

Michigan: A State at the Intersection of the Debate Over Full Planting Flexibility

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Abstract

Greater flexibility in U.S. farm programs with elimination of the restriction on the planting of fruit and vegetable (FAVR) crops is likely to be a major issue in congressional 2007 farm policy discussions. Michigan is a state with a wide range of both FAVR and program crops planted under the current policy. To capture the diversity of situations that would apply among crops covered by the current policy, this research has examined a broad set of Michigan FAVR crops (dry beans, pickling cucumbers, processing tomatoes, fresh market tomatoes, squash, and blueberries). We evaluate both those factors that are likely to prevent the entry of Direct and Counter-Cyclical Program (DCP) crop producers into the production of FAVR crops (barriers to entry or disincentives) and those factors that are likely to encourage DCP crop producers to enter the production of FAVR crops (inducements to entry or incentives). The balance will determine the likely outcome from elimination of the FAVR. With the exception of dry beans, a change in the FAVR would provide only small (or no) positive incentives for DCP crop producers to enter the production of FAVR crops. Similarly, barriers to entry would, in many cases, be high enough to significantly limit, or even prohibit, movement of DCP crop producers into the markets for FAVR crops. When considering these factors in combination, only dry beans appear to have the potential for entry of a significant number of new producers. In most other cases, the probability of entry by new producers appears to be low. Even with a low or zero response in total supply, equity issues will likely still arise.

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Executive summary

As Congress prepares for 2007 farm policy discussions, the issue of planting flexibility is likely to be at the center of the debate. U.S. farm acts began to provide greater planting flexibility for farmers in 1990, made major steps in 1996, and retained that increased flexibility in 2002. An exception to this trend is a restriction, that has existed in various forms since 1990, on the planting of fruit and vegetable crops. This restriction, now known as the “Fruit/Vegetable and Wild Rice” restriction [referred to in this research as the FAVR] covers 175 crops – thereby limiting the planting of these crops on program acres. If this restriction is eliminated in 2007, growers enrolled in the Direct and Counter-Cyclical Program (DCP) program could continue to receive payments on base acres, regardless of the crop planted. The question of whether the FAVR should be retained has generated debate among both DCP and FAVR commodity groups interested in projecting market response to a policy change.

In assessing the impacts of such a policy change on the supply of crops currently included in the restriction [referred to in this research as FAVR crops], it is necessary to examine individual producer ability and willingness to adjust existing planting patterns to include more FAVR crops and fewer DCP crops. In particular, it is necessary to determine (a) whether producers now growing DCP crops would begin to plant FAVR crops on existing base acres, (b) whether that change in plantings would result in significant changes in total supply of FAVR crops, and (c) whether that change in supply would result in a significant change in market prices, thereby affecting the incomes of existing FAVR crop producers. The focus of this research is the first question since individual firm response to a potential change in policy would influence the answer to the two subsequent questions about quantity and price impacts.

We evaluate both those factors that are likely to prevent the entry of DCP crop producers into the production of FAVR crops (barriers to entry or disincentives) and those factors that are likely to encourage DCP crop producers to enter the production of FAVR crops (inducements to entry or incentives). The balance will determine the likely

outcome from elimination of the FAVR. Based on a series of interviews with industry participants, this research examines the disincentives and incentives relative to six Michigan FAVR crops (dry beans, pickling cucumbers, processing tomatoes, fresh market tomatoes, squash, and blueberries) representative of broad FAVR crop categories.

Four factors are identified with potential to limit producers' ability to enter production of FAVR crops. These are:

- Capital investment
- Rotation requirements
- Market accessibility
- Labor and management requirements

Inducements to entry include those factors that could positively affect producer decisions to plant a FAVR crop when the FAVR is eliminated. In particular, this research examines the change in profitability of FAVR crop production when compared to that of DCP crops. A change in relative profitability would occur if the FAVR is eliminated and DCP crop producers continue to receive DCP program payments on acreage now planted to a FAVR crop.

Results of this research indicate that, with the exception of dry beans, a change in the FAVR would provide only small positive incentives for DCP crop producers to enter the production of FAVR crops. At the same time, barriers to entry faced by DCP crop producers seeking to begin production of FAVR crops would be, in many cases, high enough to significantly limit entry. When considering these factors in combination, only dry beans appear to have potential for the entry of a significant number of new producers. In other cases, the probability of entry by new producers appears to be low.

Though a variety of FAVR crops were examined in an effort to capture the full range of characteristics that could affect the entry of DCP crop producers into FAVR crop markets, results might not be applicable to every FAVR crop production region throughout the United States. As this research has demonstrated, the production of each FAVR crop is affected by a set of production and marketing characteristics that is truly unique to that crop. Consequently, a similar investigation in a different geographic

location, even for similar crops, might reach different results. Such an outcome is indicative of the complex impacts that would result from a change in the FAVR.

List of Acronyms

CAB	Crop Acreage Base
CBSA	Canadian Border Security Agency
DCP	Direct and Counter-cyclical Program
ERS	Economic Research Service
FACT	Food, Agriculture, Conservation and Trade Act
FAIR	Federal Agriculture Improvement and Reform Act
FAVR	Fruit and Vegetable and Wild Rice Restriction
FSA	Farm Service Agency
FSRI	Farm Security and Rural Investment Act
MDA	Michigan Department of Agriculture
NAICS	North American Industry Classification System
PFC	Production Flexibility Contract
URAA	Uruguay Round Agreement on Agriculture
USDA	United States Department of Agriculture
WTO	World Trade Organization

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Introduction

As Congress prepares for 2007 farm policy discussions, the issue of planting flexibility is likely to be at the center of the debate. U.S. farm acts began to provide greater planting flexibility for farmers in 1990, made major steps towards increased flexibility in 1996, and retained most flexibility in 2002. An exception to this trend was the introduction of a special planting restriction in 1990 that prevented the planting of a specified list of crops on crop acreage base [CAB]. The continuation of this planting restriction is likely to be a major issue in 2007 farm policy debates.

Under the 2002 Farm Security and Rural Investment Act, commodities eligible to participate in the direct and counter cyclical program [DCP], commonly referred to as “DCP crops,” are: barley, corn, grain sorghum (including dual purpose varieties that can be harvested as grain), oats, canola, crambe, flax, mustard, rapeseed, safflower, sesame and sunflower (including oil and non-oil varieties), peanuts, rice (excluding wild rice), soybeans, upland cotton, and wheat (USDA FSA 2003). The DCP program establishes a special planting restriction that applies to all vegetables (including dry edible beans - excluding limas, potatoes, sweet potatoes, and sweet corn), fruits (including all berries) and wild rice, all of which are referred to as Fruit/Vegetable and Wild Rice Restriction [FAVR] crops or “FAVR crops” (USDA FSA 2003).¹ Total U.S. cropland consists of DCP crops, FAVR crops, and crops that are neither covered nor restricted under the DCP program.

The question of whether the FAVR should be retained in 2007 has generated increasing debate among both DCP and FAVR commodity groups interested in projecting market response to a policy change. If the FAVR is eliminated from the 2007

¹ The crops covered by this restriction are also sometimes referred to as “fruit or vegetable crops” even though not all of the crops covered by the FAVR are, strictly speaking, a fruit or vegetable. For example, crops as varied as wild rice, chickpeas/garbanzo beans, coffee, and nuts (except peanuts) are included in the list of crops covered by FAVR regulations. In all, 175 crops were declared to be “fruits and vegetables” under the FAVR regulation in 2005.

farm policy, the most frequently mentioned policy alternative is that growers of DCP crops would continue to receive payments on base acres, regardless of the crop planted.²

In assessing response to such a policy change in the FAVR, it is necessary to examine individual producers' ability and willingness to alter planting patterns. In particular, it is necessary to determine (a) whether producers now growing DCP crops would begin to plant FAVR crops on existing CAB, (b) whether that change in plantings on program acreage would result in significant changes in total supply of FAVR crops, and (c) whether that change in supply would result in a significant change in market prices, thereby affecting the incomes of existing FAVR crop producers. The primary focus in this research is the first question, since individual firm response to the new policy regime will determine answers to the two subsequent empirical questions about quantity and price impacts. In particular, this research examines the incentives for, and limitations to, producer adjustment in Michigan, a state with great diversity in the current mix of DCP and FAVR crop production. A separate issue is the distribution of government support payments between existing producers and potential new entrants.

Whether farmers now producing DCP crops would begin to plant FAVR crops on existing program acreage is essentially determined by several factors that will affect a farmer's decision to enter the production of a new product (Yip). In general, two factors will determine whether DCP crop producers would move resources (land, labor, capital) from the production of DCP crops to FAVR crops. First, adjustments will be partially determined by whether available resources can be easily moved from the production of DCP crops to the production of FAVR crops or whether limitations in resource movement (barriers to entry or disincentives) exist. Second, analysis of potential adjustments to resource use must examine whether changes in the FAVR will provide enough additional profit potential to induce DCP crop producers to make necessary changes in resource allocation and increase their production of FAVR crops (inducements to entry or incentives).

² A range of policy alternatives is possible with the final outcome ultimately determined in the political process.

The Evolution and Status of the Fruit and Vegetable Planting Restriction in U.S. Commodity Programs

The FAVR was first introduced to U.S. farm policy in 1990. The Federal Agriculture Improvement and Reform Act (1996) and the Farm Security and Rural Investment Act (2002) both retained FAVR in modified form. Growing debate within the context of a 2007 farm policy discussion has the potential to result in significant policy modifications to this provision.

The FAVR policy evolution

The Food, Agriculture, Conservation, and Trade Act of 1990 [FACT] began an evolutionary trend toward greater planting flexibility in U.S. farm programs. Beginning with the 1991 crop, producers of wheat, feed grains, upland cotton and rice were permitted to exercise planting flexibility on a portion of their crop acreage base.³ The major provisions of the FACT were:

1. Producers were eligible to exercise planting flexibility on up to 25 percent of their CAB without losing any portion of their CAB;
2. Fifteen percent of each producer's CAB was designated as "normal flex" acreage;
3. Producers received no deficiency payment on normal flex acreage, and were permitted to plant "any program crop, any oilseed, any industrial or experimental crop . . . [or] any other crop, except any fruit or vegetable crop (including potatoes and dry edible beans) not designated . . . as a crop used for industrial or experimental purposes;"
4. An additional ten percent of each producer's CAB was designated as "optional flex" acreage, with the same planting restrictions as the normal flex acreage;
5. Producers were eligible to receive a deficiency payment on optional flex acreage if it was planted to the original program crop;
6. Producers were eligible to receive non-recourse loans, marketing loans, and loan deficiency payments on all normal flex and optional flex acreage;
7. The Secretary of Agriculture was directed to make a determination of the crops that could not be planted on normal flex or optional flex acreage (U.S. Senate; USDA ERS 1991, pp. 34-5 and 133).

³ Crop acreage base is "a farm's crop-specific acreage eligible to enroll in commodity programs" (Young et al. pp 38)

As a result of these changes, the U.S. farm policy took limited steps toward greater planting flexibility. At the same time, farmers were required to plant their original DCP crop to be eligible for deficiency payments. More relevant to the case at hand, while the FACT did introduce partial flexibility, it established the restriction that DCP crop producers could not exercise that flexibility by planting fruit and vegetable crops (including potatoes and dry beans) without suffering a loss in payments.

The Federal Agriculture Improvement and Reform Act of 1996 [FAIR], took the next major step toward greater planting flexibility for program crop producers. Beginning with the 1996 crop, some farmers (producers of wheat, feed grains, upland cotton and rice) were permitted to exercise planting flexibility on their entire crop acreage base. The major provisions of the FAIR were:

1. Acreage reduction programs for producers (which had previously required producers to idle a portion of their CAB) were eliminated;
2. Deficiency payments on program crops were eliminated and replaced with a series of annual contract payments;
3. Producers were permitted to plant any program crop (feed grains, wheat, upland cotton, rice) or selected nonprogram crops (soybeans/oilseed) on the CAB and were eligible to receive all contract payments for the original program crop;
4. Producers were not permitted to plant fruit and vegetable crops (other than lentils, mung beans, and dry peas) on the CAB except (as determined by the Secretary):
 - a. in any region in which there is a history of double-cropping of contract commodities with fruits or vegetables . . . in which case the double-cropping shall be permitted, or
 - b. on a farm that has a history of planting fruits or vegetables on contract acreage, or
 - c. by a producer who has an established planting history of a specific fruit or vegetable;
5. In those cases where a farm or a producer has a history of planting fruits or vegetables (4b and c above) the contract payment was to be reduced by one acre for each acre planted to the fruit or vegetable crop (U.S. House of Representatives, 1996; USDA ERS 1996, p. 6-8).

Compared to the 1990 bill, the FAIR took major steps toward greater planting flexibility, as producers were no longer required to plant their original DCP crop to be

eligible for contract payments. At the same time, the FAIR retained the provision that producers who planted fruit and vegetable crops would experience a reduction in contract payments.

The Farm Security and Rural Investment Act of 2002 [FSRI] maintained most of the planting flexibility provisions established in 1996. Beginning with the 2003 crop, program crop producers (producers of wheat, feed grains, upland cotton and rice) were again permitted to exercise planting flexibility on their crop acreage base. A major change was that soybeans were added to the list of program eligible crops. Major provisions of the FSRI were:

1. Direct payments were continued through the crop year 2007;
2. Target prices were reinstated for covered program crops (feed grains, wheat, rice, upland cotton, soybeans and other oilseeds);
3. Countercyclical payments were made in addition to direct payments whenever the effective price (national average farm price plus the direct payment) was less than the target price;
4. The planting flexibility provisions were the same as in the 1996 FAIR, with three minor modifications:
 - a. Wild rice was added to fruits and vegetables as a prohibited crop on base acres;
 - b. In most cases, a violation of the planting flexibility provision occurred when the crop is harvested (under the 1996 FAIR, violations occurred when the crop was planted);
 - c. The planting of a perennial crop also constituted a violation, even if producers destroy production before harvest and get no benefit from the crop (U.S. House of Representatives, 2002; USDA ERS 2002).

The FAVR establishes penalties for producers when they harvest a restricted crop on base acres (or when they plant a perennial crop).⁴ Penalties can include *payment reduction* or *contract violation*, and are assessed according to specific criteria. The FAVR

⁴ Under the rules promulgated by the FSA, “planting non-perennial wild rice or fruit and vegetables on DCP base acres is not a violation (and will not result in reduced payment acres) if the wild rice or fruit and vegetable is destroyed without benefit before harvest. Planting perennials on DCP acres is a violation of the regulations even if the fruit or vegetable is destroyed without benefit before harvest” (USDA FSA 2005 p.1).

also establishes three exceptions: double-cropping region,⁵ producer history, and farm history. *Payment reductions* occur when a producer is eligible for either farm or producer history and plants a FAVR crop. Under the designated exceptions there is no contract violation when a fruit or vegetable crop is planted on base acres, but, in most cases, the direct and countercyclical payments are reduced by an equivalent number of acres. Farm Service Agency [FSA] records indicate that, on average in 2003 and 2004, 14,649 U.S. farms used either producer or farm history exemptions to plant FAVR crops on 623,432 base acres.

The FAVR exception based on farm history establishes that a restricted crop may be planted on base acres without causing a contract violation when a farm has a documented history of planting FAVR crops during the crop years 1991 to 1995 and 1998 to 2001.⁶ Specific type of FAVR crop planted and acreage total is not considered when determining farm history. Under this exception, producers are permitted to plant a FAVR crop on base acres without being in violation, but the acres on which the producer is eligible for direct and countercyclical payments will be reduced by the number of FAVR crop acres harvested.

A separate exception to the FAVR occurs when a producer (in contrast to a farm) has a history of planting a restricted crop. Acreage planted under this exception may not exceed the average annual acreage planted to a FAVR crop during the crop years 1991 to 1995 and 1998 to 2001.⁷ Similar to the farm history exception, producers are permitted to plant a restricted crop on base acres without incurring a contract violation, and the acres on which the producer is eligible for DCP payments will be reduced by the number of FAVR crop acres harvested.

⁵ Under the double-cropping exception, a contract violation is not incurred when restricted crops are planted in a region that is identified as eligible for double-cropping of program crops with fruits or vegetables. These regions are established by USDA based on their planting history before the 2002 crop year. There is no reduction in DCP payments under the double-cropping exception. No regions of Michigan are eligible for the double-cropping exception.

⁶ Planting history must be documented with Farm Service Agency.

⁷ In contrast to farm history, the producer history exception is crop and acreage specific. If a producer has history of planting FAVR but the planted crop is not the FAVR for which the producer has a history or the harvested acreage is in excess of the producer history, the producer is in violation of his DCP contract. Years in the designated period with no FAVR plantings enter the average as zero.

When none of these exceptions to the FAVR apply, the planting of a restricted crop on base acres will cause a *contract violation* to occur.⁸ FAVR contract violations occur when the following situations apply: a) FAVR crops are planted on base acres enrolled in the DCP, and b) there is no applicable farm or producer history of planting FAVR crops, and c) FAVR double-cropping region exception does not apply. Once the violation is established it is categorized as either a) a planting violation, when FAVR are planted on part of DCP acres not eligible for exception, or b) a reporting violation.

There are two consequences for violating a DCP contract. If the violation is deemed severe enough to warrant contract termination then all DCP payments previously paid for the applicable year must be refunded by the producer with interest and no further DCP payments will be made for the applicable contract. Alternatively, if the violation is not deemed to warrant contract termination, then an acre-for-acre reduction is applied to all DCP payments in the applicable year, and an additional penalty is assessed based on the pre-determined highest market value of the FAVR planted on the farm.⁹

The growing debate over the FAVR

The question of whether the FAVR should be retained is arising in response to at least two factors. First, the legality of the FAVR under World Trade Organization [WTO] rules has been challenged in a dispute between the United States and Brazil over U.S. cotton subsidies. The feasibility of retaining the FAVR in any future WTO negotiations has also been raised. Second, some domestic interest groups, beginning to prepare for the 2007 farm policy debate, are questioning whether existing farm programs should be revised to provide a greater incentive for the planting of fruits and vegetable crops.

In 2002, Brazil filed a complaint with the WTO claiming that aspects of the U.S. cotton program violated provisions of the Uruguay Round Agreement on Agriculture [URAA], thereby distorting trade and resulting in “significant price depression and price suppression in the markets for upland cotton in Brazil and elsewhere.” (WTO 2002 p.N 4). In the initial request for consultation, Brazil claimed that U.S. farm policy provisions “will result in over-production of high-cost U.S. upland cotton, which will continue to

⁸ DCP contracts are signed annually. Therefore, a contract violation is applicable for a one-year period.

⁹ A reporting violation occurs when a farm operator files an erroneous acreage report. In most cases these violations are not severe enough to result in contract termination.

displace and impede Brazil's export market share in the world market and specific national markets for upland cotton" (WTO 2002 p.N-5).

The final WTO Panel ruling examined several aspects of the U.S. cotton program, including the use of Production Flexibility Contracts [PFC] under the 1996 FAIR and the use of DCP in the 2002 FSRI. In both cases, cotton producers were subject to provisions that prevented the planting of FAVR crops on their cotton base acreage. The WTO panel characterized the FAVR in the following manner for the 1996 FAIR:

Producers were permitted to plant any commodity or crop on base acres, subject to certain limitations and exceptions concerning the planting of fruits and vegetables. PFC payments were either eliminated or reduced if producers planted fruits and vegetables on base acres, unless they satisfied a special eligibility criterion. Additionally, producers had to use the land for an agricultural or related activity and not for a non-agricultural commercial or industrial use and comply with certain conservation requirements. Otherwise, PFC payments were not affected by what was planted on base acreage nor by whether anything was produced on it at all (WTO 2004c Section 7.215 pp. 73).

In examining the 2002 FSRI, the WTO panel identified a similar restriction on the eligibility of cotton producers for DCP payments:

Producers are permitted to plant any commodity or crop on base acres, subject to certain limitations concerning the planting of fruits and vegetables. DCP payments are either eliminated or reduced if producers plant these crops on base acres, unless they are destroyed before harvest, subject to certain exceptions. Additionally, producers must use the land for an agricultural or conserving use and not for a non agricultural, commercial, or industrial use and abide by conservation compliance requirements. Otherwise, DCP payments are not affected by what is produced on base acreage nor by whether anything is produced on it at all (WTO 2004c Section 7.222-223 pp. 74 – 75).

In both cases, the WTO panel concluded that such payments and the legislative and regulatory provisions regarding planting flexibility limitations did not conform with paragraph 6(b) of Annex 2 of the Agreement on Agriculture.¹⁰ The WTO Panel then found that the effect of the U.S. cotton program was to cause "significant price suppression in the same world market . . . constituting serious prejudice to the interests of

¹⁰ Paragraph 6(b) of the Annex to the Agreement on Agriculture requires that "the amount of payments in any given year shall not be related to, or based on, the type or volume of production (including livestock units) undertaken by the producer in any year after the base period" (WTO 2004a).

Brazil” (WTO 2004c Section 8.1(g)(i)). Consequently, the Panel concluded that the United States “is under an obligation to take appropriate steps to remove the adverse effects or ... withdraw the subsidy” (WTO 2004A Section 8.3(d)). Ultimately, in response Congress may choose to modify U.S. farm programs, to remove the FAVR, and minimize trade-distorting effects of U.S. programs.

Though the dispute between the United States and Brazil directly addressed only the U.S. cotton program, that case has become a legal precedent for action against other U.S. program crops. In 2004, Canadian corn growers filed a countervailing and antidumping case against U.S. corn exports to Canada, claiming that U.S. corn was the recipient of illegal subsidies (Canadian Corn Growers). The Canadian Border Security Agency cited the ruling in the U.S.-Brazilian cotton case as legal precedent for its preliminary ruling in favor of the Canadian corn growers, finding that the FAVR created an actionable form of subsidy that was subject to countervailing duties

it is noted that a WTO Panel examined the direct payment program in Upland Cotton and found that this program was an actionable subsidy under the Subsidies Agreement. The Appellate Body rejected an appeal by the United States. In upholding the decision of the Panel, the Appellate Body stated that the direct payments did not qualify as “green box” subsidies because they were not “decoupled income support.” The Appellate Body found that direct payments were not decoupled from production because such payments were denied if certain specified crops were produced. This ban effectively “coupled” payment with production because it had the effect of channeling production toward crops that were eligible for payments (CBSA Appendix IV Determination of Subsidy).

The outcome of the U.S.-Canada corn dispute could pose a very serious issue for all U.S. program crops.¹¹ If other countries follow the precedent set by Canada and cite the Brazilian cotton ruling as the basis for taking action against the U.S., then there could be additional challenges to U.S. farm policies. Very simply, virtually every importing country that buys a U.S. DCP crop (corn, wheat, cotton, rice or soybeans) could consider such an action, placing U.S. exports of DCP crops at risk. The prominent role of the

¹¹ In April 2006 the Canadian International Trade Tribunal issued a final ruling that the “dumping and subsidizing of (corn) originating or exported from the United States of America has not caused injury” (CITT). Even though the final ruling in this case was in favor of the U.S., questions over the legality of the FAVR under the rules of the WTO continue to be raised.

FAVR in these disputes raises serious doubts whether such a restriction would survive if Congress decided to undertake a major revision of existing commodity programs.

The low probability of retaining the FAVR in any future WTO negotiations also increases the possibility that the FAVR may be discontinued (Thompson). The most recent Doha round of WTO negotiations has been ongoing since 2001. Although the outcome of these negotiations is unclear the initial framework for agricultural negotiations included the objective of achieving “substantial reductions in trade-distorting domestic support” (WTO 2004b Annex A Section 6).¹² Most observers believe that if any future WTO agreement is able to achieve this objective, domestic program payments will have to be much less trade distorting than at present. Thus program provisions, such as the FAVR, which have already been cited as contributing to trade distortion, are likely to face even more pressure for legislative change in the future.

Finally, domestic policy issues are likely to contribute additional pressure to change the existing FAVR. As deliberation of the 2007 farm policy begins, some domestic interest groups are questioning whether the FAVR is incompatible with other government policies. Observers have noted that the current distribution of farm programs favors existing DCP crops and excludes fruit and vegetable growers, raising questions of equity issues (Fields) while others have questioned a policy that limits FAVR production in apparent contradiction to other government policies promoting consumption of fruits and vegetables (Martin). As a result domestic political debate could contribute to changes in, or the elimination of, the FAVR by Congress in 2007. In anticipation of such a possibility, interest groups representing FAVR crops have begun to raise questions of equity. If the FAVR is lifted the fruit and vegetable industries would likely request more support for research and promotion of specialty crops (Thompson).

A State at the Intersection in the FAVR Debate

To assess the potential impact of a change in the FAVR, it is first necessary to examine the current cropping mix under the existing policy. Comparing diversity in crop

¹² On July 27, 2006, the WTO Director-General reported that there were no significant changes in the negotiators positions and the gaps remained too wide to continue with the negotiations of agriculture. At that time, no date was set to continue with the agricultural trade negotiations (WTO 2006)

mix, there is a clear distinction among states where FAVR crops are predominant, states where DCP crops are predominant, and states where both FAVR and DCP crops contribute more equally in terms of total area harvested and average cash receipts.

U.S. crop allocation under existing FAVR policy

In 2002, area harvested to selected DCP crops totaled 248 million acres in the U.S. Among the most important DCP crops, corn area represented 78 millions acres, wheat 59 millions acres, soybeans 74 million acres, barley 4.7 million acres, and oats 4.3 million acres. Similarly, total CAB area, which represents the actual area eligible for the conversion to FAVR crops if the restriction is eliminated, totaled 267.5 million acres.¹³ Out of this area, corn accounted for approximately 87.7 million acres, wheat 76.1 million acres, soybeans 53.4 million acres, barley 8.7 million acres, and oats 3.1 million acres (USDA ERS 2006a). The area harvested for selected FAVR crops, shown in Table 1, totaled 12 million acres. Out of this area, orchards represented 5.3 million acres, vegetables 3.7 million acres, dry beans 1.7 million acres, and potatoes 1.3 million acres (USDA 2006b).

¹³ A small percentage of these acres may already be planted to FAVR crops if producers are eligible for exceptions to the existing FAVR and/or willing to incur the associated penalties.

Table 1. Selected DCP and FAVR Cropland Area in the U.S. and Michigan, 2002

Item	Total Area			Total CAB		
	U.S.	Michigan	MI Share	U.S.	Michigan	MI Share
	-----acres-----		%	-----acres-----		%
<i>DCP crops^a</i>	247,911,165	4,803,700	1.9	267,585,078	4,823,256	1.8
Corn	78,392,200	2,235,400	2.9	87,751,081	2,834,120	3.2
Wheat	59,365,900	444,100	0.7	76,125,140	632,609	0.8
Soybeans	73,744,200	2,047,200	2.8	53,447,526	1,258,459	2.4
Barley	4,748,150	5,150	0.1	8,763,379	24,980	0.3
Oats	4,365,400	71,850	1.6	3,126,955	71,282	2.3
<i>FAVR crops^b</i>	11,987,045	560,919	4.7	N/A	N/A	N/A
Orchards ^c	5,330,439	118,166	2.2	N/A	N/A	N/A
Vegetables ^d	3,698,744	137,887	3.7	N/A	N/A	N/A
Dry beans	1,691,775	259,026	15.3	N/A	N/A	N/A
Potatoes	1,266,087	45,840	3.6	N/A	N/A	N/A

Source: USDA Census of Agriculture

^a DCP crops for the U.S. include barley, corn, cotton, oats, peanuts, rice, sorghum, soybeans and wheat. DCP crops for Michigan include: barley, corn, oats, soybeans and wheat

^b FAVR crops represent harvested area as reported in the 2002 U.S. Census of Agriculture.

^c According to the U.S. Census of Agriculture, land in orchards represents land in “bearing and nonbearing fruit trees, citrus or other groves, vineyards, and nut trees of all ages, including land on which all fruit crops failed ” Any planting that was abandoned or less than 20 total trees was not reported. Land in berries is not included with land in orchards (USDA NASS).

^d According to the U.S. Census of Agriculture, vegetables harvested for sale are the sum of total acres of individual vegetables harvested. This category does not include vegetables planted for home consumption (USDA NASS).

The mix of DCP and FAVR crop acreage is highly variable between states. In 2002 FAVR crops represented only 0.4 percent of the total cropland harvested in Illinois and Indiana. In contrast, FAVR crops accounted for 64 and 81 percent of cropland area harvested in California and Florida, respectively. Michigan and Texas are states between these two extremes with ten percent of cropland in Michigan and three percent of cropland in Texas being harvested for FAVR crops in 2002 (Table 2).¹⁴

¹⁴ Data on total area in DCP and FAVR crop production by state in 2002, from the USDA Census of Agriculture is available in Appendix A.

Table 2. Harvested Cropland Area by DCP and FAVR Crops in Selected States, 2002

State	DCP Crops	FAVR Crops	Total	FAVR Crop Share
	-----acres harvested-----			-----percent-----
Illinois	22,042,626	85,463	22,128,089	0.4
Indiana	11,325,013	46,548	11,371,561	0.4
Texas	12,496,001	396,917	12,892,918	3.1
Michigan	4,810,363	560,919	5,371,282	10.4
California	2,342,271	4,185,751	6,528,022	64.1
Florida	269,035	1,152,858	1,421,893	81.1

Source: USDA Census of Agriculture

Comparing cash receipts, variation in cropping pattern among states becomes even more apparent (Table 3). From 2000 to 2004, average annual cash receipts from FAVR crops in Illinois and Indiana account for only two and five percent of state totals, respectively, whereas FAVR crops provided 87 and 97 percent of cash receipts in California and Florida. In Michigan, FAVR crop cash receipts represented approximately 40 percent of the total and in Texas they accounted for 20 percent.

Table 3. Average Annual Cash Receipts from DCP and FAVR Crops in Selected States, 2000 - 2004

State	DCP Crops	FAVR Crops	Total	FAVR Crop Share
	-----\$1,000-----			-----percent-----
Illinois	5,832,996	89,723	5,922,719	2
Indiana	2,938,927	155,217	3,094,144	5
Texas	2,552,617	626,814	3,179,431	20
Michigan	859,550	634,851	1,494,401	42
California	2,411,547	15,953,982	18,365,529	87
Florida	102,558	3,067,924	3,170,482	97

Source: National Agricultural Statistics Service for each state

Michigan DCP and FAVR crop allocation

Clearly, when compared to national totals the share of Michigan DCP crops is relatively low, representing only around two percent of total DCP and CAB crop area (4.8 million acres) in the country (Table 1). Main DCP crops in the state are corn and soybeans which represent around three percent of total U.S. DCP area of these crops (2 million acres). Not all acreage in these crops is enrolled in farm policy programs. Total Michigan CAB area as a share of the national total represents 3.2 and 2.4 percent for corn

and soybeans, respectively. When comparing Michigan area in FAVR crops, there is significant variability among specific crops: state dry bean acreage represents approximately 15 percent of national harvested area (1.7 million acres), while vegetables account for 3.7 percent, potatoes 3.6 percent, and orchards 2.2 percent of total area in the country.

Data regarding barriers and inducements to changing this current Michigan crop mix were collected in semi-structured interviews. The objective was to evaluate whether growers now producing DCP crops would plant FAVR crops on existing CAB if the policy were to be changed. Participants were selected from food processors, farmers, extension agents, financial advisors, fresh produce shipper-distributors, and commodity group representatives. In addition, a limited number of interviews were conducted in neighboring states (Wisconsin and Indiana) where major buyers for Michigan FAVR crops are located. During the interviews, participants responded to questions about their main activities, size of business, investments in machinery and equipment, production practices (e.g., harvesting, irrigation), contracts, farm management, labor, and markets.

Given the diversity of cropping patterns across the state, interview participants were selected from geographic areas where conversion of DCP acreage to FAVR crop production was determined to be most likely.¹⁵ The first selection criterion was to choose Michigan counties with the greatest areas of current major vegetable production. The underlying assumption is that growers in these counties would have greater potential in terms of climate and soil conditions to increase FAVR crop production on base acres since these counties already utilize a significant area of cropland in production of vegetables.

There are five major vegetable producing counties located in Michigan agricultural district 7, two in districts 4, 5 and 9, and one in district 8.¹⁶ Total vegetable area harvested in these counties represents almost two-thirds of the state total. For DCP crops, wheat CAB in these selected counties is approximately 16 percent of total wheat

¹⁵ Appendix B contains a detailed explanation of state cropping patterns.

¹⁶ The Michigan Department of Agriculture defines nine agricultural districts for the state based on similar agricultural characteristics within each district. See Appendix B for a map and further discussion of these districts.

CAB in the state. Similarly, corn CAB represents 24 percent of the state's total CAB, and soybean CAB represents around 22 percent of total CAB area in the state (Table 4). Thus, given the presence of both vegetables and DCP crops in these regions, these counties were identified as areas in which interviews should be conducted.

Table 4. Major Michigan Vegetable Producing Counties and 2005 CAB

Michigan County ^a	Ag. District	Vegetables	CAB			Total
			Wheat	Corn	Soybean	
			----- acres -----			
Oceana	7	16,312	1,813	10,400	1,381	13,594
Van Buren	7	10,553	2,407	36,723	12,295	51,425
St. Joseph	8	9,931	5,806	102,141	25,785	133,731
Allegan	7	7,953	10,320	104,280	20,615	135,215
Berrien	7	7,391	5,823	50,168	29,363	85,353
Mason	4	5,639	4,107	16,250	980	21,337
Gratiot	5	5,619	17,211	96,944	61,796	175,951
Montcalm	5	5,267	17,806	64,497	12,379	94,682
Cass	7	4,957	7,764	81,435	28,427	117,626
Newaygo	4	4,941	2,487	30,971	2,197	35,655
Monroe	9	4,479	21,622	65,549	68,466	155,636
Macomb	9	3,944	4,042	13,893	15,431	33,366
<i>Total</i>		<i>86,986</i>	<i>101,207</i>	<i>673,250</i>	<i>279,114</i>	<i>1,053,570</i>
<i>Total MI</i>		<i>137,887</i>	<i>635,296</i>	<i>2,840,955</i>	<i>1,268,987</i>	<i>4,745,238</i>
<i>Share</i>		<i>63%</i>	<i>16%</i>	<i>24%</i>	<i>22%</i>	<i>22%</i>

Sources: USDA Census of Agriculture; Michigan FSA data

^a Leading vegetable crop counties based on total vegetable acres harvested in 2002

The second selection criterion included counties that currently report high acreage of both DCP and FAVR crops. These counties were identified as likely candidates to change cropping patterns in the future given high availability of DCP cropland for conversion to FAVR crop production and the added incentive of government payments. Given the policy alternative under consideration, planting on base acres would continue to provide payments for only those growers currently enrolled in DCP. There were three geographic clusters identified with these characteristics:

Cluster 1: District 5 (Montcalm, Gratiot) is the primary area for production of vegetables, potatoes, and DCP crops;

Cluster 2: District 6 (Sanilac, Tuscola and Saginaw) is the primary production region for dry beans and has important acreage in production of DCP crops;

Cluster 3: Districts 8 and 9 (St. Joseph and Monroe) contain large acreage of both DCP and FAVR crops.

Finally, cropland acreage data was compared for areas which had historically produced both DCP and vegetables (FAVR crops) but perhaps were not currently as diversified. Table 5 shows the leading Michigan DCP crop counties from 1987 to 2002 and compares them with the vegetable acreage harvested in those counties during selected years between 1987 and 2002. Though there is some variation across time, most counties increased total vegetable acreage when the years 1987 and 2002 are compared. Even so, production levels in the interim period (1992 and 1997) clearly show that vegetable acreage has been higher in the past in some counties (e.g., St. Joseph). This indicates there are climate and soil conditions favorable to vegetable production available on additional acreage, but within the scope of this project it is impossible to determine if that land is still in agricultural use. Many of these counties are located close to large urban areas and significant acreage has left agriculture. In a similar comparison, current vegetable production counties show an increasing number of acres devoted to production of DCP crops (Table 6).

Table 5. Leading Michigan DCP Counties by Vegetable Crop Acreage from 1987 to 2002

	Michigan County ^a	Ag. District	Total Vegetables			
			1987	1992	1997	2002
-----acres-----						
1	St Joseph	8	3,481	13,041	18,846	9,931
2	Gratiot	5	4,786	5,195	4,883	5,619
3	Monroe	9	4,301	4,048	4,432	4,479
4	Saginaw	6	3,313	1,934	3,212	3,486
5	Lenawee	9	3,786	4,500	4,995	3,097
6	Branch	8	904	2,052	2,442	2,639
7	Tuscola	6	2,410	1,594	3,519	2,230
8	Eaton	8	2,124	1,081	823	1,390
9	Ionia	8	2,515	662	623	625
10	Clinton	8	428	881	817	523
11	Calhoun	8	812	907	624	490
12	Hillsdale	8	625	81	125	447

Source: USDA Census of Agriculture

^a Leading DCP crop counties based on total acres of corn, soybeans and wheat harvested in 2002**Table 6. Leading Michigan Vegetable Counties by DCP Crop Acreage from 1987 to 2002**

	Michigan County ^a	Ag. District	Total DCP crops			
			1987	1992	1997	2002
-----acres-----						
1	Oceana	7	9,955	11,054	13,795	14,193
2	Van Buren	7	54,584	68,510	65,947	61,995
3	St Joseph	8	170,449	227,849	221,252	152,930
4	Allegan	7	83,927	113,967	121,144	111,224
5	Berrien	7	72,864	80,559	96,262	95,402
6	Mason	4	10,213	11,517	16,472	14,870
7	Gratiot	5	126,420	158,807	166,718	170,076
8	Montcalm	5	69,495	81,915	99,907	84,673
9	Cass	7	94,987	111,543	118,349	109,975
10	Newaygo	4	19,203	15,713	27,362	26,416
11	Monroe	9	160,657	176,203	178,936	174,688
12	Macomb	9	34,525	38,985	39,565	37,415

Source: USDA Census of Agriculture

^a Leading vegetable counties based on total vegetable acres harvested in 2002

These selection criteria provide a convergence among the Michigan geographic areas most likely to see changes in cropping patterns given a potential change in the FAVR. The interview sample was drawn from counties in agricultural districts 4, 5, 6, 7, 8, and 9. Interviews were not conducted in the Upper Peninsula, Northwest and Northeast regions (i.e., districts 1, 2, or 3). These districts do have some DCP and FAVR crop

production, but either one or both is limited, and the regions do not meet the criteria that makes them likely candidates for conversion of CAB to FAVR crop production.

Barriers to Entry into FAVR Crop Production

The movement of production resources (i.e., land, labor, capital, managerial expertise) between agricultural enterprises is partially a consequence of the barriers to entry. An industry's barriers to entry are defined as those factors that "allow incumbent firms to earn positive economic profits, while making it unprofitable for newcomers to enter the industry" (Besanko et al. p. 330).¹⁷ In the case at hand, whether DCP producers would significantly increase their production of FAVR crops is determined, in large part, by whether the FAVR crop in question possesses any unique characteristics that would act as barriers to limit the ability of DCP crop producers to enter the market.

To assess barriers to entry, it is necessary to consider the mobility of production resources between crops. The movement of production resources from a DCP crop (e.g., soybeans), to a FAVR crop (e.g., cucumbers) depends upon whether the resources themselves can be redeployed and, if so, at what cost. Assuming a frictionless transition of resources between DCP and FAVR crops, a relatively large supply response could be expected from a policy change. In such cases, producers may enter and exit markets in response to profit opportunities in a "hit and run" fashion that can drive down prices and profitability of the industry (Carlton and Perloff p. 173). On the other hand, if production resources cannot be easily converted from DCP to FAVR crops, then the supply response by DCP producers would be more limited. Producer movement between industries might be less and we would expect a lower aggregate supply response in the FAVR crop market.

With regard to cost of moving production resources from DCP to FAVR crops, barriers range along a continuum from zero to prohibitive given the specific combination of crops and producer/farm resources. If moving production resources between DCP and FAVR crops can be done at zero cost, then the supply response to change in relative profitability of crops will be rapid and large, whereas if production resources can be

¹⁷ For a discussion of the theory of barriers to entry, see Bain, pp. 3-19; Porter, pp. 7-22; Yip, pp. 17-41; Shepherd and Shanley, pp. 43-55; and Weizsacker.

moved between crops only at a high cost to the producer, then the supply response to changes in relative profitability of crops will be low (and in a very high cost case, near zero). For example, the set of barriers faced by a soybean producer would be different if the alternative crop is corn, dry beans, cucumbers, or blueberries.

In agricultural markets, most barriers to entry are determined by characteristics of the production and marketing processes associated with that market. To the extent that those processes have any unique characteristics that can only be replicated by new entrants at relatively high cost, then the market may be said to have barriers that can limit entry. In conducting the interviews for this research, a number of factors were identified that could act as barriers to entry into the markets for FAVR crops. These factors have been generally classified as (a) capital investments, (b) rotational requirements, (c) access to market channels, and (d) labor and management requirements. The combination of these factors present in each FAVR crop market would largely determine the supply response for that crop in response to a policy change.¹⁸

Capital investment

The equipment for FAVR crop production is, in general, different from the equipment used in the production of DCP crops. Some FAVR crops require a relatively large capital investment in specialized equipment that can only be used in the production process of that crop, while a few FAVR crops require minimal investment or can use the same equipment that is used in the production of DCP crops. Large, or highly specialized, equipment investments represent barriers to entry for DCP producers seeking to enter the market for those FAVR crops, thereby limiting the potential supply response to a policy change.

Interview participants in Michigan indicated that the equipment necessary to grow some vegetables is particularly specialized and costly (i.e., new tomato planters or harvesters can cost up to \$250,000). On the other hand, FAVR crops such as dry beans, require the same equipment used in production of many DCP crops, thereby requiring no, or minimal, new capital investment to enter the dry bean market.

¹⁸ While the factors identified in this study may be unique to the agricultural sector, they roughly correspond to the factors identified by other researchers to be relevant in other industries.

Additional capital investment in irrigation is needed for production of many FAVR crops. Unlike some states with drier climates where all crops (even DCP crops) are irrigated, very little DCP acreage in Michigan is actually irrigated. Many FAVR crops have very short, concentrated growing periods with high water requirements. In these cases, shifting production requires additional capital investment and potentially imposes geographic limitations on the areas in which irrigation is a feasible investment. Even though the overall need for irrigation in FAVR crop production is more common than in DCP crop production, it varies among specific crops. For example, snap beans require intensive irrigation during the two weeks prior to harvest, dry beans normally do not require irrigation, and cucumbers have relatively high and constant water requirements throughout the growing season. Irrigation is frequently used in FAVR crop production to achieve specific quality attributes, particularly in the fresh fruit and vegetable industries where exterior appearance will often determine marketability. Other investments associated with availability of irrigation are labor and energy necessary to operate large irrigation systems. Such requirements limit expansion of FAVR crop production in Michigan. The need to irrigate some FAVR crops acts as an important barrier to entry for DCP crop producers, while the ability to produce other FAVR crops without irrigation would impose less of a barrier on DCP crop producers seeking to enter FAVR markets.

In the case of perennial FAVR crops, long-term capital investments and risk management strategies are likely to be substantially different than those used by DCP crop producers accustomed to working with annual crop and decision-making cycles. Costs associated with planting of new trees, and long lag times before the first harvest, add additional uncertainty to the production of FAVR crops. Even though the expected annual returns to these crops are normally higher, production is very risky and requires the analysis of production strategies under highly uncertain markets (Teague and Lee). Even with annual FAVR crops, per-acre cost of establishment and harvesting is normally much higher when compared to DCP crops. Return on investments for some processing vegetables (i.e., pickling cucumbers) take approximately two years on average, depending on the size of the operation.

Rotational requirements

The production of most FAVR crops requires a strictly maintained rotational pattern to prevent increases in pests or plant disease and to maintain production yields of acceptable quality. The need to rotate acreage can act as a barrier to entry for DCP crop producers, particularly when those rotational requirements are combined with geographic limitations (e.g., soil types, weather patterns) that may limit the area over which FAVR crops can be grown. While crop rotation is also practiced by most DCP producers, growing patterns and increased pest pressures make adherence to rotation among FAVR crops particularly critical.

Poor rotation and pest control practices can compromise output quality, particularly among the many FAVR crops sold as fresh products. Exterior appearance is a critical quality attribute for sales and rotational requirements must be strictly maintained as a means of pest control, lack of which can compromise the appearance of fresh produce. Of course, alternative control options are possible but they may be cost prohibitive, legislatively constrained, and/or less effective. Strict rotation helps to manage pest pressure through non-chemical controls as much as possible. For example, when land available for rotation is limited, the use of methyl bromide has been prevalent among vegetable growers. In some areas of Southwest Michigan growers fumigate 50 to 80 percent of their cropland. Interview participants report that limited availability of land for rotational purposes has also increased the use of fumigants for potato growers. In different areas across the state current legislation has constrained the use of methyl bromide (historically the most commonly used fumigant), which has already raised costs of production for many FAVR crop producers.

A crop that requires a strict three-year rotation will require three times the land planted annually in order to maintain successful long-term production. Pressures due to acreage contraction in agriculture limit the availability of land for rotation. The converse can also be true: perennial FAVR crops will restrict the amount of land available for significant periods, which may act as a barrier to entry for those producers who require rotational acreage for other crops.

Access to market channels

Difference in the structure of marketing channels may limit the ability of DCP crop producers to enter the production of FAVR crops. Most DCP crops are marketed through open access market channels with commonly accepted pricing mechanisms (e.g., spot and futures markets), while many FAVR crops are marketed through distribution channels that are generally less accessible than those for DCP crops.

Commonly, markets for fruit and vegetables are differentiated between fresh and processed products. Some FAVR crops, particularly, those marketed as processed products, are transferred primarily through contractual relationships between the producer and the processor. For example, contracts are often signed with growers before planting and stipulate the volume processors will need to operate their processing plants, in many cases based on anticipated final demand for the product. For example in 2005, 98.3 percent of U.S. snap bean area planted was reported to be under contract. Similarly, 99.9 percent of sweet corn for processing, 100 percent of green peas, 78.8 percent of pickling cucumbers, 98.6 percent of processing tomatoes were produced under contracts in the U.S. (USDA ERS 2006b) In Michigan, contracts in the pickling industry alone reach 90 percent of production and other crops such as potatoes, carrots, green beans, and tomatoes have similar percentages of production under contracts (Martinez and Thornsbury 2006a).

Some processors sign contracts with third-party harvesters to service their growers during harvest periods. In this situation, participation is frequently limited to geographic areas close to processing facilities. Some contracts are based on quotas for delivery of product during pre-specified harvest windows. These arrangements increase pressure on growers to delivery the volume and quality of production according to contract specifications, thereby limiting access to the marketing channel for those without a contract.

In addition to plant access, processing plant location is also a market channel consideration for producers. Most fruit and vegetables processors are specialized with large investments in physical capital. Some growers interviewed in this research suggested that, as a rule of thumb, production area should not be further than 100 miles

away from a processing plant. For production of pickling cucumbers, chipping potatoes or even dry beans if there are no processors in close range there is essentially no market access. Like most of the agri-food system, the trend in the processing sector is towards fewer operations and consolidation of firms in the industry (Calvin et al.).

Likewise for fresh produce, certain FAVR crop characteristics (e.g., perishability, cost of handling, seasonality) require proximity to markets. In the case of Michigan, major markets for fresh fruit and vegetables are located close to the cities of Chicago and Detroit. In many cases, the fresh produce industry still relies on verbal agreements based on long-term relationships between growers and wholesalers, particularly in Michigan, for the delivery of fresh produce. In fresh markets, reaching the level of trust to establish verbal agreements can create barriers more difficult for new growers to penetrate than written contracts. For example, some wholesalers reported that on average they have worked with the same supplier for more than ten years (Martinez and Thornsby 2006b). To the extent that time is required for DCP crop producers to establish the level of trust needed to gain access to these fresh product markets, DCP producers may face an additional barrier to entry. If the use of contracting or relationship marketing is infrequent in an industry, however, DCP crop producers would face a low barrier to entry.

Most producers interviewed during this research indicated that if a buyer needs to increase supplies, it is more common to seek a grower that is already active in the market rather than a new grower. This practice is most common when retailers compete for consumer dollars through low prices and special offerings, primarily because these markets are often driven by spot pricing at the retailer - shipper level (with little forward contracting). Shippers are thus more likely to seek out growers where they feel more comfortable with the ability to deliver quantity and quality of product requested.

There is certainly substitution between some fresh and processed products in many FAVR crops. For example, some vegetables (i.e., squash, pumpkins, etc.) that are initially targeted towards the fresh market, tend to be diverted into processing when access to fresh markets is limited (either by design, lack of quality, or response to pricing). The lower-valued processing markets are frequently viewed as an outlet for residual product. Interview participants agreed that Michigan fresh producers seek to

enter the market when there is a high-price window, which increases volume and reduces prices, negatively affecting a crop's profitability over time.

The impact for FAVR crops (e.g., sweet corn, pumpkins, squash) that can easily be sold through some form of direct marketing (e.g., roadside stands) might be different from FAVR crops that are less likely to move through a direct marketing outlet (e.g., asparagus, celery, peppers). Increased supplies during a local production season often reduce price during these periods, but the possibility to sell directly to consumers can offer additional outlets. For crops in which direct marketing is not common, there is little capacity for direct sales to consumers. As a result, farmers in these markets are even more reliant on wholesalers or retailers for market access, thereby, creating an additional barrier to entry.

Both fresh and processed product markets for many FAVR crops are considered mature industries with slow demand growth. Facing little or no growth, margins are very low. For many FAVR crops, average prices have been relatively flat during the past decade. At the same time, price volatility tends to be greater in markets for FAVR crops. Biological factors such as time lags, seasonality in production and market demand greatly influence price variations (Tomek and Robinson). Incentives for new producers to invest in fresh-market crop production are often restricted by the relatively high price volatility in these markets.

Labor requirements and management

The labor requirement for most DCP crops is relatively low given highly mechanized production processes for those crops. Many FAVR crops (particularly those sold fresh) require the use, and management of more labor-intensive production methods (often including migrant labor). To the extent that the production of FAVR crops is reliant on a larger labor force, the acquisition and management of those workers (including the necessity for a manager to invest in understanding the regulatory system for migrant labor) is a barrier to entry for DCP crop producers seeking to convert their production to FAVR crops. The need to hire a large number of laborers is not a pressing issue faced by most DCP producers, whereas for fresh fruit and vegetable producers, where the majority of production is hand-harvested, supply of labor during harvest time is

crucial. The harvest window narrows as crop perishability increases, leaving little room for adjustment in most FAVR crops. According to vegetable producers interviewed, the shortage of labor supply alone can pose very large barriers to entry for production of FAVR crops.¹⁹

Another labor consideration is the requirement for a better trained work force needed to operate the highly specialized equipment often associated with FAVR crops. Specialized equipment requires more skilled labor supply to operate, which in turn, requires a more detailed business plan including production and marketing to account for increasing labor costs if a DCP crop producer decides to invest in FAVR crop production. According to interviewees, in order to get financial assistance growers seeking to enter FAVR markets often face a more rigorous review of their business plan, management capability, and marketing plan.

Narrow planting and harvesting windows, specialized equipment, and market price variability all increase the risks associated with FAVR crop production when compared with DCP crops. Futures and forward pricing markets are important price stabilizers in DCP crop production permitting producers of DCP crops to more readily manage risks, and plan production; thus, DCP crops are relatively less influenced by spot markets and variability of prices (Falatoonzadeh, et al.). In the case of FAVR crops futures or forward pricing are not usually available, particularly for fresh produce, making production of these crops more vulnerable to uncertain market and production conditions.

Inducements to Entry into FAVR Crop Production²⁰

For the purpose of this analysis, the inducement for DCP crop producers to enter FAVR crop production is the relative size of additional profits created by changing to the production of FAVR crops. Under the current policy, DCP crop producers could plant

¹⁹ Citing this issue, one participant stated that he had known examples of FAVR crop producers in his region that had converted to DCP crop production in recent years, but that he “had never known” a DCP crop producer who had converted to FAVR crop production.

²⁰ To refer to a change in FAVR as an “inducement to enter” the production of FAVR crops is technically incorrect. A change in policy to eliminate the FAVR should probably be referred to as “elimination of a disincentive to enter” the production of FAVR crops (i.e., an elimination of the loss of payments penalty under the FAVR). Nevertheless, for reasons of simplicity, this research will refer to the program payments that would be received as an “inducement.”

FAVR crops on CAB if they were willing to incur the penalty, or risk of penalty, as defined in the existing DCP program.²¹ If the FAVR is removed and DCP crop producers continue to receive payments on CAB, change in the relative profitability of FAVR crops produced by DCP crop producers can be consistently measured as the relative size of DCP payments compared to the revenue per acre generated by the FAVR crop.²²

The relevant question is whether a policy change would provide a sufficiently large change in the profit of a FAVR crop planted on CAB to cause DCP crop producers to enter the FAVR market when they had not already done so under current economic conditions. Assuming that size of the DCP payment is large compared to revenue generated by the FAVR crop, DCP crop producers could have a significant inducement to enter FAVR crop production. Conversely, if size of DCP payment is small, inducement to change to FAVR crop production would be also small. In Michigan, agricultural districts 5 through 8 represent the main geographic areas in terms of DCP cropland acreage and payments. Average DCP payments for wheat range from \$18.62 per acre in district 5 to \$22.26 in district 6. DCP payments for corn range from \$32.60 per acre in district 5 to \$36.53 per acre in district 6, and DCP payments for soybeans range from \$9.06 per acre in district 6 to \$11.20 per acre in district 8 (Table 7).

²¹ As described earlier, an individual grower's penalty under the current policy could range from zero for those producers eligible for the double-cropping exemption to contract termination with loss of DCP payments and market price adjustments. The proposed change in FAVR would essentially make all DCP producers exempt from penalty, including those currently eligible for exemptions.

²² This approach is similar to that used by Fumasi, Richardson, and Outlaw in their assessment of impacts from a change in the FAVR on cropping patterns in Texas.

Table 7. Michigan Participation in DCP by Districts, 2005

District	CAB ^a	Payment		
		Wheat	Corn	Soybean
	-----acres-----	-----\$/acre-----		
1	28,042	14.76	29.39	N/A
2	59,070	17.18	28.80	6.59
3	69,998	16.21	30.27	6.40
4	98,348	17.18	28.27	8.47
5	482,943	18.62	32.60	9.06
6	1,002,253	22.26	36.53	9.94
7	615,129	18.00	36.14	10.81
8	1,528,414	19.10	36.17	11.20
9	861,041	19.21	36.08	10.08

Source: authors' calculation based on FAS

^a Payment acres are 85 percent of enrolled DCP acres

Under the current policy, we assume DCP crop producers compare net returns per acre from producing a DCP crop to net returns per acre from producing a FAVR crop. The DCP crop producer is eligible to receive DCP crop benefits on CAB if a program crop is planted, but will receive no DCP benefits and get penalized if he plants the FAVR crop on CAB. Thus, the relevant comparison is:

DCP crop market revenue per acre + DCP crop payment per acre - Variable cost for DCP crop per acre <hr style="width: 100%;"/> Net return per acre for DCP crop	vs.	FAVR crop market revenue per acre - FAVR contract violation penalty - Variable cost for FAVR crop per acre <hr style="width: 100%;"/> Net return per acre for FAVR crop	(1)
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If we assume that the planting restriction is removed, and the DCP crop producer is now permitted to plant a FAVR crop on CAB, continue to receive DCP payments, and incur no penalty then the relevant comparison becomes:

DCP crop market revenue per acre + DCP crop benefit per acre - Variable cost for DCP crop per acre <hr style="width: 100%;"/> Net return per acre for DCP crop	vs.	FAVR crop market revenue per acre + DCP crop benefit per acre - Variable cost for FAVR crop per acre <hr style="width: 100%;"/> Net return per acre for FAVR crop	(2)
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In order to determine the size of the inducement provided by a change in the FAVR, we examine the size of the DCP crop benefit per acre relative to net return per acre for the FAVR crop. The inducement for DCP crop producers to enter the FAVR crop market after a potential policy change will be measured by the ratio:

$$\frac{\text{DCP crop benefit per acre}}{\text{Net return per acre for FAVR crop}} \quad (3)$$

If the DCP benefit per acre is large relative to net return per acre for the FAVR crop, then a change in the FAVR will provide a relatively large inducement for DCP crop producers to increase production of FAVR crops.²³ On the other hand, if the DCP benefit per acre is small relative to net return per acre for the FAVR crop, then DCP crop producers would have little additional incentive to enter the FAVR crop market if a policy change occurs and therefore will be unlikely to increase their plantings of FAVR crops beyond current levels.

Analysis of Barriers and Inducements to Enter Selected FAVR Markets

Clearly, the barriers and inducements for conversion of CAB vary for each current FAVR crop. We examine six crops representative across broad FAVR categories to assess the likelihood of conversion of CAB to FAVR crop production (Table 8). These six crops (dry beans, pickling cucumbers, processed tomatoes, fresh market tomatoes,

²³ Net (rather than gross) returns provides the most optimistic measure of inducement since DCP crop benefit would be a smaller percentage of the total if cost of FAVR crop production was not taken into account.

squash, and blueberries) are representative of the broad types of crops grown in Michigan where planting is currently restricted by the FAVR. If the FAVR is removed, results indicate that generally high barriers to entry, in addition to relatively low financial inducement to entry, will limit conversion of DCP crop acres to FAVR crop acres in many cases. Therefore, aggregated supply response to a change in the FAVR is generally expected to be low. Variations in commodity-specific conditions, however, make response highly variable among FAVR crops; ranging from high for dry beans to low for pickling cucumbers, fresh market tomatoes, and blueberries.

Table 8. Likelihood of Conversion of Michigan DCP Crop Acreage to Specified FAVR Crops^a

Crop	Factor Influencing Conversion					Likelihood of Conversion
	Capital Investment	Rotation Restrictions	Market Accessibility	Labor & Mgmt Needs	Financial Incentives	
Dry Beans	Low	Low	Low to Med	Low	Med	High
Pickling Cucumbers	High	Med to High	High	Med to High	Low	Low
Processed Tomatoes	Med to High	Med to High	High	Med to High	Low	Low to Med
Fresh Market Tomatoes	High	Med to High	High	High	Low	Low
Squash	Low to Med	Med to High	Med to High	Med	Low	Med to High
Blueberries	High	High	Med	High	Low	Low

Source: Authors' analysis based on interviews

^a Does not include limited volume sales through outlets such as farmers markets or roadside stands

Dry beans are annual crops grown commercially as high-volume commodities using equipment very similar to that used for soybeans. Since equipment is similar, specialized capital investment required for conversion from DCP crops to dry beans is very low for growers with soybean CAB (minimal for those with corn and wheat CAB). Dry beans fill a role in cropping rotations very similar to that of soybeans (both are legumes). Therefore, there are very low barriers to entry into dry bean production related

to rotational requirements. The labor and management requirements for dry beans are also very similar to DCP crops, thus, creating low barriers to switching from DCP crop production to dry bean production (and vice versa). Though there is some additional equipment required to handle dry beans at the elevator (e.g., sorter), and not every buyer will be expected to accept dry beans due to this handling limitation, in areas where dry bean production is already concentrated, elevators are more likely to accept both DCP crops and dry beans. Consequently, DCP crop producers in Michigan face low to medium barriers to entry related to market accessibility for dry beans.

In terms of inducement to entry, the average DCP payment in agricultural districts 5 and 6 (where dry beans are prevalent) is \$20.70 per acre. Reported returns for dry beans are approximately \$135 per acre (Puente-Asquet). Based on equation (3) above, relative financial inducement is calculated to be 15 percent ($\$20.70/\135). While, by itself, this percentage would not be considered a large number, when combined with the low barriers to entry already discussed, there is a high likelihood that Michigan producers of DCP crops may convert to dry bean production if the FAVR is eliminated. According to those processors interviewed if the prices of DCP crops are expected to be high in a given season, signing production contracts for dry beans is very difficult.²⁴

Pickling cucumbers and processed tomatoes are chosen to represent those annual FAVR crops grown in Michigan specifically destined for processed product markets (another notable example is potatoes for chips). Some equipment needed for these crops is highly specialized (i.e., harvesters, planters) requiring investments that are not easily transferable to other production activities. Irrigation is also needed in most Michigan areas, which is an additional investment that growers of DCP crops do not normally incur since most DCP crops are not irrigated. These investments create high barriers to entry in both the pickling cucumber and processed tomato markets. In some cases, processors may partially offset investment costs by arranging harvesting services through a third-party supplier. Although growers still incur a cost for the custom service, the advantage is that growers are not obligated to invest in specialized equipment that has limited alternative uses within their own operation. Such arrangements are rare in Michigan.

²⁴ Puente-Asquet found that in Michigan when the price of soybeans increases producers tend shift acreage from dry beans to soybeans.

Also in Michigan, pressure from pests and disease is very high in tomato and pickling cucumber crops, especially considering that growing seasons normally take place during the most humid months of the year (April to October for pickling cucumbers, May to August/September for processed tomatoes). Under these conditions, rotational requirements become a critical part of managing pest and disease pressure. Both pickling cucumbers and processed tomatoes require three-year rotations. Thus, for a grower seeking to enter the production of FAVR crops three acres of land must be available for each one acre planted to FAVR crops, presenting medium-to-high barriers to entry.

Tomatoes and pickling cucumbers destined for processed markets are, for the most part, mechanically harvested (thus the high capital requirements). While harvesting processed tomatoes still requires a substantial number of workers, albeit not as many as needed for hand-harvest, labor requirements for pickling cucumbers are not radically different from those of DCP crops. Management of both these specific FAVR crops is much more intensive. Water management, short growing and harvesting seasons, high pest and disease pressure, and high investment costs make day-to-day management critical. Both growers and buyers of pickling cucumbers agreed in interviews that the management challenges are particularly high for this crop. As a result, labor and management barriers to entry are rated as medium to high for both crops.

A high proportion of FAVR crops grown for processing markets are sold under contract. This permits processors to manage the flow of these highly perishable products through their facilities and manage inventories of finished product demanded by buyers. Many processing vegetable have a very limited market opportunity outside of processing markets. In Michigan, production contracts in the pickling industry can reach 90 percent of production. Without a contract, new growers will have few outlets to sell their product.

Unless markets for final products are growing, processors are unlikely to contract for increased volumes. In the case of pickling cucumbers, sales have been stagnant while products that include processed tomatoes have seen moderate growth on a national basis, yet little in Michigan. At the same time, buyers for both crops indicate that the high level of management required would make them reluctant to sign with new, inexperienced,

growers. Personal relationships remain very important in these markets, even with the presence of written contracts, and barriers to market accessibility remain high.

Cost of production for these particular FAVR crops is substantially higher than those for DCP crops (fresh cucumbers approximately \$3,700 per acre (Isaacs et al), irrigated fresh cucumbers approximately \$5,600 per acre, pickling cucumbers approximately \$940 per acre (Center for Dairy Profitability) fresh staked tomatoes approximately \$8,600 per acre (Isaac et al), corn approximately \$420 per acre, soybeans approximately \$325 per acre (University of Illinois)). Average DCP payment for agricultural districts 4 and 5 (where pickling cucumbers are grown) is \$19.03 per acre. In districts 7 and 8 (where processing tomatoes are grown), DCP payments average \$21.91 per acre. Revenue for these two commodities is estimated as \$450 and \$1000 per acre, respectively. Thus, the ratio of DCP payment to FAVR net return for each of these crops is estimated as less than five percent. With high barriers and low inducements to entry, the likelihood of conversion of CAB to pickling cucumbers is determined to be low. Though the inducement for entry remains low for processing tomatoes, somewhat lower barriers to entry cause the likelihood of CAB conversion to processing tomatoes to be classified as low to medium.

Outcomes are only slightly different when the same commodities are produced for fresh market consumption. Capital investment requirements for fresh market tomatoes are higher than those for processed tomatoes. While irrigation may be optional for the latter, requirements for consistent size and blemish-free exterior appearance makes irrigation essential for the former. In the case of Michigan, fresh market tomatoes are normally produced in raised beds covered with plastic to meet these strict requirements. Specialized equipment is needed for such production systems. Therefore capital investment in specialized assets is high for fresh market tomatoes.

Rotational requirements are similar to those of processing tomatoes (medium to high) but labor and management needs are much greater. In addition to the management required to handle the irrigation and strict quality control needs mentioned above, fresh market tomato plants are set, staked, twined, and harvested by hand. Large amounts of

labor are required and often migrant workers are hired. Worker regulation and supervision add significant complexity to the management skills needed for these crops.

Fresh market tomatoes are generally sold under contract. A large proportion moves through fast food and other chain restaurants, where contracts approach 100 percent of anticipated needs. Fresh tomatoes also move into retail outlets through re-packer firms that grade and re-sort tomatoes into desired lots. There are only a small number of re-packers (this is a very concentrated sector of the supply chain) and they normally either contract or share ownership with existing growers. Consequently, barriers to entry for fresh tomato markets are considered to be high.

When compared with processing tomatoes, financial inducements for conversion of DCP crop acreage to fresh market tomatoes are lower. DCP payments per acre in agricultural districts 7 and 8 remain at \$21.90 per acre while net returns to fresh market tomatoes are higher than those for processed tomatoes. Therefore the financial incentive to convert to fresh market tomatoes after a policy change is lower. High barriers to entry and low incentives for conversion result in an overall low likelihood of DCP acreage conversion to fresh tomatoes.

Within FAVR crops there are a number of vegetables that are produced to supply both fresh and processed markets (e.g., squash). Growers of these crops will normally sell as much as possible in the fresh market where returns are higher (determined by quantities demanded and quality of product), and the remainder will be sold for further processing. Some growers will contract a pre-determined percentage for processing to ensure a base level of sales.

Many of these FAVR crops require little specialized equipment. An exception occurs in areas where irrigation is required. Therefore, investments in specialized equipment are considered low to medium barriers to entry. Rotational requirements tend to be strict (as they are for all vegetable crops), but acreage planted is normally limited. Still an approximate three-fold multiple of acreage is needed to maintain proper rotations, making this barrier to entry rated as medium to high. Workers (often migrant) are used to harvest fresh market product but since a large proportion is generally sold as processed

goods, management of precise details related to exterior appearance is not as strict. Labor and management requirements are rated as medium barriers to entry.

Barriers to market entry remain medium to high and vary somewhat between fresh and processed products. Just as with processed tomatoes, processors of squash for example, contract a high proportion of their needs in advance to maintain scheduling consistent with plant capacity and buyer demand. However, based on interview results processors of these products seem more open to moving between suppliers as the crops are generally perceived as easier to grow. Since repacking is not generally part of the supply chain, access to fresh markets is not as limited as that for tomatoes. Nevertheless, barriers remain as most large food retail outlets prefer suppliers who can manage vegetables across an entire product category. For many growers with limited volumes, direct sales to consumers do provide alternative outlets, albeit on a small scale. Thus, market access is rated medium to high.

Additional financial incentives for conversion to squash production after a change in policy are low. The average DCP payment in districts 7 and 9 in Michigan (where vegetable acreage is high) is only \$21.72 per acre. Potential returns are estimated as approximately \$725, for a ratio between DCP payments and net returns of less than three percent. Despite this relatively small number, with barriers to entry lower than other fresh market FAVR crops, the likelihood for conversion can be considered medium to high. This is a category where fast entry by new growers is somewhat more likely with relatively less risk; fast exit could equally easily be achieved.

Finally, we consider blueberries as representative of CAB conversion to perennial crops that are restricted under the current FAVR. Capital investment requirements are high, not only because of the specialized equipment needed for production (planters, harvesters, trimmers, etc.) but also because of the length of time between initial investment and realized returns. On average, blueberries bushes are set two years (as 2- or 3-year old plants) before a commercially viable harvest is achieved. Full yields are not realized until six to eight years after plant-set. Such time lags are a major barrier to entry for new producers.

Rotational restrictions are high. Unlike annual crops where extra acreage is needed to ensure proper rotation, perennial crops restrict land available for other crops over an extended period. With proper maintenance blueberry bushes remain productive for at least 15 to 20 years. Labor and management requirements are also high. Many fresh market blueberries are hand-harvested and hand-packed into shipping containers. Although some blueberries are harvested mechanically, the trade-off is lower labor needs but greater capital investments required for very specialized equipment. Market accessibility is somewhat greater for blueberries as there has been an expanding demand in both fresh and processed markets, but there are still limitations to entry by new firms. Fresh markets tend to be dominated by several large marketing agencies and independent producers have a more difficult time reaching large food retail outlets. Opportunities for direct-to-consumer sales exist, but volume of movement through these channels is limited.

Like most other FAVR crops, financial inducements for entry are low. In Michigan, average DCP payments in agricultural districts 4 and 7 (where most blueberries are grown) are \$19.81 per acre and net returns to blueberries are very high (estimated as over \$2,000 per acre). Therefore, the added incentive to enter blueberry markets once FAVR is removed is less than one percent. The overall likelihood of producer conversion to blueberries as a result of eliminating the FAVR is rated as low.

Even though aggregated supply response to a change in the FAVR is generally expected to be low, examination of these selected six crops illustrates that variations in commodity-specific conditions make the likelihood of additional plantings highly variable among FAVR crops. Most notably, the likelihood of conversion is seen as high for dry beans, where barriers to entry are generally much lower than the other FAVR crops. With other factors held constant, conversion is more likely in commodities where the overall market is growing (i.e., processing tomatoes and blueberries). When markets for final goods are stagnant or declining (i.e., pickling cucumbers and squash) expanded plantings are less likely.

Equity Issues

Throughout the process of conducting this research, many interview participants identified equity issues as central to the political debate over elimination of the FAVR. In particular, existing FAVR crop producers frequently mentioned the perceived inequity that would arise if they were put in position of competing with DCP crop producers who begin to plant FAVR crops and still continued to receive program payments. Opinions about how to deal with this inequity varied widely among interview participants.

Some FAVR crop producers strongly preferred to receive direct payments similar to program crop producers. Other FAVR crop producers were willing to consider more indirect forms of compensation. This research did not attempt to survey or categorize the opinions of FAVR crop producers regarding potential compensation, but it can be stated that FAVR crop producers were unanimous in their opinion that eliminating the FAVR and permitting program crop producers to plant FAVR crops and receive program crop payments would create an inequitable competitive situation. The resolution of this issue – perhaps more than any other – is likely to be central to the resolution of the FAVR debate.

Conclusions

A change in public policy shifts economic conditions in the marketplace with potential to alter decisions made by farm managers. Whether the change in economic incentives and disincentives is large enough to result in substantial changes in market behavior depends on many other factors that must be included in management decisions. The trend toward greater flexibility in U.S. farm programs, evident since at least 1990, has had an effect on planting decisions since that time.

Potential for even greater flexibility in U.S. farm programs with elimination of the restriction on the planting of fruit and vegetable crops (the FAVR) is likely to be a major issue in 2007 congressional deliberations on farm policy. This research has examined the likely impact of an elimination of the planting restriction on those Michigan crops included in the current FAVR. Given the wide range of FAVR and DCP crops planted in

Michigan under the current policy, the state is poised at the intersection of the debate over introducing full planting flexibility.

Planting decisions by existing DCP crop producers are likely to be affected by farmers' perceptions of (a) the barriers to entry (disincentives) that must be overcome to produce FAVR crops, and (b) the inducements (incentives) to enter the production of FAVR crops that would be created by a policy change. Though much of the discussion of a change in the FAVR has focused on the incentives that DCP crop producers would have to enter production of FAVR crops, to our knowledge no previous research has examined the full range of incentives and disincentives that would affect the decisions of DCP crop producers. To capture the diversity of situations that would apply in the wide range of crops covered by the FAVR, a broad set of Michigan crops were examined (dry beans, pickling cucumbers, processing tomatoes, fresh market tomatoes, squash, and blueberries).

In most cases, a change in the FAVR would provide a small (or no) positive incentive for DCP crop producers to enter the production of FAVR crops. Similarly, barriers to entry would, in many cases, be high enough to significantly limit, or even prohibit, movement of DCP crop producers into the markets for FAVR crops. When considering these factors in combination, only dry beans appear to have the potential for entry of a significant number of new producers. In most other cases, the probability of entry by new producers appears to be low.

Even with a low or zero response in total supply, equity issues will likely still arise. Of particular concern is the potential that growers of the same commodity (e.g., fresh tomatoes) may be treated differently under the farm policy, if planting restrictions are removed. For example, growers with CAB could plant and still receive DCP payments while growers without CAB would not receive payments.

Though a wide range of FAVR crops were examined by this research in an effort to capture the full range of characteristics that could affect the entry of Michigan DCP crop producers into FAVR crop markets, results might not be applicable to every FAVR crop production region throughout the United States. As demonstrated, production of each FAVR crop is affected by a set of production and marketing characteristics that is

truly unique to that crop and region. Consequently, the results of a similar investigation in a different geographic location, even for similar crops, might reach different results. Such an outcome is indicative of the complex impacts that would result from a change in the FAVR.

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Appendix A. Total Area in DCP and FAVR Crop Production, by State, 2002

State	DCP	FVAR	Total	Share FAVR
Florida	269,035	1,152,858	1,421,893	81.1%
California	2,342,271	4,185,751	6,528,022	64.1%
Rhode Island	2,441	2,950	5,391	54.7%
Massachusetts	20,132	23,403	43,535	53.8%
Maine	76,028	75,803	151,831	49.9%
Nevada	16,830	12,779	29,609	43.2%
Arizona	438,337	210,090	648,427	32.4%
Connecticut	31,032	14,240	45,272	31.5%
New Hampshire	15,132	6,164	21,296	28.9%
New Jersey	214,074	75,352	289,426	26.0%
Oregon	975,033	273,887	1,248,920	21.9%
Washington	2,842,037	735,075	3,577,112	20.5%
Idaho	2,030,939	477,202	2,508,141	19.0%
New York	1,334,212	297,745	1,631,957	18.2%
New Mexico	453,572	91,042	544,614	16.7%
West Virginia	74,526	11,398	85,924	13.3%
Georgia	2,401,378	296,740	2,698,118	11.0%
Michigan	4,810,363	560,919	5,371,282	10.4%
Wyoming	282,885	31,038	313,923	9.9%
Delaware	432,160	43,777	475,937	9.2%
Colorado	2,788,146	207,214	2,995,360	6.9%
Vermont	99,364	6,741	106,105	6.4%
Utah	213,208	14,072	227,280	6.2%
Wisconsin	5,568,217	350,106	5,918,323	5.9%
South Carolina	1,009,647	55,903	1,065,550	5.2%
Pennsylvania	2,061,331	110,638	2,171,969	5.1%
North Dakota	14,444,831	767,417	15,212,248	5.0%
Alabama	1,137,394	53,612	1,191,006	4.5%
Virginia	1,322,074	56,961	1,379,035	4.1%
North Carolina	3,609,903	138,172	3,748,075	3.7%
Maryland	1,152,039	39,994	1,192,033	3.4%
Texas	12,496,001	396,917	12,892,918	3.1%
Minnesota	16,351,053	444,602	16,795,655	2.6%
Oklahoma	4,576,146	107,108	4,683,254	2.3%
Tennessee	2,586,391	43,492	2,629,883	1.7%
Louisiana	2,414,556	37,923	2,452,479	1.5%
Nebraska	14,295,701	192,339	14,488,040	1.3%
Mississippi	3,502,322	40,548	3,542,870	1.1%
Ohio	8,704,687	67,552	8,772,239	0.8%
Montana	5,888,160	35,688	5,923,848	0.6%
Missouri	9,367,268	55,213	9,422,481	0.6%
Arkansas	6,539,774	29,130	6,568,904	0.4%
Kentucky	2,807,586	12,085	2,819,671	0.4%
Indiana	11,325,013	46,548	11,371,561	0.4%

Illinois	22,042,626	85,423	22,128,049	0.4%
Kansas	16,627,798	31,183	16,658,981	0.2%
South Dakota	10,104,702	15,112	10,119,814	0.1%
Iowa	22,597,501	15,859	22,613,360	0.1%
<i>United States</i>	<i>224,718,596</i>	<i>12,079,355</i>	<i>236,797,951</i>	<i>5.1%</i>

Source: Authors' calculation based on data from the 2002 U.S. Census of Agriculture.

* Rank based on national share of FAVR crop production

Appendix B. Michigan Crop Allocation under Existing FAVR Policy

Michigan agriculture is characterized by a nearly equal value of production in DCP and FAVR crops. From 2000 to 2004, cash receipts for major DCP crops averaged \$860 million per year (38 percent of total crop receipts in the state). In the same period, cash receipts for FAVR crops (i.e., vegetables, fruits (including berries), potatoes and dry beans) were \$635 million annually (28 percent of total crop value in the state). The remaining share of cash receipts correspond to crops that are neither included in the DCP program, nor included in the FAVR (i.e., floriculture and nursery). In total this group represented approximately 34 percent of total cash receipts (Table 9)

Table 9. Michigan Cash Receipts by Selected Commodities, 2000 – 2004

Item	2000	2001	2002	2003	2004
	-----1,000 dollars-----				
Corn	295,917	346,105	383,009	438,795	458,050
Soybeans	324,092	292,548	363,489	433,442	422,684
Wheat	77,613	98,841	93,871	141,787	127,506
<i>Total Selected DCP crops</i>	697,622	737,494	840,369	1,014,024	1,008,240
<i>Total Crops</i>	1,997,663	2,016,829	2,165,057	2,480,268	2,566,438
<i>Share of MI crop value</i>	35%	37%	39%	41%	39%
Vegetables	239,917	233,497	257,492	271,005	297,143
Fruit	238,523	214,682	155,113	250,255	296,689
Potatoes	87,362	91,478	93,143	92,892	87,186
Dry beans	75,340	24,669	50,068	62,989	54,814
<i>Total Selected FAVR Crops</i>	641,142	564,326	555,816	677,141	735,832
<i>Total Crops</i>	1,997,663	2,016,829	2,165,057	2,480,268	2,566,438
<i>Share of MI crop value</i>	32%	28%	26%	27%	29%

Source: Michigan Agricultural Statistics, various years

The diversity of DCP and FAVR crop production in Michigan is also observed at the farm level. Based on The North American Industry Classification System [NAICS] which provides an important snapshot of cropland allocation at the farm-level, in 2002 there were 12,294 Michigan farms categorized as primarily engaged in oilseed and grain

farming (NAICS 1111).²⁵ Out of the approximately 3.9 million acres harvested on these farms, soybeans represented 1.7 million acres, corn 1.4 million acres, and wheat 0.3 million acres. Approximately five percent of the cropland acreage on these specific farms was destined to production of the listed FAVR crops; 177,132 acres to dry beans, 12,240 acres to vegetables, 2,050 acres to orchards, and less than 500 acres to production of potatoes and berries (Table 10).

Vegetable and melon farming (NAICS 1112) was the primary sales activity on 1,610 Michigan farms. These farms represented a total of 287,013 acres, out of which of vegetable production totaled 98,797 acres, and DCP crops 104,249 acres. Other crops harvested on these farms were potatoes (43,750 acres), and dry beans (7,484 acres). Land in orchards and berries represented 6,862 and 565 acres respectively.

Fruit and tree nut farming (NAICS 1113) was the primary activity on 2,376 Michigan farms with a total of 143,115 acres of harvested cropland. Land in orchards represented 102,129 acres of total harvested cropland, followed by land in berry production (18,096 acres), DCP crops (10,214 acres), vegetables (5,017 acres), and potatoes (10 acres).²⁶

²⁵ In the 2002 Census of Agriculture, the NAICS code was assigned on the basis of which commodity or commodities represented 50 percent or more of a farm's total sales or sales equivalent. Farms were classified as "primarily engaged" in these activities.

²⁶ Other important industry classifications in Michigan include greenhouse, nursery and floriculture with 3,169 farms and 115,232 harvested acres, and other crop farming comprised of 9,460 farms and 797,679 acre of harvested cropland. Other crop farming includes sugar, hay, and all other crops (NAICS 11193, 11194, 11199).

Table 10. Michigan Harvested Cropland by North American Industry Classification

Industry Classification	Farms		Selected Crops Harvested							
	Number	Acres	Corn for grain	Wheat for grain	Soybeans for beans	Dry edible beans	Potatoes	Land for vegetables	Land in orchards	Land in berries
			-----acres-----							
Oilseed and grain (1111)	12,294	3,898,303	1,405,399	325,087	1,715,123	177,132	354	12,240	2,050	135
Vegetable and Melon (1112)	1,610	287,013	51,502	15,401	37,346	7,484	43,750	98,797	6,862	565
Fruit and tree nut (1113)	2,376	143,115	5,259	433	4,522	(D)	10	5,017	102,129	18,096
Greenhouse, nursery, and floriculture (1114)	3,169	115,232	2,156	675	3,596	(D)	16	1,915	1,471	283
Other crop farming (1119)	9,460	797,679	117,030	29,874	71,801	54,827	1,297	15,542	4,130	176

Source: 2002 Census of Agriculture Michigan

(D) Undisclosed to protect farmer's identity

The diversity of agricultural production systems in Michigan requires a subdivision of the state into several distinctive areas to facilitate further analysis. The Michigan Department of Agriculture [MDA] provides a division of the state into nine agricultural districts based on “similar agricultural characteristics” that allows comparison of heterogeneous cropland acres (MDA, 2000). The regions are: Upper Peninsula, Northwest, Northeast, West Central, Central, East Central, Southwest, South Central and Southeast (Figure 1).

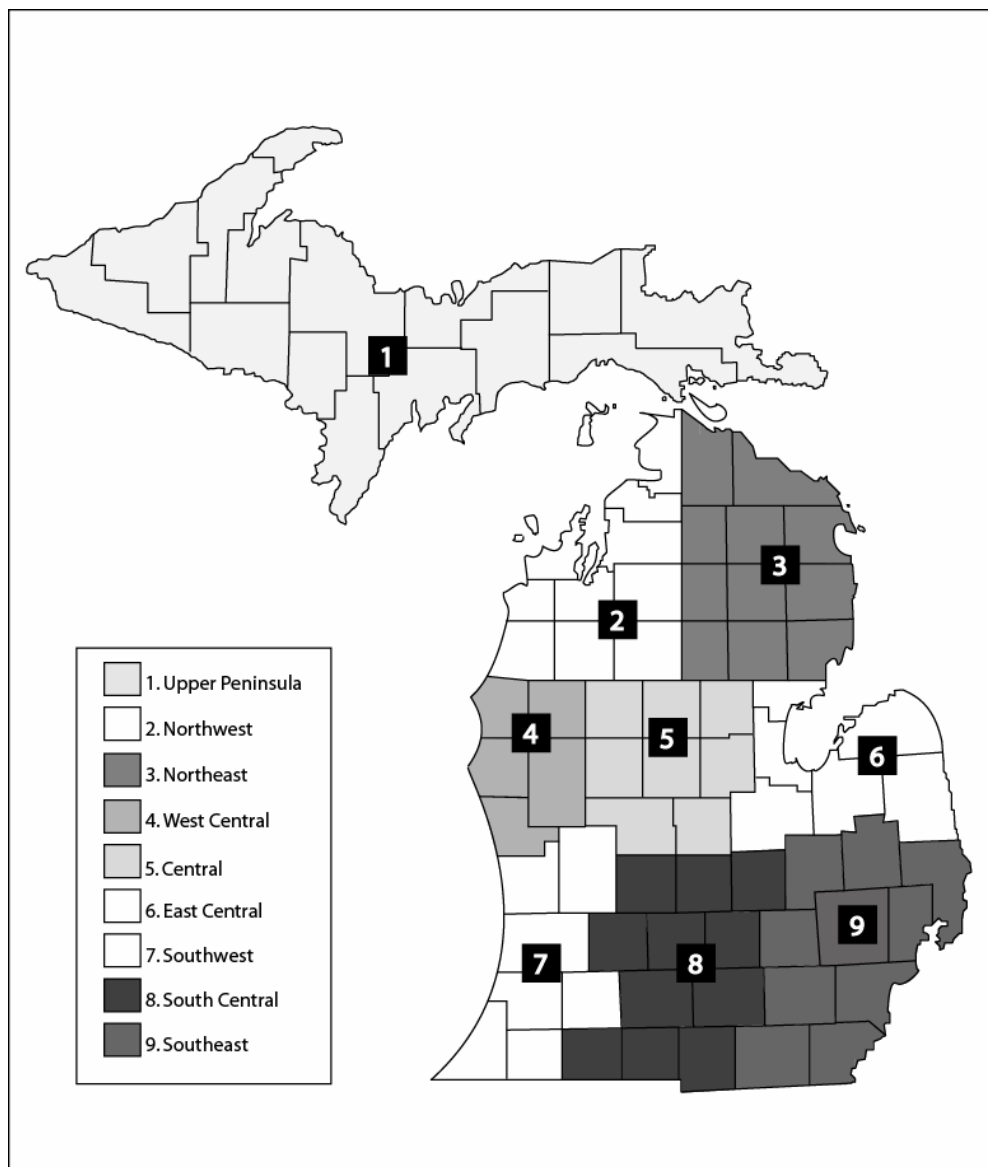


Figure 1. Agricultural Districts of Michigan.

Source: Michigan Department of Agriculture Rotational Survey, September 2002.

District 1, Upper Peninsula region, includes the counties of Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, and Schoolcraft. Most of the agriculture in this region is based on forage systems, however, the Upper Peninsula region does include a small cropland area. In 2002 total DCP area harvested was 7,980 acres, representing 0.2 percent of total DCP crop area in Michigan (Table 11). In 2005 this region reported 28,042 in CAB, representing less than one percent of total CAB area in Michigan. DCP payments per acre for wheat and corn were \$14.76 and \$29.39, respectively (the Upper Peninsula does not receive payments for soybeans). Regional share of FAVR crop area is very low. In 2002, total area of dry bean harvested represented only 0.5 percent of the total state dry bean acreage harvested (1,168 acres), while potatoes represented 5.3 percent (1,168 acres), and orchards 0.3 percent (334 acres).

District 2, Northwest region, includes the counties of Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee and Wexford. DCP crop production represents a relatively small area in this district. In 2002 DCP production represented 27,524 acres (0.6 percent of Michigan total DCP production area). In 2005 total CAB was 59,070 acres (1.2 percent share of Michigan total CAB). On average, DCP payments for wheat were \$16.21 per acre, for corn \$28.80 per acre and for soybeans \$6.59 per acre. The Northwest region is the most important tree-fruit production area in Michigan. In 2002, this region comprised 34,779 acres of land in orchards, representing 29.4 percent of the state total. All the other FAVR crops represented a small area compared to total area planted in the state. Vegetables accounted for 1.9 percent (2,593 acres), potatoes 2.8 percent (1,294 acres), dry beans 0.2 percent (582 acres), and berries 1.3 percent (260 acres).

District 3, Northeast region, includes the counties of Alcona, Alpena, Cheboygan, Crawford, Iosco, Montmorency, Ogemaw, Oscoda, Otsego, Presque Isle, and Roscommon. The Northeast region has limited area allocated to DCP crop production. In 2002 area in production of DCP crops totaled 37,698 acres, representing 0.8 percent of total DCP area in Michigan. In 2005 total CAB acreage was around 70,000 acres (1.5 percent share of Michigan total CAB). Wheat average DCP payments were \$16.21 per acre, corn payments were \$30.27 per acre, and soybean payments were \$6.40 per acre. In

2002 the main FAVR crops produced in this region were potatoes which totaled 2,712 harvested acres (5.9 percent of the state total potato area), followed by dry beans (3,396 acres). Other small proportions of land were destined to orchards, vegetables and berries.

District 4, West Central region, includes the counties of Lake, Mason, Muskegon, Newaygo and Oceana. In 2002 DCP crops were harvested on 72,881 acres in this region. In 2005 wheat payments were on average \$17.17 per acre, corn payments \$28.27 per acre, and soybean payments \$8.47 per acre. This region is one of the main fruit and vegetable growing areas in Michigan. Land in orchards accounts for 22.1 percent of the state total (26,026 acres), while vegetable area represents 21.4 percent (29,676 acres). Total area for berries accounts for 6.2 percent of the state total (1,190 acres). Dry beans and potatoes represent less than one percent of the total Michigan area in production of these crops.

District 5, Central region, includes the counties of Clare, Gladwin, Gratiot, Isabella, Mecosta, Midland, Montcalm, and Osceola. This region is very diverse with a significant share of the state acreage in production of DCP and FAVR crops. In 2002 total DCP harvested area was around 416,000 acres, which represented 9.3 percent of total Michigan DCP crop area. In 2005 total CAB enrolled in the DCP was 482,943 acres (10.2 percent of total DCP acres in the state). Estimated program payments per acre were approximately \$18.62 for wheat, \$32.60 for corn and \$9.06 for soybeans. In 2002 around 37.3 percent of total potato area harvested in Michigan (17,095 acres) was located in this region. Dry bean production area was 50,000 acres (19.4 percent of Michigan dry bean area) and vegetable production area was 13,490 acres (9.8 percent of Michigan vegetable area).

District 6, East Central region, includes the counties of Arenac, Bay, Huron, Saginaw, Sanilac, and Tuscola. This region represents approximately 21 percent of total DCP area in the state (938,550 acres). In 2005 there were approximately one million acres enrolled in the DCP. Payments for wheat were approximately \$22.26 per acre, for corn \$36.53 per acre, and for soybeans \$9.94 per acre. This region is the main dry bean production area in Michigan, representing more than 75 percent of total harvested dry

bean cropland (195,316 acres). This region also accounts for approximately nine percent of potatoes and vegetable area produced in Michigan respectively.

District 7, Southwest region, includes the counties of Allegan, Berrien, Cass, Kalamazoo, Kent, Ottawa, and Van Buren. In 2002 DCP crop area totaled around 595,000 acres, representing 13 percent of total DCP area in Michigan. In 2005, a total of 615,129 acres were enrolled in DCP. On average, the DCP payment per acre for wheat was \$18.00 per acre, for corn \$36.14, and for soybeans is \$10.81. This region is also very diverse with large shares of berry, orchard and vegetable crop production in the state. Around 85 percent of berry area (16,462 acres), 41 percent of orchards (48,362 acres) and 28 percent of land in vegetables production (38,132 acres) in Michigan are located in this region. A small share of the state dry beans and potatoes production is also located in the Southwest region.

District 8, South Central region, includes the counties of Barry, Branch, Calhoun, Clinton, Eaton, Hillsdale, Ingham, Ionia, Jackson, Shiawassee and St. Joseph. In 2002, this region represented one-third of all major DCP crop acreage in the state (1,498,088 acres). In 2005, around 1.5 million acres were enrolled in the DCP. Per-acre DCP payments for wheat were \$19.10, for corn \$36.17 and for soybeans \$11.20. FAVR crop area included vegetables (17,705 acres), potatoes (6,512 acres), dry beans (2,634 acres), orchards (2,450 acres) and berries (322 acres).

District 9, Southeast region, includes the counties of Genesee, Lapeer, Lenawee, Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne. Total DCP area harvested in 2002 was approximately 901,000 acres (20 percent share of state total DCP area). In 2005, there were 861,041 acres enrolled the DCP. The DCP payments for wheat were \$19.21 per acre, for corn \$36.08 per acre and for soybeans \$10.08 per acre. Vegetable production in this region accounts for 16 percent (22,062 acres) of the state total vegetable area. The region also accounts for a small area in potatoes production (2,109 acres), orchards (3,957 acres), dry beans (882 acres) and berries (438 acres).

Table 11. Total Major DCP and FAVR Crop Area Harvested and Share of State

Region	District	DCP crop*	FAVR Restricted Crops					
			Dry Beans	Potatoes	Orchards	Vegetables	Berries	
1	Upper Peninsula	Acres	7,980	1,168	2,445	334	548	110
		share MI	0.2%	0.5%	5.3%	0.3%	0.4%	0.6%
2	Northwest	Acres	27,524	582	1,294	34,779	2,593	260
		share MI	0.6%	0.2%	2.8%	29.4%	1.9%	1.3%
3	Northeast	Acres	37,698	3,396	2,712	330	431	18
		share MI	0.8%	1.3%	5.9%	0.3%	0.3%	0.1%
4	West Central	Acres	72,881	179	243	26,062	29,676	1,190
		share MI	1.6%	0.1%	0.5%	22.1%	21.5%	6.2%
5	Central	Acres	415,936	50,340	17,095	1,222	13,490	87
		share MI	9.3%	19.4%	37.3%	1.0%	9.8%	0.5%
6	East Central	Acres	938,550	195,316	4,459	563	12,878	272
		share MI	20.9%	75.4%	9.7%	0.5%	9.3%	1.4%
7	Southwest	Acres	595,060	2,403	1,673	48,362	38,132	16,462
		share MI	13.2%	0.9%	3.6%	40.9%	27.7%	85.3%
8	South Central	Acres	1,498,088	2,634	6,512	2,450	17,705	322
		share MI	33.3%	1.0%	14.2%	2.1%	12.8%	1.7%
9	Southeast	Acres	900,927	882	2,019	3,957	22,062	438
		share MI	20.0%	0.3%	4.4%	3.3%	16.0%	2.3%
<i>Michigan</i>		<i>Acres</i>	<i>4,496,228</i>	<i>259,026</i>	<i>45,840</i>	<i>118,166</i>	<i>137,887</i>	<i>19,289</i>

Source: USDA Census of Agriculture

*Corn, soybeans, wheat only