added to each industry's imports:

$((m1-ms) \times (PE^{Sk}_i + GFCF^{Sk}_i + GCE^{Sk}_i)) + ((m2-ms) \times PE^{Sk}_i)$

Intra-provincial exports are estimated by calculating the marginal propensity to import (both out-shopping and intermediate inputs) for the rest of the province based on the same methodology used to calculate community/regional intra-provincial imports. Intra-provincial exports will be added to the estimated community/regional exports.

After an initial community/regional table has been created there is a high probability that it will be unbalanced: row sums will not equal column sums. The community/regional table will be rebalanced using the Haring-McMemanin method or RAS, by performing multiple iterations of row and column error pro-rations until the row and column errors converge to zero.

The estimation of intra-provincial imports into a region/community and incorporation of intra-provincial imports into the region/community model's leakages will constrain local multipliers to values not exceeding provincial level multipliers.

Developing Community/Regional Impact Models

Industry outputs in response to a shock in final demand are calculated as $(I-(I-\mu-\alpha-\beta)A)^{-1}((I-\mu-\alpha-\beta)e^*+(I-\mu-\beta)X_d+(I-\mu)X_r)=X$

Where:
I = an identity matrix of industry by industry dimension
A = a matrix of technical coefficients representing inter-industry purchases (zij) divided by own industry gross output Xi.
μ = a diagonal matrix whose elements represent the ratio of imports to use
α = a diagonal matrix whose elements represent the ratio of government production to use
β = a diagonal matrix whose elements represent the ratio of inventory withdrawals to use
e* = final demand categories of consumption, government purchases of goods and services, business and government investment, and inventory additions
Xd = final demand category of domestic exports
X_r = final demand category of re-exports

Employment is calculated as a fixed number of positions per dollar of industry output.
GDP components are calculated based on a fixed ratio of W_i to industry output.