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Benefits and Distribution of Government Spending in the Agri-Food Sector

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SUMMARY

Overall annual spending by Canada's federal and provincial governments in support of the agri-food sector is approaching $8 billion. The OECD assigns the majority of this spending to standardized categories. Over the last 10 years, the average annual spending of $6.3 billion, as summarized by the OECD, has been distributed as follows:

- $3.7 billion on producer support (59% of spending)
- $707 million on inspection services (11% of spending)
- $681 million on marketing and promotion (11% of spending)
- $457 million on R&D (7% of spending)
- $448 million on infrastructure (7% of spending)
- $273 million on agricultural schools (4% of spending)

The OECD also estimates that the financial equivalent of interventions to support market prices – such as tariffs and TRQs (tariff rate quotas) – adds another $3.7 billion in producer support. This generates a PSE (producer subsidy equivalent) value of 20% for Canadian agriculture, which means government intervention supplies 20% of farm receipts.

The net benefit of program spending on the farm sector, as well as on the overall agri-food supply chain, can vary by type of program spending. Specifically, the benefits of one dollar of public funds spent on supporting producer income can have a different return than the same dollar spent on inspection services or R&D that supports innovation.

Tariffs and TRQs generate high returns to production agriculture. However, this benefit ignores costs imposed on consumers. When considering only expenditure programs, R&D has the highest return; the benefit in the agri-food sector is much greater than the expenditure, and the internal rate of return is as much as 20% or more. The next highest return to public funds is in the area of market facilitating activities, which includes inspection services, traceability programs, and market development activities. The benefit to the agri-food sector also exceeds these program costs. Program spending on producer support (which includes business risk management programs) has the lowest return within production agriculture. When the support dollars are decoupled from production decisions, the benefits of spending on these programs remains in production agriculture. When programs are not decoupled, the "transfer efficiency" is much less, with estimates ranging from 25% to 50% of the spending in support of producer income. Consumers and input suppliers receive benefits from coupled programs through higher production, increasing input usage, input prices, and to some degree through lowering output prices.

A significant portion of expenditures designed to stabilize or protect farm sector incomes remains in the farm sector, and is capitalized into farmland values. Studies indicate that up to 50% of farmland value can accrue from the capitalization of benefits. This benefit accrues to landowners. An analysis of aggregate data indicates that the ability to stabilize incomes ranges from 25% to 50%, depending on the commodity, with support levels growing over time.

This study strongly suggests that if there are public funds for spending on the agri-food sector, they should be directed to its highest return area, which is research and development. The study also suggests that, with fewer taxpayer dollars available, funding should be taken out of business risk management programs. An inference can be made that governments can enhance the benefits of intervention by redirecting funds from business risk management programs into investments in areas such as R&D and marketing and promotion. However, from a short-term political perspective, the longer-term benefits may not exceed the current costs.

BY STEPHEN J. CLARK, AND SHELLEY THOMPSON, SJT SOLUTIONS

Introduction

Agricultural policies support the overall health of the agri-food sector in a variety of ways. Governments invest in the sector via investments in research and development. The government also helps the sector through market facilitation, such as inspection and market development and promotion activities, as well as income stabilization through direct payments. Agriculture also receives other types of support, such as border protection through tariffs and quotas. Consumers also provide support to agri-food. For example, supply management results in a transfer from consumers to producers via price. Thus, the total support provided to agriculture is greater than expenditures made by governments.

Agricultural policies vary in their effectiveness and efficiency. Effectiveness refers to how well the policy achieves it objective(s). Efficiency refers to how the benefits of the policy are distributed. This paper examines the effectiveness and efficiency of selected Canadian policies and then suggests a realignment of government spending based on the results. The capitalization of direct payments into land values is also discussed.

Support to Canadian Agriculture

Canadian agriculture has received $100 billion in total support (from federal and provincial governments and consumers) over the last decade, as measured by the OECD's Total Support Estimate (TSE). This metric captures "the monetary value of transfers arising from all policy measures that support agriculture." Over the 2000 to 2009 period, 41% of total support was transferred from consumers and 63% was transferred from taxpayers (with a 4% reduction from budgetary revenue). Almost $75 billion has been transferred to producers from consumers and taxpayers because of agricultural policies. This is known as the Producer Subsidy Equivalent (PSE) - the "additional money farmers receive in a particular

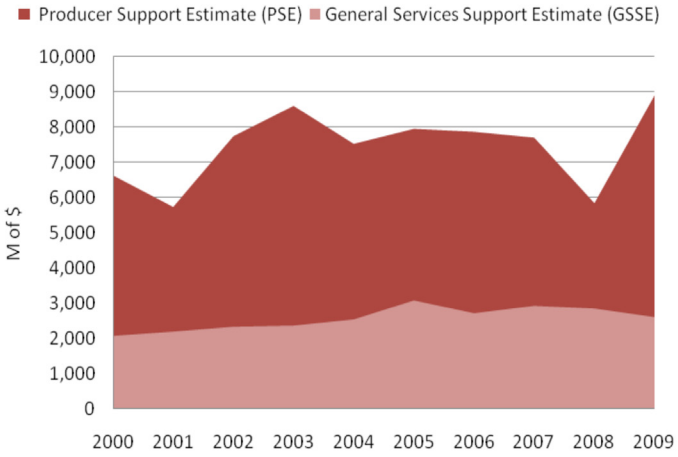

Figure 1. Total Support to Agriculture

year because governments intervene in agriculture."[1] The sector also benefits from policies that support producers collectively. The General Services Support Estimate (GSSE) captures the value of these policies.[2] Over the 2000 to 2009 period, almost $26 billion was transferred to the sector in this way. The accompanying chart shows the size of these transfers on annual basis. In 2009, the TSE was $11.5 billion. The PSE and GSSE, which make up almost the entire TSE, were $8.9 billion and $2.6 billion, respectively. Support provided to producers collectively is much less variable than support provided to producers individually. The support transferred to producers by consumers and taxpayers, which excludes the amount expended on general services, represented 13% to 26% of the value of farm market receipts.[3]

Producers receive support in a variety of ways. Over the last decade, the largest components of the PSE have been: market price support (50%); payments based on current acres/animal numbers/revenue/ income that require production (28%); and payments based on non-current acres/animal numbers/revenue/ income that do not require production (12%). Milk received just over two-thirds of market price support. The other supply managed commodities, poultry and eggs, received 5% and 2% of market price support. Grains and oilseed crops did not receive any market price support, but did receive support through other program areas. Beef received market price support in 2001 and 2002. Familiar programs that are categorized as providing payments based on current acres/animal numbers/revenue/income that require production include crop insurance, ASRA,

NISA, CAIS, AgriInvest, and Agri-Stability. Programs such as the CAIS Inventory Transition Initiative, APF Transition Payment, Grains and Oilseeds Payment Program, Cost of Production Payment, and the PEI Hog Transition Program provided payments based on non-current acres/animal numbers/revenue/income and did not require production.

Policies that provide support to producers on a collective basis do so through support to R&D, agricultural schools, inspection services, infrastructure, and marketing and promotion. In 2009, Canada spent $2.6 billion on general support. Inspection services accounted for one-third of expenditures. Marketing and promotion programs (including food aid) represented 25% of expenditures while research and development accounted for 18%.

Milk is the most heavily supported commodity, followed by poultry, other commodities, and eggs, according to the Producer Single Commodity Transfers (Producer SCT). The Producer SCT is defined as "the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies linked to the production of a single commodity such that the producer must produce the designated commodity in order to receive the payment."[4]

Figures 2 and 3 reveal some important points. First, agricultural income has trended downwards in real terms over the last four decades. Second, the importance of direct payments to farm income has trended upwards over the same period. For agriculture in general, direct payments and farm income are counter-cyclical. Direct payments (either implicitly or explicitly) help to stabilize farm income.

Figure 4 shows direct government support and net market farm income for the hog and beef industry.[5] Government support has been increasing while income has been falling. This is not surprising, since both industries have undergone substantial upheavals within the last two decades, hogs due to structural changes within the industry and beef due to the BSE crisis of 2003. In the case of beef, rising direct payments during the BSE crisis were ad hoc payments to beef producers.

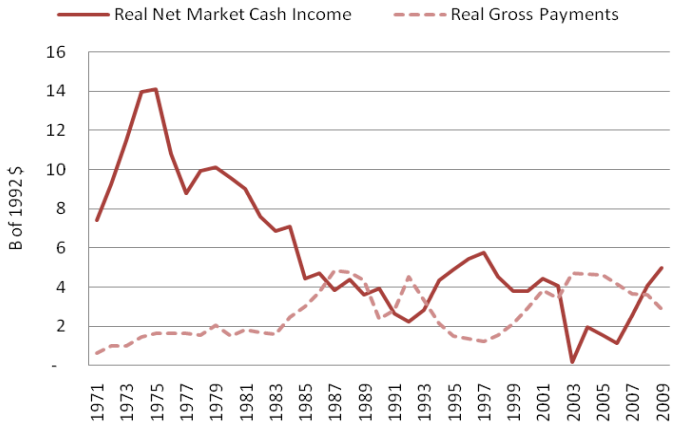

Figure 2. Farm Income & Government Payments.

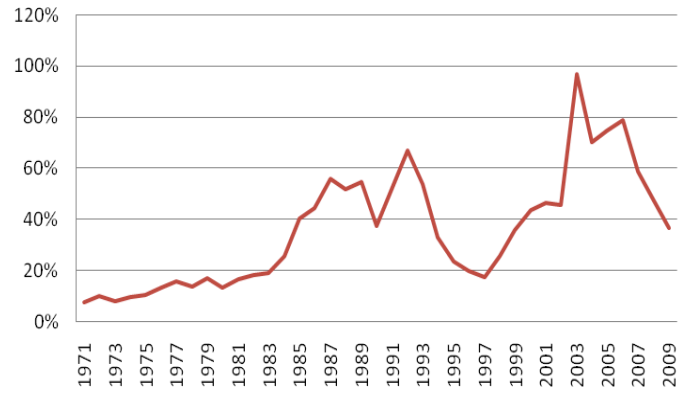

Figure 3. Government Support as a Percentage of

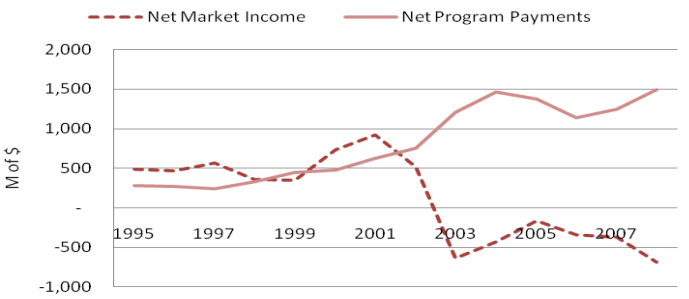

Figure 4. Hog & Beef Income & Government

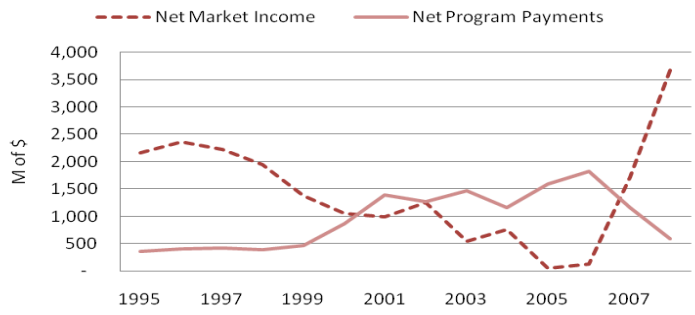

Figure 5. Grain & Oilseeds Income & Government Payments.

Direct government support for the grains and oilseeds sectors trended upwards during the mid to late 1990s and has since gone sideways (see Figure 5). The commodity boon in the grains and oilseeds sector is evident from the upward trend in recent years. The figure indicates that, for this sector, direct government payments and income tend to be countercyclical, as would be expected from a stabilization policy.

Plotting income and direct government payments for the supply managed industries (dairy and poultry) produces a chart that is much different than those for grains and oilseeds and beef and pork. Because of the nature of supply management, direct government support is a minor source of income support for producers. As discussed in the previous section, market prices are supported and imports controlled in supply management. This transfers income from consumers to producers. The chart indicates that there is little need for stabilization using direct payments within the supply managed industries. Since the data is taxfiler data, the payments received are likely for non-supply managed operations on a farm where the majority of income is based on the production of supply managed products.

The final chart in this section (Figure 6) shows the relationship between income and direct government payments for all other agriculture. Other agriculture includes potato production, other vegetables, fruit and tree nut, greenhouse nursery and floriculture, other crops, and other animal production. Prior to 2000, there was little in the way of direct government support for these commodities. However, since 2000 there has been a sharp rise in support for this sector. This reflects the "whole farm approach" of agriculture policy and the movement away from commodity specific programs.

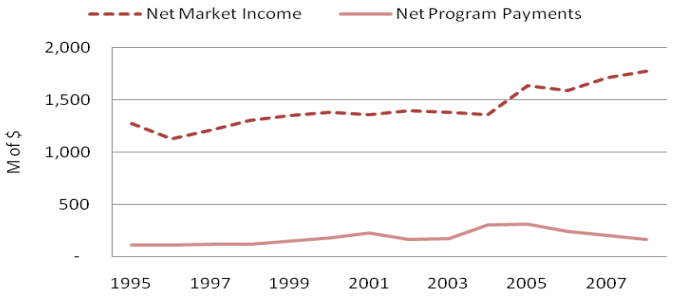

Figure 6. Dairy & Poultry Income & Government Payments.

Transfer Efficiency

Governments support farm income through instruments such as direct payments and tariff/export subsidies. If these transfers were 100% efficient, then every one of the dollars from consumers and government would end up in producers' pockets.[6] However, there are several reasons why the efficiency of transfers won't be 100%:[7]

- As farmers increase the production of the supported commodity, prices fall which benefits consumers;
- Farmers may increase the production of a supported commodity which increases input use and thus input price increases (with benefits flowing to input suppliers);
- As production shifts toward the supported commodity, production of unsupported commodities decrease, which means income won't increase by the full amount of the transfer;
- For rented land, some of the benefit will go to landlords;
- Increases in government dollars may result in increased labor supplied to the farm which reduces off-farm income;
- Additional farm support could displace some other income benefits (i.e. for low-income households which receive general income assistance).

There are also deadweight losses, or "resource allocation distortions caused by the support."[8]

Transfer efficiency is also affected by the extent of decoupling. If production does not change as a result of a government program, then the dollars transferred directly to the sector will not leak out to consumers, input suppliers, and processors. The producer may or may not benefit from the capitalization of payments into land values. The actual benefit depends on the ownership of the land and whether, in subsequent periods, the producer rents land, buys land or sells land.

Stabilization Programs

One of the goals of Canadian agricultural policy has been to develop policies that are decoupled from output and input production decisions. For example, an aim of both the Net Income Stabilization Account (NISA) program and the Canadian Agricultural Income Stabilization (CAIS) program was to decouple output from support. Decoupled programs satisfy most of the requirements to be considered WTO-green but not all. (Production is required to receive payments under the NISA and CAIS programs. However, the WTO's green box does not require production.) Because these programs do not distort output and input markets, they have minimal distortions in international markets. If producers are risk neutral, stabilization policies are decoupled. An examination of Canadian stabilization programs by Turvey *et al* concluded that "funds transferred to farmers through the NISA program will not be transferred to other agents in the agri-food sector" (p. 55), or it is unlikely that NISA or CAIS would distort input markets.[9] From this analysis, Turvey *et al* conclude that "NISA or NISA type programs would be risk as well as production neutral" (p ii). Therefore, Turvey *et al* conclude that whole farm programs like NISA and CAIS are functionally decoupled from both output and input markets.[10] More recent studies by Bakhshi and Kerr[11] and Bakhshi and Gray[12] demonstrated that although some aspects of NISA and CAIS are not decoupled, the effects are both small and statistically insignificant.

Based on this, stabilization program payments are not coupled to output in any meaningful way. Because the payments are decoupled, all the money and benefit will remain with the producer (though the benefit can be capitalized). Output does not rise and thus there is no impact on consumers, input suppliers or processors. Input suppliers with market power can still capture some of the producer margin via their pricing systems. Consequently, the transfer efficiency is virtually 100%. In the supply managed sectors, price support is the dominant form of policy. In the supply managed sectors, the policy only benefits producers.

General Services Support

Funding agricultural research and development is one way that governments support agriculture. Producer groups also fund R&D. The private sector can be a very significant investor in some commodities, such as canola. Agricultural R&D has a high rate of return. Table 1 describes three studies that demonstrate this high rate of return.

While these studies reveal a high rate of return to producers from agricultural research, consumers and input suppliers can also benefit. Consumers benefit when output increases and price falls. Input suppliers can benefit if output expands and if the innovation does not reduce the need for the input. Benefits also differ because of supply management.

Table 1. From Gray R and S Malla, "The Rate of Return to Agricultural Research in Canada," Canadian Agricultural Innovation Research Network Policy Brief, October 2007.

Study	Commodity & Time Frame	Results
Gray and Scott, 2003	Return to research funded by the SK Pulse Growers over the period 1984 to 2020	For genetic research: IRR to producers= 20.4% Producer B/C = 12.80 to 1 Overall B/C = 16.98 to 1
Scott, Guzel, Furtan and Gray (2003)	Return to Western Canadian wheat and barley research funded through the Western Grains Research Foundation (WGRF) over the period 1988 to 2020	IRR to producers on wheat research = 23.8% IRR to producers on barley research = 36%

According to Prasada *et al,* "Supply managed sectors adjust to technological change differently than other agricultural sectors. In the former, quota rents increase while in the latter, outputs, exports, and final consumption increase in tandem with declines of relative supply prices. Thus, spending on research and development in the supply managed sectors will not have significant impacts on the average consumer, but quota holders directly benefit as a result. With output and prices capped, quota rents capture the benefits of technological change. Since quota holders gain from technological change, these farmers should finance the research that leads to technological change rather than using public funds. Alternatively, if more dollars were put into research and development in other areas of primary agriculture, especially the ones producing tradable goods, significant returns would be realized."[13]

Governments also provide support for market facilitation services, such as inspection and market and trade promotion. These services can be beneficial to the agri-food sector. In 2009, Canada spent $848 million on inspection services (federal and provincial) according to OECD data. Cao and Johnson estimated the benefit of mandatory meat hygiene regulations (in the form of HACCP) in New Zealand. They found significant net benefits to New Zealand from these regulations, taking into account private and public costs and benefits. Estimated net benefits ranged from $149 million to $499 million NZ$.[14] It is likely that Canadian government expenditures on inspection services have a positive rate of return.

The federal and provincial governments expended $141 million on marketing and trade in 2008-09. Industry organizations also provide funds for these activities. The Canadian Canola Council (CCC) and AAFC have both provided funds to assist in the development of markets for canola oil. "Returns on investment from CCC market development work to date are already evident: Every $1 invested in US market development has resulted in $1,000 of additional canola oil sales to the US, the number one customer of Canadian canola oil. In 2009 alone, Americans increased their consumption of canola oil by 12%. The vast majority (8%) of Canadian canola products are exported."[15] The benefits of this promotion would flow to producers (if production increased because of higher demand for oil), to consumers (if price falls), to input suppliers (if production increased because of higher demand for oil), and to processors (greater processing volumes because of higher demand for oil).

Conclusions

Based on the review presented in this section, it is clear that some instruments used to support the agri-food sector are more efficient in terms of transfer than others. Dollars spent on research and development will create additional benefits over and above the original expenditure. This is also true of funds spent on market facilitation activities, such as inspection and marketing and trade promotion. Consequently, the transfer efficiency of these two types of support is greater than 100%. The transfer efficiency of payments made to producers varies by payment type. If program payments are decoupled from production, then 100% of the payment remains with producers. Experts suggest that Canada's farm income stabilization programs are essentially decoupled and thus these programs are 100% transfer efficient. Programs that are not production neutral will change output levels and input use and thus are less than 100% transfer efficient. Price stabilization, market price support, and farm input subsidy programs are examples of non-production neutral programs.

Transfer Effectiveness

An analysis by Tiboudeau and Clark (TC) looked at two measures of transfer effectiveness: rate of income stabilization (how well does the policy stabilize income) and the effect of past government support on the variance of income.[16]

The econometric study estimated the following income stabilization coefficients by region. The results indicate, for example in Central Canada, that every $1 decrease in income is offset by $0.42 in support payments.

The effectiveness of income stabilization[17] can also be examined on a commodity basis. The results of Table 3 clearly indicate that Canadian agricultural

policy within the last 20 years has been an effective tool in income stabilization. Aside from the supply managed industries, stabilization of aggregate sector income through government payments ranges from approximately 25% to 50%, depending on the commodity. Still, agricultural government support programs maintain an important element of increasing income support, with estimates ranging from approximately 5% to 8% per year. The results also reveal that there has been substantial progress in extending government support across all agricultural commodities, since both the rate of stabilization and increasing income enhancement are higher for other agriculture than the traditional commodities (livestock and grains and oilseeds). In that sense, the results are showing that these programs have become more comprehensive.

The Thibodeau and Clark analysis also found that government support programs in Canada may encourage riskier behaviour or cause a problem of moral hazard. Moral hazard results when government support causes producers to take on more risk than they would in the absence of the government program. Since the goal of stabilization is to provide an increase in support when incomes fall, producers know that unfavourable events resulting in low income will be at least partially offset by increased government support. This means that they will potentially be willing to take on riskier production strategies than they would in the absence of government support, leading to moral hazard. In Quebec, for example, a 1% increase in government support results in a 1.9% increase in the variance of income. In Saskatchewan, on the other hand, a 1% increase in government support results in a 0.377% increase in the variance of income. Schaufele and Sparling evaluated the AgriStability program in terms of its objectives: lower variation in farm income; reduce the probability of negative cash flows; and provide targeted, equitable, whole farm support.

Table 2. Income Stabilization Coefficients. From Tiboudeau D and JS Clark, "Government Support, Transfer Efficiency, and Moral Hazard Within Heterogeneous Regions in Canadian Agriculture," Paper for 2009 IAAE Conference.

Region	Income Stabilization Coefficient
Atlantic	-0.085
Central	-0.424
West	-0.297
BC	-0.233

Table 3. Stabilization and Income Enhancement Coefficients for Canadian Agriculture, 1994-2008.

Sector	Income	Income
Grains & Oilseeds	27.&	7.1%
Hogs & Beef	35.6%	5.0%
Other Agriculture	49.0%	8.0%

Table 4. Provincial Farmland Value Capitalization Estimates for Government Support Payments (2006)

Province	Total capitalization of Federal support ($/acre)	Total capitalization of Prov'l support ($/acre)	Support contribution to farmland value (%)
Prince Edward Island	150.73	169.97	17.04
Nova Scotia	78.70	96.19	14.62
New Brunswick	207.29	176.58	32.98
Quebec	468.20	620.63	53.11
Ontario	309.26	242.99	15.70
Manitoba	210.29	152.28	63.28
Saskatchewan	111.34	84.00	55.02

Note: Values are the proportion of farmland value attributed to support payments in 2006. Source: Thibodeau and Clark (2009), Table 3.

This study found that AgriStability did help stabilize farm income. However, the program did not provide equitable support. Higher gross income farms (in terms of the reference margin) received a greater share of the benefits.

Capitalization

Substantial evidence exists to suggest that government support is eventually capitalized into farmland values, likely to the same extent in all provinces.[18] While the rate of capitalization is the same for all regions of the country, the effect of removing all government payments from producers is not, because government payments to producers is different across regions and because the rate of provincial support to producers is different. Table 4 summarizes the results of TC's estimates of the decline in land values resulting from removal of government support.

The table illustrates that government support as a proportion of land value ranges from a low of 6.5% in British Columbia to a high of 63% in Manitoba. From a dollar value perspective, Quebec receives the highest amount of support per acre. The table also illustrates that there are differences in provincial payments per hectare, with Quebec topping the list by a substantial margin. Comparisons between provinces, especially those of Central Canada with the Prairie region, are somewhat distorted, since they are per hectare comparisons and farm size is much different between the two regions.

Another useful estimate coming from TC is an estimate of the rate of discount used to capitalize government payments into agriculture. This is an estimate of the rate of return of government payments into land values across Canada. This rate of return is estimated by TC (page 10) as 9.29% (based on a capitalization rate of $11.76 per dollar of government payment).[19] This rate of return can be used as a measure of the rate of return to government payments to Canadian landlords. Therefore, the 9.29% is the per dollar return to landlords of government payments. It is directly comparable to a rate of return to agricultural R&D or market facilitation.

Conclusion

The Canadian agri-food sector receives substantial amounts of support through agricultural policies. This support, from consumers and taxpayers, totaled $100 billion over the last decade. Producers received almost three-quarters while the remainder was used to fund R&D, inspection, market services, etc. In 2009, total transfers to the agri-food sector were $11.5 billion, with $8.9 billion directly benefiting producers. Significantly less support was allocated to general services such as R&D. As a percentage of total expenditures in agriculture, both market facilitating (such as inspection services and market and trade promotion activities) and R&D expenditures are becoming less important over time.

Income stabilization programs have been somewhat effective in Canada. This study found that stabilization programs reduced income variability by 27% in hogs and beef, 35% in the grains and oilseeds sector, and 49% in other agriculture. Policies also attempt to increase the level of income. Analysis found that income enhancement varied by commodity.

Evidence from numerous studies indicates that the funding pattern described above is not the most efficient allocation of government expenditures. Although Canada's decoupled policies are effective in the sense that they transfer funds to producers without leakages from primary agricultural producers (except perhaps landlords), money expended on activities such as R&D creates higher returns.

The rate of return on R&D appears to exceed that for market facilitating activities such as inspection and market development. The return for both of these activities exceeds the return for direct payments to producers, which has been estimated to be 9.29%.

The results suggest that reallocating incremental government spending to R&D or market facilitating activities would be more beneficial than continuing to focus government spending on direct payments to producers.

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5. The data used to construct variables are Statistics Canada CANSIM tax filer data. Government payments (Gt) is CANSIM R3033 (Net Program Payments): program payments and insurance proceeds after deducting stabilization levies or government levies. Income (It) is CANSIM 2510 (Net Market Income): Operating revenues less total operating costs. Data include both federal and provincial direct payments.

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9. Distortion means that the program is not production neutral.

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16. Tiboudeau D and JS Clark, "Government Support, Transfer Efficiency, and Moral Hazard Within Heterogeneous Regions in Canadian Agriculture," Paper for 2009 IAAE Conference.

17. Stabilization payments reduce the variability of income by providing countercyclical payments. Complete stabilization implies an income stabilization coefficient of -1. Income stabilization effectiveness is measured by how close the coefficient of stabilization is to -1.

18. Thibodeau, D. R., and J. S. Clark (2009). Government support, transfer efficiency, and moral hazard within heterogeneous regions in Canadian Agriculture, Contributed paper to the International Association of Agricultural Economists, Beijing, China.

19. This results from manipulation of the present value formula PV=R/r where PV is the present value of land, R is the return to the asset (either market based returns or government payments). The implied rate of return is therefore r=R/PV. In TC the estimated capitalization rate is $11.76 per dollar of government support (=1/r). Hence r=approximately 9.29%.