Economic Impact of Saskatchewan School Divisions on the Provincial Economy

PRAXIS

RESEARCH | STRATEGY | RESULTS

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EXECUTIVE SUMMARY

This study will demonstrate significant economic benefits to the province of a sound and well-funded K-12 (kindergarten to grade 12) education system through a review of school division spending and high school graduate post-secondary and labour market outcomes.

Introduction

Education in Saskatchewan is divided into 27 school divisions of three categories: 18 Public, 8 Separate, and 1 Francophone. While each school division's primary goal is to provide the highest possible level of quality education, each category of division may take their own approach. The Separate school divisions aim to provide both religious and general education to members of the Christian – primarily Catholic – community. The Francophone school divisions aim to provide a knowledge of the French language, culture, and overall identity to students from pre-kindergarten to grade 12. The Public school divisions focus primarily on general education with subjects added as a division sees fit, such as the addition or removal of core French.

Primary and secondary education are critical factors in the development of children and young adults. Factors such as social ability, health, self-esteem, and patience are all developed and affected through a child and adolescent's time in the educational system.

In the 2020-21 school year, Saskatchewan school divisions spent $2.3 billion on goods, services, salaries, and employed 22,150 full time equivalent (FTE) persons. Despite the Saskatchewan government giving school boards across the province a one-time $20-million cash injection to help with rising fuel and insurance costs during the upcoming school year, school divisions remain under significant financial pressure. Four Saskatchewan school divisions have announced they're cutting a combined total of nearly 100 jobs due to budget shortfalls as well as adding $70 to $100 per year lunch supervision fees. This was done in response to budget shortfalls, in part due to inflation and an increase to non-teaching staff salaries.

Methodology

To estimate the provincial impact of school divisions, an economic model was developed that uses the latest provincial input-output (I-O) tables available. Input-output analysis is a form of macroeconomic analysis based on the interdependencies between different economic sectors or industries. This method is commonly used for estimating the impacts of positive or negative economic shocks and analyzing the ripple effects throughout an economy. Inputs for the economic model were 2020-21 school division spending, FTEs, and high school graduates' labour market and post-secondary education outcomes.

Summary of Results

This analysis presents results based on standard methodologies for estimating economic contributions for sub-national geographies. Results are the sum of direct, indirect, and induced impacts for the province from school division spending and high school graduates' post-secondary and labour market outcomes.

All impacts are considered relative to a hypothetical base case: no K-12 education in Saskatchewan. Direct impact is the total initial expenditure. Indirect impact is the secondary impact that includes inter-

industry transactions (i.e. purchases of inputs from supporting industries). Induced impact is the additional impact from changes in household spending as additional labour is hired or reduced.

GDP (gross domestic product) measures 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). Gross domestic product excludes the value of intermediate goods and services used in production. Labour income includes wages, salaries, and employer contributions to pensions and benefit packages.

Gross output measures total expenditures on local goods and services as well as business profits and payments to labour. Gross output is the total value of goods and services produced by an industry. This includes intermediate inputs that are foreign- and domestically-produced goods and services used by an industry in the production of its gross output. Value-added is the difference between gross output and intermediate inputs and represents the value of labour and capital used in producing gross output. The sum of value-added across all industries is equal to gross domestic product for the economy.

Employment impacts are measured in positions and FTEs and contains a mix of full- and part-time positions. Employment results are rounded to the nearest whole number, and as such, column sums may not necessarily add to the table total.

Table 1: Total Provincial Impacts: School Division Operations and Graduate Productivity

Total Impacts 2020-21 School Year	Gross Output ($M)	Gross Domestic Product ($M)	Employment (FTES and Positions)	Labour Income ($M)	Provincial Government Revenues ($M)
School Division Operations Impacts (2020-2021)	5,452.4	3,784.6	38,505.6	2,433.4	412.1
Graduate Productivity	2,854.4	1,677.2	13,248.4	655.0	144.3
Total Impact	**8,306.8**	**5,461.8**	**51,754.1**	**3,088.4**	**556.4**

In summary, through operational spending and graduate productivity school divisions generate $8,306.8 million in gross economic activity, $5,461.8 million in gross domestic product, accounting for 7.0 per cent of total provincial GDP, and 51,754 jobs. Roughly 1 in 11 jobs in the province depends directly or indirectly on school divisions.

Investment in K-12 education generates significant economic activity. With a K-12 budget of $1,977.3 million in 2020-21 (including capital projects), each $1 dollar invested creates $4.20 dollars in gross economic activity, $2.80 dollars in gross domestic product, and $1.60 dollars in labour income (included in GDP).

INTRODUCTION

School Divisions in Saskatchewan

Education in Saskatchewan is divided into 27 school divisions of three categories: 18 Public, 8 Separate, and 1 Francophone. While each school division's primary goal is to provide the highest possible level of quality education, each category of division may reflect their local approach. The Separate school divisions aim to provide faith-based general education to members of the minority faith community, primarily Roman Catholic. The Francophone school divisions aim to provide a knowledge of the French language, culture, and overall identity to students from pre-kindergarten to grade 12. The Public school divisions focus primarily on general education with subjects added to reflect local circumstances.

Those elected to serve on the various boards within the school division system are responsible for the well-being and prosperity of many groups including families, teachers, communities, and students. All staff within the school divisions strive to provide a safe and enjoyable environment to provide the most effective level of education possible.

There are several stakeholders involved in the management of school divisions. These levels include the Ministry of Education, the Saskatchewan School Boards Association, the Saskatchewan Association of School Business Officials, LEADS (the League of Educational Administrators, Directors, and Superintendents), and the Saskatchewan Teachers' Federation. While these partners work collaboratively, the Ministry of Education is ultimately responsible for funding and regulating education. School boards govern divisions through strategic planning, approving policies for staff, and managing yearly budgets and grants.

Funding Pressures

Saskatchewan's $2.6 billion education budget for 2020-21 is sourced from the general provincial revenue fund (GRF). (The provincial government sets mill rates for education property taxes, which are collected locally and flow into the GRF.) The Government of Saskatchewan recently announced a one-time $20-million cash injection for school divisions to help with rising fuel and insurance costs during the upcoming school year. Despite this announcement, school divisions remain under significant financial duress.

Four Saskatchewan school divisions recently announced a reduction of nearly 100 jobs due to budget shortfalls. To date, Greater Saskatoon Catholic Schools, Saskatoon Public Schools, Chinook School Division and South East Cornerstone Public School Division have announced staffing cuts, and more divisions are expected to follow suit.

On June 14, 2022, Greater Saskatoon Catholic Schools announced it is cutting 19.5 full-time equivalent (FTE) positions and implementing a $70 per year lunch supervision fee for elementary school students.

Saskatoon Public Schools announced it is cutting 12.7 FTE positions in elementary schools and 6.9 positions in secondary schools, one educational psychologist position, one English as an additional language teaching position, half of a speech language pathologist position, and charging $100 per child lunch supervision fee.

The Chinook School Division announced it is cutting 20 teaching positions.

The South East Cornerstone Public School Division announced it is cutting 21.8 FTE teaching jobs, 2 consultants in early literacy and curriculum, and 11.6 non-teaching jobs (education psychologists, caretakers etc.). The South East Cornerstone Public School Division indicated that most of the job cuts were necessary after operating grants did not increase enough to offset inflation and an increase to non-teaching staff salaries.

Benefits of K-12 education

Primary and secondary education are critical factors in the development of children and young adults. Factors such as social ability, health, self-esteem, and patience are all developed and affected through a child and adolescent's time in the educational system.

Benefits of primary and secondary education can be seen in positive outcomes later in life, as well. Studies have shown that those who have completed their secondary education have higher rates of productivity, better health later in life, and are much less likely to be involved in crime. Compared to high school dropouts, graduates earn an average of $150,000 to $415,000 in additional earnings over the course of a lifetime.[1] On average those who have graduated live six to nine years longer than their dropout counter parts, due mostly to a combination of increased lifetime earnings and a better health education.

High school graduates have been shown to have lower incarceration rates ranging from 3.4% to 10% than those without a diploma. Aside from the obvious personal benefits that come with education, there are communal benefits as well, as the decreased incarceration rates of graduates equates to an average of $26,600 less in federal spending per graduate.

Finally, it is estimated that graduates in the USA between the ages of 20 and 65 receive $23,200 in government medical assistance while non-graduates receive an estimated $60,800.

METHODOLOGY

To estimate the provincial impact of school divisions, an economic model was employed which uses the latest provincial input-output (I-O) tables available. Input-output analysis is a form of macroeconomic analysis based on the interdependencies between different economic sectors or industries. This method is commonly used for estimating the impacts of positive or negative economic shocks and analyzing the ripple effects throughout an economy. The Saskatchewan core model contains 35 industries and 66 commodities (aggregated to 25 industries in detailed results by industry) and based on a standardized method (Statistics Canada's) and will yield results like Statistics Canada's inter-provincial model and the Conference Board of Canada's STEAM Model. Model description and definitions are available in Appendix A.

In addition to the Saskatchewan core model, Praxis has developed several satellite modules. One relevant to this study is the fiscal module. This module provides a more thorough representation of the impact of the school divisions on government revenues. Typical economic impact models will only

[1] Taken from Shafiq (2013). Original text in US dollars – $117,000 to $322,000. Converted to Canadian dollars at a rate of 1.29 CAD to 1.00 USD.

provide results in terms of indirect taxes. Praxis' economic impact model extends this to include personal income taxes, corporate and unincorporated business taxes, excise taxes, and resource revenues. The fiscal module is updated annually upon the release of the federal and provincial government budgets.

Operating Impacts

Operational impacts of school divisions trace the revenue and expenses of operating through the economy. Operational impacts were calculated by creating a mixed endogenous–exogenous model. This allows a modification of the input structure of the expanding industry to reflect the input and output structure of a new development or event. This approach is appropriate when the input structure of the new development or event differs significantly from the input structure of the impacted industry. Under this approach expenses are treated as industry gross output and assigned to either inter-industry purchases or final value-added (wages, amortization, and profits). The labour income and employment coefficient in the model was adjusted to reflect actual employment and income paid to labour. A detailed account of the mixed endogenous–exogenous model methodology is available in Appendix B.

Incremental gross output (direct impact) was assigned to the "Government Sector." In the provincial and national input-output accounts, in addition to Public Administration and publicly funded health, the government sector also includes universities, government-funded elementary and secondary schools, community colleges and CEGEPs,[2] and other government education services. It should be noted that the input-output industry "education services" includes private, for-profit educational services only.

All school division financial statements for the 2020-21 school year were accessed and summated to reach a provincial school division spending and FTE total. Locally sourced expenses on goods and services were assigned to input-output model industries as incremental inputs. Annual expenses included salaries and wages, benefits, agency contracts, equipment expenses, facilities expenses, information technology, advertising, association fees and dues, financial services, insurance, materials and supplies, professional services, telephone and fax, and travel.

In terms of expenses: wages, salaries, and benefits totaled $1,737.6 million. Remaining expenses were broken down into the following components: Finance, Insurance, Real Estate and Rental and Leasing, Professional, Scientific and Technical Services, Manufacturing, Other Services, Information and Cultural Industries, Utilities, Transportation and Warehousing, Administrative and Support, and Waste Management and Remediation Services. Total school division spending was $2,308.4 million and total school division employment was 22,150.5 FTEs.

Graduate Productivity Impacts

Assessing the impact of labour market and postsecondary outcomes of high school graduates begins with determining the annual number of High School graduates in the province.

[2] A French acronym for *collége d'enseignement général et professionnel*. CEGEPs are a system of general and vocational colleges exclusive to the province of Quebec.

Table 2: High School Graduates by School Year 2015/16 to 2019/2020

	2015 / 2016	2016 / 2017	2017 / 2018	2018 / 2019	2019 / 2020
Saskatchewan	9,966	10,125	10,053	10,203	10,320

Source: Statistics Canada Table: 37-10-0008-01 (formerly CANSIM 477-0026) Number of graduates from regular programs for youth, public secondary schools, by age and sex. Excludes general programs for adults and vocational programs for youth and adults.

Noting that the number of graduates is relatively steady at 10,000 per school year, 10,320 (the latest available) was used as an estimate for 2020-21. Of these 10,320 graduates, some will enter the labour force directly, some will access post-secondary training, a very few will do neither (assumed to be 0), and some will leave the province.

In Saskatchewan, compared against all other levels of educational attainment, high school graduates have the lowest participation rate and employment rate while also experiencing the highest rate of unemployment (not including high school graduates currently attending or with some post-secondary education). The rates for participation and employment are 71.2% and 66.4%, respectively for high school grads compared to 77.9% and 77.3% for those with a bachelor's degree. Labour market outcomes can be significantly limited for those with only a high school education. A survey of SaskJobs showed that of the 11,978 listings currently available (26/07/22) only 326 were directed to those with a grade 12 education and did not require further specialized training such as certification in a trade.

Table 3: Destination of High School Graduates

Total - Highest certificate; diploma or degree for the population aged 15 years and over*	857,295
No certificate; diploma or degree*	177,210
No certificate; diploma or degree 15+ less 15 to 17-year-olds still in High School	169,194
Secondary (high) school diploma or equivalency certificate*	261,210
Postsecondary certificate; diploma or degree*	418,880
Adjusted Total less 15+ still in High School	849,284
Ratio of No High School or Post Secondary Completion to 849,284	0.199
Ratio of High School Completion Only to 849,284	0.308
Ratio Post Secondary Completion to 849,284	0.493
18 Year-Olds that out-migrate (international and interprovincially) **	280
Estimate of High Graduates entering Labour Market immediately after High School	3,856
Estimate of High Graduates Accessing some form of Post Secondary Education	6,184
Total High School Graduates	10,320

*Statistics Canada 2016 Census
**Statistics Canada tables: 1710001501 and 1710001401

Table 4: Labour Market Outcomes by Educational Attainment

	High School Graduates	Employment Rate	Graduates Employed
Estimate entering labour market immediately after high school	3,856	0.712	2,746
Estimate accessing some form of post-secondary education	6,184	0.773	4,780

Of those employed, employment by industry was estimated using Statistics Canada's Table: 37-10-0183-01 (Postsecondary graduates, by detailed field of study and International Standard Classification of Education) for Saskatchewan for post-secondary completers. For high school graduates, Praxis took a 35-position sample from the 326 ads on SaskJobs directed to those with a grade 12 education that did

not require further specialized training such as certification in a trade. From this sample, a breakdown by industry was determined.

Results of this exercise, aggregation into I-O industries, and the estimated economic output (based on the Saskatchewan average gross output per employee) are shown in the table below:

Table 5: High School Graduates Employment by Industry and New Economic Output

	Industry of Employment High School Completion Only	Industry of Employment Post Secondary Completion	Combined	New Output ($M)
Crop and Animal Production	78	170	249	107
Forestry and Logging	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0
Support Activities for Agriculture and forestry	0	0	0	0
Mining and Oil and Gas Extraction	78	115	194	210
Utilities	0	95	95	79
Construction	392	144	536	152
Manufacturing	78	100	178	114
Wholesale Trade	78	2	81	20
Retail Trade	78	2	81	7
Transportation and Warehousing	235	13	248	73
Information and Cultural Industries	157	204	361	94
Finance, Insurance, Real Estate and Rental and Leasing	78	387	465	246
Professional, Scientific and Technical Services	78	765	843	129
Administrative and Support, Waste Management and Remediation Services	157	86	243	22
Educational Services	78	2	81	4
Health Care and Social Assistance	314	1,485	1,799	239
Arts, Entertainment and Recreation	0	60	60	5
Accommodation and Food Services	392	130	522	37
Other Services (Except Public Administration)	78	156	235	18
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0
Transportation Margins	0	0	0	0
Non-Profit Institutions Serving Households	0	0	0	0
Government Sector	392	864	1,256	164
Total	**2,746**	**4,780**	**7,526**	**1,720**

The productivity impact of employed high school graduates was estimated by converting positions into economic output and "shocking" the economic model in terms of the resultant output. Induced impacts of this incremental output were also used to calculate additional consumer spending in the province.

It should be noted that graduate productivity impacts are not instantaneous to 2021 but occur several years later. Impacts in 2021 would include several of the previous years' graduate productivity impacts and, with the number of high school graduates steady at around 10,000 per year, these impacts would be consistent and occurring annually.

RESULTS

Results below are direct, indirect, and induced impacts for school division spending and high school graduate productivity impacts. All impacts are considered relative to a hypothetical base case: no K-12 education in the province. Direct impact is the total initial expenditure. Indirect impact is the secondary impact that includes inter-industry transactions (i.e. purchases of inputs from supporting industries). Induced impact is the additional impact from changes in household spending as industries add labour in response to higher levels of demand for output. Gross output measures total expenditures on local goods and services as well as business profits and payments to labour. GDP (gross domestic product) measures 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). Gross domestic product excludes the value of intermediate goods and services used in production.

Operational direct employment is measured in FTEs (full-time equivalent positions). Direct, and all indirect and induced graduate productivity employment impacts are measured in positions. Labour income includes wages, salaries, and employer benefits. Labour income includes wages, salaries, and employer contributions to pensions and benefit packages. Economic model results are shown in the tables below:

Table 6: School Division Operations Direct, Indirect, and Induced Impacts – Provincial

School Division Operations Impacts (2020-21 School Year)	
Gross Output ($M)	
Direct	2,308.4
Indirect	324.6
Induced	2,819.4
Total Gross Output	**5,452.4**
Gross Domestic Product ($M)	
Direct	1,859.7
Indirect	193.0
Induced	1,731.9
Total Gross Domestic Product	**3,784.6**
Employment (Positions)	
Direct	22,150
Indirect	907
Induced	15,447
Total Employment	**38,506**
Labour Income ($M)	
Direct	1,737.6

Indirect	54.0
Induced	641.7
Total Labour Income	**2,433.4**

Table 7: High School Graduate Productivity Direct, Indirect, and Induced Impacts – Provincial

Graduate Productivity (2020-21 School Year)	
Gross Output ($M)	
Direct	1,720.3
Indirect	509.7
Induced	624.4
Total Gross Output	**2,854.4**
Gross Domestic Product ($M)	
Direct	1,000.7
Indirect	292.4
Induced	384.1
Total Gross Domestic Product	**1,677.2**
Employment (Positions)	
Direct	7,526
Indirect	2,226
Induced	3,497
Total Employment	**13,248**
Labour Income ($M)	
Direct	389.8
Indirect	113.1
Induced	152.1
Total Labour Income	**655.0**

Results by Industry

The economic impact of Saskatchewan school divisions on the provincial economy is pervasive and widespread. Tables 8 and 9 provide total impacts (sum of direct, indirect, and induced) in 2020-21 by industry of school division spending and high school graduate productivity on the provincial economy by industry. In the case of school division operations, the bulk of direct activity occurs within the Government Sector itself, but further impacts (indirect) occur in Utilities, Manufacturing, Transportation and Warehousing, Finance, Insurance, Real Estate and Rental and Leasing reflecting the high proportion of specialized services required for school division operation. For graduate productivity, direct impacts are consistent with new combined employment in Table 5 and are concentrated in Construction, Finance, Insurance, Real Estate and Rental and Leasing, Professional, Scientific and Technical Services, Health, Accommodation and Food services, and the Government Sector. In both cases, induced impacts, which represent the additional impacts of consumer spending of wages earned, are concentrated heavily within the retail trade and service industries.

Table 8: Detailed Impacts by Industry – Direct, Indirect, and Induced Impacts of School Division Operations

2020-21 School Year	Gross Output Impact ($M)	GDP at Basic Prices Impact ($M)	Employment Impact (Positions)	Labour Income Impact ($M)
Crop and Animal Production	67.0	25.4	156	2.3
Forestry and Logging	1.9	0.7	4	0.3
Fishing, Hunting and Trapping	0.2	0.1	2	0.0
Support Activities for Agriculture and forestry	1.2	0.8	9	0.5
Mining and Oil and Gas Extraction	60.6	39.5	56	6.7
Utilities	318.4	210.3	383	43.9
Construction	74.8	29.1	264	15.6
Manufacturing	168.9	45.8	263	19.0
Wholesale Trade	89.1	57.9	367	26.1
Retail Trade	444.5	291.1	5,044	176.6
Transportation and Warehousing	145.5	76.0	497	30.4
Information and Cultural Industries	122.9	68.9	471	32.6
Finance, Insurance, Real Estate and Rental and Leasing	1,082.1	759.2	2,043	136.5
Professional, Scientific and Technical Services	56.4	37.4	368	20.6
Administrative and Support, Waste Management and Remediation Services	42.9	24.0	465	16.7
Educational Services	19.4	12.8	446	8.4
Health Care and Social Assistance	88.1	60.4	664	23.7
Arts, Entertainment and Recreation	48.5	22.8	600	16.0
Accommodation and Food Services	189.0	89.9	2,637	66.6
Other Services (Except Public Administration)	89.0	54.6	1,152	36.2
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	33.6	18.4	463	17.3
Government Sector	2,308.4	1,859.7	22,150	1,737.6
Total	**5,452.4**	**3,784.6**	**38,506**	**2,433.4**

Table 9: Detailed Impacts by Industry – Direct, Indirect, and Induced Impacts of Graduate Productivity

	Gross Output Impact ($M)	GDP at Basic Prices Impact ($M)	Employment Impact (Positions)	Labour Income Impact ($M)
Crop and Animal Production	159.6	60.6	371	5.5
Forestry and Logging	1.6	0.6	4	0.2
Fishing, Hunting and Trapping	0.1	0.0	0	0.0
Support Activities for Agriculture and forestry	2.4	1.6	18	0.9
Mining and Oil and Gas Extraction	271.8	177.5	251	29.9
Utilities	139.8	92.4	168	19.3
Construction	200.2	77.8	707	41.8
Manufacturing	180.0	48.8	281	20.2
Wholesale Trade	59.5	38.6	245	17.4
Retail Trade	117.9	77.2	1,338	46.8
Transportation and Warehousing	129.8	67.8	444	27.1
Information and Cultural Industries	136.8	76.6	524	36.2
Finance, Insurance, Real Estate and Rental and Leasing	555.3	389.6	1,049	70.0
Professional, Scientific and Technical Services	179.3	118.8	1,170	65.5
Administrative and Support, Waste Management and Remediation Services	52.8	29.6	573	20.6
Educational Services	5.6	3.7	129	2.4
Health Care and Social Assistance	270.8	185.7	2,041	72.7
Arts, Entertainment and Recreation	16.9	8.0	210	5.6
Accommodation and Food Services	84.9	40.4	1,185	29.9
Other Services (Except Public Administration)	51.3	31.5	665	20.9
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	9.7	5.3	133	5.0
Government Sector	228.1	145.3	1,744	117.0
Total	**2,854.4**	**1,677.2**	**13,248**	**655.0**

Government Revenue Impacts

An expansion in economic activity is expected to generate incremental government revenues. Praxis' economic impact model's fiscal module is based on the latest provincial and federal budgets and estimates government revenues as follows:

- Provincial personal income tax is calculated by using the provincial 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 respective provincial corporate tax rate 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.
- Federal and Provincial sales taxes collected are calculated using a ratio of government sales and excise tax revenues to retail industry output.

Estimated government revenues are for direct, indirect, and induced impacts and do not represent taxes paid solely by sales. Estimates are not adjusted for any changes to equalization entitlements.

Table 10: Government Revenue Impacts – Direct, Indirect, and Induced Impacts of School Division Spending

School Division Operations Government Revenue Impacts 2020-21	Personal Income Tax (PIT)	Corporate Income Tax	Unincorporated Business Income Tax	Sales and Excise Taxes	Total Revenue
Federal ($M)	457.8	37.6	69.7	20.4	**585.5**
Provincial ($M)	271.3	30.1	50.2	60.5	**412.1**
Total ($M)	**729.1**	**67.6**	**119.9**	**80.9**	**997.5**

Table 11: Government Revenue Impacts – Direct, Indirect, and Induced Impacts of Graduate Productivity

Graduate Productivity Government Revenue Impacts 2020-21	Personal Income Tax (PIT)	Corporate Income Tax	Unincorporated Business Income Tax	Sales and Excise Taxes	Total Revenue
Federal ($M)	131.9	31.6	46.5	8.3	**218.3**
Provincial ($M)	73.0	25.3	33.6	12.4	**144.3**
Total ($M)	**204.9**	**57.0**	**80.1**	**20.7**	**362.6**

Provincial Government Return on Investment

In 2020-21, Saskatchewan's 27 school divisions received $1.94 billion in school operating funding and a further $37.3 million in capital funding totalling $1,977.3 million.

While not offset by the $556.4 in provincial revenues generated, investment in K-12 education generates significant economic activity. With a K-12 budget of $1,977.3 million in 2020-21, each $1 dollar invested creates $4.20 dollars in gross economic activity, $2.80 dollars in gross domestic product and $1.60 dollars in labour income (included in GDP).

Table 12: Economic Impacts per Dollar Invested in K-12 Education

Gross Output ($)	Gross Domestic Product ($)	Employment (Positions and FTEs)	Labour Income ($)
4.20	2.80	0.000026	1.60

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APPENDIX A: DEFINITIONS AND MODEL DESCRIPTION

Employment: measured in a mix of FTEs and positions.

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

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.

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.

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 $(I-D(I-\mu-\alpha-\beta)B)^{-1}\ D((I-\mu-\alpha-\beta)e^*+(I-\mu-\beta)Xd+(I-\mu)Xr)=X$

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.

Xd = final demand category of domestic exports

Xr = final demand category of re-exports.

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

APPENDIX C: MIXED ENDOGENOUS–EXOGENOUS INPUT-OUTPUT IMPACTS

In a 3-industry x 3-industry input-output model with industry 3 exogenized, endogenous industry output and final demand XM

$$\begin{vmatrix} X1 \\ X2 \\ YL3 \end{vmatrix}$$

is calculated as follows:

$$XM = M^{-1} YM$$

Where M=

$$\begin{vmatrix} (1-aL11) & -aL12 & 0 \\ -aL21 & (1-aL22) & 0 \\ -aL31 & -aL32 & -1 \end{vmatrix}$$

$$AL = (D(I-\mu-\alpha-\beta)B)$$

YM=

$$\begin{vmatrix} YL1+aL13X3 \\ YL2+aL23X3 \\ -(1-aL33)X3 \end{vmatrix}$$

$$YL = D((I-\mu-\alpha-\beta)e^{*}+(I-\mu-\beta)Xd+(I-\mu)Xr)$$

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
Xd = final demand category of domestic exports
Xr = final demand category of re-exports