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Economic Impact From Farm Investments in Canada (2015)

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PROJECT REPORT

RP

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Maurice Doyon, Stéphane Bergeron

Rapport de projet *Project report*

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Economic Impact from farm investments in Canada (2015)

Maurice Doyon¹, Stéphane Bergeron²

Executive Summary

- On-farm investments made by Canadian farmers are significant. In 2015, Canadian farmers in the six sectors studied have collectively invested more than 9.2 billion dollars; this in turn has generated economic benefits for the country, with nearly 89,000 full-time jobs created, and contributing 8.7 billion dollars to the GDP.
- This activity has generated significant fiscal revenue for provincial and federal government. Specifically, we estimate at 415 million dollars the fiscal revenue for the federal government, and an aggregated amount of \$508 million of fiscal revenues for the provinces.
- The stability of farm prices that are characteristic of productions under supply management seems favorable to farm investments. While supply management represents roughly 20 % of farm receipts of the six sectors studied, they represent 25 % of total investments and 28 % of the total GDP generated by farm investments. Moreover, on a per farm basis, supply managed farms create significantly more employment and contributions to GDP than their non-supply managed counterparts.
- Although supply managed productions require significant investments in quotas, it seems that the stability associated with supply management outweighed that extra cost, relative to non-SM sectors and creates a favorable environment for greater levels of investment.
- From a job creation perspective, supply managed farms create significantly more jobs than non-supply managed farms. With supply managed farm productions generating 1.78 jobs per farm from on-farm investments, while non-supply managed farm productions generate on average 0.6 jobs per farm from on-farm investments. Dairy farmers generate the most jobs, with 1.93 jobs per farm generated from farm investments.
- The economic impact from on-farm investments mostly benefit rural areas. Expressing the estimated benefits for regions relative to the importance of urban centers help express these values in terms that are more meaningful to decision makers. On-farm investments have a significant impact on the economic activity of rural areas, but also indirectly benefit other regions, such as Montreal where technology and manufacturing centers are often located.

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INTRODUCTION

This report investigates the economic impact generated by investments made on farms in Canada. The agricultural sector generates economic activities from the creation of goods, farm expenses and investments. This report focuses only on the impact generated from investments, which includes investment in technologies, environmental stewardship as well as renovation and modernization of equipment.³ The data used was extracted from the Farm Financial Survey (2015) of Statistics Canada. Three types of economic impact are estimated: jobs (expressed in person-years of work), gross domestic product (GDP) and fiscal revenues generated for the federal and provincial governments. These economic impacts are calculated using the EcoTec Consultants model. Details on the EcoTec models can be found in Appendix A.

The three types of economic impact are composed of three types of benefits defined as follows:

Direct benefits

Direct economic benefits are essentially the expenditure and jobs directly created from farm investments. For example, direct jobs (expressed as full-time equivalents (FTE)) represent workers hired to install new technologies or build new infrastructure.

Indirect benefits

Indirect economic benefits are those that result from the acquisition of goods and services between companies hired by the farm. For example, the installation of new equipment by the farm is a direct benefit for the contractor hired for this activity. However, the contractor buys equipment and purchases services (i.e. accounting, managerial, utilities, etc.) that are considered indirect benefits. A relative proportion of these indirect benefits are attributed to the investing farm, using mathematical models such as the EcoTec Consultants model.

Induced benefits

Induced economic benefits are generated by household spending resulting from work income earned from jobs created directly or indirectly from farm investments⁴.

This analysis focuses on six agricultural productions. Using the nomenclature from Statistics Canada, we have three supply-managed production: *Dairy cattle and milk production farms* (Dairy), *Egg production for consumption* (Eggs)⁵ and *Broiler and chicken production* (Poultry)⁶. Three productions not under supply management (non-SM): *Hog and pig farming* (Hog), *Beef Cattle ranching and farming* (Beef) and *Oilseed and grain farming* (Oilseeds/Grain).

³ Investments from acquiring additional quotas were not included in estimates of the economic impact presented in this report.

⁴ Induced benefits are open to critique and are sometimes omitted. Nevertheless, all agree that they are real. Just think of the impact of the closing of the major employer in a small town on the town car dealership. Instead of omitting them, we choose a conservative approach in computing them. Therefore, income tax and other deductions are subtracted, as well as a saving rate, at each iteration.

⁵ Does not include hachery

⁶ Includes turkey

Throughout the report, the economic impacts are provided at the aggregate level and per farm. The number of farms per type used to calculate the per farm values are given in Table 1 and have been calculated from Statistics Canada Census of Agriculture (2016)⁷ for the Farm types as defined above (Table 004-0200). Atlantic Provinces (New Brunswick, Newfoundland-Labrador, Nova Scotia Prince Edward Island) and Prairie provinces (Alberta, Manitoba and Saskatchewan) have been aggregated to match the format of the data obtained from the Statistic Canada’s Farm Financial Survey.

TABLE 0-1
Number of farms by type and by regions

	Regions					
	Atlantic	Quebec	Ontario	Prairies	B-C	Canada
Supply Management Sectors						
Dairy	615	5,163	3,439	791	517	10,525
Eggs	109	201	642	335	721	2,014
Poultry	133	583	1,029	337	387	2,471
Total	857	5,947	5,110	1,463	1,625	15,010
Non-Supply Management Sectors						
Hog	47	1,463	1229	465	101	3313
Beef	1,074	2,474	6,786	23,317	2,362	36,018
Oilseeds/Grain	283	4,506	16,876	41,659	304	63,633
Total	1,404	8,443	24,891	65,441	2,767	102,964

Source: Statistics Canada Farm Census Survey (2016), Table 004-0200

Table 0-2 reports the Farm Cash Receipts of each farm sector. This provides measure to understand the relative importance of the sector. From this we can see that 43 G\$ is the total Cash Farm receipts in Canada for the sectors considered, with 33 G\$ from farms not under supply management, representing 78 % of the total revenue. Supply managed farms have 9 G\$ of Farm Cash receipt, representing 22 % of the farm considered. In other words, the weight of the supply-managed farm sector, in our study, account for roughly 20% of farm receipts. These numbers will be useful throughout this report to put into perspective the relative impact of farm investments.

⁷ One should note that the Farm Financial Survey data are from 2015, while the census data are from 2016. This was necessary given that the Financial survey does not include a complete census of farms, implying some extrapolation to get a sector estimate. The most accurate farm count to pair with the investment data are from Statistics Canada 2016 farm census. While slight differences might exist in count between 2015 and 2016, these differences have little implication for the estimated benefits presented in the report.

TABLE 0-2
Farm Cash Receipts (x 100,000 \$)

	Provinces					Canada
	Atlantic	Quebec	Ontario	Prairies	B-C	
Supply Management Sectors						
Dairy	352	2,188	1,943	982	564	6,029
Eggs	78	162	356	234	123	953
Poultry	193	643	780	424	358	2,398
Total	624	2,992	3,080	1,639	1,045	9,380
Non-Supply Management Sectors						
Hog	27	1,322	1,126	1,719	32	4,226
Beef	118	742	1,509	7,822	307	10,498
Oilseeds/Grain	71	1,062	2,948	14,518	62	18,662
Total	216	3,127	5,583	24,059	401	33,385

Source: Statistics Canada 2015, Table 002-0001

The report is organized in two parts. First, the economic benefits (jobs, GDP, fiscal revenue) of agricultural investments from farms under supply management and not under supply management are given per province. A breakdown of the data by production at the Canadian level is also included. In the second part, the focus is on the result for the province of Quebec and only includes values for the farm under SM. EcoTech Consultants has developed a specific model to Quebec with the ability to measure economic impacts per administrative region. Therefore, economic benefits are given by administrative region as well as per farm type at the province of Quebec level.

Abbreviation used in this report

- FTE** : Full Time Equivalent
- GDP** : Gross Domestic Product
- M** : Million
- SM** : Supply Management

PART 1: Economic Impact from farm investments in Canada and its regions

Farm investment from farms in Canada

In 2005, the Canadian farms considered invested over 9 G\$, with farms under SM investing 2.3 G\$ and farms not under SM investing 6.9 G\$, representing respectively 25 % and 75 % of the total investments. In the SM sector Dairy Farms invest the most in absolute terms and per farm. With an average on-farm investments reaching \$170,000. In the non-SM farm sectors it is the Oilseeds and Grain Farms that invest the most in absolute terms with 4.5 G\$, but from a per farm basis it is the hog farms that invest the most with \$120,000 in investments per farm, compared to \$70,000 for the Oilseeds and Grains farms.

TABLE I-1
On farm investment by Farm Type and per Province
(Millions of dollars)

	Provinces						per farm
	Atlantic	Quebec	Ontario	Prairies	B-C	Canada	
Supply Management Sectors							
Dairy	83.22	787.39	650.58	158.51	90.12	1,769.81	0.17
Eggs	8.63	45.43	73.47	27.11	35.52	190.18	0.09
Poultry	7.13	179.89	137.52	2.35	17.42	344.31	0.14
Total	98.98	1,012.71	861.57	187.97	143.06	2,304.30	0.15
Non-Supply Management Sectors							
Hog	NA	84.50	185.67	113.45	NA	383.62	0.12
Beef	20.62	66.51	281.77	1,532.42	83.36	1,984.69	0.06
Oilseeds/Grain	4.70	168.57	551.78	3,758.87	14.29	4,498.21	0.07
Total	25.33	319.57	1,019.22	5,404.75	97.66	6,866.52	0.07

Source: Calculation from Statistics Canada's Farm Financial Survey (2015)

Jobs generated from farm investments in Canada

In 2015, jobs created from on-farm investments reached 26,704 full time equivalent (FTE) in the SM sectors, with Quebec generating the most direct jobs at 5,506 and Ontario generating the most jobs when including indirect and induced jobs, with 10,765 FTE.

In the non-SM sectors, the prairie region generates the majority of jobs from farm investments, with 38,070 FTE jobs, representing over 60 % of all jobs generated for Non-SM farms in Canada.

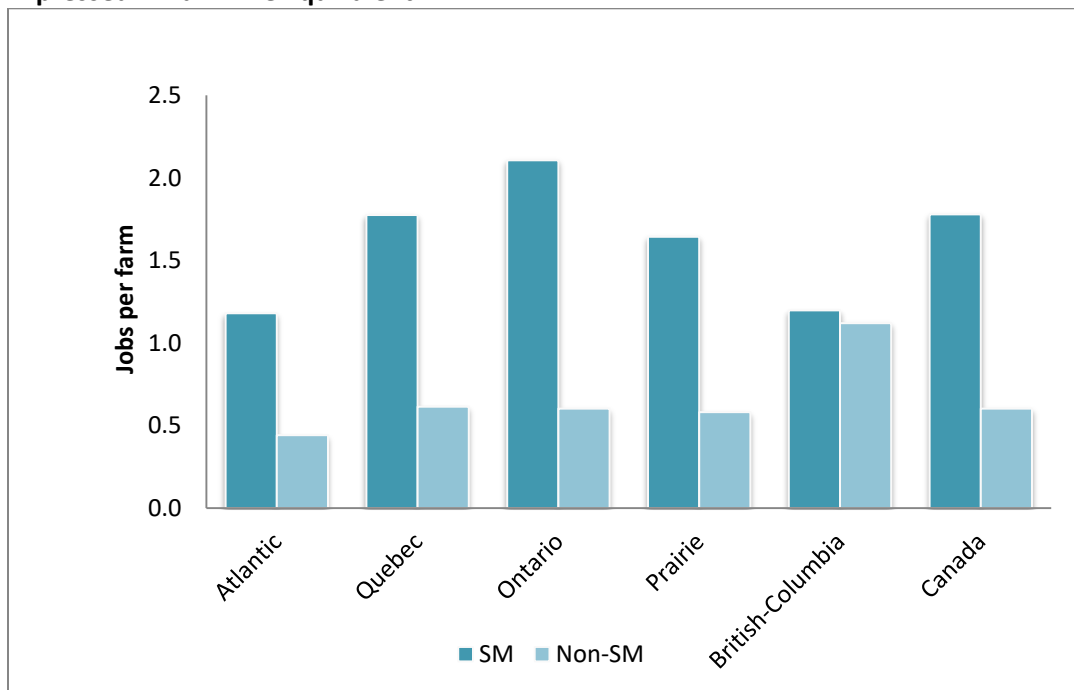
TABLE I-2
Jobs generated from agricultural investments by province (2015)
Expressed in Full Time Equivalent jobs

Jobs generated - Supply Management Sectors					
	DIRECTS	INDIRECTS	INDUCED	TOTAL	TOTAL/FARM
Atlantic	488	199	324	1,012	1.18
Quebec	5,506	2,044	3,008	10,557	1.78
Ontario	5,150	1,980	3,636	10,765	2.11
Prairie	1,010	566	829	2,404	1.64
British Columbia	883	359	705	1,947	1.20
Canada	13,041	5,152	8,511	26,704	1.78
Jobs Generated - Non-Supply Management Sectors					
	DIRECTS	INDIRECTS	INDUCED	TOTAL	TOTAL/FARM
Atlantic	183	154	283	620	0.44
Quebec	2,053	1,229	1,910	5,192	0.61
Ontario	5,835	3,362	5,791	14,988	0.60
Prairie	21,616	7,466	8,988	38,070	0.58
British Columbia	1,010	743	1,346	3,099	1.12
Canada	30,707	12,966	18,340	62,013	0.60

Source: Calculated from EcoTec consultants and Statistics Canada

Figure I-1 compares the jobs generated per farm between SM and non-SM sector, by regions and for Canada. In all cases, the SM sector generates more jobs per farm compared with the non-SM sector. In British Columbia, the number of jobs generated per farm is similar between sectors with 1.20 jobs (FTE) for the SM compared to 1.12 jobs (FTE) in the non-SM sector. Other regions have a much more significant difference in favor of the SM sector, the Canadian average being 1.78 jobs for SM versus 0.60 for the non-SM sectors considered. Ontario is the province with the most jobs generated per SM farm with 2.1 jobs (FTE).

Figure I-1
Jobs per farm generated from agricultural investments by province (2015)
Expressed in Full Time Equivalent



Source: Calculated from EcoTec consultants and Statistics Canada data

Table I-3 provides the number of jobs related to farm investments generated directly, indirectly and induced for Canada, organized by farm type. Oilseed and Grain farms generate the most jobs in total with 37,276 jobs, 19,061 of those are direct, 7,223 are indirect and 10,991 are induced. This production represents 42 % of all jobs generated. Dairy produces the second most total jobs from on-farm investment with 20,364 jobs, representing 23.0 % of all jobs generated in Canada by farm investments, followed by Beef with 20,292 jobs in total representing 22.9 %. The other sectors reported each account for less than 5 % of jobs generated from on-farm investments in 2015 (see Figure I-2 for a distribution of jobs).

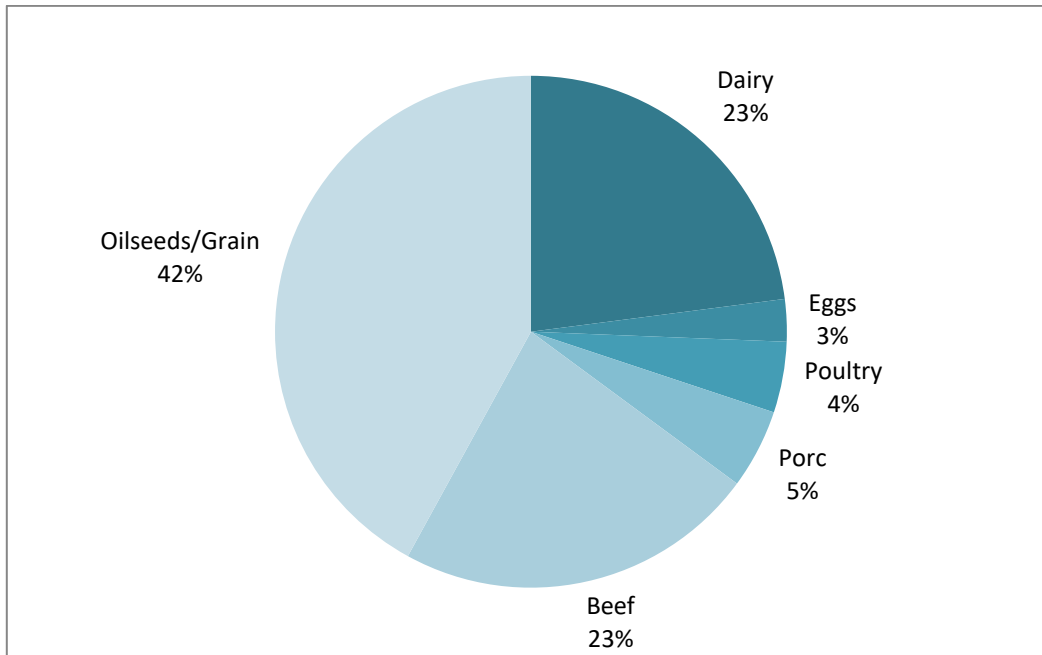
When the data is examined from a per farm perspective, the results are different. Dairy generates nearly 4 times as many jobs as the Oilseeds and Grain farms, followed by Poultry with 1.61 jobs per farm. Among the non-SM farms, it is the hog production that generates the most jobs on a per farm basis, with, on average, an estimated 1.34 jobs generated.

TABLE I-3
Jobs generated from agricultural investments in Canada by farm production (2015)
Expressed in Full Time Equivalent jobs

Jobs Generated					
Sector	DIRECTS	INDIRECTS	INDUCED	TOTAL	TOTAL/FARM
Dairy	9,971	3,914	6,479	20,364	1.93
Eggs	1,155	433	781	2,370	1.18
Poultry	1,915	804	1,251	3,970	1.61
Hog	2,170	886	1,390	4,446	1.34
Beef	9,475	4,858	5,959	20,292	0.56
Oilseeds/Grain	19,061	7,223	10,991	37,276	0.59
Total	43,748	18,118	26,851	88,717	

Source: Calculated from EcoTec consultants and Statistics Canada data

FIGURE I-2
Distribution of total jobs generated from agricultural investments in Canada by farm production (2015)



Source: Calculated from EcoTec consultants and Statistics Canada

GDP generated from farm investment in Canada

Table I-4 reports the direct, indirect and induced GDP measure generated from on-farm investments, by regions for SM sector and non-SM sector. The SM sector generated 2.5 G\$ worth of GDP, with 1.05 G\$ directly, 0.485 G\$ indirectly and 0.928 G\$ induced. Quebec has the largest impact on direct GDP generated at 0.425 G\$, while Ontario has the largest generated GDP when including indirect and induced GDP, for a total of 1 G\$.

In the non-SM farm category, it is the prairies that generates the most GDP from farm investments, with 4.03 G\$, representing nearly 65 % of the GDP for our non-SM farms. Trailing behind the prairies is Ontario with a total GDP of 1.148 G\$.

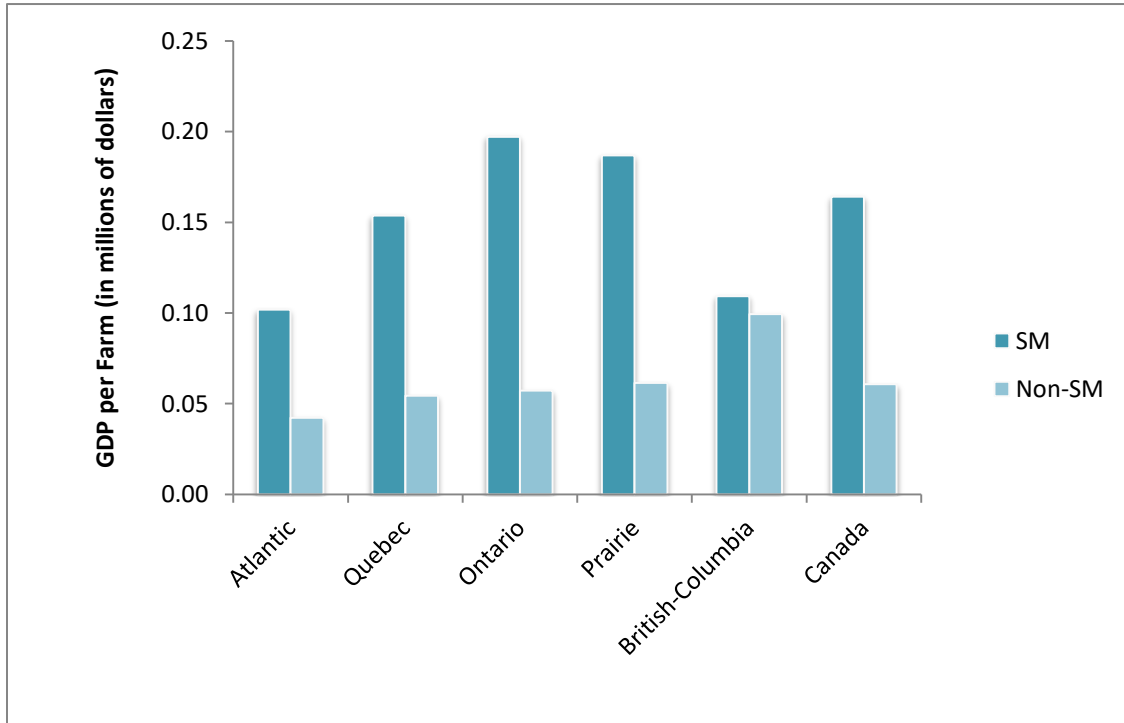
Examining the data from a per farm perspective reveals that the SM sector generates up to three times more GDP per farm, compared to non-SM farms. (Figure I-3)

TABLE I-4
Generated GDP from agricultural investments by province (2015)
Values in millions of dollars

GDP Generated - Supply Management Sectors					
	DIRECT	INDIRECT	INDUCED	TOTAL	TOTAL/FARM
Atlantic	33.7	18.0	35.7	87.4	0.10
Quebec	424.5	179.5	310.9	914.9	0.15
Ontario	421.3	184.6	402.3	1,008.3	0.20
Prairie	99.8	70.7	102.9	273.5	0.19
British Columbia	70.3	32.0	75.5	177.9	0.11
Canada	1,050.0	485.6	928.4	2,463.9	0.16
GDP Generated - Non-Supply Management Sectors					
	DIRECT	INDIRECT	INDUCED	TOTAL	TOTAL/FARM
Atlantic	13.1	17.3	29.1	59.5	0.04
Quebec	160.8	109.3	189.9	459.9	0.05
Ontario	483.8	315.0	628.9	1,427.7	0.06
Prairie	2,021.9	864.5	1,142.9	4,029.3	0.06
British Columbia	73.5	66.8	135.1	275.4	0.10
Canada	2,753.9	1,374.5	2,128.3	6,256.6	0.06

Source: Calculated from EcoTec consultants and Statistics Canada

FIGURE I-3
Average GDP generated per farm from agricultural investments, by regions (2015)
Values in millions of dollars



Source: Calculated from EcoTec consultants and Statistics Canada

Table I-5 reports the GDP generated from agricultural investment by farm production, by Canadian regions. Oilseed and Grain generates the most GDP 3.8 G\$, followed by Beef 2.1 G\$, and Dairy with 1.9 G\$. These amounts represent respectively, 43 %, 24 % and 22 % of the total GDP generated by farm investments across all sectors. This distribution is illustrated in Figure I-4.

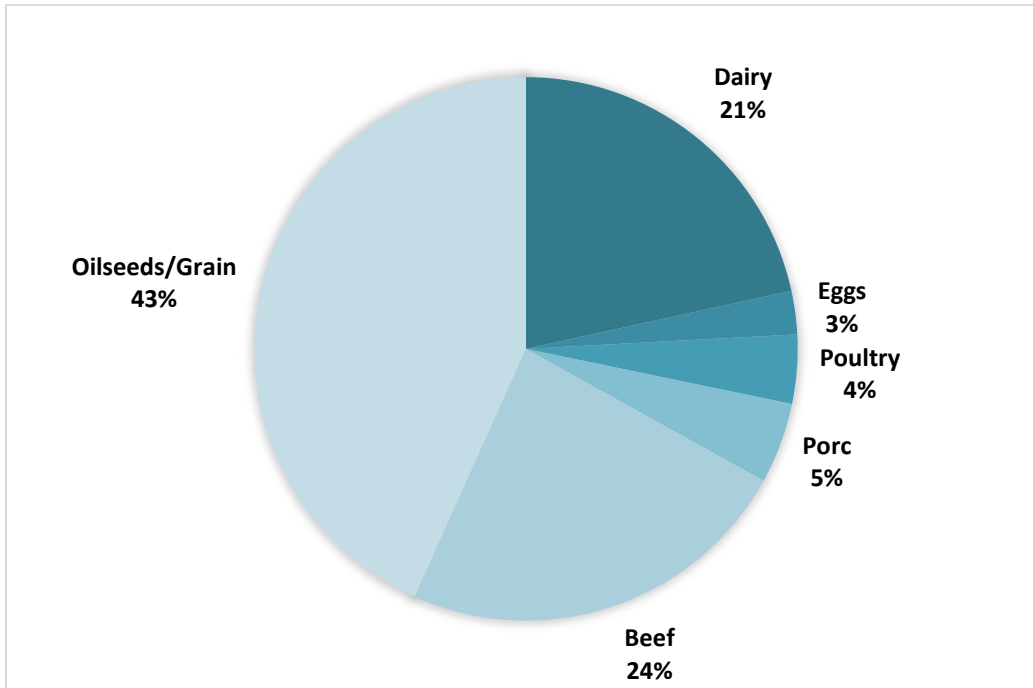
Examining the data from a farm perspective, we find that on average investments made in 2015 on a dairy farm contributed \$180,000 to the creation of wealth in Canada (GDP). Similarly, in average each poultry and egg farm contributed in average \$140,000 and \$110,000 to the Canadian GDP, respectively. This is only the impact of their investments.

TABLE I-5
Generated GDP from agricultural investments by farm type (2015), Canada
Values in millions of dollars

Farm Type	GDP Generated			TOTAL	TOTAL/FARM
	DIRECT	INDIRECT	INDUCED		
Dairy	804.7	369.8	706.7	1,881.2	0.18
Eggs	96.4	41.8	86.7	224.9	0.11
Poultry	148.9	74.0	135.0	357.8	0.14
Hog	178.6	86.4	154.6	419.6	0.13
Beef	855.7	514.1	693.3	2,063.1	0.06
Oilseeds/Grain	1,719.5	774.0	1,280.4	3,773.9	0.06
Total	3,803.8	1,860.1	3,056.6	8,720.6	

Source: Calculated from EcoTec consultants and Statistics Canada

FIGURE I-4
Distribution among farm types of GDP generated from agricultural investments (2015).



Source: Calculated from EcoTec Consultants and Statistics Canada

Fiscal revenue generated from farm investments in Canada

Table I-6 reports the Fiscal Revenue for the federal and provincial governments. These revenues include amounts from personal income taxes, sales and goods taxes, and corporate taxes. Municipal taxes are included in the provincial values.

The SM sector generates a total of 214 M\$ of fiscal revenue, with 86 M\$ going to the federal government and 127 M\$ going to the provincial governments. The province of Quebec receives the largest fiscal revenue with 56 M\$, followed by Ontario with 49 M\$.

The non-SM sector generates a total of 710 M\$ in fiscal revenue, 329 M\$ to the federal government and 381 M\$ to the provinces. The prairies generate the largest fiscal revenue with 282 M\$, representing 74 % of all fiscal revenues generated from investments on farms not under SM and included in this study.

Table I-6 Fiscal Revenue for the Federal and Provincial government generated from on-farm investment (2015)

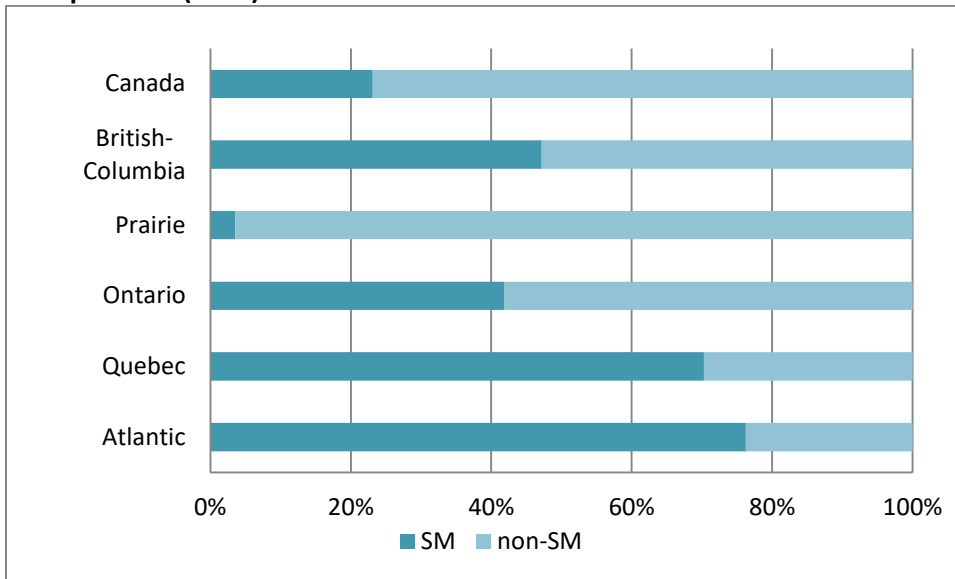
Values in millions of dollars

Fiscal Revenue - Supply Management Sectors			
	Federal Government	Provincial Government	TOTAL
Atlantic	3.5	5.7	9.2
Quebec	31.8	55.5	87.4
Ontario	36.5	49.1	85.6
Prairie	9.2	10.8	20.0
British Columbia	5.2	6.0	11.3
Canada	86.3	127.2	213.5
Fiscal Revenue - Non-Supply Management Sectors			
	Federal Government	Provincial Government	TOTAL
Atlantic	1.2	1.7	2.9
Quebec	13.7	23.2	36.9
Ontario	50.7	68.0	118.7
Prairie	257.0	281.6	538.6
British Columbia	6.1	6.5	12.6
Canada	328.8	381.0	709.8

Source: Calculated from EcoTec Consultants and Statistics Canada

Figure I-4 illustrates the relative contribution of farm investment from the SM sector and non-SM sector to the total fiscal revenue (provincial and federal) for Canada and each province. In Quebec and the Atlantic provinces, the fiscal revenue are mostly generated by farms under SM (>70%). In Ontario and British Columbia, farm revenue is balanced between both the SM and non-SM farms. In the Prairies, the great majority of fiscal revenue is generated from farm investments from farming not under SM (>90%).

FIGURE I-5
Distribution of total fiscal revenue from SM farms and farms not under SM for Canada, and for each province (2015)



Source: Calculated from EcoTec Consultants and Statistics Canada

Table I-7 reports the fiscal revenue for the federal and provincial government by Farm Type. The Oilseed and Grain producers generate the largest fiscal revenue with 232 M\$ going to the federal government and 262 M\$ going to the provinces. Most of Oilseed and Grain producers are found in the Prairie region, which explains the high fiscal revenues reported in Table I-5 for the region. Beef generates the second highest total fiscal revenue at 180 M\$. However, at provincial levels, Dairy generates more fiscal revenue. This is explained by the fact that dairy sector is abundant in the province of Quebec, where provincial taxes are higher than other parts of the country.

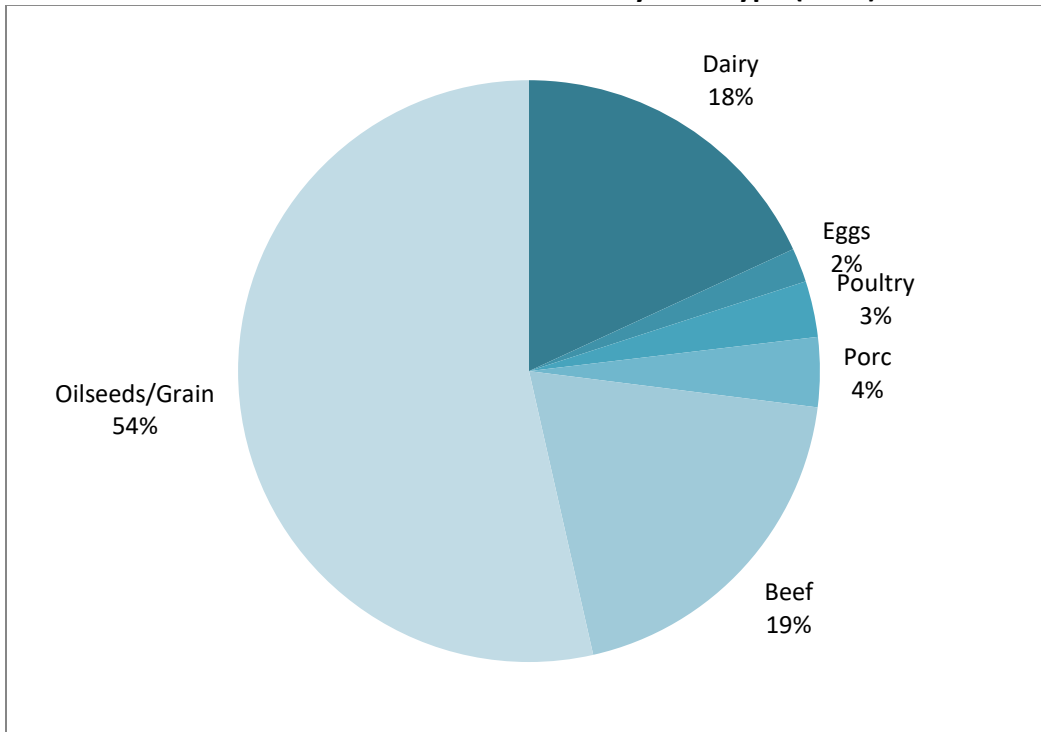
TABLE I-7 Fiscal Revenue for the Federal and Provincial government generated from on-farm investment, by Farm Type (2015)
Values in millions of dollars

Farm Type	Fiscal Revenue		TOTAL	TOTAL/FARM
	Federal Government	Provincial Government		
Dairy	67.3	100.0	167.3	0.0159
Eggs	7.3	10.1	17.5	0.0087
Poultry	11.7	17.1	28.7	0.0116
Hog	15.2	20.5	35.7	0.0108
Beef	81.1	98.6	179.7	0.0050
Oilseeds/Grain	232.4	261.9	494.4	0.0078

Source: Calculated from EcoTec Consultants and Statistics Canada

Figure I-6 illustrates the distribution of the total fiscal revenue, including provincial and federal, by Farm Type. Investments made on oilseed and grain farm generates 54 % of all fiscal revenue, followed by Beef farms (19 %) and Dairy farms (18 %). The other farm types each account for less than 5 % of all fiscal revenue.

FIGURE I-6 Distribution of total fiscal revenue by farm type (2015)



Source: Calculated from EcoTec Consultants and Statistics Canada

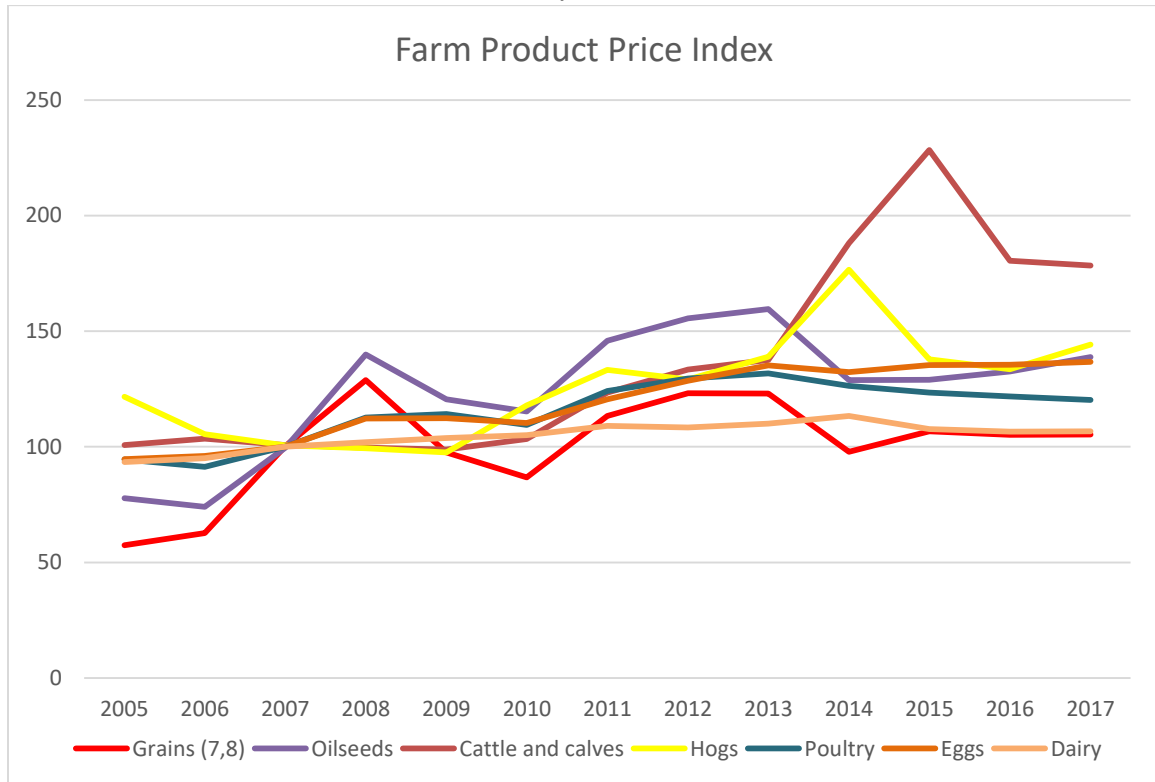
Discussion of Part 1: Economic Impacts from farm investments across Canada

Investments made by Canadian farmers across the country are significant. In 2015, Canadian farmers in the productions studied have collectively invested more than 9.2 billion dollars, excluding investments in production quotas. These investments, by their diffuse nature, do not capture the public attention. Nevertheless, they are important, especially in rural area where their direct economic impact occurs. For instance, in 2015 we estimate that farm investments in six important agricultural sectors generated directly 43,700 equivalent full-time jobs. When taking into account the indirect and induced impacts of those investments, the total impact on Canadian jobs increases to 88,700 EFT jobs.

Similarly, investments made by those farms in 2015 contributed to 8.7 billion dollars to the country's GDP and generated close to 925 million dollars in tax revenues for the federal and provincial governments. Those numbers certainly merit the attention of policy makers.

In this study, we are also interested in making a distinction between supply-managed production and non-supply managed ones. Although 2015 was a good or decent year for most productions studied, supply managed productions are known for the farm price stability they offer, relative to non-supply managed productions, as can be seen from the trends depicted in Figure I-7.

Figure I-7
Farm Product Price Index from 2005-2017, Canada



Source: Created from Statistics Canada Table 002-0068

From a previous study⁸, we found in the literature that output price stability and/or predictability could support greater on-farm investments. Moreover, the same study indicated that the perception of stakeholders in three villages in Quebec was that supply managed producers are more prone to invest, given the predictability of revenues.

Our data confirm that producers under supply management invest more than producers not under supply managed production. While supply management represents roughly 20 % of farm receipts of the six sectors studied, they represent 25 % of total investments, 30 % of the total jobs created and 28 % of the total GDP generated by farm investments. Moreover, on a per farm basis, supply managed farms create significantly more employment and contributions to GDP than their non-supply managed counterparts.

A different way to examine the data is to examine the investments relative to farm cash receipts. Table I-8 provides the investments amount per farm production and province for each 1,000 dollars of farm cash receipts.

⁸ MBombo, Raphael. « Pertinence économique de la Stabilité des Marchés agroalimentaires », Master's thesis, Laval University, 2018.

Table I-8
On farm investments per 1,000 of farm cash receipts
Values in dollars (\$)

	Provinces					Canada
	Atlantic	Quebec	Ontario	Prairie	B-C	
Supply Management Sectors						
Dairy	236	360	335	161	160	294
Eggs	110	281	206	116	289	199
Poultry	37	280	176	6	49	144
Total	159	338	280	115	137	246
Non-Supply Management Sectors						
Hog	NA	64	165	66	NA	91
Beef	175	90	187	196	272	189
Oilseeds/Grain	66	159	187	259	230	241
Total	117	102	183	225	244	206

Source: Calculated from Table 0-1 and Table I-1

Table I-8 indicates that supply managed farms invest \$40 more than non-SM farm productions per \$1,000 of farm cash receipts. Dairy farmers invest the most in the SM productions, while Oilseeds and Grain productions invest the most, per \$1,000 of farm cash receipts for the Non-SM sectors.

Although supply managed productions require significant investment in quotas, it seems that the stability associated with supply management outweighed that extra cost, relative to non-SM sectors and creates a favorable environment for greater levels of investment.

PART 2: Economic Impact from on-farm investments for Quebec and its regions

Farm investment from supply-managed farms in Quebec

Quebec farms invested over 1 G\$, with the dairy sector having the largest amount of investments at 787 M\$, followed by the Poultry production with 180 M\$ of on-farm investments and egg production with 45 M\$ of on-farm investments.

**Table II-1: Farm investments of farms under supply management in Quebec
Values in Millions of Dollars**

Administrative Region	Farm Production		
	Dairy	Eggs	Poultry
Bas-Saint-Laurent	91.2	1.6	1.7
Saguenay-Lac-Saint-Jean, Côte-Nord	43.3	1.1	2.5
Québec	24.6	1.6	12.2
Mauricie	33.9	0.9	12.9
Estrie	75.8	3.4	3.4
Outaouais	11.0	0.9	1.1
Abitibi-Témiscamingue, Nord-du-Québec	15.6	0.9	0.0
Gaspésie, Îles-de-la-Madeleine	2.6	0.7	0.3
Chaudière-Appalaches	170.0	6.6	30.0
Montréal, Laval	0.8	0.0	0.0
Lanaudière	29.3	5.4	39.3
Laurentides	26.1	0.9	3.4
Montérégie	147.6	13.6	54.2
Centre-du-Québec	115.8	7.9	18.9
TOTAL	787.4	45.4	179.9

Source: Calculation from Statistics Canada's Farm Financial Survey (2015)

Jobs generated from farm investments in Quebec

In 2015, on farm investments in Quebec from Dairy, Eggs, and Poultry productions have generated 9,843 full-time jobs, 5,372 of those are directly generated from farm investments, 1,835 generated indirectly and 2,636 are induced. The Dairy sector accounts for the largest contribution to jobs with 7,555, followed by the Poultry farms with 1,767 jobs and Egg farm with 522 jobs. Examining the data from a per farm basis, reveals that investments by the Poultry farms generate the most jobs at 3.03 average jobs per farm, followed by the Egg sector with on average 2.60 jobs per farm and Dairy with 1.46 jobs per farm for Dairy.

TABLE II-2 Jobs generated from on-farm investments in Quebec for supply managed production. (2015)

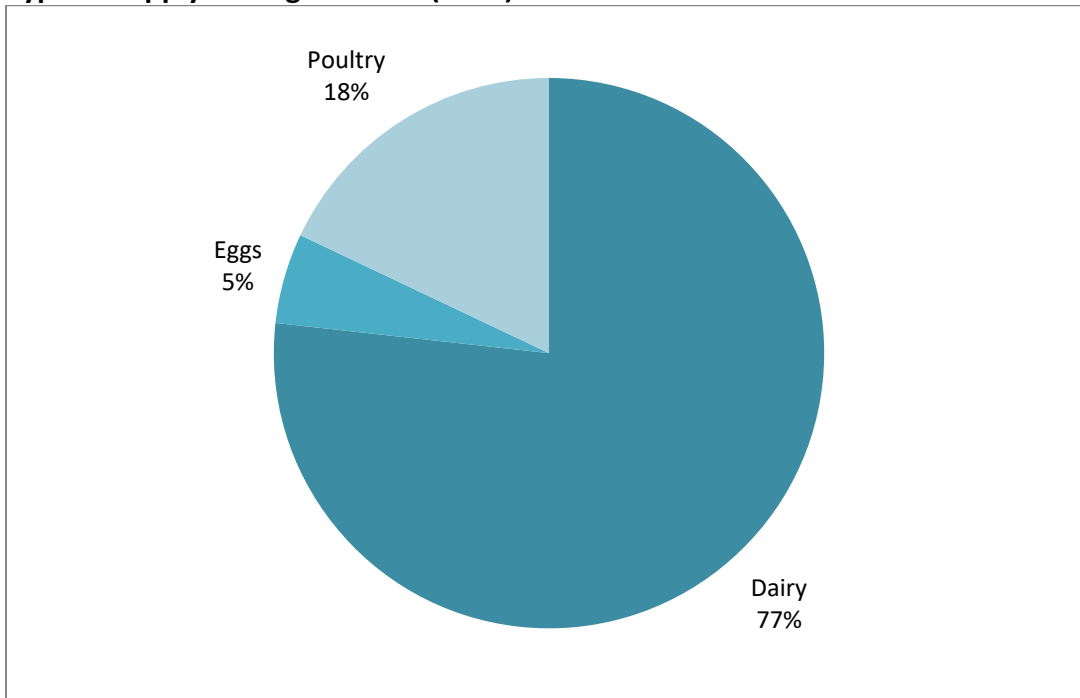
Expressed in full time equivalent jobs

	Jobs Generated				
	DIRECT	INDIRECT	INDUCED	TOTAL	TOTAL/FARM
Dairy	4,135	1,403	2,017	7,555	1.46
Eggs	282	94	146	522	2.60
Poultry	956	337	473	1,767	3.03
TOTAL	5,372	1,835	2,636	9,843	1.66

Source: Calculated from EcoTec Consultants and Statistics Canada

NOTE: The Job generated numbers from Table II-1 do not correspond to the same values as those found for Quebec in Table I-2. The reason for this is that the data in this section includes only farm investments from Quebec farms, while the numbers in the previous section included investments from across Canada. Investments made on-farm in other provinces than Quebec can generate direct, indirect and induced jobs in Quebec if the service or the product of investments is located in Québec (for example a technology firm that would be located in Montreal). Consequently, the numbers in this section will be slightly different from those found in the first part of the study.

FIGURE II-1 Distribution of total jobs generated from farm investments in Quebec by Type of Supply Managed Farms (2015)



Source: Calculated from EcoTec Consultants and Statistics Canada

Table II-3 reports the jobs generated from investments from the dairy, eggs and poultry farms by administrative region. The Montérégie region generates the most direct jobs with 1,076, this amount increases to 1,973 when including indirect and induced jobs. The Chaudière-Appalaches region is the second most important with 860 direct jobs generated, which amounts to 1,282 when including indirect and induced jobs. Montreal benefits most proportionally from indirect and induced jobs. This phenomenon will be discussed later with the help of Figure II-2.

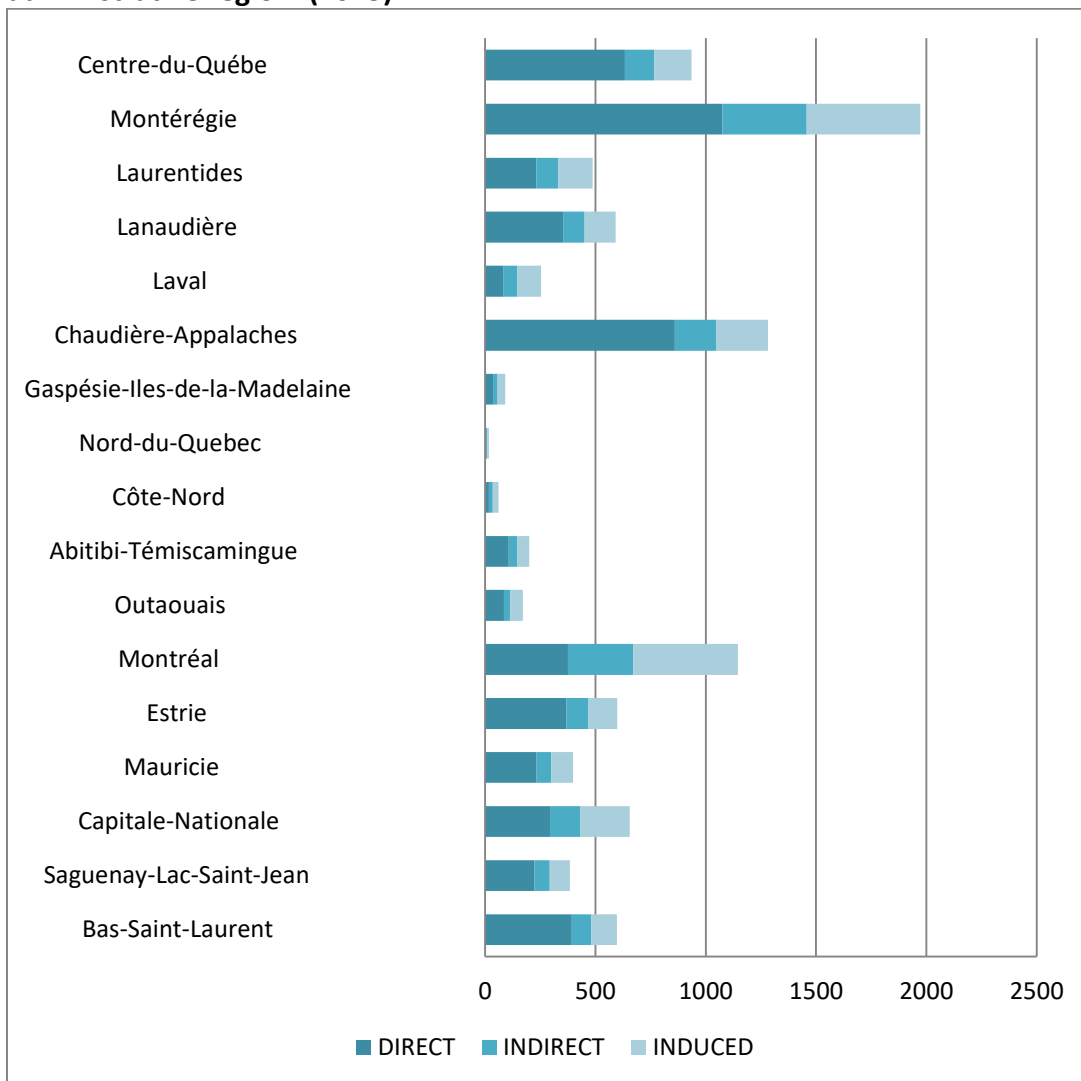
TABLE II-3 Jobs generated from investments from the dairy, eggs and poultry farms by administrative region. (2015)
Expressed in full-time equivalent

Administrative Region	DIRECT	INDIRECT	INDUCED	TOTAL
Bas-Saint-Laurent	393	88	116	597
Saguenay-Lac-Saint-Jean	223	69	92	385
Capitale-Nationale	295	138	223	656
Mauricie	233	67	99	398
Estrie	368	100	131	599
Montréal	376	296	475	1,146
Outaouais	86	29	57	171
Abitibi-Témiscamingue	107	40	53	200
Côte-Nord	17	18	26	61
Nord-du-Québec	4	6	7	17
Gaspésie-Iles-de-la-Madeleine	36	21	34	90
Chaudière-Appalaches	860	188	234	1,282
Laval	84	63	107	253
Lanaudière	353	97	142	592
Laurentides	231	101	155	487
Montérégie	1,076	382	515	1,973
Centre-du-Québec	633	133	169	936
TOTAL	5,372	1,835	2,636	9,843

Source: Calculated from EcoTec Consultants and Statistics Canada

Direct jobs related to farm investments are near the farm since they include construction and land improvements. However, some investments may generate jobs at a distance, such as purchase of new technologies or of software. Indirect and induced jobs can be both created near and at a distance from the place of investments, with a higher proportion often being created in urban centers where many services are found. Figure II-2 illustrates the distribution of the direct, indirect, and induced jobs generated from investments from the dairy, eggs and poultry, by administrative region. Proportionally to direct jobs generated, Montreal benefits the most from indirect and induced jobs.

FIGURE II-2 Jobs generated from investments from the dairy, eggs and poultry, by administrative region. (2015)



Source: Calculated from EcoTec Consultants and Statistics Canada

GDP generated from farm investments in Quebec

Table II-4 reports GDP generated from on-farm investments for the three supply-managed production studied. Dairy farms generate the largest GDP for Quebec, with 320 M\$ directly generated, and 654 M\$ generated when indirect and induced effects are included. This represents nearly 77 % of all GDP generated from all farm types under supply management in Quebec, reflecting the important number of dairy farms found in Quebec. A distant second is poultry farms with a total GDP of 151 M\$ from on-farm investments, followed by eggs with 46 M\$ worth of GDP generated. The relative distribution of GDP by farm production is illustrated in Figure II-3

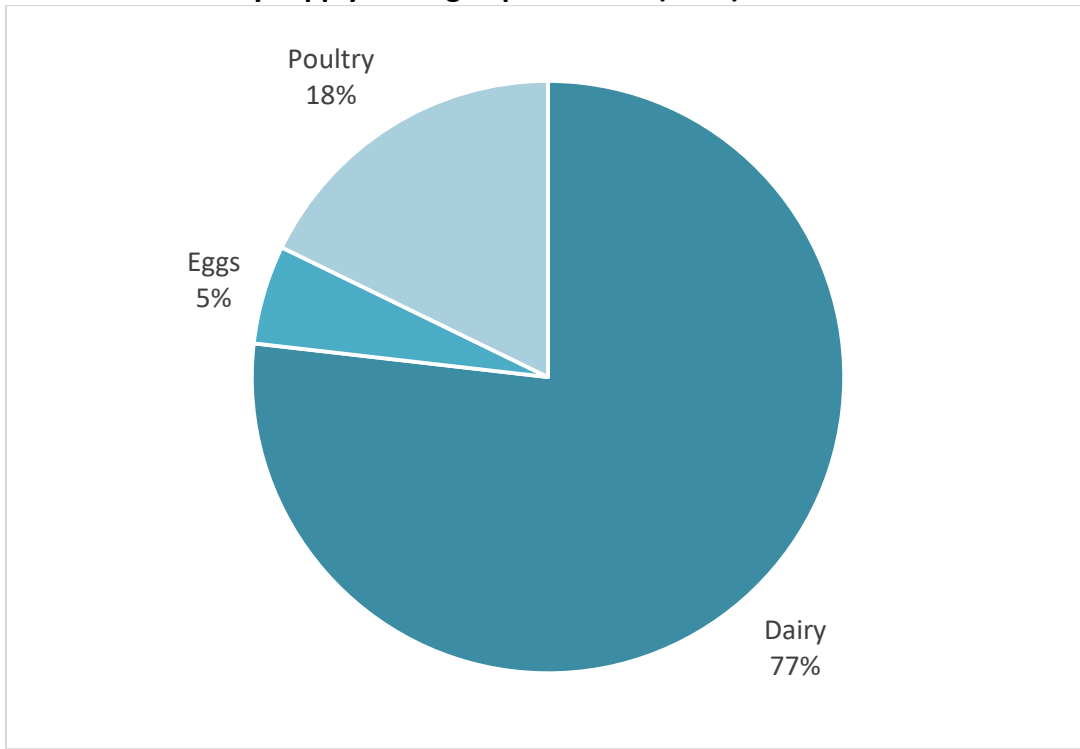
TABLE II-4 GDP generated from on-farm investments in Quebec, for supply-managed productions, 2015

Values expressed in million dollars

	GDP Generated				
	DIRECT	INDIRECT	INDUCED	TOTAL	TOTAL/FARM
Dairy	320	123	211	654	0.13
Eggs	22	8	15	46	0.23
Poultry	72	29	50	151	0.26
TOTAL	414	161	276	851	

Source: Calculated from EcoTec Consultants and Statistics Canada

FIGURE II-3 Distribution of total (direct, indirect and induced) GDP generated by on-farm investment by supply-managed production (2015)



Source: Calculated from EcoTec Consultants and Statistics Canada

Table II-5 reports the direct, indirect and induced GDP generated from investments made on dairy, eggs and poultry farms for each administrative region in Quebec. It is the region of Montérégie that generates the most direct GDP with 142 M\$, which increases to 230 M\$ when indirect and induced GDP are included. This is followed by Chaudière-Appalaches and Centre-du-Québec, with respectively a total GDP generated of 176 M\$ and 125 M\$. Montreal benefits most, proportionally, from the indirect and induced GDP. To illustrate this point, compare the distribution of total GDP from Chaudière-Appalaches, with 176 M\$ total GDP, 62 % is from direct investments, 14 % from indirect and 24 % induced. For Montréal the total GDP is at \$100 M, with 28 % of that coming from direct investments, 27 % from indirect effects and 45 % generated from induced activity. Figure II-4 illustrated the distribution of total GDP generated among direct, indirect and induced benefits.

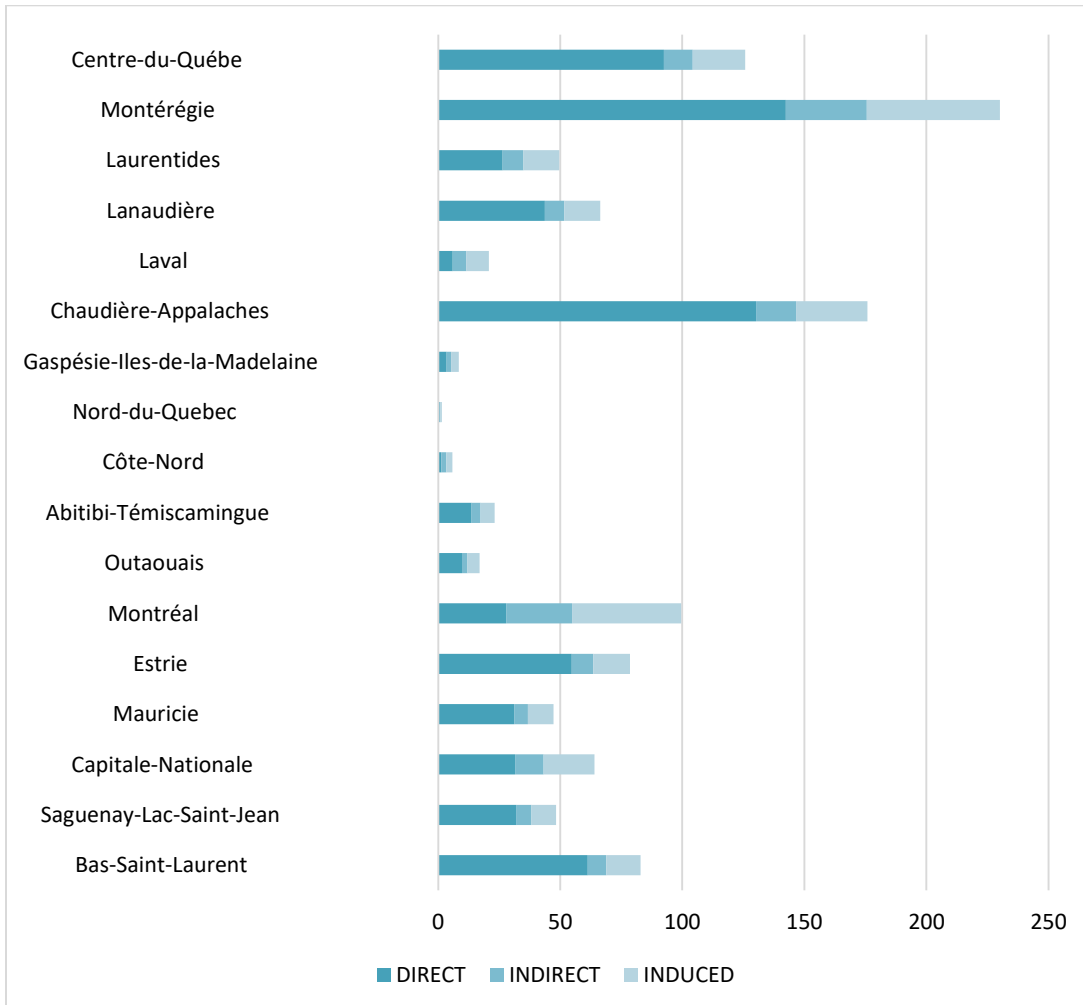
TABLE II-5 GDP generated from on-farm investments of the dairy, eggs and poultry sectors in Quebec, by administrative region (2015)
Values expressed in million dollars.

Administrative Region	DIRECT	INDIRECT	INDUCED	TOTAL
Bas-Saint-Laurent	61.2	7.7	14.0	82.9
Saguenay-Lac-Saint-Jean	31.9	6.3	10.0	48.3
Capitale-Nationale	31.6	11.6	20.8	64.0
Mauricie	31.1	5.6	10.4	47.2
Estrie	54.8	8.7	15.1	78.6
Montréal	27.8	27.0	44.6	99.5
Outaouais	9.7	2.3	4.9	17.0
Abitibi-Témiscamingue	13.6	3.7	5.8	23.2
Côte-Nord	1.2	2.2	2.5	5.9
Nord-du-Québec	0.3	0.6	0.7	1.5
Gaspésie-Iles-de-la-Madeleine	3.5	1.8	3.2	8.5
Chaudière-Appalaches	130.3	16.3	29.2	175.8
Laval	5.9	5.5	9.4	20.8
Lanaudière	43.7	8.0	14.7	66.4
Laurentides	26.4	8.5	14.7	49.6
Montérégie	142.4	33.2	54.5	230.1
Centre-du-Quebec	92.4	11.8	21.6	125.8
TOTAL	707.9	160.8	276.3	1 145.0

Source: Calculated from EcoTec Consultants and Statistics Canada

FIGURE II-4 Distribution of the GDP generated by investments on dairy, egg and poultry farms (2015)

Values expressed in million dollars



Source: Calculated from EcoTec Consultants and Statistics Canada

Fiscal revenue generated from farm investments in Quebec

Table II-6 reports government fiscal revenue that includes revenue from corporate taxes, personal income taxes and sales taxes, generated from investment on farms in the province of Quebec. Dairy farms generate a total of 116 M\$ in fiscal revenue, with 29 M\$ going to the federal government and 38 M\$ to the Quebec government. Para fiscal revenues that amount to 49 M\$ are also generated. Poultry farms generate a total of 22 M\$, while Eggs farms generate a total of 7 M\$.

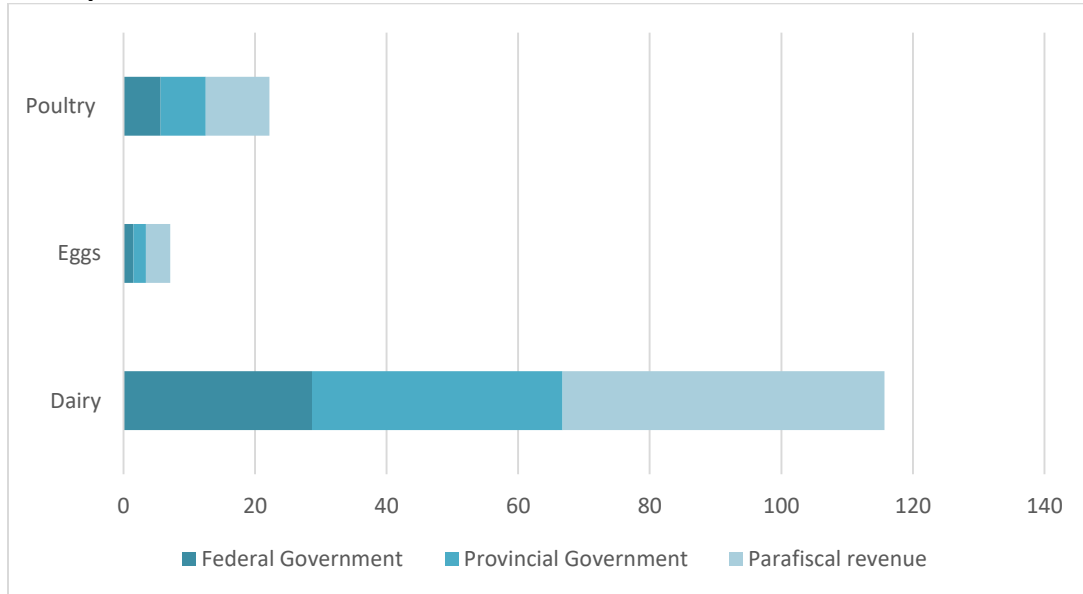
TABLE II-6 Fiscal revenue for the Quebec and Federal government generated from on-farm investments in Quebec (2015)

Values expressed in million dollars

Farm Type	Fiscal Revenue			TOTAL
	Federal Government	Quebec Government	Para fiscal revenue	
Dairy	29	38	49	116
Eggs	2	2	4	7
Poultry	6	7	10	22
TOTAL	36	47	62	145

Source: Calculated from EcoTec Consultants and Statistics Canada

FIGURE II-5 Distribution of the fiscal revenue to the Federal government, provincial governments and Para fiscal revenue, generated from on-farm investment by three farm types under supply management (2015)
Values expressed in million dollars



Source: Calculated from EcoTec Consultants and Statistics Canada

Discussion

In 2015, Quebec farmers under supply management invested more than \$1 G on farm improvements, excluding their investments in quotas. This generated nearly 10 000 full time equivalent jobs and added 851 million dollars to the National GDP. This section reports job and GDP creation per administrative region of Quebec. This is of importance since many jobs created from farm investments benefit rural areas with otherwise limited economic activities. In such places, the relative importance of new jobs is greater than would be perceived if it had been created in urban centers, such as Montreal. For example, (Table II-7) shows that the creation of 1 job and one dollar of GDP in the Bas-Saint Laurent administrative region is relatively equivalent to 24 jobs and \$18 in GDP in Montreal. In other words, creating one job in the Côte-Nord region is the equivalent of creating, from a relative impact perspective, 38 jobs in Montreal (Table II-7). Similarly, generating \$1 of GDP in Côte-Nord would be equivalent, in relative impact, to creating \$36 of GDP in Montreal.

TABLE II-7 Relative impact of job and GDP creation for four regions of Quebec compare to the metropolitan region of Montreal

	Bas-Saint-Laurent	Saguenay-Lac-Saint-Jean	Abitibi-Témiscamingue	Côte-Nord
Number of jobs (FTE) in Montreal equivalent to 1 job in this rural area	24	16	28	38
Number of GDP dollars in Montreal equivalent to 1 GDP dollar in this rural area	18 \$	11 \$	18 \$	36 \$

Source: Institut de la Statistique du Québec

Given that most of the Canadian population lives in urban areas, it is often difficult for urban citizens and decision makers to comprehend how important 10 jobs could be for a small rural village. By illustrating that those 10 jobs in Bas-Saint-Laurent are the equivalent of 240 jobs in Montreal helps to capture the relative importance of the creation of what might be otherwise considered unimportant.

TABLE II-8 Economic benefits from on-farm investments for three regions expressed relative to the region of Montreal

Administrative region	GDP created	Relative* GDP	Jobs created	Relative* Jobs
Bas-Saint-Laurent	82.9 M\$	1.5 G\$	597	14,328
Saguenay-Lac-Saint-Jean	48.3 M\$	0.5 G\$	385	6,160
Abitibi-Témiscamingue	23.2 M\$	0.4 G\$	200	5,600

Notes: Jobs expressed in full time equivalent

*Relative weight when compared to Montreal

Using the relative impacts of Table II-7, we calculate the relative PIB and jobs for three administrative regions (Bas-Saint-Laurent, Saquenay-Lac-Saint-Jean and Abitibi-Témiscamingue), to highlight the economic importance of on-farm investments for the local economies. Table II-8 shows that \$82 M of GDP in the Bas-Saint-Laurent is equivalent to approximately 1.5 G\$ of GDP in Montreal. Similarly, the addition of 587 jobs in the Bas-Saint Laurent is equivalent to adding over 14,000 jobs in Montreal. These numbers help to illustrate and to put into perspective the important role that on-farm investments have on rural economies.

Conclusion

The report is summarized in the following points:

- On-farm investments made by Canadian farmers are significant. In 2015, Canadian farmers in the six sectors studied have collectively invested more than 9.2 billion dollars; this in turn has generated economic benefits for the country, with nearly 89,000 full-time jobs created, and contributing 8.7 billion dollars to the GDP.
- This activity has generated significant fiscal revenue for provincial and federal government. Specifically, we estimate at 415 million dollars the fiscal revenue for the federal government, and an aggregated amount of \$508 million of fiscal revenues for the provinces.
- The stability of farm prices that are characteristic of productions under supply management seems favorable to farm investments. While supply management represents roughly 20 % of farm receipts of the six sectors studied, they represent 25 % of total investments and 28 % of the total GDP generated by farm investments. Moreover, on a per farm basis, supply managed farms create significantly more employment and contributions to GDP than their non-supply managed counterparts.
- Although supply managed productions require significant investments in quotas, it seems that the stability associated with supply management outweighed that extra cost, relative to non-SM sectors and creates a favorable environment for greater levels of investment.
- From a job creation perspective, supply managed farms create significantly more jobs than non-supply managed farms. With supply managed farm productions generating 1.78 jobs per farm from on-farm investments, while non-supply managed farm productions generate on average 0.6 jobs per farm from on-farm investments. Dairy farmers generate the most jobs, with 1.93 jobs per farm generated from farm investments.
- The economic impact from on-farm investments mostly benefit rural areas. Expressing the estimated benefits for regions relative to the importance of urban centers help express these values in terms that are more meaningful to decision makers. On-farm investments have a significant impact on the economic activity of rural areas, but also indirectly benefit other regions, such as Montreal where technology and manufacturing centers are often located.

Models and algorithms, EcoTec Consultants

The economic impact models developed by EcoTec Consultants are dynamic and rely on analysis of input-output tables complemented by econometric modules. These modules generate more comprehensive economic impact statistics. The basic data set used for the input-output tables and econometric modules was obtained from Statistics Canada, the Canada Revenue Agency, the Institut de la statistique du Québec and the Quebec Ministère des Finances.

Two EcoTec Consultants models were used in this study: the interprovincial model (which calculates the economic benefits by province) and the inter-RCM model (which calculates the economic benefits by rural county, municipality and administrative region in Quebec). The inter-RCM model works in parallel with the interprovincial model and has the same number of goods and services (295) and industries (117). This parallel operation ensures that the model remains balanced and that the sum of the economic benefits by RCM or administrative region is the same or very close to the data for the province of Quebec as a whole, as generated by the interprovincial model.

Both models run simultaneously, simulating the real functioning of the economies of Canada (interprovincial model) and Quebec (regional model). The regional model calculates the same statistics as the interprovincial model.

A simulation begins when we introduce a shock to the model, in the form of expenditures, categorized either by product (for 295 goods and services) or by industry (117 industries). The main algorithm begins by calculating the imports from other countries and from each of the other Canadian provinces and subtracting these imports from the expenditure vector. Thus, the money that then remains in the model is the amount that will actually remain in the economy for a spending cycle.

The model then determines which industries produce the goods consumed initially (vector of initial expenditures). For example, if the initial expenditures include \$5 million for transportation of parts used to maintain industrial equipment, those monies will go to the trucking industry.

From this data on sales by industry, the model will extract the contribution to GDP. Finally, the model calculates government tax revenues for three main categories: personal income taxes; sales taxes (GST and QST) and other indirect taxes (excise taxes, etc.); and corporate income taxes. This study reports all three sources of tax revenues.

The second spending cycle involves companies making purchases to meet the initial demand. Each spending cycle reduces the amount of money left in the economy because of three main factors: imports of goods and services from other countries and the nine other provinces; the taxes levied by governments; and the savings set aside by businesses and owners.

For each spending cycle, the model incorporates purchases from Quebec companies by businesses in other provinces. This makes it possible to more accurately calculate the true economic benefits, as Quebec companies are major suppliers for various industries in other provinces.

The induced impacts are calculated using a special simulation of the model called a closed simulation. This means that workers can spend their wages based on the consumer spending pattern typical of Quebec. Since consumer spending accounts for more than 60% of the Canadian and Quebec economies, it is important to accurately calculate the induced impacts to provide a complete overview of all the economic benefits.

The model takes several measures to ensure that the induced impacts are not overestimated. For example:

- Both federal and provincial personal income taxes are levied before the workers spend their wages.
- Employee social contributions (EI premiums, public and private pension funds, etc.) are deducted.
- The average propensity to consume (APC) in Quebec is estimated at 94.6% (the remaining 5.4% is considered savings, according to Statistics Canada data for 2015).

The total economic impacts are the sum of direct, indirect and induced impacts. Together, these statistics provide a comprehensive picture of the economic benefits generated by the initial expenditures used to start the simulation. It should be noted here that since this is an interprovincial model, the federal government's tax revenues include all federal revenues for the ten Canadian provinces.