Risky Business:
Factors Affecting Participation Rate of AgriStability

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Introduction

Assisting in the management of risk faced by farmers is one of the priorities for Canadian agricultural policy with the primary means of assistance offered through CAIS and AgriStability. The goal of this program is to mitigate the short-term impact of large income losses by covering a percentage of the operator's shortfall as compared to historical performances of his or her farm operation(s). Funding for the program comes from both the federal government and their provincial counterparts, with federal expenditures on AgriStability (and its predecessor CAIS, and a related program AgriInvest) between 2003 and 2009 averaging $777 million and provincial expenditures on these programs averaging $646 million (Rude and Ker 2011).

Participation levels for the program, however, have been dropping despite increasing uncertainty in agricultural markets. At the national level, participation in CAIS and AgriStability dropped slightly from 57% in 2004 to 52.9% in 2009 (Treasury Board of Canada Secretariat 2012) but there was a significant drop for Ontario over the same period from 73.4% to 56.5% (OMAFRA 2012). The decline in the use of the government's major risk management program for farmers comes at time of unprecedented volatility in agricultural commodity markets. Given the possibility of falling crop prices and increased variability in all prices, it would be expected the need and use of a program like AgriStability would increase rather than fall and begs the question of why farmers are opting out.

Some producers have complained the programs are biased against sectors afflicted with consistent adverse market conditions outside their control (Baerg 2012). Others have argued the lag in the timing of payment, a consequence of program design for the program to be non-trade-distorting in accordance to NAFTA, is too long to be helpful to the business. Participation is

expected to fall further as the level of coverage under AgriStability from the current 85% of the shortfall to 70% in 2013 as part of the new agricultural policy framework Growing Forward II (AAFC 2012).

Previous literature has focused on the effectiveness of CAIS and AgriStability as a risk management tool. Antón et al. (2011) found the delay in payment and coverage of AgriStability interferes with farmers' private risk management strategies, reducing its effectiveness as a risk management tool. However, no empirical evidence is provided to illustrate the extent these facts influence potential and existing AgriStability participants' decision to remain or drop out of the risk management programs. Although dominant factors that influence CAIS and AgriStability participation remain relatively unexplored, literature of participation in other government programs offer some insights. Perry et al. (1989) simulated two land conservation programs at the farm level and suggested that cross compliance with other programs may negatively impact participation decisions. Several studies also have gauged how alternative premium subsidy levels influence program participation (e.g. Coble, et al., 1996; Smith and Baquet, 1996; and Goodwin, 1993) by estimating various price elasticities of demand for risk management programs. Decomposing enrollment status, Cabas et al. (2008) found out that price variability is particularly important in the crop insurance participation decisions for new entrants while yield variability is important for dropouts.

The purpose of this paper is to assess the factors that affect participation rates for the CAIS and AgriStability programs. Section two summarizes the CAIS and AgriStability program and how payments are triggered under the different schemes. Section three summarizes the Ontario Farm Income Database (OFID) used for the analysis. Section four describes the assessment of the differences between farms that enter, stay, and exit the CAIS and AgriStability

programs, and the details of the financial variables compared. Lastly, section five shows the results of the analysis and discusses the implication of the results.

Summary of CAIS and AgriStability Programs

Canadian agricultural policy has evolved considerably from coupled-payments intended to enhance farm income to decoupled programs designed to enhance competitiveness (see Table 1). The initial aim was to improve the income of farmers and production levels across the country largely through price support mechanisms (Leslie 1986, Freshwater 2012). The role of the Canadian government in supporting the welfare of farmers shifted further in 1991 with the enactment of the Farm Income Protection Act (FIPA) (Office of the Auditor General of Canada 1994). FIPA introduced the Canadian Farm Income Program (CFIP), which were designed to trigger payments only when their program year margin (a modified version of the producer's net farm income for a particular year) fell below a historical average (reference margin). The level of income support was now based on an individual producer's internal past performance rather than on a comparative external measure such as commodity price.

The next major change in Canadian agricultural policy was the introduction of the Agricultural Policy Framework (APF) in 2003. APF outlined five pillars to guide policy development with Business Risk Management (BRM) directly related to support programs. The Canadian Agricultural Income Stabilization Program (CAIS) was introduced under the BRM pillar to replace CFIP, but the payment triggers under CAIS were essentially the same as CFIP. Under CAIS, it costs $4.50 for every $1,000 of Reference Margin for maximum protection, $3.825 for medium protection, and $3.15 for minimum production, and an addition of $45 dollar of administration fee. Payments are triggered when program year margin (eligible revenue minus

eligible expenses) falls below a certain percentage of the reference margin (Olympic average of previous three of five year's program year margin, where the top and the bottom performing years were removed from the calculation). Depending on the fall in margin, different payments are triggered:

- For the first 15% of the margin decline, the program covers 50% of the decline,
- For the next 15%, the program covers 70% of the decline, and
- For the rest of the decline, the program covers 80% of the decline.

Program payout is capped at 70% of reference margin decline at maximum protection, 66.5% for medium protection, and 56% for minimum protection. Further coverage was possible if the program year margin was negative, in which case an additional 60% of the negative margin was covered.

The guidelines for Canadian agricultural policy were re-focused with the implementation of Growing Forward in 2008 as a replacement for the Agricultural Policy Framework (APF). AgriStability was introduced under Growing Forward, replacing the CAIS program with the same payment trigger mechanism calculated by falls in program year margin, except that tier one payments (triggered by the first 15% fall in reference margin) are eliminated and replaced by AgriInvest, another tripartite program. Medium and minimum level of protection has also been eliminated - program fees have been set to $4.50 per every $1000 of reference margin protected, with a maximum coverage of 70% of reference margin covered (negative margin is now included as part of the maximum coverage calculation).

Growing Forward 2 (GF2) replaced the current policy framework in April 2013. One of the major focuses of GF2 appears to be reducing the amount of income stabilization provided by

BRM and placing a higher degree of responsibility on producers to manage and mitigate risk, both in the short and longer term (AAFC 2011). Changes were made to AgriStability under GF2, which further reduced the program payout trigger to 70% below the reference margin (under Growing Forward, the payout trigger was 85% below reference margin). Maximum coverage will be 70% of margin decline, for both positive and negative program year margin.

Table 1 one shows the program payout scenarios under the three different programs, for a farm with a Reference Margin of $100,000 and a Program Year Margin that has declined to -$10,000. Program payment has decreased in successive programs under the same scenario. Decrease in program payments may be one of the reasons why farms are dropping out of the program.

Table 1 – Program payout scenarios under CAIS, AgriStability, and AgriStability under Growing Forward 2 given a reference margin of $100,000 and a program year margin of -$10,000

		CAIS		AgriStability		AgriStability Under Growing Forward 2	
Coverage		%	$	%	$	%	$
Tier 1	$100,000 to $85,000	50%	$7,500				
Tier 2	$85,000 to $70,000	70%	$10,500	70%	$10,500		
Tier 3	$70,000 to $0	80%	$56,000	80%	$56,000	70%	$49,000
Tier 1 + Tier 2 + Tier 3			**$74,000**		**$66,500**		**$49,000**
CAIS Payment Cap	$100,000 to $0	70%	$70,000				
Negative Margin	$0 to $ -10,000	60%	$6,000	60%	$6,000	70%	$7,000
Total Payment with Negative Margin Coverage			$76,000		$72,500		$56,000
AgriStability Payment Cap	$100,000 to -$10,000			70%	$77,000		$77,000
Total Payment			**$76,000**		**$72,500**		**$56,000**

Data

To assess factors affecting AgriStability participation rate, we use data from the Ontario Farm Income Database (OFID). OFID is collected by OMAFRA and used for administering CAIS, AgriStability, and other BRM programs. The dataset consists of five parts: (1) non-financial characteristics of the operator; (2) income and expense data from tax files between 2003 to 2011; (3) program payment data between 2003 and 2011; (4) beginning and ending inventory data of commodities for each year between 2003 and 2009; and (5) production data (i.e. estimated acreage, herd size) generated from the inventory data. Note that tax filers are assumed to be farm operators, a standard assumption for reporting on tax-based datasets. The database contains 26,494 farms that participated in CAIS and AgriStability for one or more years between 2003 and 2011.

Two criteria are used in the sample selection, based on completeness of data associated with each operation. The data from operators are used for: (1) tax files between 2003 and 2009, and (2) from operators who applied for CAIS / AgriStability during those years. Tax files filed before 2003, and those filed in years when the operators did not participate in the stabilization programs, and did not have inventory or production level information.

A unique feature of the OFID is the ability to link operators with their respective operations. As such, this allows us to convert operator-level data into farm-level aggregations. Revenue and expenses of each operation are taken from the income tax file of the tax filers associated with the operation and then aggregated to the farm level. Revenue and expenses are also explicitly identified by commodity. Expense items from the tax files are broken down further into four categories: (1) labour expenses, (2) custom work expense, (3) interest expenses,

and (4) capital and depreciation expenses. In this paper we focus on the total operating expense. This analysis uses the Earnings Before Tax, Interest, and Amortization (EBITA) as a measure of net income.

Financial Performance Measures

The OFID is used to calculate three measures related to revenue, expense and net income for farm operations. The three values are calculated for both cash and accrual reporting. There is no balance sheet information available on assets and liabilities.

1. *Total Operating Revenue (TOR)* = revenue from commodity sales, crop insurance payments and production related revenue.

2. *Total Operating Expense (TOE)* = all expenses incurred by the farm less salary paid to family members, quota rentals, and other tax-adjusting items on tax form.

3. *Earnings Before Interest and Tax and Amortization (EBITA) = Total Operating Revenue – non-operating revenue*[*] *– (Total Operating Expense* – interest expenses – capital and depreciation expenses).

The *EBITA* is calculated to give a clearer picture of financial performance of farms. *EBITA* is a standard accounting measure of firm profit and is often considered a more accurate measure of net income. Capital and depreciation expenses are directly from the tax files and are used to proxy the value of asset depreciation (amortization).

The above revenue and expense measures are used to calculate four ratios, which assess financial performance of the farm operation, calculated for both cash and accrual reporting.

1. *Operating Profit Margin* = profit as a percentage of sales revenue *= EBIT / TOR*.

[*] Non-operating revenue includes farm-related revenue reported in the tax-file not directly related to commodity production. This category includes expense rebates and sales of goods and services such as gravel and custom work

2. *Operating Expense Ratio* = expenses required to generate a $1 of revenue = *TOE / TOR*.

Note that *EBIT* is a modified version of the net income measure *EBITA*, where capital and depreciation costs are *included* in the expense side of the *EBIT* measure.

Government payment data for each operation are kept in a separate data set from the income and tax file data. The government data are based on actual, calculated payments from OMAFRA rather than those reported by the operators. Payments are linked to the year in which they are triggered and not the year the operator receives the funds. For this paper, we shift the payment to the year operators receive them.

Methods

Farm characteristics of the farms that drop out are compared to a sample of the operations that stay in the program to understand why some farms prefer to stay in the CAIS and AgriStability programs while others drop out. Because OFID only has data on financial information during the years farms participate in the program, we compare the data of the dropout farms one year before they drop out (i.e. last year with data) to farms that are continuously in the sample between 2003 and 2011. These two groups chosen for comparison, as they are mutually exclusive. We also compare data on the year new entrants enter into the program (those who start participating in AgriStability after 2003) to these two groups to understand the reason why some operations choose to participate. We compare the averages of the financial and production information (revenue, expenses, acreage, number of operators, operating profit margin) of these three groups.

Result

Table 2 shows the number of participants, new entrants, permanent exits and temporary dropouts from CAIS and AgriStability between 2003 and 2011. Between this period, there were a total of 26,494 participating farms, of with 7,772 farms (29.3%) participated in the programs every year since 2003. While there are still new operations enrolling into CAIS and AgriStability every year, the number of new entrants into the program is very small have fallen from year to year, with the most dramatic fall in entrants between 2007 and 2008, one year after the introduction of AgriStability.

Table 2 – Number of participants, new entrants, and exits from the CAIS and AgriStability program in Ontario between 2003 and 2011

Year	Participants	Continuous sample	New Entrants	Permanent Exits	Temporary Exits
2003	21,136	7,772			
2004	19,817	7,772	1,028	1,118	1,222
2005	20,266	7,772	945	1,824	600
2006	18,661	7,772	698	1,707	1,079
2007	17,789	7,772	974	1,889	1,218
2008	16,670	7,772	523	2,015	971
2009	15,186	7,772	405	2,107	845
2010	13,536	7,772	406	2,247	794
2011	12,462	7,772	379		

Both low number of entrants and large number of farm exiting every year affect participation rate in CAIS and AgriStability. Number of farms that exited the program permanently in 2010 is almost double that of 2003, whereas new entrants into the program in 2011 is only around one-third of new entrants in 2004. The drop in the number of temporary drop out reveals that less farms that drop out of the program came back into the program. There is a large group of farms that stay in the program every year, however.

Figure 1 shows the breakdown of farm by the years they remained participating in the program. This includes operations that temporarily drop out of the program. It shows that a significant portion of farms participate in CAIS and AgriStability every year. About 30% of participants have been part of the CAIS / AgriStability program for all nine years, about a third of participants have participated in the program for four or less years, and another third participated for five to eight years. This suggest that over 70% of farms that ever participated in CAIS and AgriStability eventually made the decision to exit the program at one point, and more farms over time choose not to re-enroll into AgriStability after they drop out.

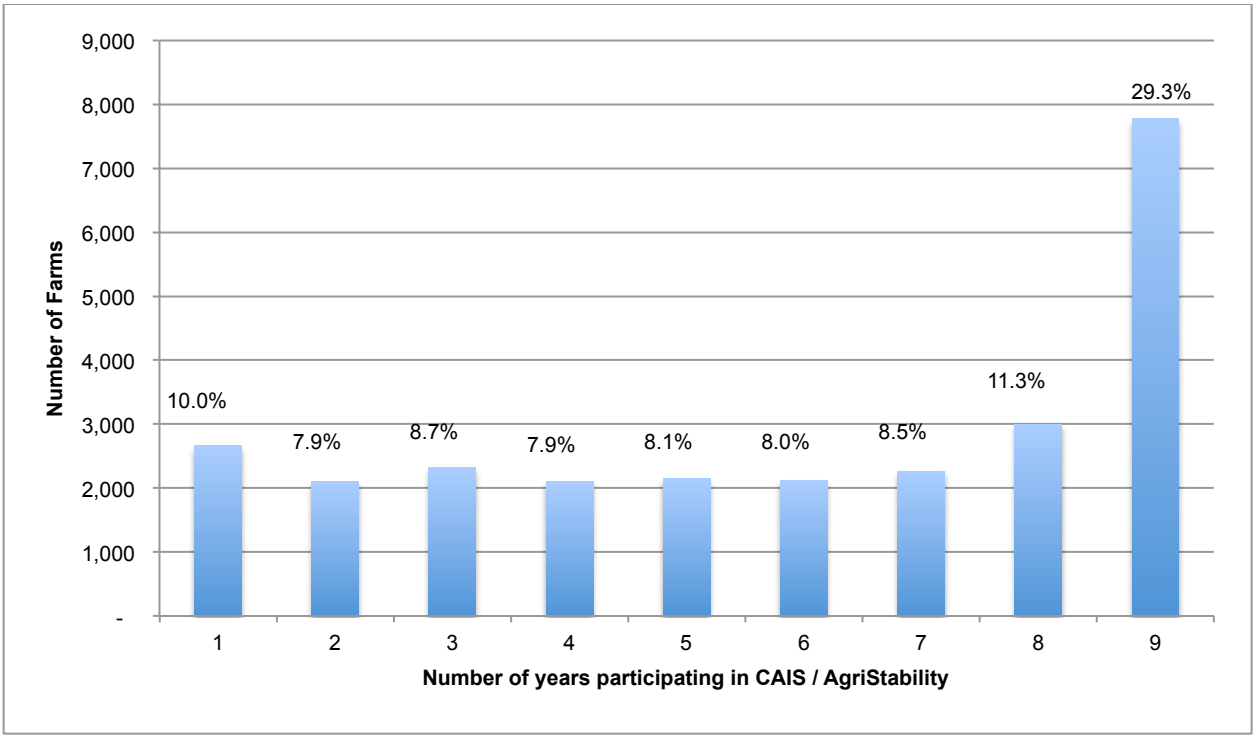

Figure 1 – CAIS / AgriStability participating farms, by number of participating years

Probability of a CAIS/AgriStability participating farm exiting the CAIS / AgriStability program temporarily or permanently is shown in Table 3. Four states were assigned to each farm for each year between 2003 and 2011: before-program, in-program, temporary exit (if an operation exits OFID for one or two years but reappears in the database in a later year), and permanent exit (if an operation leaves the OFID database but does not reappear). Table 3 shows a abbreviated summary of the year-to-year transition probability given these four states – transition from before-program to in-program state, transition from temporary-exit to in-program state, and transition from permanent-exit to permanent-exit state are omitted. It shows that each farm has approximately one in ten chances of exiting the program on a year-to-year basis, and a 3.7% chance of temporary exiting the program for one or two years.

Broken down by revenue classes (based on annual average of total operating revenue), it shows that one in five farms that temporarily drop out drop out for two years in a row before rejoining the program. Also, farms with sales between $0 to $10,000 have more than one in four chances of exiting the program, and probability of exit declines for larger revenue classes.

Table 3 – Year-to-year transition probability from participation of CAIS / AgriStability program to staying in participation, temporary drop out of the programs, and permanent exit of the programs, between 2003 to 2011 for all farms and by annual average revenue classes

Year x	Participation		
Year x + 1	Participation	Temporary Dropout	Permanent Exit
All Farms	86.5%	3.7%	9.8%
$0 - $10k	67.1%	6.4%	26.6%
$10 - $50k	82.4%	4.5%	13.1%
$50 - $100k	87.2%	3.7%	9.1%
$100 - $250k	88.6%	3.4%	8.0%
$250 - $500k	89.1%	3.2%	7.7%
$100 - $250k	90.3%	2.9%	6.8%
> $1million	90.8%	2.7%	6.5%

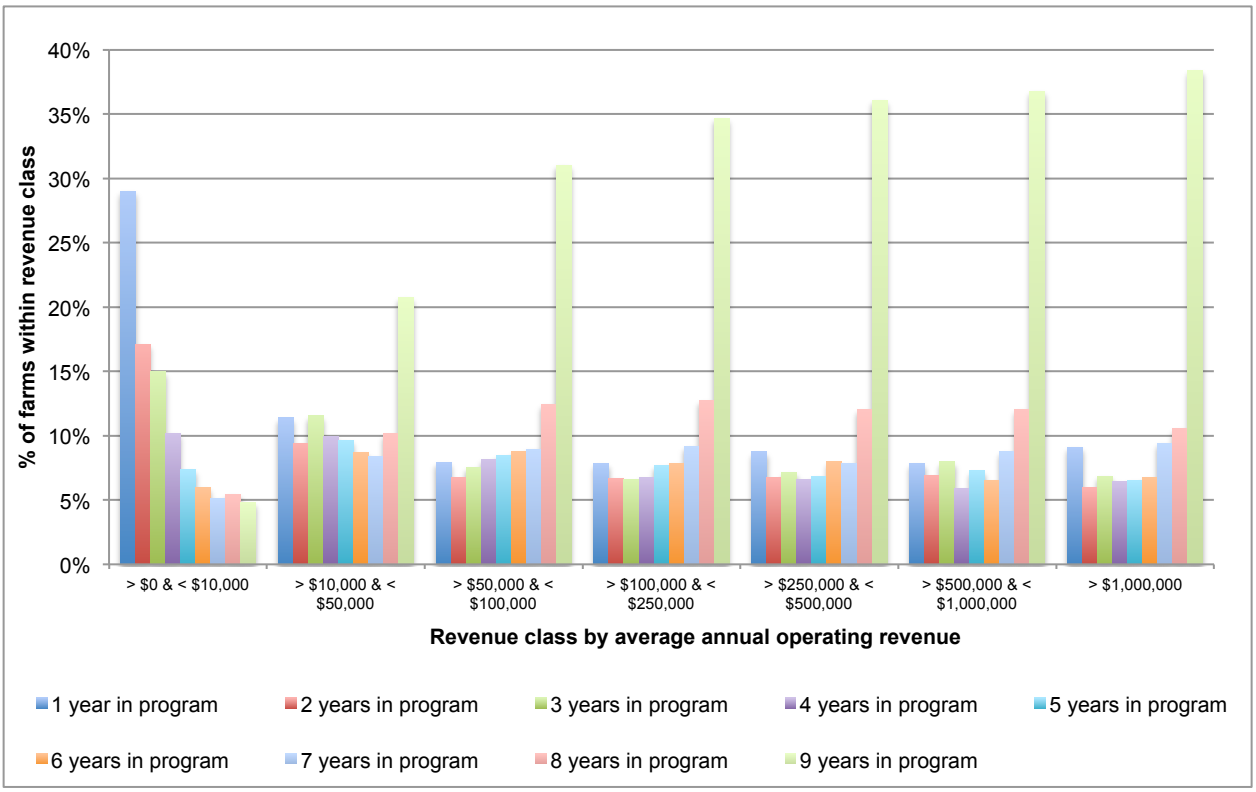

Figure 2 – CAIS / AgriStability participating farms by number of participating years, categorized by average annual operating revenue

Figure 2 shows the breakdown of the number of years of participation for farms in different revenue classes (based on annual average total operating revenue). Large share of operations with sales less than $10,000 (29%) enrolled in the program for only one year before exiting the program, whereas a much larger share stays enrolled every year between 2003 and 2009. Length of enrollment seems to correlate with the size of the operation. This could be because the CAIS / AgriStability programs are not valuable for smaller operations, or that these farms are much less viable compared to larger operations.

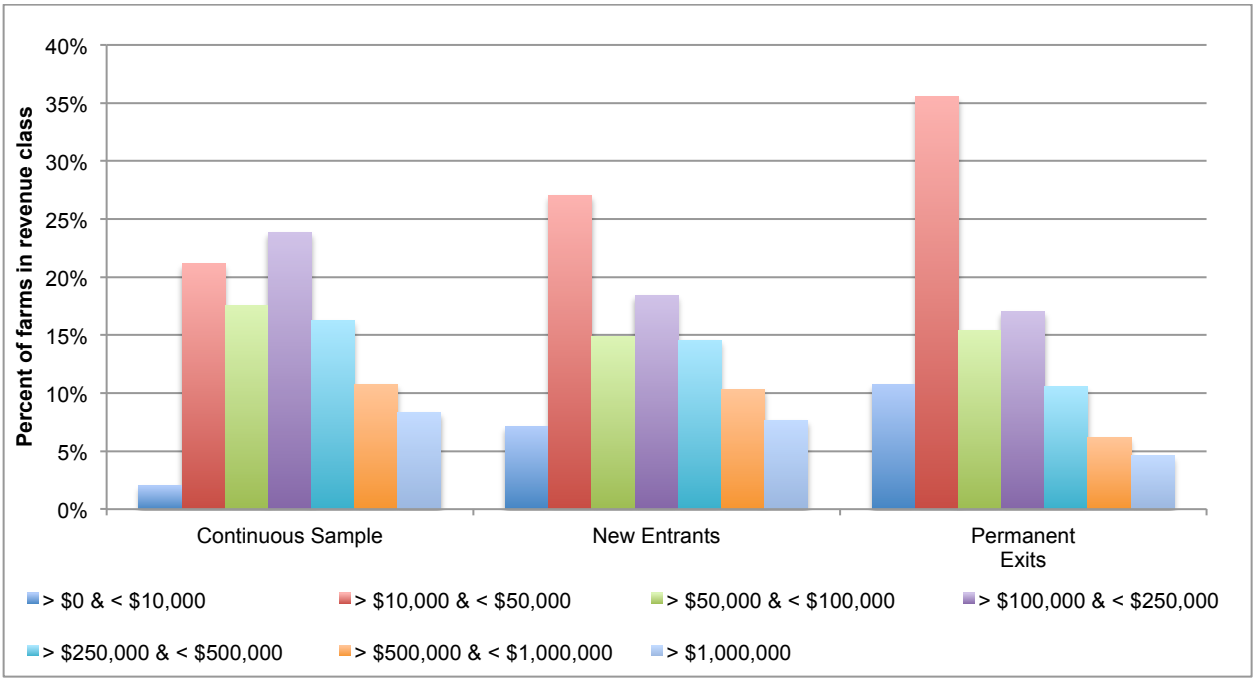

Figure 3 – Average size composition of farms participating, entering, and exiting the CAIS and AgriStability programs, between 2003 and 2011

Figure 3 shows the size distribution of the three groups based on annual averages of total operating expenses. It shows that farms continuously participate in CAIS / AgriStability every year tends to be larger than those entering the program after 2003, and larger than those that exit the program. Over 57.8% of farms that participate in AgriStability every year have sales between $50,000 to $500,000, versus 47.9% of new entrants and 45.4% of exits. Over 44% of farms that exits the program have sales of less than $50,000 the year before they quit the program.

Sector composition of participants, new entrants, and permanent exits has also changed over time. Figure 4 shows the sector composition of farms that participated in CAIS and AgriStability in 2003, 2007, and 2010. These years are chosen to showcase the changes from the beginning of the program (2003), changes to the program from CAIS to AgriStability (2007), and the later years in the dataset (2010). It shows that, of farms that participate in CAIS/AgriStability every year, more farms are switching to field crop production (meaning more

than 50% of the farm's operating revenue are generated from crops sales), whereas the percentage of farms participating in other production types have all declined. This reflects the trends in changes to the composition of Ontario farm production in general - majority of the CAIS and AgriStability participants are field crop operations, followed by beef, swine, fruits and vegetables, and dairy operation. Note that supply managed sectors are underrepresented in OFID, as CAIS and AgriStability payments are reduced for supply managed commodities. The field crop sector is a particularly large group of Stability participants and growing: between 2003 and 2011, percentage of participants that are field crop operations have increased from 41% to 55%.

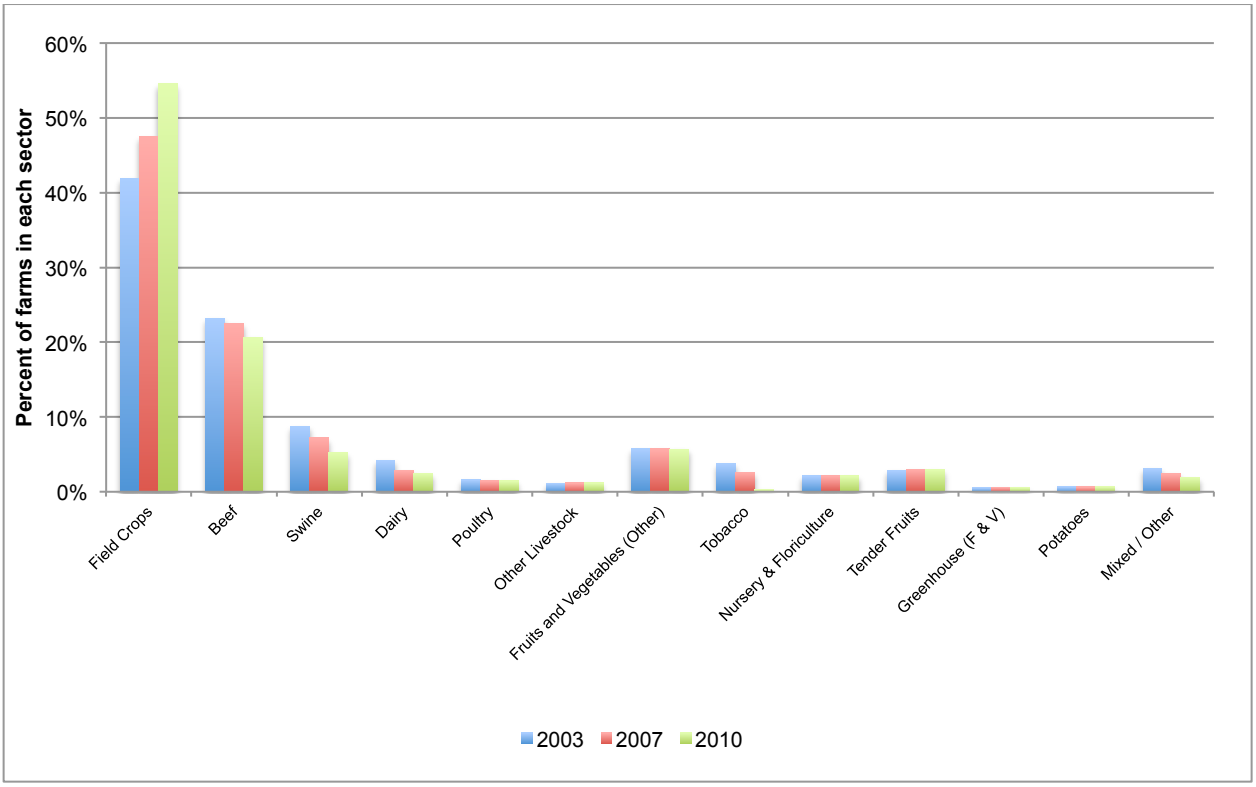

Figure 4 – Sector composition of CAIS / AgriStability farms that participated every year, in 2003, 2007, and 2011

New entrants into the program have very similar composition in 2004, as shown in Figure 5. Large percentage (more than 2 in 5) of new entrants into the program is field crop operations. A number of differences stick out in the later years – particularly, given the large share of field

crop operations there are in Ontario, it is surprising to see the percentage of new entrants being field crop operations is stable over time. Jump in participation for the dairy sector in 2007 and tobacco sector in 2010 are also surprising, but coincide with the cap on price quota prices in 2007, and the tobacco quota buyout in 2009. There is also a large decline in the number of beef farms that enter into the program over time. It could be that majority of beef farms already signed up to the program in 2003 and very few beef operations were left that have not enrolled in the program.

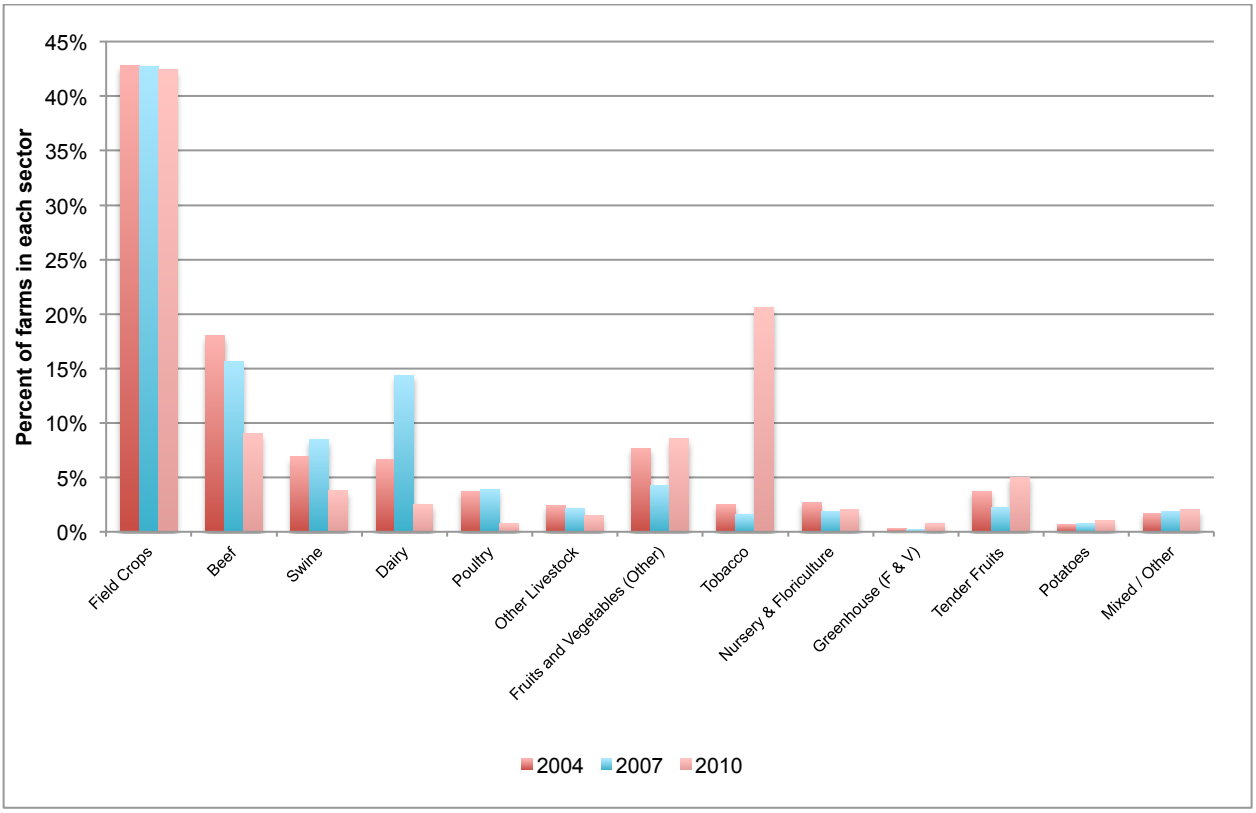

Figure 5 – Sector composition of farm entering into the CAIS / AgriStability program in 2004, 2007, and 2011

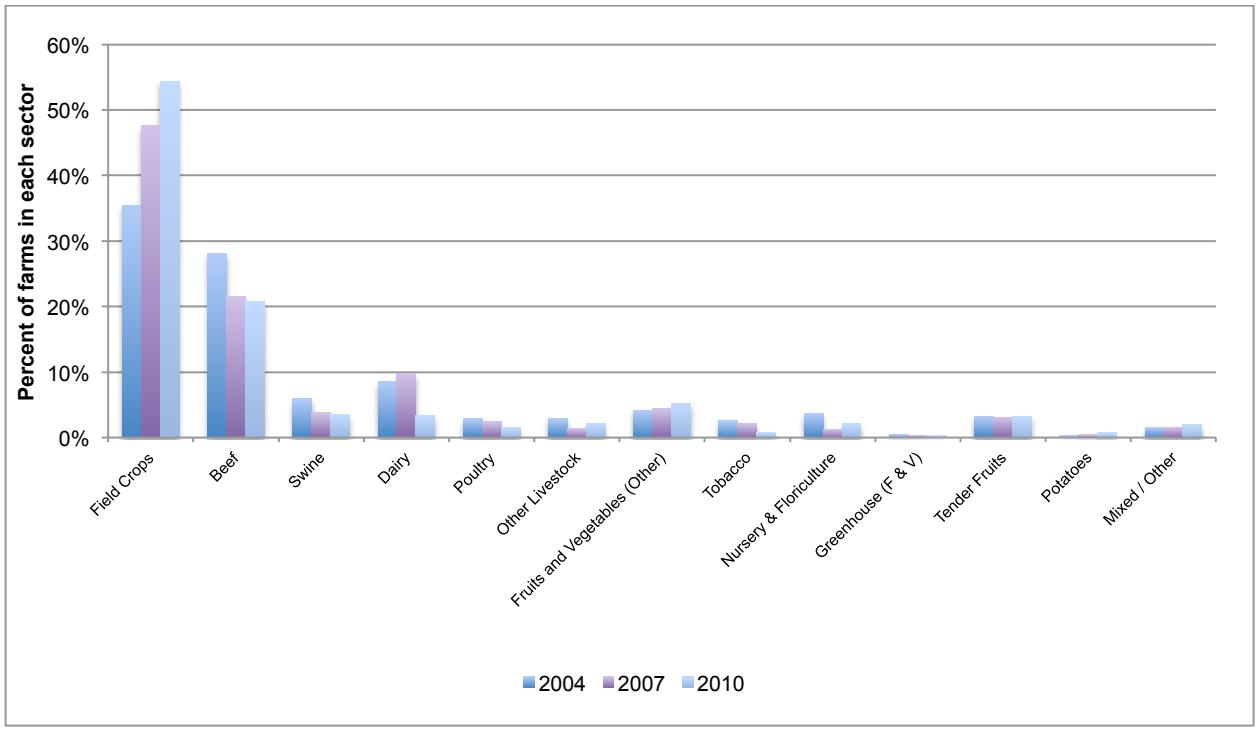

Figure 6 – Sector composition of farms exiting CAIS / AgriStability in 2004, 2007, and 2011

In terms of exits, Figure 6 shows the sector composition of farms exiting AgriStability in the years 2004, 2007, and 2010. Larger share of farms that exit the program are field crop operations, and the percentage has risen from 35% in 2004 to 54% in 2010. This is likely partly due to larger share of farms switching to cropping operations, and it may also be because field crop operations are more resilient to risk, and due to increase in crop prices. Since enrollment cost scales up with net annual sales, increase in crop prices may have reduced the incentive for crop farms to stay enrolled. Furthermore, cropping operations have more alternative risk management options compared to other sectors: mainly, crop insurance programs. Surprisingly, the beef share of permanent exits remained relatively stable between 2007 and 2010.

Analysis of Farm Characteristics of continuing participants, new entrants, and permanent exits

In the analysis section, farm characteristics of the farms that continuously participate in the programs, the new entrants, and farms that permanently exit the program are analyzed. 563 farms from the continuous sample, 146 new entrants, and 410 permanent exits operations are excluded from the summary statistics for the following reasons.

- Farms with one or more years of non-zero total accrual operating revenue or accrual operating expenses between -$1 and $1. Extremely low operating revenue generates extremely large financial ratios.
- Farms with one or more years of very high interest expenses
- Farms with very high acreage (over 100,000 acres)

Note that for permanent exits, the farm's characteristics in their last year of enrollment are reported, since no data is collected once they exit the program.

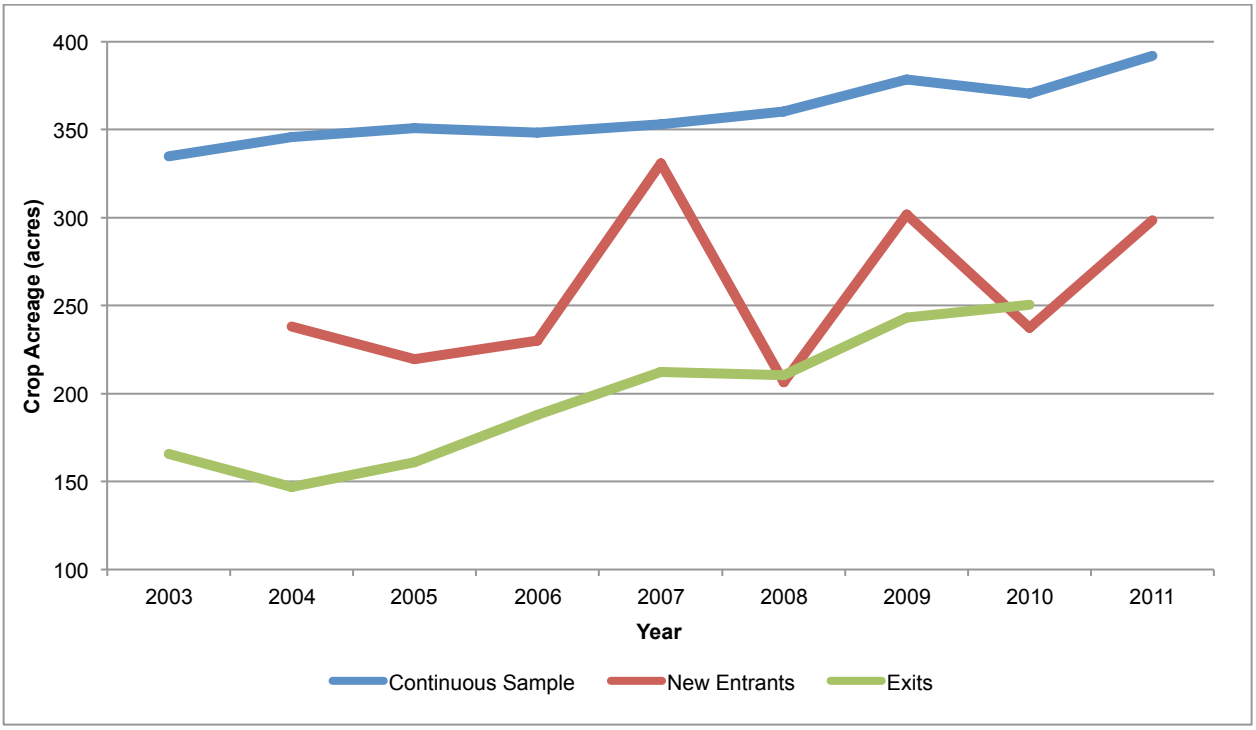

Figure 7 – Average acreage of CAIS / AgriStability continuous participants, new entrants, and permanent exits between 2003 and 2011

Figure 7 shows the average crop acreage of the three groups between 2003 and 2011. Note that this acreage includes land for which crop is grown for feed on farm and for sale. Farms that participate in CAIS and AgriStability every year have higher acreage than new entrants and those who exit the program. While this may be reflective of the large share of field crop operations in the continuous sample, note that a large percentage of new entrants and permanent exits are field crop operations also. This suggest that CAIS and AgriStability may be more beneficial for land based operations and/or larger operations.

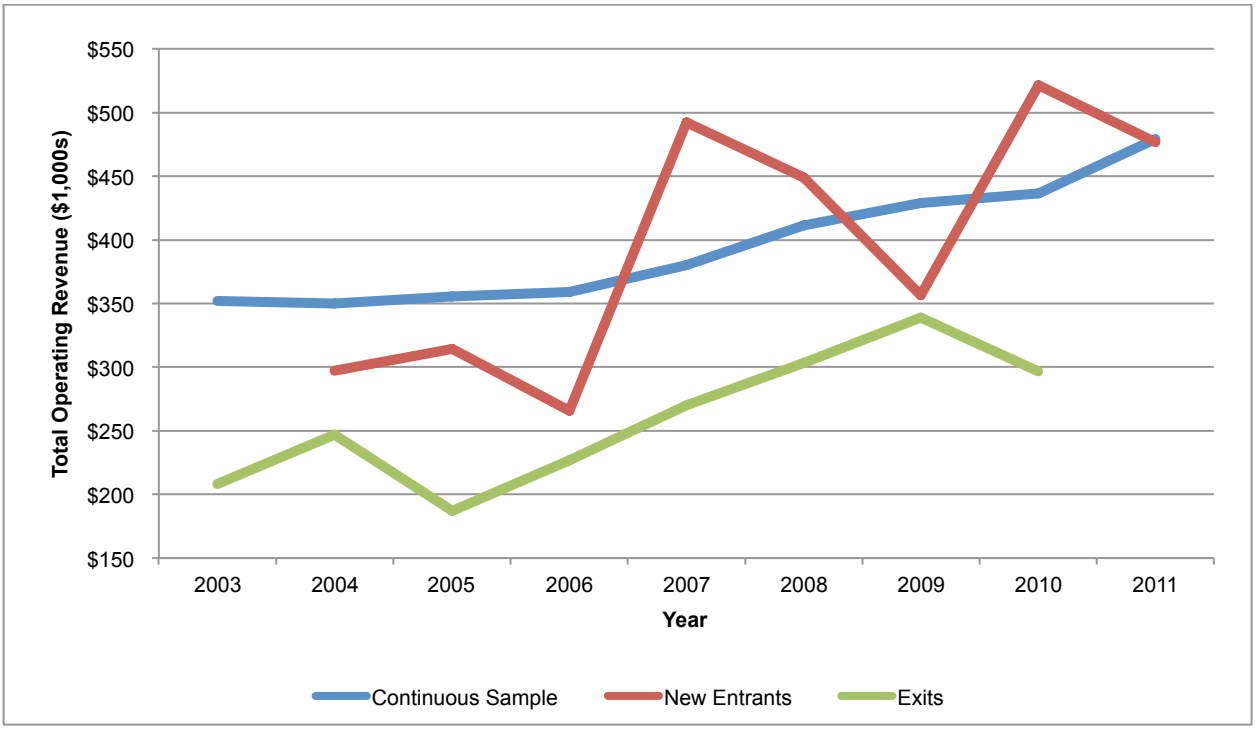

Figure 8 – Average total operating revenue of CAIS / AgriStability continuous participants, new entrants, and permanent exits between 2003 and 2011

Figure 8 shows the average of total operating revenue for the three groups. Farms that exit the program have much lower operating revenue compared to farms in the continuous sample or new entrants, by approximately $100,000 each year. This makes sense given the sector breakdown, as farms in the higher revenue classes are more likely to enroll every year. New entrants are not necessarily smaller than those in the continuous sample, in particular in years 2007, 2008, and 2010. A number of reasons can explain the size of new entrants in these few years: introduction of AgriStability in 2007, and the transition of the pilot Risk Management Program (RMP) into a permanent program in 2011 for field crops, which requires farms to participate in AgriStability in order to be eligible for RMP payments.

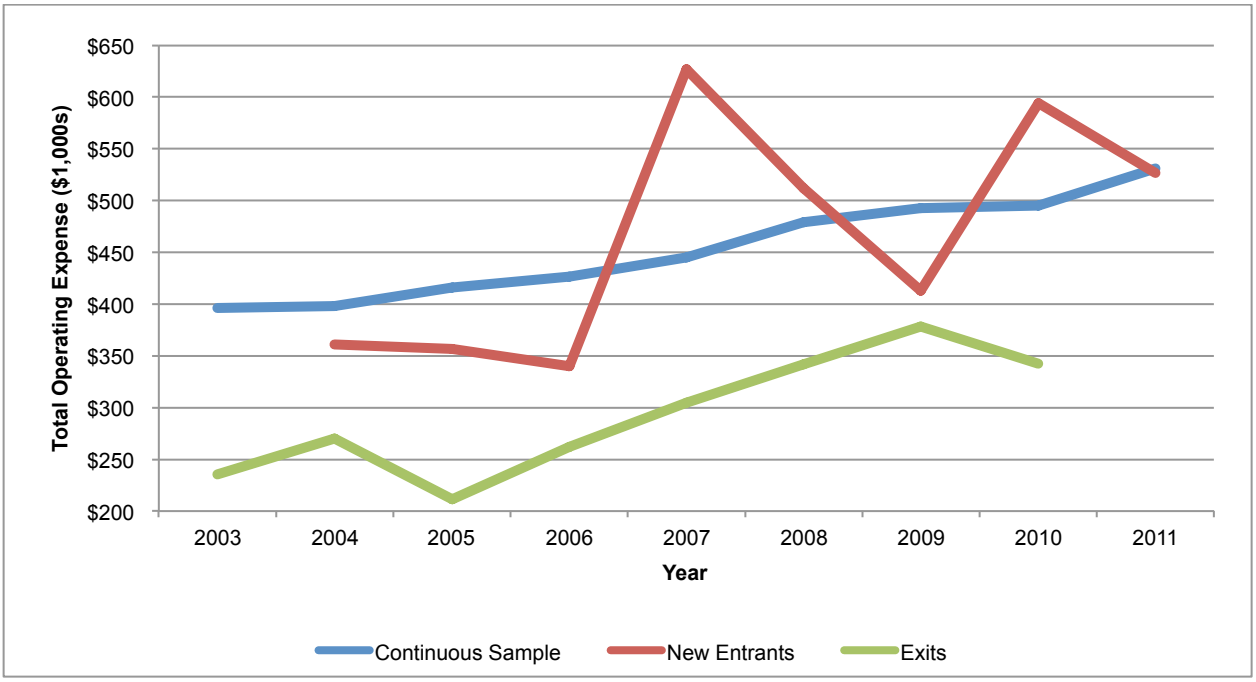

Figure 9 – Average total operating expense of CAIS / AgriStability continuous participants, new entrants, and permanent exits between 2003 and 2011

Along with lower revenue, farms exiting the programs have lower expenses also. Figure 9 shows the average total operating expenses for farms in the continuous sample, new entrants and permanent exits. Like revenue, average expenditure have increased for all three groups also, and also peaked above average expenditure of farms in the continuous sample in the years 2007, 2008, and 2010.

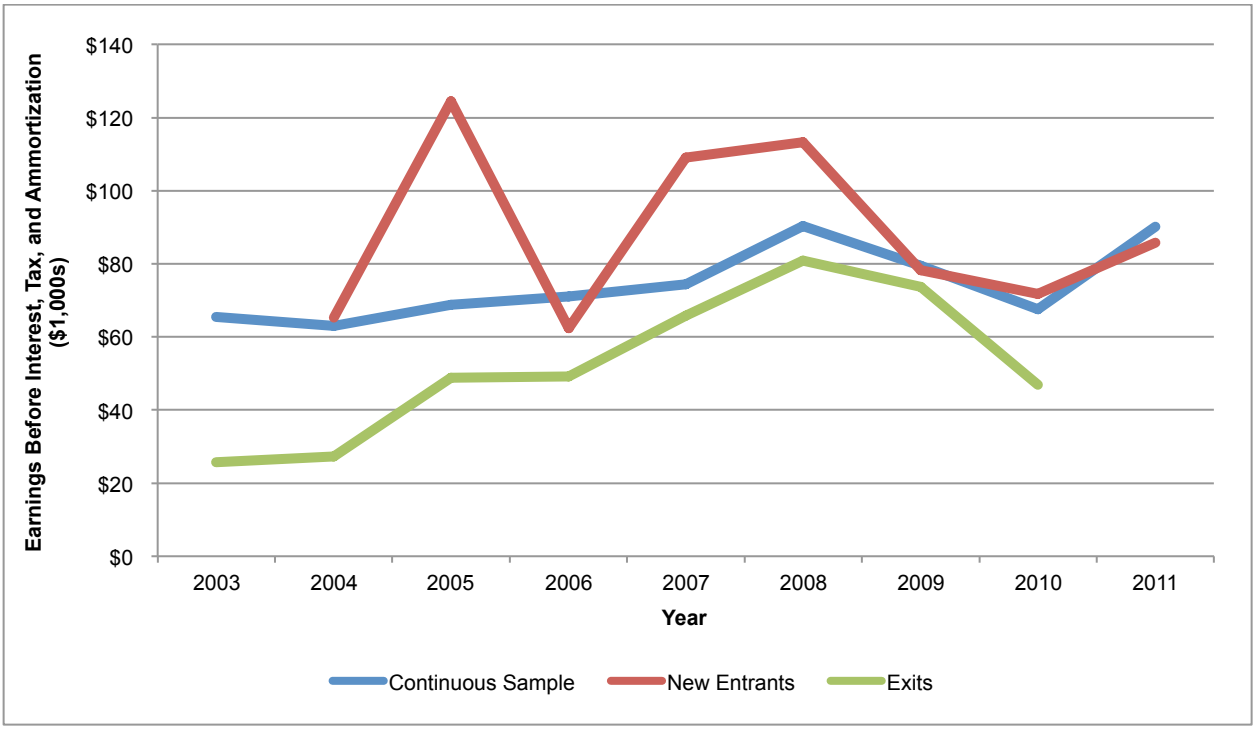

Figure 10 – Average EBITA of CAIS / AgriStability continuous participants, new entrants, and permanent exits between 2003 and 2011

Figure 10 shows the average EBITA of the three groups between 2003 and 2010. It shows that in addition to having lower revenue and expenses, farms that exit CAIS / AgriStability also have a lower net income compared to those that continuously participate in the program. In contrast, while new entrants are also typically smaller (in terms of lower revenue and expenses) than the farms in the continuous sample, the average net income of this group is often similar to or higher than those in the continuous sample. This is interesting particularly because farms that enter into CAIS and AgriStability later are not necessarily farms that are in need.

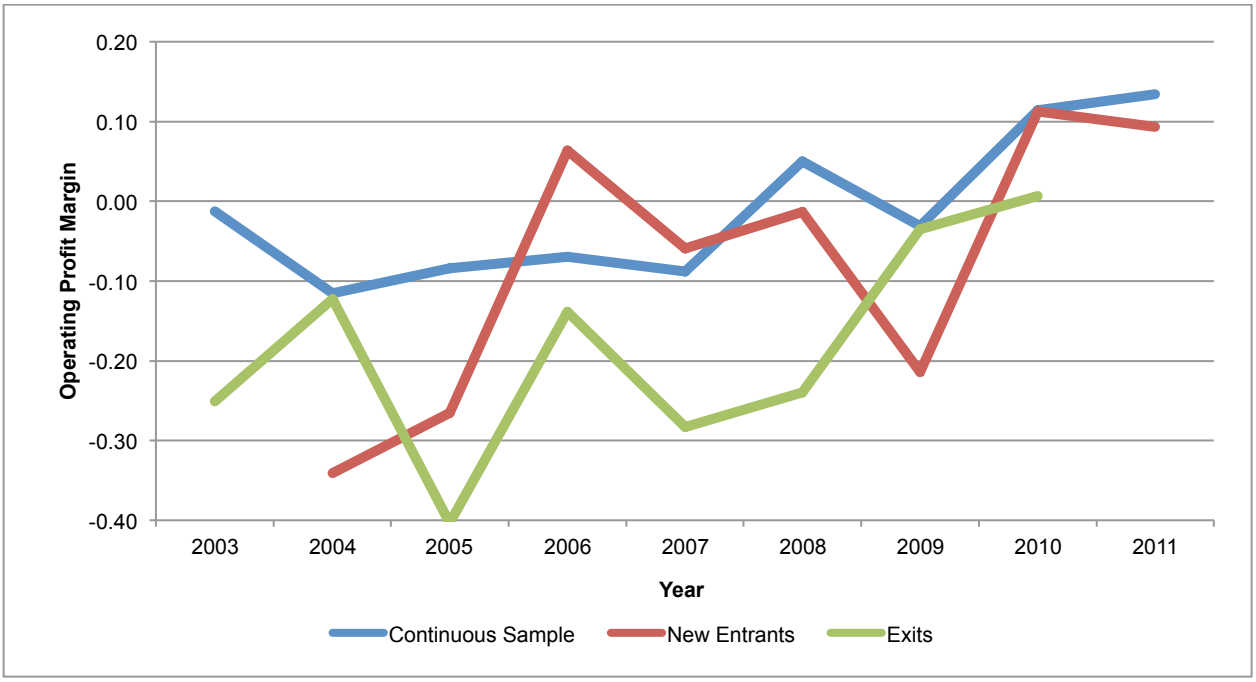

Figure 11 – Average operating profit margin of CAIS / AgriStability continuous participants, new entrants, and permanent exits between 2003 and 2011

Figure 11, which shows the Operating Profit Margin of the three groups, reveals that those who exit are, per dollar of revenue, consistently less profitable. The average operating profit margin for farms that exit the program permanently are consistently below zero, meaning these operations were on average running net losses, whereas those in the continuous sample continues to do well. For new entrants, operating profit margin are often below zero and lower than the continuous sample, even though they have higher net income. This could be the reason why these operations are enrolling into CAIS and AgriStability.

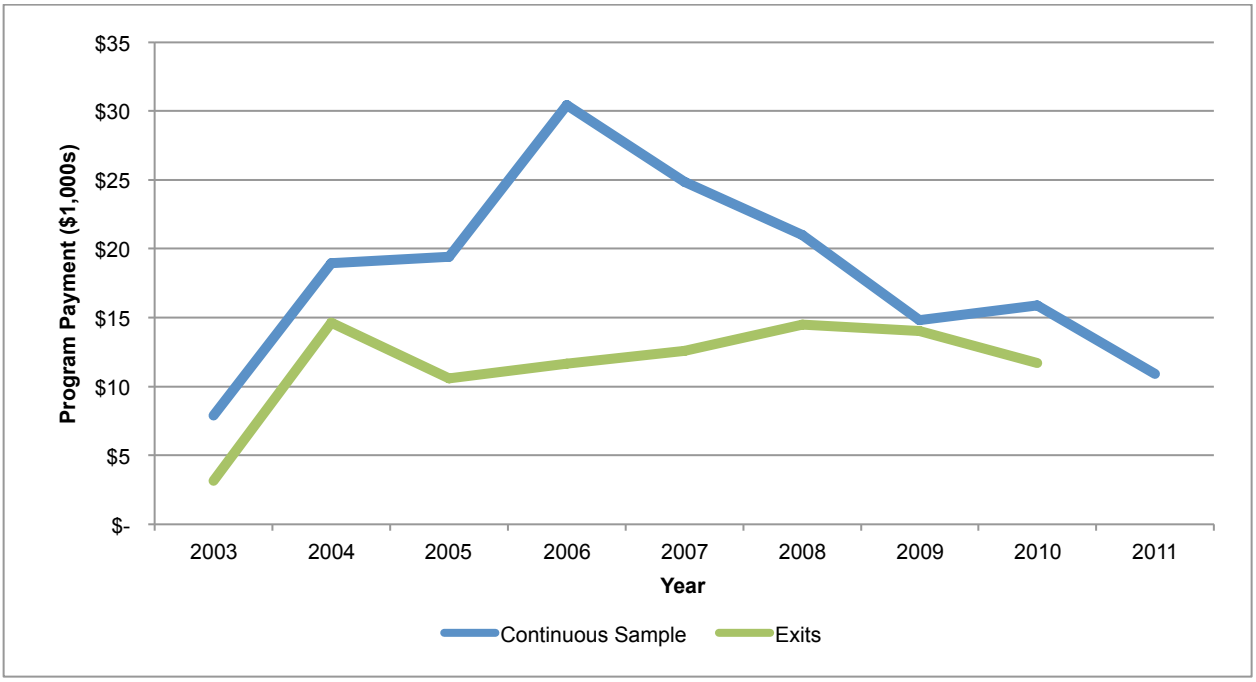

Figure 12 – Average government payments of CAIS / AgriStability continuous participants and permanent exits between 2003 and 2011

Finally, Figure 12 shows the average program payments for the continuous sample versus those that exited the program permanently. Farms that continuously participate in CAIS/AgriStability on average received much more payments from CAIS/AgriStability, AgriInvest and other ad-hoc programs than those that exit. In particular, those in the continuous sample received a large sum of payments in 2006 and 2007. Much of these payments would have been made to field crop operations, as during these years field crop prices were depressed and large amount of money went into the AgriRecovery (ad-hoc) programs to support ailing field crop operations. One reason why farms exit is because they are consistently getting less program payouts compared to the other farms.

Conclusion

Review of the characteristics of program participants, new entrants into the program, and those who exit CAIS and AgriStability revealed a number of interesting factors that may affect participation, namely:

- Changes in supply management policy may have increased dairy and tobacco farm participation
- Participation patterns are marked different for farms with operating revenue less than $10,000 compared to other farms. Specifically, many of these small farms only participated in CAIS / AgriStability for a single year before leaving the program.
- The majority of participants are field crop operations, and operations that participate in the program every year have larger agricultural land base compared to those that exit the programs
- Farms that exit AgriStability are not only smaller in terms of sales and level of expenses, but they also have lower net income and operating profit margin.
- Farms that participate in AgriStability every year on average trigger much higher payments than those that drop out.

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