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How Would Markets Be Affected?

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Eliminating Fruit and Vegetable Planting Restrictions

How Would Markets Be Affected?

Demcey Johnson, Barry Krissoff, Edwin Young, Linwood Hoffman, Gary Lucier, and Vince Breneman

Abstract

Participants in U.S. farm programs are restricted from planting and harvesting wild rice, fruit, and most vegetables (nonprogram crops) on acreage historically used for program crops (known as base acreage). However, a recent World Trade Organization challenge to U.S. programs has created pressure to eliminate planting restrictions. Although eliminating restrictions would not lead to substantial market impacts for most fruit or vegetables, the effects on individual producers could be significant. Some producers who are already producing fruit and vegetables could find that it is no longer profitable, while others could profitably move into producing these crops. Producers with base acreage are the most likely to benefit because they would no longer face payment reductions.

Keywords: Farm programs, base acres, direct payments, vegetables, fruit, wild rice, planting restrictions

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Summary

Price and income support payments to farmers can influence production decisions. These subsidy programs insulate producers from fluctuations in market prices and raise farm household income. Under such a system, however, producers base their planting decisions for the subsidized commodities not only on information about market conditions, but also on government payments. Thus, in responding to distorted market signals, farmers may produce a different mix of commodities than they would otherwise.

Interest in market liberalization prompted U.S. policymakers to design and implement less distorting government programs. Farm legislation in 1996 and 2002 converted some support to decoupled payments. Decoupled payments are per acre payments based on historical plantings (also known as base acreage) of program crops and yields rather than on current market prices or production levels of the crops.

The 2002 Farm Act makes some payments to farms in proportion to their base acreage of traditional program crops—wheat, feed grains, upland cotton, rice, and oilseeds. Payments are tied to the amount of cropland enrolled in programs and to base acreage. Farmers producing nonprogram commodities may receive payments if they also produced program commodities in the past, but they are restricted in planting and harvesting wild rice, fruit (including nuts), and vegetables (other than lentils, dry peas, and mung beans) on base acreage. Fruit and vegetables are not supported by traditional commodity programs.

What Is the Issue?

In March 2005, the World Trade Organization (WTO) found that direct U.S. payments for cotton, and by extension all program commodities, do not meet the definition of decoupled payments because eligibility for payments restricts production of fruit and vegetables. This development draws into question whether the United States can continue to claim that program payments for any program commodity are “green box” supports, exempt from WTO regulations, without eliminating the planting restriction. In WTO terminology, “green box” supports are policies that are considered to “minimally” distort trade and are not subject to any limitations.

The quantity of fruit and vegetables produced and consumed is relatively small compared with that of program crops, and market demand is slow to respond to changing conditions. The concern is that, eliminating planting restrictions could shift acreage away from program crops, such as corn or soybeans, and into fruit and vegetables which could lead to a significant decline in prices. What are the possible effects on fruit and vegetable markets of ending planting and harvesting restrictions?

What Did We Find?

Eliminating planting restrictions could affect individual fruit and vegetable markets, depending on the costs and returns for producing the specific fruit or vegetable, which vary across regions and over time. Farmers would be more likely to shift acreage away from program crops and into

fruit and vegetables in regions where the land and climate are suitable for fruit or vegetable production.

Commercial production of fruit and vegetables is concentrated regionally, with much of the production in Florida and California. Eliminating planting restrictions may facilitate the move from program crops to fruit and vegetables in such areas as California, southeastern Washington, southern Idaho, the area stretching from North Dakota throughout the upper Midwest to northwestern New York and the coastal plain in Southeastern States. However, given the small amount of base acreage in Florida, removing planting restrictions would have little effect on any expansion there.

Farmers in these regions, however, would not necessarily make large acreage shifts because restrictions are not always binding. For example, farmers can plant fruit and vegetables on the portion of their cropland that is not base acreage without a reduction in payment. If nonbase cropland is not available, the farmer can lease or purchase nonbase cropland and reconstitute the farm to include the new acreage, again without incurring a payment reduction. Farm program rules currently permit fruit and vegetables to be produced on base acreage if the farm has a history of planting fruit and vegetables, but in these cases, payments on these farms are reduced by $22 per acre on average. Nearly 5 percent of fruit and vegetable production was on base acreage in 2003 and 2004.

In many cases, barriers other than program rules, such as the need for specialized equipment, expertise, agronomic constraints, or labor for harvesting, dissuade producers from growing fruit or vegetables. Startup costs for new and sometimes existing growers of fruit and vegetables can be substantial. Higher production costs and greater risk are two reasons that producers may choose not to plant additional acreage to fruit and vegetables.

Because some fruit and vegetables are expensive to produce, program crop farmers are more likely to switch to less capital-intensive crops, such as dry beans, or to processing vegetables, such as sweet corn or tomatoes, than to fresh fruit. For example, producing cantaloupes in Arizona may require shaping beds, laying plastic mulch, hand thinning and weeding, pollinating, several passes with chemical control agents, irrigating half a dozen times during the season, and removing and disposing of the plastic mulch. At harvest, growers must arrange for harvest labor, haul the melons to a cooler where field heat is removed, and have the product delivered to market quickly. In contrast, harvesting equipment used in soybean operations would be more adaptable for dry beans and many growers already have the experience needed to produce dry beans.

Although the market effects of eliminating restrictions are likely to be small for most fruit and vegetables, the effects on individual producers could be significant. Some producers who are already producing fruit and vegetables could find that it is no longer profitable, while others could profitably move into producing fruit and vegetables. Producers with base acreage are the most likely to benefit because they would be able to realize additional revenue from planting fruit and vegetables.

How Did We Do the Analysis?

We examined planting restrictions from a farm, regional, and national perspective. Due to the wide variety of fruit and vegetables and limited information on potential market adjustments, we relied on production and price data from the census of agriculture and USDA's National Agricultural Statistics Service and on farm program data from the Farm Service Agency. We used data from the census of agriculture and Farm Service Agency to determine where program crops, wild rice, and fruit and vegetables are grown and where land constraints might be significant for farmers interested in expanding production. Our analysis of overall market effects was complicated by the lack of comprehensive and consistent data, the large number of commodities, and the limited estimates of relevant economic parameters. We use breakeven analysis and a simple market equilibrium simulation model to illustrate the basic economic tradeoffs. While a more extensive simulation would be informative, a comprehensive model that includes fruit and vegetable markets is not available. Building such a model was beyond the scope of this analysis.

Introduction

The 2002 Farm Act provided direct and countercyclical payments to farmland owners with a history of producing program crops—wheat, feed grains, upland cotton, rice, peanuts, and oilseeds. Both direct and countercyclical payments depend on base acreage and program yields, which reflect historical use of the land and the associated yields for program crops. Planting and harvesting may be restricted for program participants. In particular, payments may be forfeited if a producer plants and harvests wild rice, fruit (including nuts), and vegetables (other than lentils, dry peas, and mung beans) (hereafter, simply referred to as fruit and vegetables) on base acreage.

Planting restrictions have become a focal point of policy discussions in recent years, largely because of a case brought by Brazil to the World Trade Organization (WTO) against U.S. cotton programs. The WTO appellate body ruled in March 2005 that, because of planting restrictions on fruit and vegetables, U.S. fixed direct payments for cotton partly depend on current plantings and thus could not be considered "minimally trade distorting" under terms of the Agreement on Agriculture.[1] This legal ruling draws into question whether the United States can continue to claim that direct payments for any program commodity are a "green-box" support, exempt from WTO obligations, without eliminating the restrictions (see box, "Categories of WTO Domestic Support Policies").

If direct payments were categorized as "amber-box" policy for purposes of WTO notification (member countries report all spending on agricultural programs to the WTO), the United States would run a higher risk of exceeding its $19.1 billion ceiling on domestic support negotiated under the Uruguay Round. The risk would be particularly high in years when low prices lead to large Federal expenditures under other commodity programs (e.g., marketing loans).[2] Thus, eliminating planting restrictions has been suggested as a necessary step for the U.S. to remain within its current WTO spending limits.

Industry groups are divided on the issue of whether or not they favor relaxing planting restrictions. Given the magnitude of base acreage and the small size of acreage for fruit and vegetables, growers are naturally concerned about the price-depressing effects of potential shifts of production (Antle).

Categories of WTO Domestic Support Policies

A traffic light analogy is used to categorize WTO domestic support policies and to place them in one of four colored policy boxes:

Red: Prohibited policies that must be stopped. No domestic support policies are in this category.

Amber: Policies subject to careful review and reduction over time.

Blue: Payments made in conjunction with payment-limiting programs.

Green: Policies considered to have little or no effect on production or trade and are not subject to any limitations.

[1]Schnepf provides an overview of the ruling in the Brazil cotton case. The legal ruling of the WTO appellate body is available at http://www.wto.org/english/tratop_e/dispu_e/find_dispu_documents_e.htm.

[2]For discussion, see Sumner, pp. 9-14.

But processors argue that they would be subject to lower risks of localized crop problems (e.g., diseases that can render fields unsuitable for vegetable production). Additionally, processors, particularly in the Midwest, view planting restrictions as a competitive obstacle. They argue that restrictions limit supply and opportunities for procurement close to plants, imposing higher procurement costs. This argument carries special force in areas where vegetables were traditionally grown but where base acreage expanded under the 2002 Farm Act (as a result of base acreage updating and the addition of historic soybean acreage), leaving a much smaller share of nonbase acreage. Althoff and Gray note that the proportion of Indiana cropland designated as base acreage (and hence subject to planting limitations) increased from 57 percent to 93 percent as a result of program changes under the 2002 Farm Act. Nationally, base acreage increased from 211 million acres to 269 million acres (Young et al.).

Base Acreage and Planting Restrictions Under the 2002 Farm Act

The 2002 Farm Act provides income support to U.S. agriculture through various programs for 2002-07, including direct and countercyclical payments (Westcott, Young, and Price). Direct and countercyclical payments are determined using base acreage, program payment yields, and payment rates. Base acreage reflects historical use of the land for eligible crops, and program payment yields are historically determined commodity yields.[3] Payment rates are established in the legislation. Base acreage designations under the 2002 Act were made in 2002/03. In addition to granting eligibility to the seven crops (corn, grain sorghum, barley, oats, wheat, rice, and upland cotton) for which Production Flexibility Contract payments were made under the 1996 Farm Act, the 2002 Act also permitted farmland owners to include peanuts and oilseeds in base acreage. Although base acreage designations remain fixed for the 2002 Act, producers must enroll in the direct and countercyclical payment program annually to be eligible for those payments.[4]

Producers have considerable planting flexibility on base acreage, except for restrictions on:

- Wild rice.
- Fruit (including nuts).
- Vegetables, other than lentils, mung beans, and dry peas. Dry peas include Austrian, wrinkled seed, green, yellow, and umatilla. Peas grown for the fresh, canning, or frozen market are not dry peas.[5]

Planting for harvest of fruit and vegetables is prohibited on base acreage, except in the following situations:

- Harvesting double-cropped (producing two or more crops for harvest on the same acreage in the same crop year) fruit and vegetables on base acreage is permitted, without loss of payments, in any region that has a history of double-cropping covered crops with the otherwise prohibited crops.[6] An individual farm need not have a double-cropping history, only the region.
- Harvesting of any fruit and vegetables on base acreage is permitted, with an acre-for-acre loss of direct and countercyclical payments for each acre planted to the otherwise prohibited crop, if the Secretary of Agriculture determines that the *farm* had a history of planting those crops.
- Harvesting of any fruit and vegetables on base acreage is permitted, with an acre-for-acre loss of direct and countercyclical payments for each acre planted to the otherwise prohibited crop, if the Secretary of Agriculture determines that the individual *producer* had an established planting history of the specific crop.

[3]For additional background and analysis of recent changes in base acreage, see Young et al.

[4]Planting restrictions for fruit and vegetables were initiated in the Omnibus Budget Reconciliation Act of 1990. These planting restrictions were established in response to grower concerns about potential market impacts if base acreage became available for fruit and vegetable production. Wild rice was added to the list of fruit and vegetables in the 2000 Agricultural Appropriations Act (Young et al.)

[5]See U.S. Department of Agriculture (2002, p. 64759) for a complete list of prohibited crops.

[6]See U.S. Department of Agriculture (2002, p. 64758-64759) for a list of approved double-cropping regions.

A farm would have a history if it planted fruit and vegetables on base acreage in any year from 1991 to 2001, excluding 1996 and 1997.[7] A farm with a history can plant all base acreage to fruit and vegetables on base acreage. A producer would have a history if he/she planted fruit and vegetables on other farms during the same period. A producer with history can only plant the specific crop in which there is a history, and the producer is limited to the (average) number of historical acres for which the producer has a history. A farm or producer with a history is not considered to be in violation of the contract if fruit and vegetables are planted to base acreage, but direct and countercyclical payments would be reduced acre-for-acre for base acreage planted to fruit and vegetables.

A contract is considered to be in violation if fruit and vegetables are planted on base acreage when the farm or producer does not have a history of doing so, a producer exceeds historical plantings, or an acreage-reporting violation occurs. In these cases, additional reductions in payments are assessed. If the producer does not have a planting history, direct and countercyclical payments are reduced acre-by-acre for each acre of fruit and vegetables planted on base acreage *and* the producer is also assessed an additional payment reduction based on the market value of the fruit and vegetables. The total payment reduction cannot exceed the value of all direct and countercyclical payments otherwise received. Because producers annually enroll in the direct and countercyclical payment program under the 2002 Farm Act, payment reductions for contract violations are limited to the year of the contract.[8]

If the farm with base acreage is not enrolled in the direct and countercyclical program, wild rice, fruit, or vegetables may be planted on the base acreage in that year with no payment reductions, since no payments are made. The farm can be enrolled in subsequent years and become eligible for direct and countercyclical payments. Even when not enrolled for direct and countercyclical payments, farmers producing program commodities remain eligible for marketing loan benefits.

Illustration of Payment Reductions When Fruit and Vegetables Are Planted on Base Acreage

To understand how planting restrictions may affect government payments, consider the following example of a corn farm. Suppose this farm has 200 base acres of corn, a direct payment, and countercyclical payment yields of 102 bushels (bu) per acre.[9] Direct program payments are calculated by the product of the direct payment rate ($0.28/bu), the farm's direct payment yield (102 bu/acre), and 85 percent of the farm's base (200 acres). The direct payment equals $4,855 in this example.

Countercyclical payments are issued only if the effective price for a program commodity is below the target price, which is $2.63/bu. The effective price is equal to the direct payment rate plus the higher of the national average market price or the national loan rate. If the market price for corn is $2.25/bu, which is higher than the national loan rate of $1.95/bu, the countercyclical payment rate would be $0.10/bu ($2.63 – ($0.28 + $2.25)). Countercyclical payments are calculated by the product of the countercyclical payment rate

[7]Average annual plantings are either (but not both) of the periods 1991-95 or 1998-2001. For further details, see the Farm Service Agency Online Fact Sheet (USDA, February 2003).

[8]The payment reductions for harvesting fruit and vegetables on program acreage were higher under the 1996 Act, partly because the producer signed a multiyear contract under that law.

[9]Direct and countercyclical payment yield are identical for farms unless the producer elected to update base acreage and countercyclical payment yields under the provisions of the 2002 Farm Act (Young et al.).

($0.10/bu), the farm's countercyclical payment yield (102 bu/acre), and 85 percent of the farm's base (200 acres). The countercyclical payment equals $1,734 in this example.

If producers expect to earn a better rate of return by planting crops other than corn, they can do so and still collect corn direct and countercyclical payments provided that they do not plant wild rice, fruit, or vegetables. Direct and countercyclical payments, therefore, do not require planting of particular crops.

A farmer's decision to produce wild rice, fruit, and vegetables on program acreage depends on current market conditions, expected profit from production alternatives, and any loss of direct and countercyclical payments that might be incurred. To illustrate the tradeoffs to the producer, we expand our example of corn payments to show the reduction in payments for a scenario in which the farm has a planting history for fruit and vegetables and a scenario in which the farm does not have a planting history but elects to plant tomatoes (table 1).

First, assume that the corn farm in our example has a history of fruit and vegetable production (scenario 1) and the producer decides to harvest 60 acres of fresh-market tomatoes.[10] In this case, the farm would lose the direct and countercyclical payments ($1,977) associated with the 60 acres of base. This switch would be profitable to the farmer if the net profit from tomatoes exceeded the lost payments and the expected market profit from producing a permitted crop ($133 per acre).

[10]As discussed on pp. 10-18, barriers to planting tomatoes and other fruit and vegetables may be significant. We abstract from these for purposes of this illustration.

Payment reductions increase if the farm does not have a history of producing fruit and vegetables. Consider three scenarios (scenarios 2, 3, and 4) in which a farm plants 60, 1, and 200 acres of tomatoes. The farm foregoes the revenue from tomatoes as well as the direct and countercyclical payments for the base acreage that is planted to the alternative crop. The payment reduction is capped at the total value of the direct and countercyclical payments. Thus, in scenarios 2 and 4, the farm receives the maximum payment reduction of $6,589. In scenario 3, because only 1 acre of tomatoes is planted, the payment reduction is based on the value of tomato production and payments for the 1 base acre. Note that, in scenario 3, if the price of tomatoes increases, the payment reduction increases to offset the higher revenue until the maximum payment reduction is reached.

Scenarios 5 and 6 illustrate cases in which planting restrictions are not binding. When the base acreage constraints are not violated, no payment reduction is involved (table 1). The farm remains in compliance in scenario 5 because it does not produce any tomatoes. In scenario 6, additional nonbase acreage is acquired for tomato production and thus the farm has no payment reduction. The farm is not required to plant tomatoes on the newly acquired acreage. Tomatoes can be planted on the acreage that was designated originally as base as long as the farmer has a sufficient amount of nonbase acreage available. We observed this type of land use adjustment when we visited several fruit and vegetable producers in Michigan (see box, "Observations From a Trip to Michigan).

Table 1

Farm program payment reductions for violating wild rice, fruit, and vegetable planting restrictions

Item	Farm with history of planting wild rice, fruit, and vegetables	Farm in violation			Farm without history, no violation	Farm that expands to circumvent restrictions
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
1. Cropland, acres	200	200	200	200	200	260
2. Corn base, acres	200	200	200	200	200	200
3. Direct payment per acre, dollars[1]	24.28	24.28	24.28	24.28	24.28	24.28
4. Countercyclical payment per acre, dollars[2]	8.67	8.67	8.67	8.67	8.67	8.67
5. Total direct and countercyclical payment per acre, dollars (3 + 4)	32.95	32.95	32.95	32.95	32.95	32.95
6. Total direct and countercyclical payment, dollars (2 x 5)	6,589.20	6,589.20	6,589.20	6,589.20	6,589.20	6,589.20
7. Tomatoes, acres	60	60	1	200	0	60
8. Value of tomatoes per acre, dollars	5,000	5,000	5,000	5,000	0	5,000
9. Total value of tomatoes (7 x 8)	300,000	300,000	5,000	1,000,000	0	300,000
10. Direct and countercyclical payment acre-for-acre reduction, dollars (5 x 7)	(1,976.76)	(1,976.76)	(32.95)	(6,589.20)	0	0
11. Additional payment reduction[3]	0	(4,612.44)	(5,000.00)	0	0	0
12. Total payment reduction	(1,976.76)	(6,589.20)	(5,032.95)	(6,589.20)	0	0
13. Expected market net return per acre for corn or other permitted cropping alternative, dollars[4]	100	100	100	100	100	100
14. Loss of payments per acre, dollars(12/7)	(32.95)	(109.82)	(5,032.95)	(32.95)	0	0
15. Breakeven value or net profit per acre for tomatoes, dollars[5]	132.95	209.82	6,169.00 6	132.95	NA	100

NA = Not applicable. Numbers in parentheses = Negative numbers.

[1]Direct payment rate = ($0.28 per bu) x payment yield (102 bu/acre) x payment acre (0.85).

[2]Countercyclical payment rate = (($2.63 - ($0.28 + $2.25)) x payment yield (102 bu/acre) x payment acre (0.85).

[3]Additional payment reduction for farms with no planting history = the lesser of the market value of the wild rice, fruit, and vegetables or any remaining direct and countercyclical payment. As market returns increase, the total payment reduction (row 12) would increase until it reaches the total value of direct and countercyclical payments.

[4]Farmer could produce any crop other than wild rice, fruit, or vegetables.

[5]Market net return that would be required to justify planting tomatoes. Farmer would need a profit that would exceed lost market revenue from program crop plus any payment reduction.

Source: Compiled by Economic Research Service, USDA, from Farm Service Agency, USDA.

The value of direct payments varies by commodity and location (fig. 1). The legislated payment rates are commodity dependent. In addition, the program yields reflect historic production levels associated with the specific base acreage. The per acre value of direct payments range from over $100 per base acre in several counties in California, where rice and cotton are produced, to under $15 per base acre in many parts of the country.

For farmers with base acreage for multiple crops, when electing to plant fruit and vegetables on base acreage, farmers can designate the base to be forfeited for that year. The per acre value of the base varies on most farms, depending on the specific commodity historically produced on the base

Observations From a Trip to Michigan

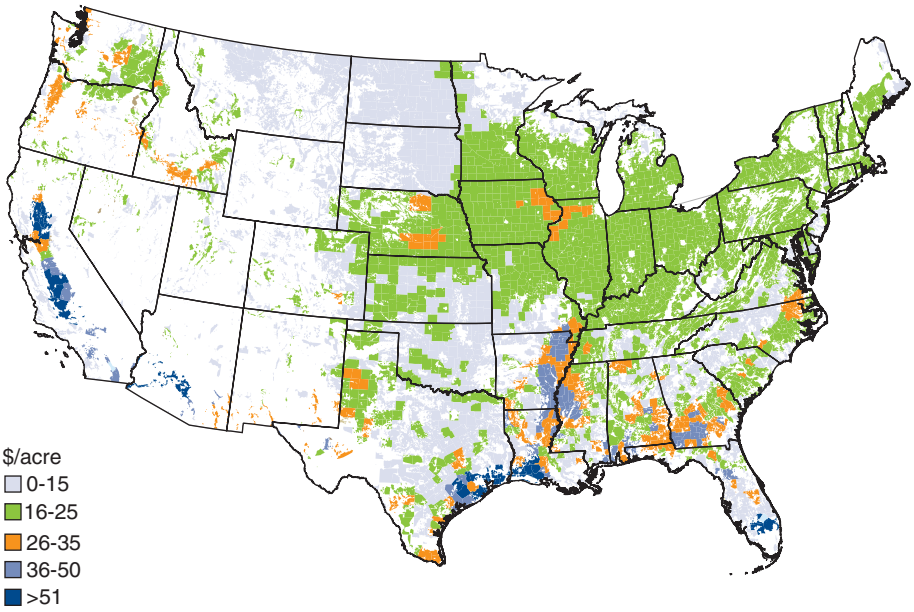
To gain perspective on these issues, we visited Michigan, where agricultural acreage is dominated by program crops but many fruit and vegetables are also grown. Over 3 days, we accompanied a team of researchers from Michigan State University to meetings with farmers, processors, and Extension staff in several counties. Although the number of participants was too small to qualify as a statistical sample (and no formal survey was taken), our discussions provided insight into the economic issues and attitudes of stakeholders. For many of the farmers—including vegetable producers, most of whom also owned base acreage—planting restrictions did not register as an issue of great importance. Some commodities (such as pickling cucumbers) are viewed as market constrained, with stagnant demand and little hope for acreage expansion. For producers with no previous experience in producing fruit and vegetables, the barriers to planting such crops as fresh tomatoes and most fruit are high enough that moving out of program crops is deemed extremely unlikely.

Planting restrictions are not always a binding constraint. Producers who want to grow vegetables can do so—without jeopardizing their direct or counter-cyclical payments—if they control or can gain control of sufficient nonbase acreage. A producer can plant fruit and vegetables on nonbase acreage that he or she owns or rents. If a producer does not have sufficient land, he or she can buy or lease additional nonbase cropland for fruit and vegetable production. This situation was illustrated by an enterprise we encountered in Michigan, with operations extending across several counties through multiple land rentals. By annually reconstituting the farm entity with the Farm Service Agency and renting sufficient nonbase acreage (in some cases, at considerable distance), this enterprise has been able to grow cucumbers and dry edible beans, without a reduction in payments, on acreage that was originally designated as base acreage. In addition, producers with a history of producing fruit and vegetables may do so by forgoing direct and countercyclical payments associated with the base acreage used for fruit and vegetables.

In Michigan, we met several dry edible bean producers who expressed concern about the possibility of new entrants under full planting flexibility. However, their concern was not merely that prices and returns would be pushed lower; it was also that new entrants would be collecting Federal subsidies on land planted to dry edible beans. Perceptions of fairness (or unfairness) were a dominant theme in these discussions of current restrictions and the possible shift to full flexibility.

Figure 1

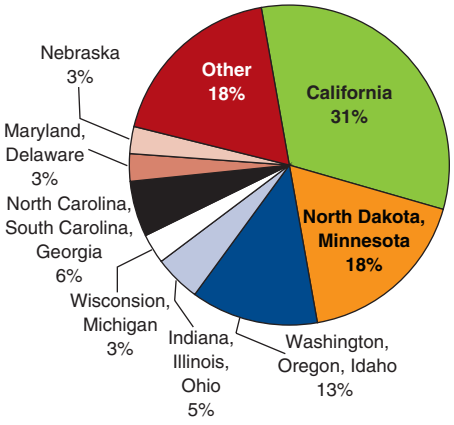
Per acre value of direct payments depends on commodities produced historically and local yields



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

Figure 2

Share of acreage by region on which farmers elected to lose program payments and to plant fruit and vegetables



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

acreage. Direct payments for oats average about $1 per acre, while payments for rice average close to $100 per acre. Thus, we would expect farmers to give up payments from lower valued base acreage first.

Payment Reduction Experience

The preceding discussion, which illustrates the payment reductions to a farmer if he or she violated the planting restrictions, raises the question: How frequently do program participants plant fruit and vegetables on base acreage? In 2003 and 2004, about 14,400-15,000 program farms planted fruit and vegetables on just over 600,000 base acres nationwide (table 2). About 99 percent of these farms had a history of planting fruit and vegetables on base acreage, so they lost direct and countercyclical payments ($22 per acre) associated with only the affected acreage. Almost one-third of the acreage with payment reductions was in California, and about one-fifth was in North Dakota and Minnesota combined (fig. 2).

The number of farms that experienced reduced payments rose under the 2002 Farm Act. The expansion of base acreage to include oilseeds reduced the availability of nonbase acreage for fruit and vegetable production. Also, under the 1996 Act, the penalty for planting fruit and vegetables was to forfeit all current and future payments under the 7-year contract farmers signed when they enrolled. Under the 2002 Act, farmers must enroll annually, which reduces the penalty.

Table 2
Payment reductions from planting wild rice, fruit, and vegetables

	Farms with a history of planting wild rice, fruit, and vegetables			Farms with wild rice, fruit, and vegetable planting violations[1]	
Year	Farms	Area	Payment reduction[2]	Farms	Payment reduction[2]
	Number	*Acres*	*Dollars*	*Number*	*Dollars*
1999	10,106	477,389	15,627,622	42	82,123
2000	9,278	469,333	13,346,750	30	31,411
2001	8,381	393,327	9,980,812	17	23,368
2002[3]	1,052	78,673	2,452,314	0	0
2003	14,926	616,942	13,456,814	56	37,220
2004	14,371	629,923	13,958,487	82	50,153

[1]A planting violation occurs when the farm operator plants wild rice, fruit, or vegtables on base acreage and the farm or producer does not have a planting history.

[2]Includes production flexibility contract and market loss assistance payments under the 1996 Farm Act and direct and countercyclical payments under the 2002 Farm Act.

[3]For 2002 contracts only, wild rice, fruit, and vegetables could be planted on excess base acreage and not be a violation of the contract or result in a reduction of direct and countercyclical payments.

Source: Farm Service Agency, USDA, unpublished payment reductions reports.

Agronomic and Economic Barriers to Expanding Fruit and Vegetable Production

A producer who is considering a shift or move into producing fruit and vegetables needs to consider potential demand (or revenue) and cost factors, particularly the specialized costs for the select commodity. For new growers, demand and cost factors can be substantial barriers to entry into fruit and vegetable production (table 3).

For farmers not constrained by program restrictions, planting decisions are based on the expected net return (revenue minus cost) for various crops that can be grown on a given parcel of land. Risks are also relevant to planting decisions; for risk-averse producers, higher risks must be balanced by higher expected returns.

We frame the discussion in terms of expected net return (ignoring risk aspects, a topic to which we return later). For a land parcel not subject to planting restrictions, the optimal crop is the one that maximizes expected net revenue. Alternatives might include fruit and vegetables, in addition to other crops. Suppose the farmer has n different cropping alternatives (i = 1, 2, …, n). The optimization problem can be represented as follows:

(1) $$\underset{i}{Max}\,(Net\ returns_i) = revenue_i - cost_i,$$

Now consider the effects of planting restrictions. For a land parcel subject to restrictions, the cropping alternatives have to be divided into two sets: fruit and vegetables and other "unrestricted crops." If the farmer elects to plant a fruit or vegetable, a payment reduction applies. The optimization problem becomes:

(2) $$\underset{i}{Max}\,(net\ returns_i) = \begin{cases} For\ fruit\ and\ vegetables: \\ Revenue_i - cost_i - payment\ reduction \\ \\ For\ unrestricted\ crops: \\ Revenue_i - cost_i \end{cases}$$

Government payments are reduced when fruit and vegetables are planted on base acreage. The size of the payment reduction depends on a number of factors. Farmers with an established history of growing fruit or vegetables usually incur a smaller payment reduction, as discussed earlier.

Cropping choices thus depend on the relative magnitude of market revenue, cost, and any payment reductions that apply. In some situations, payment reductions would be expected to have no effect on planting decisions. First, this situation could occur if comparisons of expected net returns did not favor production of fruit or vegetables. Production costs for these crops could be high relative to revenue, which amounts to a supply-side barrier to entry.

Second, payment reductions have little or no effect on planting decisions if they are small relative to the prospective gains from planting fruit or vegetables. The expected net return for a fruit or vegetable might exceed that for an unrestricted crop—by more than the value of payments foregone.

Table 3
Market and production barriers for new fruit and vegetable producers

	Market/demand factors			Production costs/supply factors					
Commodity	Market growth	Import competition	Contracting	Production expertise	Labor	Irrigation	Field preparation	Other production costs	Other
Processed market:									
Pickling cucumbers	N	L	M	M	L/M[1]	M	M	L	
Processed tomatoes	L/M	L	H	H	L[2]	H	M[3]	H	Need good yields due to low processor price offerings
Dry edible beans	N	M	M	M	L	L	L	L	Specialized handlers
Sweet corn	N/L	L	H	L	L	L/M	L	L	Mechanical harvest by processor
Green beans	L/M	L	H	L	L	L	L	L	Mechanical harvest by processor
Green peas	N	L	H	L	L	L	L	L	Mechanical harvest by processor
Potatoes	M/H	M	M/H	M	L	M	M	M/H	Custom harvest would save on machinery cost
Fresh market:									
Tomatoes	M/H	H	L	H	H	H	H	H	High capital requirement.
Bell peppers	M/H	H	L	H	H	H	H	H	High capital requirement.
Potatoes	L/M	L	L	M	L	M	M	M/H	Custom harvest would save on machinery cost
Pumpkins	L/M	L	L	L	M	L	L	L	Labor needs are heavy at harvest
Green beans	M/H	M	L	L	M/L[1]	L	L	L	Can be harvested by machine, if available in area
Broccoli	M/H	L	L	H	H	H	M	M	
Sweet corn	M/H	L	L	L	M/L[1]	L/M	L	L	Can be harvested by machine, if available in area
Strawberries	M/H	L	L	M	L[4]/H	H	M	H	Pick-your-own operation lowers labor cost, but requires higher insurance. Capital requirement high
Fruit:									
Apples	N	L	L	M	M/H	M/H	M/H[5]	M/H	Mostly hand harvested
Cherries	M/H	L	L	M	M/H	M/H	M/H[5]	H	Mostly hand harvested
Grapes	M/H	M	L	H	M/H	M/H	M/H[5]	H	Mostly hand harvested
Citrus	L/M	L/M	L	H	M/H		M/H[5]	H	Mostly hand harvested

N = Negative; L = Low; M = Medium; H = High.
[1]Depends on availability of custom machine harvest in area.
[2]Assuming processor responsible for harvest.
[3]Unless drip irrigation used, in which case H.
[4]Assuming pick-your-own operation.
[5]Depends on whether planted on previously planted orchards (M) or establishing a new orchard (H).

Source: Economic Research Service, USDA, assessment of market factors.

Third, farmers may choose not to plant fruit or vegetables because of constraints on demand. Access to a market (or buyer) may be controlled through contracting arrangements, for example, so that farmers can expect a given (favorable) return only on limited acreage. In that situation, payment reductions might have no practical significance for entry or expansion decisions.

The following snapshot of the fruit and vegetable sector illustrates key market factors, especially the costs of producing and selling fruit and vegetables. It illustrates the difficulty of generalizing about the likely impacts of eliminating planting restrictions for these diverse and specialized crops.

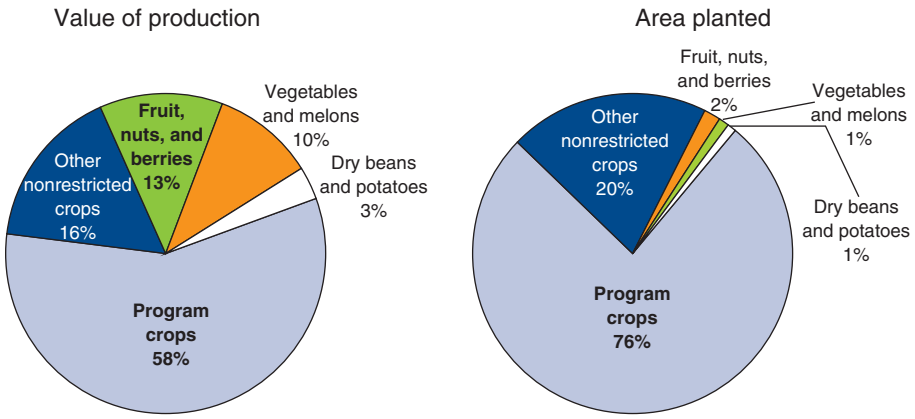
Fruit and Vegetable Sector Is Diverse[11]

The fruit and vegetable industry accounts for over one-quarter of U.S. crop cash receipts (fig. 3) and one-fifth of U.S. agricultural exports. Although the fruit and vegetable share of crop receipts is relatively large, these high-value crops are produced on less than 13 million acres, or less than 4 percent of U.S. planted cropland. This acreage produces a wide range of agricultural products (see Appendix: Area Planted and Value of Production for Selected Fruit and Vegetables). A window into this diversity is offered by the census of agriculture. The 2002 Census of Agriculture reports area and production for more than 100 fruit and vegetable commodities or groups of commodities. Some commodities are annuals (e.g., snap beans, tomatoes, and potatoes), while others are perennials (e.g., oranges, apples, and almonds). Some are grown for direct consumption, such as fresh-market apples, tomatoes, and onions, while others are grown for processing into such products as orange juice, tomato sauce, and frozen sweet corn.

Vegetables are produced throughout the United States, with the largest overall acreage (excluding that for potatoes and dry beans) in California and Florida (fig. 4). The upper Midwest (Michigan, Minnesota, and Wisconsin) and the Northwest (Washington and Oregon) report the largest vegetable acreage for processing, while California, Florida, and Texas harvest the largest share of fresh vegetable and melon acreage. The eastern seaboard States (from Georgia to New York) also report substantial vegetable

[11]For additional information on the fruit and vegetable sector, see the ERS Fruit and Tree Nuts Briefing Room at http://www.ers.usda.gov/Briefing/FruitAndTreeNuts/ and the Vegetables and Melons Briefing Room at http://www.ers.usda.gov/Briefing/Vegetables/.

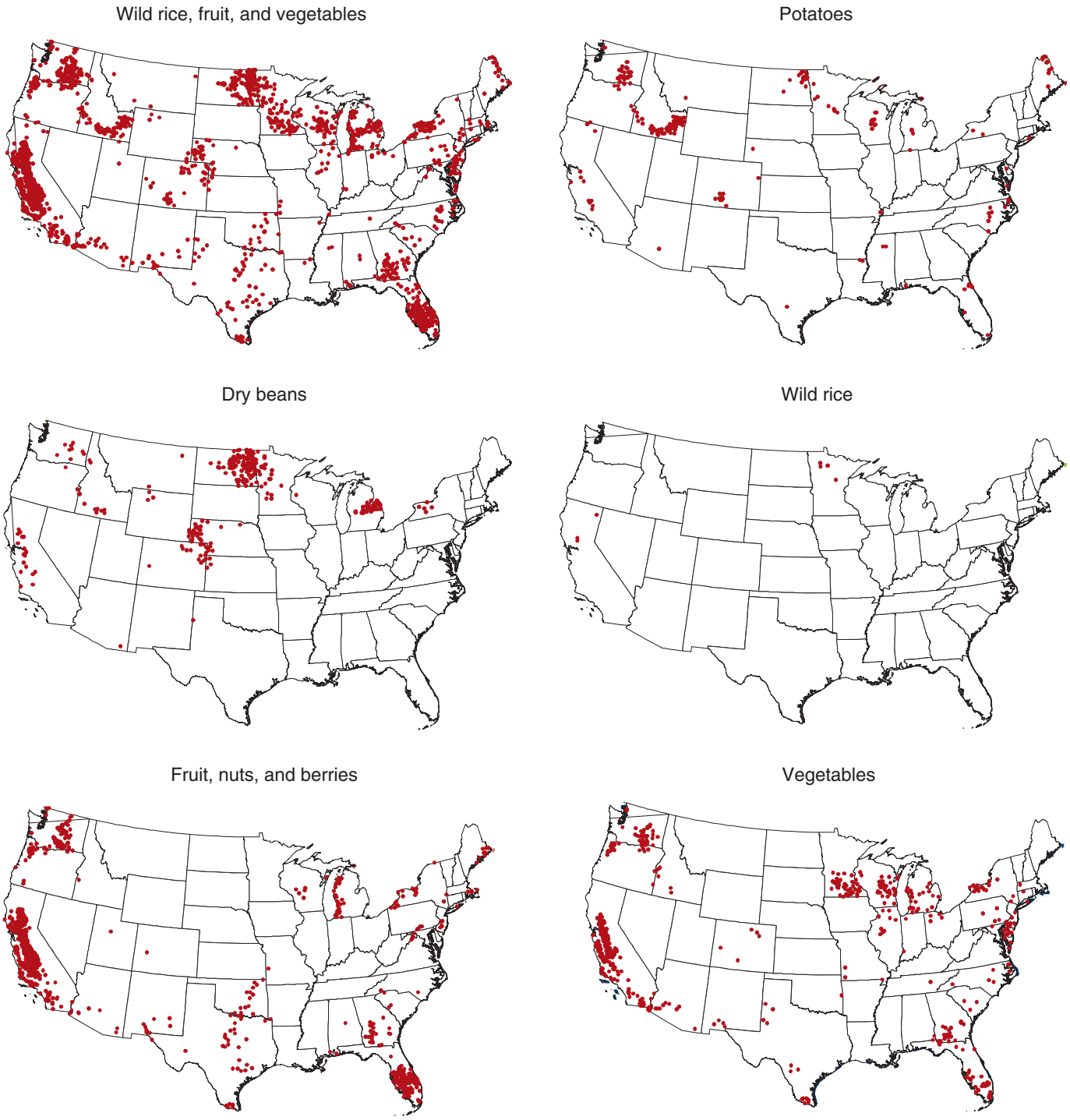
Figure 3
Share of crop's value of production and area planted, 2003



Source: National Agricultural Statistics Service, USDA, 2003.

Figure 4

Location of fruit and vegetable production, 2002



1 dot = 5,000 harvested acres

Source: National Agricultural Statistics Service, USDA, 2002.

acreage. With continuous strong output of cool-season crops, such as lettuce, broccoli, and celery, California remains the major producer of fresh vegetables even during the winter. Florida, however, is the top producer of warm-season crops (e.g., tomatoes, peppers, snap beans). Potato production is concentrated in the Northwest (Idaho, Washington, and Oregon), but Colorado, North Dakota, California, Wisconsin, and Maine are also key suppliers. North Dakota, the top dry pea and lentil producer, is also the largest producer of dry beans (about one-third of national output in 2002-04), followed by Michigan, Nebraska, Minnesota, and Idaho.

California, Oregon, Washington, Florida, Texas, Michigan, and New York lead in fruit orchard acreage. California alone accounts for nearly one-half of the Nation's fruit acreage, Florida almost one-fourth, and Washington close to one-tenth. California's mild climate gives it an advantage over other fruit-producing States. California is the Nation's largest producer of grapes, strawberries, peaches, nectarines, avocados, and kiwifruit. It also leads in production of fresh-market oranges and tree nuts, including virtually all almonds, pistachios, and walnuts. Washington is the largest apple producer for both fresh use and processing. Washington is also a leading producer of grapes (mostly for wine and juice), pears, and sweet cherries. Midwestern and Northeastern States are key producers of processed fruit products, such as canned tart cherries and apple sauce, while Florida, the primary citrus producer, leads in production of oranges for juice, grapefruit, and tangerines.

Market Considerations

Producers who are expanding fruit and vegetable production need to consider potential product demand; the need to locate, develop, and secure markets; the prevalence of contracting in the sector; and import competition (table 3). Market competition can be intense for many fruit and vegetables. Because demand for most fruit and vegetables is relatively inelastic, small changes in quantity supplied can induce large price changes. Diverting a small share of program crop acreage into fruit or vegetable production could represent a large acreage shift. For example, consider the shortrun price response in the fresh tomato market resulting from hurricane damage in Florida and rains in California during fall 2004. Because there are few substitutes for tomatoes on a sandwich or in other fresh uses, the resulting drop in November tomato supplies caused the free-on-board shipping point price for tomatoes to jump 274 percent over year-earlier levels (Lucier et al.).

Most vegetables destined for processing are grown under contractual arrangements between growers and processors. Contracting shifts a portion of the decisionmaking related to production from the grower to processors, such as juice processors, canning firms, and salad processors. Contracting is especially prevalent in the production of vegetables (tomatoes, sweet corn, green beans, and green peas), as processors require assurances of a crop's volume, specific characteristics (e.g., variety, size, color), and timing for delivery to the factory. Area grown under contract ranges from close to 100 percent for green peas to about 85 percent for cucumbers (Lucier et al.)

For a producer who wants to shift into processed vegetables, negotiating a production contract with a processor (or through an established bargaining

association) is virtually a prerequisite. Proximity to processing plants can limit the effective range of some vegetable crops (due to transport costs), with some regions, such as the Northeast, having few processing plants.

The longrun demand for many processing crops (especially canning crops) is stagnant or declining and offers little chance for industry acreage expansion. For example, per capita use of sweet corn for canning has declined 19 percent over the past decade (Lucier et al.). Removing acreage restrictions in such markets may reduce costs for some processors who may be able to contract acreage that is closer to the plant, thereby reducing transportation costs. Increasing acreage available to vegetable processors also could put downward pressure on contract prices that processors offer growers. With the potential for lower grower prices and stagnant or declining demand, incentives for new growers to enter the market may be small unless they have a price advantage from lower transportation costs or other factors.

Another consideration in deciding whether to enter the fruit and vegetable industry is competition from imported, and many times less costly, products. Imports play a substantial role in the fruit and vegetable industry, particularly for fresh-market fruit. Excluding banana imports, imports as a share of fresh fruit consumption have doubled, rising from 12 percent in 1992-94 to 24 percent in 2002-04 (Lucier et al.). Summer fruit, especially grapes, from the Southern Hemisphere account for much of the increase, although the popularity of tropical fruit, such as mangoes and papayas, has helped expand the level of imports in the U.S. market. Other fruit, such as apples, are facing stagnant demand and import competition.

Production Costs

While returns per acre can be substantial, costs of producing many fruit and vegetables (especially fresh-market crops) are high, creating significant barriers to switching land use from program crops to fruit and vegetables (table 3). A number of products have high labor requirements that are often difficult to meet. Other products require specialized harvesting equipment. Irrigation needs, high herbicide and pesticide costs, and specialized production and marketing expertise all contribute to high production costs.

The complexity of growing and marketing fresh-market produce can be much greater than that of most field crops. For example, producing cantaloupes in Arizona may require shaping beds, laying plastic mulch, hand thinning and weeding, pollinating (renting and setting out beehives), several passes with chemical control agents (herbicides, insecticides, and fungicides), irrigating half a dozen times during the season, and removing and disposing of the plastic mulch. At harvest, growers must arrange for harvest labor (likely a contractor), haul the melons to a cooler where field heat is removed, and sell the melons. Marketing fresh produce can be even more daunting than growing it because delivery of the product has to be quick.

Operating costs for some fresh fruit and vegetables are substantially greater than for field crops, and farmers may need to provide solid documentation of a marketing plan before receiving lender approval. For example, the cost of planting, harvesting, and packing an acre of bell peppers ranges from $5,000 to $13,000 (Smith and Taylor).

For a farmer switching to processing vegetables, such as dry beans, sweet corn, or green beans, startup and operating costs are much less onerous than for such crops as cantaloupes, strawberries, tomatoes, and peppers. Harvesting equipment used in soybean operations would be more adaptable for dry beans, for example, and local processors provide harvesters for most processing vegetables.

For example, the per acre cost of hand harvesting and sorting snap beans (green or wax) for fresh market in North Carolina is about 70 percent greater than harvesting by machine (and hand sorting and grading). However, the net return per acre is currently greater with hand harvesting because of higher yields. Hand harvesting allows growers to make multiple passes in a field over several days, while machine harvesting allows just one pass because plants are destroyed in the process (Estes, Sanders, and Sampson). Such products as fresh fruit, berries, and fresh-market pumpkins are largely harvested by hand, which can significantly raise labor costs. Although virtually all vegetables, and several fruit and tree nuts, for processing are machine harvested, several fresh-market crops now offer a choice of harvest method.

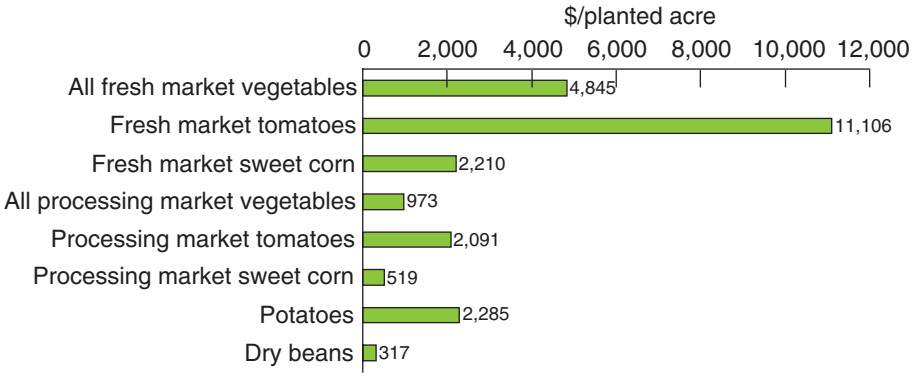
Planting fruit and nut trees and vines on base acreage may be less likely than planting vegetables and melons because trees and vines take several years to mature, and thus receiving a commercial fruit or nut crop from them takes longer.

Fruit and Vegetables Have Higher Value and Costs per Acre

The per acre value and production cost of fruit and vegetables are generally much higher than for program crops. We calculated value per acre for all vegetables, fresh and processed vegetables, and select vegetable categories (fig. 5 and appendix). For fresh-market vegetables, average revenue per planted acre during 2003-05 was about $4,800—five times that for processing vegetables. For comparison, we calculated the per acre value of production plus marketing loan benefits and direct and countercyclical payments for five program crops in 2003 (fig. 6).[12] The value for the program crops ranges

[12]Countercyclical payments are paid when prices fall below legislated levels, helping to maintain revenue when market prices are low.

Figure 5
Value of production per acre for selected fruit and vegetables, 2003



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

from about $144 per acre for wheat to about $835 per acre for rice. Fruit and vegetable crops have no national cost-of-production budgets, which makes it difficult to compare net returns for them with those for program crops.

Given the high cost of production for some fruit and vegetables, lower cost crops may garner more interest from new growers. Strawberries (for fresh and processing), fresh tomatoes, and bell peppers had the highest value (and by extension, the highest cost) per planted acre, with strawberries having by far the greatest value at nearly $27,000. Pumpkins, sweet corn, and watermelon had the lowest per acre value for fresh crops.

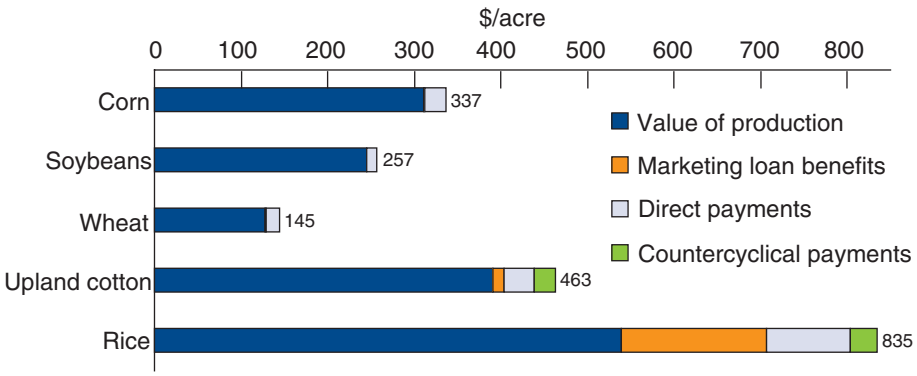
Green peas, sweet corn, and snap beans had the lowest per acre value among processing crops, with tomatoes (used to make such products as paste, sauces, and ketchup) having the highest. California produces 95 percent of the processing tomato crop—the single largest processing vegetable other than potatoes.

Seasonal Aspects May Limit Expansion

In evaluating the market effects of relaxing current restrictions, we must be aware of the seasonal dimension, especially for fresh vegetables and fruit. Outside of California, Florida, Arizona, and Texas, most market impacts would be limited to warm-season months (July-September) due to temperature and light conditions. An exception would be New Jersey and Georgia, where harvests of selected crops can extend from May through November. Supply shifts could affect the market for storable crops, such as potatoes, cabbage, and dry edible beans, until the next harvest when changes in market prices dictate the appropriate acreage response.

Most fruit and vegetables used for processing are harvested and processed during the summer and fall. However, because most canned, frozen, and dehydrated products are produced under contract, changes in market volume would largely be dictated by the needs of processors responding to market

Figure 6
Value per acre of production and marketing loan benefits plus direct and countercyclical payments per base acre for selected program crops, 2003[1]



[1]Assumes national average payment yields for direct payments.
Source: Compiled by the Economic Research Service, USDA, from data from the Farm Service Agency and the National Agricultural Statistics Service, both USDA.

demand for finished products, such as catsup, frozen corn, and canned peaches. Additional growers looking for processing contracts may push contract prices lower, but the volume contracted may not expand greatly (if at all) due to limited markets for most of these products.

During the late fall, winter, and early spring, domestic sources for warm-season fresh crops, such as tomatoes, peppers, cucumbers, squash, and snap beans, are limited. Florida, with a limited number of base acres, produces 40 percent of the U.S. fresh tomato crop and other warm-season crops. Imports are an important component of the market for most warm-season crops during the three seasons, while greenhouse products continue to snare an ever-growing share of the tomato and bell pepper retail market. Thus, summer to early fall, when most States have vegetable crops, is the period that is most at risk from any crop acreage shifts.

Seasonal factors complicate the national picture. For example, a surge in fresh-market tomato supplies harvested during the summer and early fall in Northern States could affect prices and revenues during the summer tomato season and the early portion (October and early November) of Florida and California's fall tomato market. However, these supplies would not directly affect Florida's (and the United States') winter- and spring-season tomato markets. Thus, the impact of changing acreage and output may be much more limited when viewed from a seasonal perspective because only a portion of a year's crop and the producing States may be affected.

Competition for Land Between Program and Fruit and Vegetable Crops[13]

To put bounds on possible land use shifts if planting restrictions were relaxed, we identify where various crops can be grown and where current base acreage constraints may be restricting production of wild rice, fruit, and vegetables. According to the census of agriculture, about 434 million acres of cropland were available in 2002, of which about 12.5 million acres were used to produce fruit and vegetables. USDA's Farm Service Agency (FSA) indicates that 266 million acres of cropland were designated as base acreage in 2003 and 35 million acres of cropland were enrolled in the Conservation Reserve Program and not available for annual crop production.[14] From this information, one might conclude that current planting restrictions are not binding and that sufficient land is available to increase production of fruit and vegetables.

Where Is Fruit and Vegetable Production Limited?

We plotted the geographical intersection of crop production and base acreage by using a series of maps to illustrate where planting restrictions might be significant and which commodities might be affected. An advantage of maps is that they convey some of the variation in land use (and land constraints) across regions.

The first map shows base acreage as a share of total cropland, minus land enrolled in long-term retirement programs (fig. 7).[15] The map shows the relative importance of base acreage in various regions. Base acreage comprises a particularly large share of cropland in the Corn Belt, northern Plains, Mississippi Delta, and parts of the Southeastern States. While a much smaller share of available cropland, base acreage is important in California, the most important fruit- and vegetable-producing State. Very little cropland in Florida, the second leading fruit- and vegetable-producing State, is designated as base acreage.

The second map shows fruit and vegetable area as a share of nonbase cropland (fig. 8). The map highlights areas where further expansion of fruit and vegetables may be limited either by lack of total land or by planting restrictions on base acreage. Eastern North Dakota, a region where dry beans and potatoes are grown, shows up as a region where base acreage constraints may be limiting fruit and vegetable production. Land constraints also show up in southern Minnesota, central Wisconsin, northern Illinois, western Michigan, and western New York, where a variety of processing fruit and vegetables are grown. In California and Florida, fruit and vegetables already account for a large share of cropland. Other areas to note include parts of the eastern coastal plain, southern Idaho, and central Washington. While fruit and vegetable acreage is high in these areas, many counties in these regions have more than 100,000 acres of additional nonbase land available for crop production.

An alternative to looking at current land constraints is to look at potential changes in land availability after a policy change. Figure 9 illustrates a shift in land availability for fruit and vegetable crops and compares the relative availability of land with planting restrictions in place and the availability if

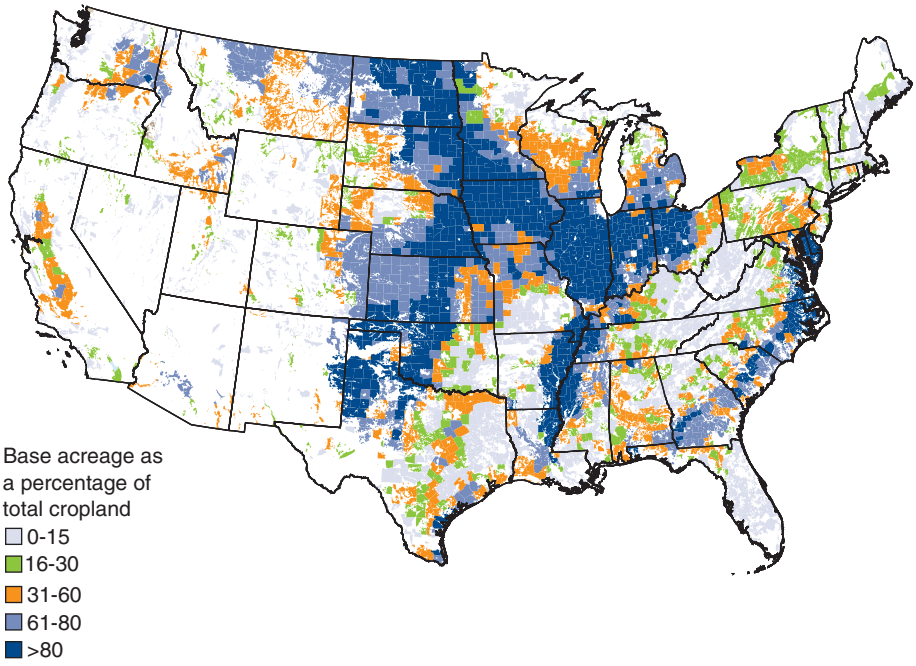
[13]This section draws on data from the Census Bureau and from USDA's Farm Service Agency. These data sources are not totally compatible. Farm program data are collected for farms based on ownership. Thus, an operating farm that leases land might consist of several FSA farms. In addition, an FSA farm might extend across county boundaries, which can affect any analysis done using county-level data.

[14]Farm program data for 2003 are used for comparison in this analysis because 2002 was a transition year for farm programs. For 2002 contracts only, fruit, vegetables, and wild rice could be planted on base acreage and not violate the contract or result in reduced direct and countercyclical payments.

[15]Land enrolled in the Conservation and Wetland Reserve programs is generally unavailable for annual crop production.

Figure 7

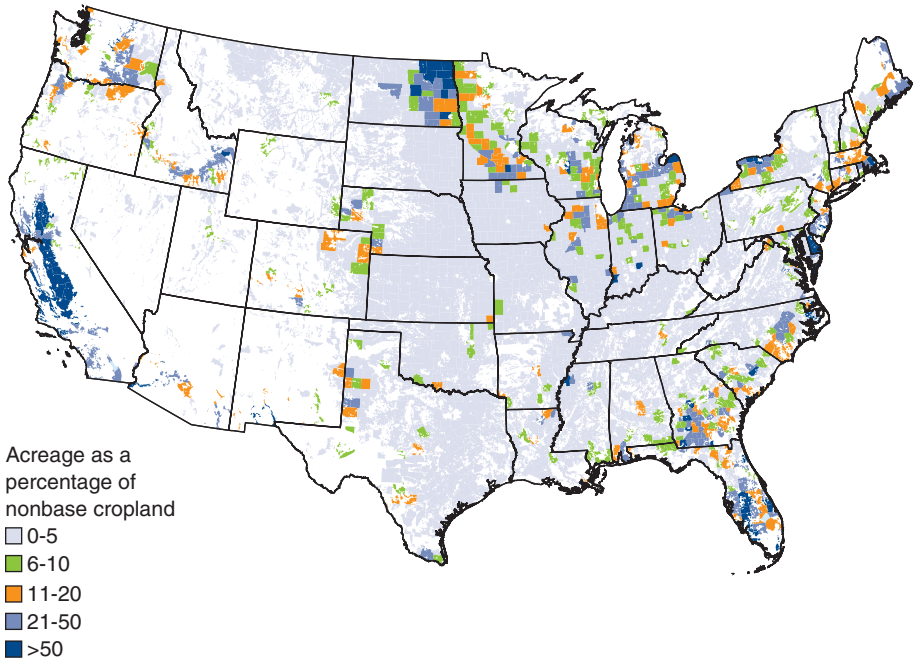
Higher shares of total cropland designated as base acreage indicate where land may be constrained



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

Figure 8

Fruit and vegetable area planted comprises a large share of nonbase cropland in some regions



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

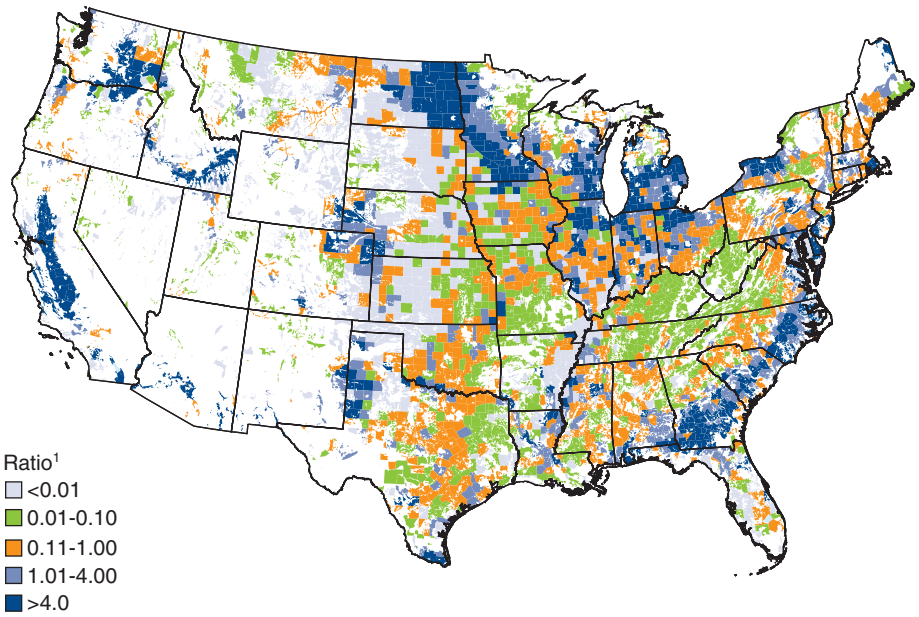
they were lifted.[16] Darker shades indicate regions where the relative availability of land for fruit and vegetables could change the most. Eastern North Dakota, Minnesota, Wisconsin, Michigan, and California are areas where the change could be most significant.

The maps help us identify areas where planting restrictions may limit fruit and vegetable production (figs. 7-9). However, they do not identify the specific commodities likely to be affected by relaxed planting restrictions. To identify the particular fruit and vegetables limited by base acreage, we computed base acreage as a share of cropland in States producing selected fruits and vegetables, weighted by State shares of planted acreage (fig. 10). This measure indicates that planting restrictions are most important for dry beans, processing vegetables, and potatoes. About 30 percent of cropland in regions that produce citrus crops is base acreage compared with 70 percent in regions that produce dry beans.

Where Are Farms That Produce Both Fruit and Vegetables and Program Crops?

The preceding discussion illustrates the overlap in regions where program and fruit and vegetable crops are produced. In fact, many producers frequently grow multiple commodities on their farms, including fruit and vegetables as well as program commodities. To evaluate the overlap between program crops and fruit and vegetable production, we look at FSA "certified" acreage. Farmers who participate in the direct and countercyclical payment

Figure 9
Impact of eliminating planting restrictions on the relative availability of land for fruit and vegetables



[1]Ratio of fruit and vegetable acreage to nonbase acreage minus the ratio of fruit and vegetable acreage to total cropland.

Source: Compiled by the Economic Research Service, USDA, from the Farm Service Agency, USDA, data.

[16]The variable being mapped (by county) is the difference between two ratios: (RC / NB) - (RC / TA), where RC denotes acreage planted to fruit and vegetables, NB denotes nonbase acreage, and TA denotes total available acreage. The first ratio measures relative availability of land with planting restrictions in place; the second shows relative availability when restrictions are lifted.

programs must annually report or "certify" the use of land on their farms. We used State-level summaries of these acreage reports and program enrollment data for 2003.

These producers presumably could expand production of fruit and vegetables if the planting restrictions were eliminated. Many farms currently produce or have a history of producing fruit and vegetables on base acreage. Farm landowners could have established a history of producing fruit and vegetables in 2002 when oilseeds were added to the list of program crops, even if they did not plant fruit and vegetables on base acreage. For example, consider a farm with 100 corn base acres and 50 other acres. This farm planted 80 acres of corn, 50 acres of soybeans, and 20 acres of fruit and vegetables in 1998-2001. When designating base acres in 2002/03, the landowner likely would have designated 100 acres as the corn base and 50 acres as the soybean base. By designating all of its acreage as base, the farm would have established a history of planting fruit and vegetables on base acreage.

Farms that certified acreage planted about 2 percent of their cropland, over 6.5 million acres, to fruit and vegetables in 2003 (excluding lentils, dry peas, and mung beans) (table 4).[17] Thus, about one-half of land devoted to fruit and vegetables is on farms that certify acreage with FSA.[18] As noted previously, farmers are less likely to plant fruit trees and vines on base acreage than they are to plant vegetables and melons because trees and vines require several years to mature, thus delaying harvest. Less than one-quarter of the land devoted to production of fruit, nuts, and berries is on farms with certified acreage.

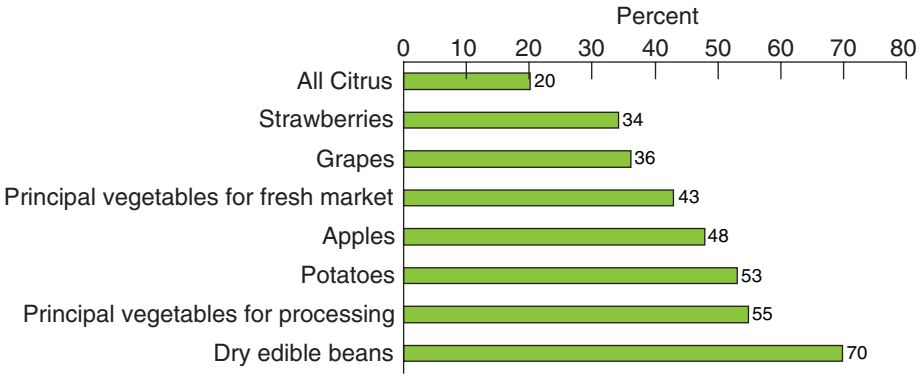
Farms that certify acreage with FSA account for most vegetable production and for 80 percent of land planted to vegetables, dry beans, and potatoes. Four commodities (sweet corn, tomatoes, dry beans, and potatoes) make up most of this acreage. Relaxing planting restrictions could result in greater production of these four commodities on land-constrained farms because many of them have produced these commodities.

Fruit and vegetable production is concentrated due to agronomic constraints; 10 States, each with over 200,000 acres of fruit and vegetables on farms

[17]We assume that almost all farms that certify their cropland use to FSA do so because they have base acreage. We acknowledge that a small proportion of the fruit and vegetable acreage on these farms may not be on farms with base acreage.

[18]County-level data are used for this analysis. Thus, a farm that produces fruit and vegetables could have a small share of the base acreage in the county.

Figure 10
Share of base acreage in areas producing selected fruit and vegetables



Source: Compiled by the Economic Research Service, USDA, from data from the Farm Service Agency and the National Agricultural Statistics Service, both USDA.

with certified acreage, account for 70 percent of area devoted to producing fruit and vegetables (fig. 4). California accounts for over one-half of the area devoted to fruit, nuts, and berries and is the leading State in tomato production, with about 85 percent of tomato acreage on farms with certified acreage. North Dakota, with almost 500,000 acres of dry edible beans on farms with certified acreage, is the leading State for dry beans.

Is Forgoing Direct and Countercyclical Payments Worthwhile?

The 80 percent of potato, dry bean, and other vegetable production on farms with program acreage clearly shows that many producers with base acreage have experience in producing fruit and vegetables and could increase production if planting restrictions were removed. Farmers who forfeited payments or violated program rules already have strong market incentives to produce fruit or vegetables.[19] In fact, many producers with a history of producing fruit and vegetables have assessed the benefits and costs of planting fruit and vegetables on base acreage and have elected to forgo payments and to plant fruit and vegetables. In 2004, producers gave up nearly $14 million in direct and countercyclical payments on 630,000 acres in order to plant fruit

[19]In addition, as noted previously, a farmer can lease nonbase cropland and reconstitute his/her farm in order to plant fruit and vegetables.

Table 4
Cropland use: Certified acreage compared with total cropland, 2003

Item	Land use on farms that certify acreage[1]	U. S. total
	1,000 acres	
Wheat, feed grains, rice, upland cotton, oilseeds, and peanuts	255,914	255,914[1]
Fruit and vegetable crops:		
Dry beans	1,177	1,406[2]
Potatoes, all	1,246	1,368[2]
Other vegetables and melons—	2,842	3,755[3]
Sweet corn	540	710[2]
Tomatoes	320	436[2]
Other beans	443	348[2]
Miscellaneous vegetables	1,582	2,261[3]
Wild rice	43	38[3]
Fruit, nuts, and berries	1,253	5,536[3]
All restricted crops	6,562	12,103
Other principal crops, including lentils, dry peas, and mung beans, but excluding hay	5,761	5,747[2]
Other cropland (includes miscellaneous crops, forage, nursery, and greenhouse, idle; excludes Conservation Reserve Program)	63,101	126,437[4]
Total cropland	331,324	400,201[3]
Base acres	266,196	266,196[1]

[1]Source: Farm Service Agency, USDA.
[2]Source: National Agricultural Statistics Service, USDA, Quick Stats, 2003.
[3]Source: National Agricultural Statistics Service, USDA, Census of Agriculture, 2002.
[4]Includes 63 million acres of hay and forage.

and vegetables (table 2). Thus, a large share of fruit and vegetable acreage, almost 10 percent of the 6.6 million acres of vegetable production on farms with certified acreage (table 4), is on base acres.

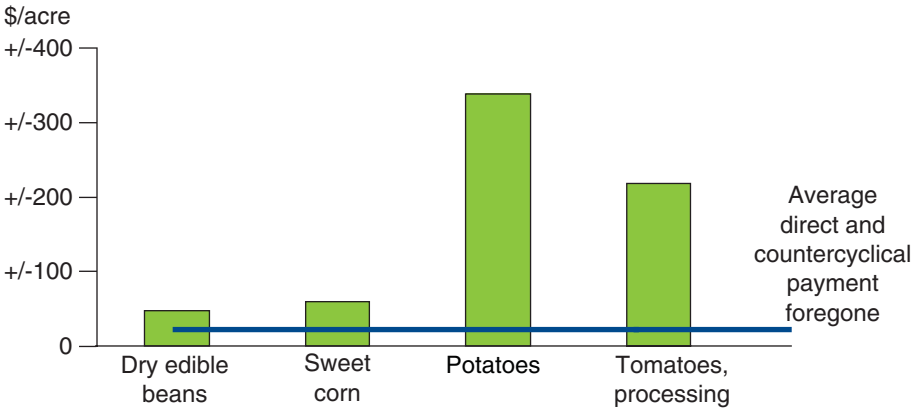
The per acre value of producing fruit and vegetables exceeds the per acre value (including direct payments) of producing competing program crops (figs. 5 and 6).[20] Higher production costs and greater risk are two reasons that producers may choose not to plant additional acreage to fruit and vegetables. The average variation in revenue for dry beans, sweet corn, potatoes, and processing tomatoes ranges from a low of about $46 per acre for dry beans to a high of $338 per acre for potatoes (fig. 11). In deciding whether or not to forgo payments on base acreage, producers with a history of planting fruit and vegetables compare fixed payments to differences in market revenue, which are highly variable across crops. In 2003, however, many producers with a history of producing fruit and vegetables concluded that giving up payments that averaged $22 per acre in order to plant fruit and vegetables on base acreage made economic sense.

California, with some of the most valuable base acreage, provides an interesting example of acreage shifts into production of a high-valued crop (fig. 1). Land devoted to almond groves has sharply increased over the last decade, and some of the rise has been at the expense of cotton base acreage. Cotton has some of the highest per acre value of payments. The United States has been the world's leading almond producer since 1977, contributing one-half of total output—nearly all produced in California's San Joaquin and Sacramento Valleys. Both domestic and export demand have been rising, with export value exceeding $1.6 billion. With recent high prices, the prospective returns for almonds—a crop that takes years to bear fruit—are such that some cotton farmers have been willing to give up their direct and countercyclical payments.[21] The value of expected net revenue from almond production exceeds the expected revenue plus government payments for cotton. While base acreage constraints could impede land-use shifts into almond production, they are not preventing the switch.

[20]While the per acre value of rice and cotton, including payments, exceeds the value per acre of processing sweet corn and dry beans, sweet corn and dry beans generally do not compete for land with rice and cotton because of regional and agronomic conditions.

[21]As reported by Schuster, one farmer claims that he can make $2,000 more per acre with almonds than with cotton.

Figure 11
Standard deviation in revenue per acre compared with average direct and countercyclical payments



Source: Compiled by the Economic Research Service, USDA, from data from the Farm Service Agency and the National Agricultural Statistics Service, both USDA.

Planting Dry Beans on Base Acreage: Economic Tradeoffs

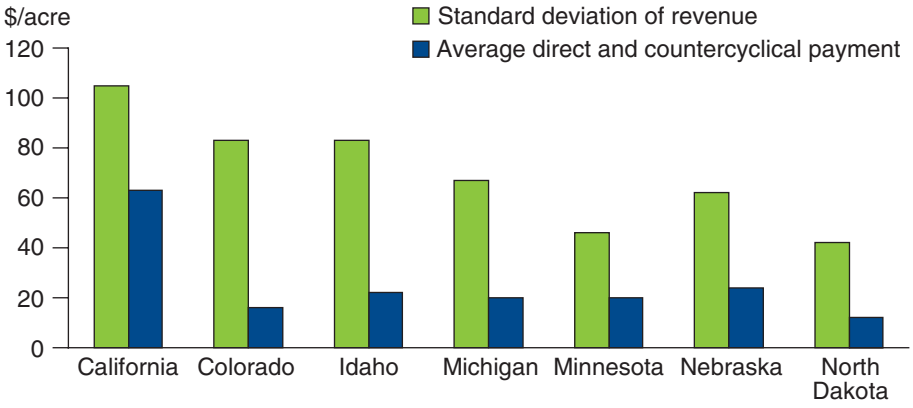
In order to illustrate some of the economic tradeoffs in planting fruit and vegetables on base acreage, we use farm- and market-level analyses in the case of dry bean production. Dry beans are grown commercially in many locations, frequently on farms with base acreage. Almost 1.2 million acres of dry beans were planted on farms with certified acreage in 2003 (table 4).

Dry beans provide an example of the potential market adjustments that could result from relaxed planting restrictions. Dry beans are unique for two reasons: (1) they have more area devoted to them than area for any other fruit and vegetables, and (2) many producers could easily expand production because they already have the experience and equipment needed to produce dry beans.

The tradeoffs between dry bean revenue and program payments vary considerably from one region to the next (fig. 12). Producers are forgoing payments that offset between 25 percent and 47 percent of the variation in revenue from dry beans. Farmers with a planting history in North Dakota are giving up about $11 per acre in payments to plant fruit and vegetables, such as dry beans. If payments were not reduced when dry bean plantings increased, how much would these farmers raise production? Would producers who do not have a history of planting fruit and vegetables elect to produce dry beans or some other crop? We now look at tradeoffs for a farm in Cass County, ND, and then consider the potential overall market adjustments if dry bean acreage expanded nationally.

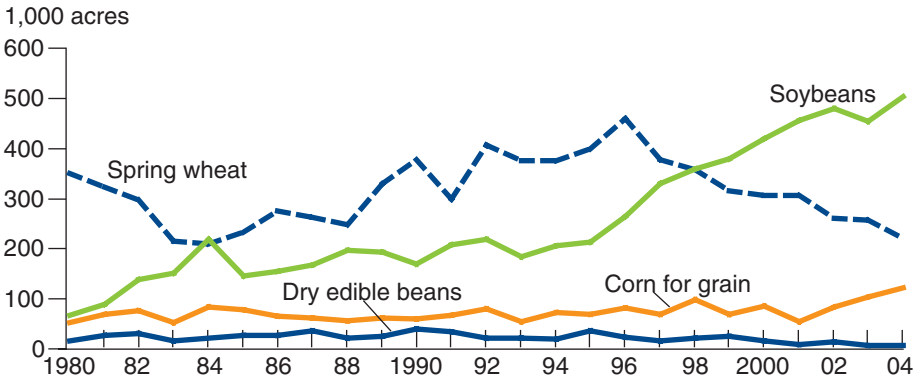
Our analysis of overall market effects was complicated by the lack of comprehensive and consistent data, the large number of commodities, and the limited estimates of relevant economic parameters. We use breakeven analysis and a simple market equilibrium simulation model to illustrate the basic economic tradeoffs. While a more extensive simulation would be informative, a comprehensive model that includes fruit and vegetable markets is not available. Building such a model would have been beyond the scope of this analysis.

Figure 12
Dry beans: Variation in revenue per acre compared with direct and countercyclical payments



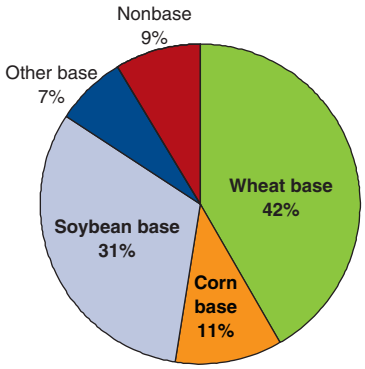
Source: Compiled by the Economic Research Service, USDA, from data from the Farm Service Agency and the National Agricultural Statistics Service, both USDA.

Figure 13
Area planted by crop, Cass County, ND



Source: National Agricultural Statistics Service, USDA.

Figure 14
Base acreage as a share of total cropland, Cass County, ND



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

Farm-Level Analysis of Planting Restrictions: Cass County, ND

Analyzing farm-level tradeoffs between producing program crops and fruit and vegetables illustrates the potential impacts of eliminating planting restrictions. We selected Cass County, ND, as a representative county for a case study. Cass County is located in the Red River Valley in eastern North Dakota. Spring wheat was historically the dominant crop, but it has been overtaken by soybeans in recent years (fig. 13). Dry edible beans represent an alternative to program crops in Cass County. Base acreage accounts for about 91 percent of cropland in Cass County (fig.14). Wheat accounts for the largest share of base acreage, followed by soybeans and corn. Other base acreage (7 percent of total cropland) consists largely of barley and sunflowers.

Breakeven Analysis

One way to analyze cropping alternatives is with breakeven analysis, which identifies prices for which the alternative practices produce identical net returns. We are interested in identifying price relationships that would induce a producer to shift acreage out of a program crop and into dry edible beans. This analysis builds on an earlier study by Westcott and Zepp, conducted when the current planting restrictions were initially considered. Although dry edible beans offer a high expected market return, they do not qualify for direct and countercyclical payments (or payments under the marketing loan program). The availability of direct and countercyclical payments can make program crops (or any permitted alternative) more attractive than a fruit and vegetable (table 5). In deciding whether or not to plant dry beans on base acreage, a

farmer would consider if dry edible beans would be planted on all or only part of his or her base acreage and if the farm has a history of planting fruit and vegetables. For a farmer without history, all of the direct and countercyclical payments likely would be forfeited if any base acreage were planted to dry edible beans (see "Illustration of Payment Reductions When Fruit and Vegetables Are Planted on Base Acreage," pp. 4-8). Thus, under current program rules, these producers are unlikely to plant dry edible beans on base acreage.

A farm with a history of planting fruit and vegetables would face different constraints. In this case, the farmer must give up only the payments associated with the base acreage used to produce dry edible beans. Breakeven prices for dry edible beans compared with prices for corn, soybeans, and spring wheat are shown in figure 15 for a farm with a planting history. If

Table 5
Components of expected revenue per acre, Cass County, ND

Component	Unit	Spring wheat	Soybeans	Corn	Dry edible beans
Program parameters:[1]					
Loan rate	$/bu	2.75	5.00	1.95	NA
Direct payment rate	$/bu	.52	.44	.28	NA
Target price	$/bu	3.92	5.80	2.63	NA
Direct payment yield	bu/acre	35.1	29.1	80.3	NA
Countercyclical payment yield	bu/acre	37.9	32.4	94.7	NA
Market parameters:					
Expected yield per acre planted[2]	bu/acre; lbs/acre for dry beans	46	33	122.9	1,479
Expected price[3]	$/bu; $/cwt for dry beans	3.27	5.50	2.06	19.00
Variable cost	$/acre	87.70	73.10	172.30	130.10
Expected per acre revenue:					
From market sources[4]	$/acre	62.72	108.40	80.87	150.91
From direct and countercyclical payment[5]	$/acre	19.70	10.88	42.45	NA
From market revenue plus payments	$/acre	82.42	119.28	123.33	150.91

NA = Not applicable.

[1]Based on Farm Service Agency data for Cass County, ND.

[2]Planted yields, rather than harvested yields, are used to capture the impacts of abandoned acres on crop revenue.

[3]For program crops (spring wheat, soybeans, and corn), expected prices for 2005 are based on regressions of the State-average marketing-year average price on harvest-period futures, quoted at planting time. For dry edible beans, the expected price is based on a regression of State-average price on planting-period (April) price received and change in yield for a weighted average of all dry edible beans.

[4]Ignores covariance of price and yield.

[5]Assumes that land planted to the program crop is base for that crop.

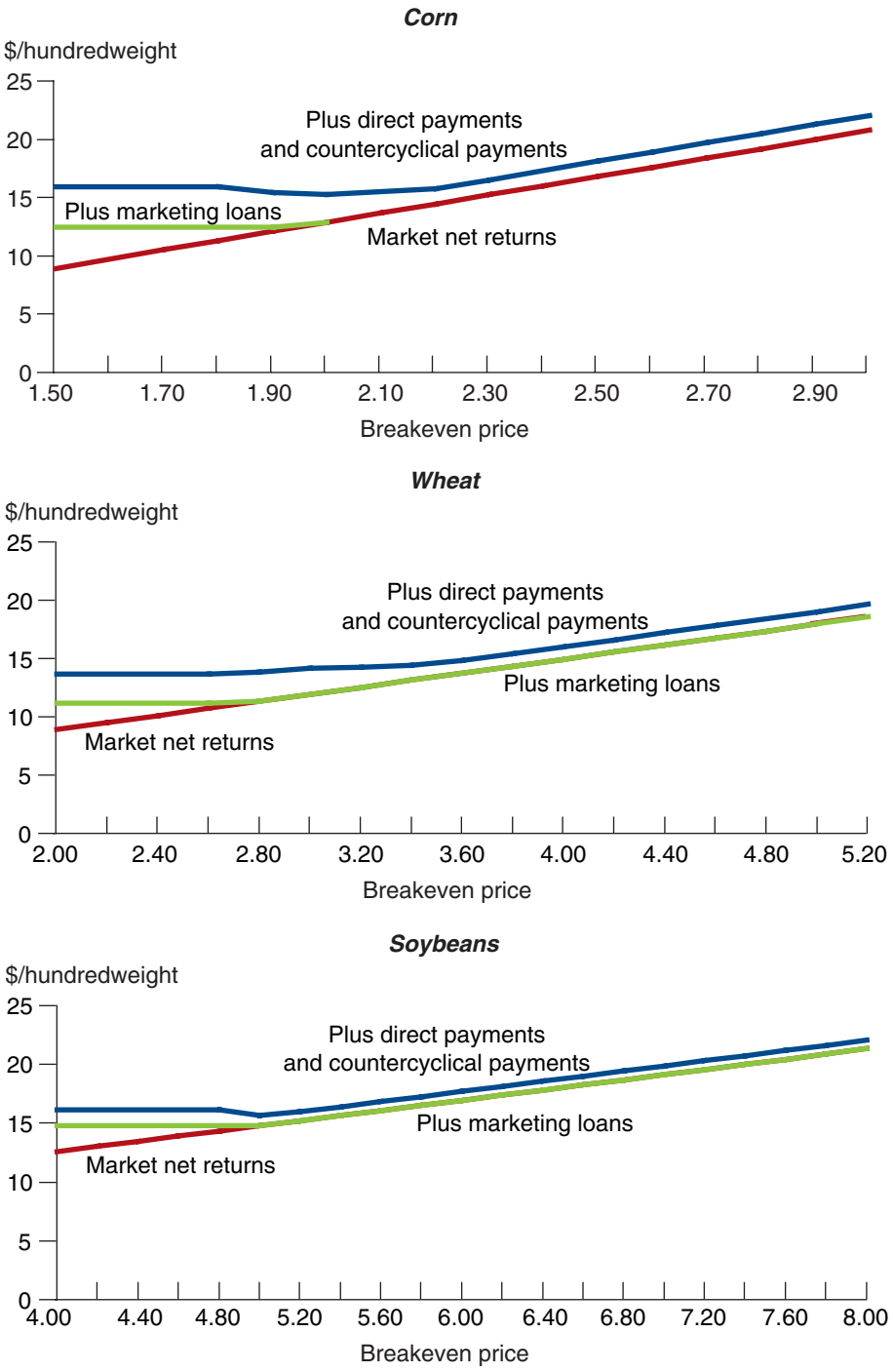
Sources: Calculations from Farm Service Agency, USDA; North Dakota State University Extension Service; National Agricultural Statistics Service, USDA; and Economic Research Service, USDA.

planting restrictions were relaxed, producers would compare market revenue for corn, soybeans, and spring wheat with market revenue for dry beans.

For any given price expectation for corn, soybeans, or spring wheat, expected dry bean prices above the breakeven line favor production of dry beans. An estimated expected price of $19/hundredweight (cwt) for dry edible beans

Figure 15

Breakeven price of dry beans compared with corn, soybeans, and wheat



Source: Compiled by the Economic Research Service, USDA, from Farm Service Agency, USDA, data.

suggests that dry edible beans would displace the three program crops, which is a curious result given the small share of dry edible beans in actual harvested acreage. Several interpretations are possible. First, the crop budgets used in this analysis might not represent actual cost differences experienced by producers.[22] Second, agronomic or rotation factors or perceptions of risk may prevent large acreage shifts into dry edible beans. For example, dry beans are subject to different price and yield risks than are program crops. Third, if producers are unable (for rotational or other reasons) to shift entirely into dry edible beans, the loss of program payments may provide a strong disincentive. Fourth, the farmer may not have a marketing contract.

[22]The results are consistent with 2005 crop budgets prepared by Swenson and Haugen, which show relatively high returns for dry edible beans in the southern Red River Valley.

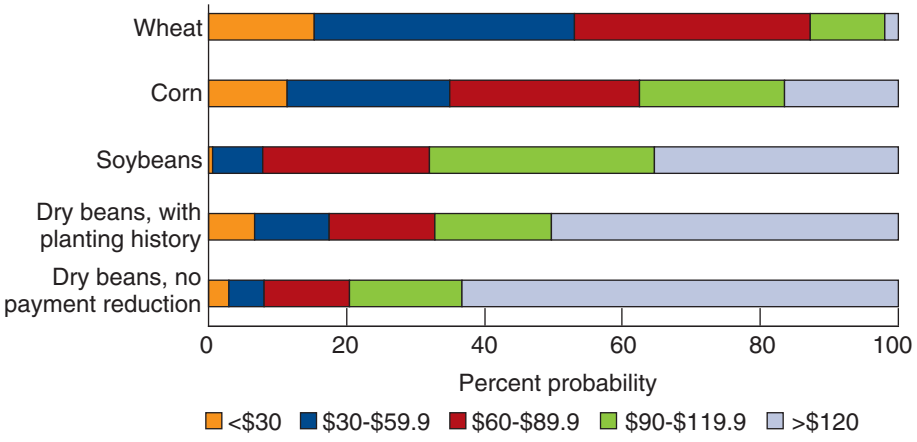
Farm-Level Simulations

Farm-level simulations extend breakeven analysis to account for correlations between variables. This approach provides a more comprehensive way to evaluate cropping choices by taking into account variation in prices and yields. We extended our analysis for Cass County by treating prices and yields as random variables in order to illustrate the impacts of risk in a farmer's decisionmaking. We developed the analysis from the perspective of a farmer who is considering cropping alternatives in April. Sources of risk include expected yields, local (State) cash prices, and national average prices (used in calculating countercyclical payments).[23]

[23]Distributions of the random variables (i.e., standard deviations and correlations) are consistent with data from the last 24 years. The simulations involve 1,000 random draws from a multivariate normal distribution. Variances and covariances were derived from regression residuals.

Figure 16 summarizes the results from farm-level simulations. Net return distributions are displayed as horizontal bars. For individual crops, the bars show the probability of net returns (dollars/acre) falling within a given range, price, and yield risk. Dry beans have considerable upside potential (chance of high per acre returns) and moderate downside risk, even when direct and countercyclical payments must be forfeited. The top three bars compare program crops: soybeans, corn, and wheat. The distribution of net returns for soybeans is particularly interesting. Under current planting rules, the farm-level simulations indicate that soybeans exhibit less downside risk than dry edible beans do, which could be an important consideration in planting decisions. For a producer with a fruit and vegetable planting history, the additional risk of

Figure 16
Probability of net returns for dry beans and program crops falling within a given range, Cass County, ND



Source: Economic Research Service, USDA.

dry beans would have to be weighed, along with the chance of higher per acre returns, when considering whether to plant dry edible beans or soybeans.

Illustration of Market Adjustments

While farm-level analysis can illustrate the incentives to producers, it does not illustrate effects of planting restrictions, or their removal, at the national market level. The following example omits regional detail, but it does indicate the overall effects of eliminating current planting restrictions.

We focus again on dry edible beans. To quantify the effect of eliminating planting restrictions, we start with a two-way classification scheme for available cropland in the 18 States where dry edible beans are grown. First, land is divided between dry edible beans and a composite of grains, oilseeds, and other unrestricted crops. Second, land is divided between program participants and nonparticipants. This framework gives us a way to illustrate the market impacts on different types of producers: those who collect direct and countercyclical payments (and are subject to planting restrictions) and those who do not. Dry edible beans account for about 1.4 million acres nationally out of an estimated 218 million acres of available cropland in the 18 States (table 6).[24] Program participants control about 84 percent of dry bean acreage and 86 percent of acreage planted to other crops, excluding fruit and vegetables. Although per acre gross revenue is higher for dry edible beans than for other crops, dry edible beans account for only 0.8 percent of the combined market value of crops in the analysis.

To illustrate the effects of a policy change, we use information on acreage and gross returns in a simple model of market equilibrium (see box, "Modeling Market Impacts"). The model differentiates program participants from nonparticipants and derives supply functions (for dry edible beans and for a composite of unrestricted crops) for each group. If planting restrictions were eliminated, program participants would no longer lose direct and countercyclical payments when they grow dry edible beans. This change can be

Table 6
Acreage and market value of dry edible beans and other crops in 18 States where dry edible beans are produced

Crop	Program participant	Nonparticipant	Total	Market value	Average gross return
	----------*Million acres*----------			*Million dollars*	*$/acre*
Dry edible beans	1.18	0.23	1.41	430	305.8
Other[1]	186.39	30.68	217.07	56,677	261.1
Total	187.57	30.91	218.48	57,107	NA
			Shares		
Dry edible beans	.837	.163	1	.008	NA
Other	.859	.141	1	.992	NA

NA = Not applicable.
[1]Includes grains, oilseeds, hay, and other crops not subject to acreage restrictions.

Source: Authors' calculations based on acreage data from the 2002 Agricultural Census, 2003 National Agricultural Statistics Service, USDA, acreage reports, and 2003 Farm Service Agency, USDA, compliance reports. Average gross returns were derived from Table 9-23 in USDA-NASS Agricultural Statistics, 2004. These are multiplied by total acreages to obtain estimated market value.

[24]Cropland estimates are based on the 2002 Agricultural Census. Available cropland excludes land that is idled or planted to other fruit and vegetables. Land controlled by program participants (by crop) was obtained from USDA-FSA compliance reports. Land controlled by nonparticipants is calculated as a residual. The analysis is limited to 18 States for which USDA's National Agricultural Statistics Service reports dry bean production: California, Colorado, Idaho, Kansas, Michigan, Minnesota, Montana, Nebraska, New Mexico, New York, North Dakota, Oregon, South Dakota, Texas, Utah, Washington, Wisconsin, and Wyoming.

Modeling Market Impacts

To estimate the aggregate impact of eliminating planting restrictions, we use a simple model of market equilibrium for the 18 States where dry edible beans are produced. We calibrate supply and demand functions to reproduce the current equilibrium—specifically, national acreage and average market returns for two types of crops: dry edible beans and a composite of unrestricted crops. Supplies of both types are divided between program participants and nonparticipants. We shift the supply of dry edible beans by participants to reflect the elimination of planting restrictions and recalculate the market equilibrium for both crop types.

Acreage planted to dry edible beans (and other crops) depends on relative returns, but cropland is not perfectly substitutable across uses. We capture this variable with an elasticity of transformation, τ, reflecting the cost or difficulty of shifting cropland. Higher values of τ (in absolute terms) correspond to less difficulty in switching and translate into larger cross-price effects—making acreage more responsive to changes in relative returns.

We derive demand and supply functions from market data (acreage, gross returns per acre, and market value of production) and various elasticities. Let ε denote the overall elasticity of supply ($\varepsilon>0$) and τ the elasticity of transformation ($\tau>0$) between vegetables and other crops. These variables are related to direct and cross-price elasticities of supply as follows:

$$\varepsilon_{ii} = s_i\varepsilon - s_j\tau$$

$$\varepsilon_{ij} = s_j(\varepsilon + \tau)$$

where ε_{ii} and ε_{ij} are direct and cross-price elasticities and s_i is the share of crop i in total market value ($s_i + s_j = 1$). The relative magnitude of ε and τ governs the size of direct and cross-price effects in the model. Large values of τ (in absolute terms) signify easier transformation of land from other crops to dry edible beans or vice versa. Parameter assumptions are shown in the table.

The figure provides an overview of market effects.* In the upper panel, supply of dry edible beans (acreage) is divided between program participants and nonparticipants. When planting restrictions are eliminated, participant supply of dry edible beans shifts to the right, which increases total supply of dry edible beans, thus lowering the price (average gross return per acre) for both participants and nonparticipants and causing nonparticipants to reduce acreage.

The lower panel shows the supply of other crops (acreage), which is also divided between program participants and nonparticipants. The participants' supply function shifts to the left, causing an overall reduction in supply of other crops, which leads to a modest price increase (average gross return per acre). Acreage planted to other crops falls for program participants (as the shift in the supply curve dominates the movement along the curve) and rises for nonparticipants, reflecting only a movement along the supply curve.

*Full details are available from the authors. The figure provides a simplified view of market equilibrium. Supplies in the analysis are jointly determined by gross returns per acre for both types of crops (dry edible beans and other crops)—something that is hard to convey graphically.

Parameter assumptions for aggregate analysis[1]

Parameter	Base-case value
Elasticity of transformation, τ	-5
Overall elasticity of supply	.1
Demand elasticity for dry beans	-.4
Demand elasticity for other crops	-.4
Average DCP payment ($/acre)	19.3

[1]Elasticities assumptions are educated guesses by the authors.

Supply shifts from eliminating planting restrictions

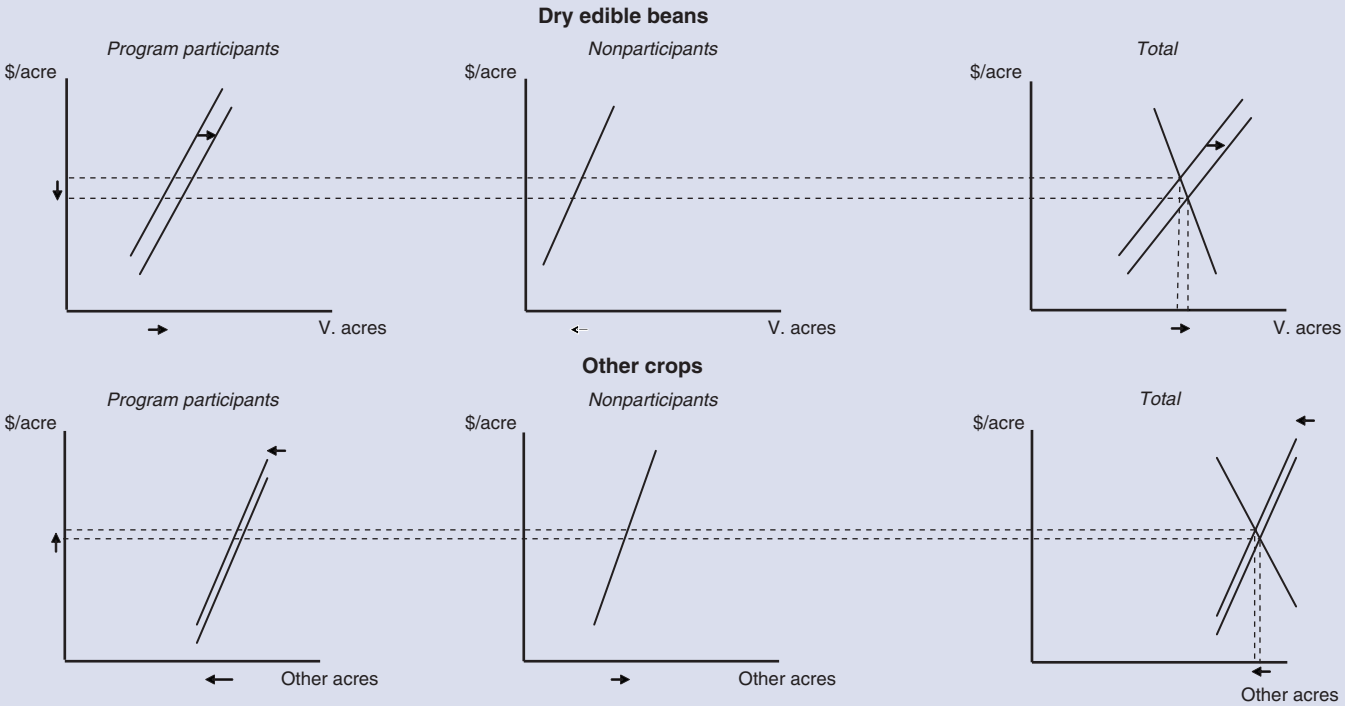


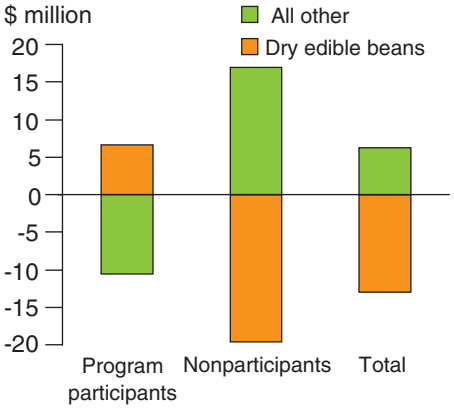
Table 7
Market impacts of eliminating planting restrictions for dry edible beans, 18 States

Item	Program participants	Nonparticipants	Total
		1,000 acres	
Change in:			
Acreage—			
Dry edible beans	83 (41 to 124)[1]	-56 (-88 to -24)	27 (14 to 41)
Other	-92 (-41 to -146)	56 (24 to 89)	-36 (-13 to -61)
		$ million	
Change in:			
Revenue—			
Dry edible beans	7 (-5 to 19)	-20 (-29 to -10)	-13 (-18 to -8)
Other	-11 (-24 to 13)	17 (8 to 29)	6 (1 to 33)
Total	-4 (-13 to 23)	-3 (-5 to 1)	-7 (-17 to 24)

[1]Numbers in parentheses indicate a range of market impacts for +/-50 percent changes in four critical parameters—the overall supply elasticity, transformation elasticity, and demand eslasticities for dry beans and other crops—in various permutations.

Source: Economic Research Service, USDA.

Figure 17
Change in market revenue for dry edible beans and other crops with planting restrictions eliminated



Source: Economic Research Service, USDA.

represented as a shift in the supply of dry edible beans by program participants. We assume that growers allocate land between dry edible beans and other crops, while recognizing that cropland is not perfectly substitutable across uses. As program participants expand their supply of dry edible beans, they simultaneously reduce their acreage of other crops. These supply shifts induce changes in market equilibrium, altering returns for both participants and nonparticipants.

Under full planting flexibility, program participants would expand dry edible bean plantings by about 83,000 acres, nonparticipants would reduce dry edible bean plantings, leaving a net increase of about 27,000 acres (table 7), and gross returns per acre for dry edible beans decline by about 4.9 percent. Program participants would reduce plantings of other crops, nonparticipants would increase plantings, total acreage for other crops would decline slightly, and gross returns per acre would be virtually unchanged (i.e., an increase of 0.03 percent).

If planting restrictions were eliminated, changes in revenue for both groups of producers would be offset, leaving small net impacts on total revenue (fig. 17).[25] Total revenue would decline by 0.01 percent for program

[25]Program participants in States not included in the 18 dry edible bean States used for this analysis would also be affected by any price changes for other crops.

participants and by 0.03 percent for nonparticipants. If program participants are forgoing direct and countercyclical payments under current program rules, they would retain these payments with elimination of planting restrictions. The net change in revenue would actually be negative for program participants, which is counterintuitive because the end of restrictions means that participants no longer lose government payments when they grow dry edible beans. The reason is that, with the end of restrictions, dry bean plantings would increase and gross returns fall. Program participants would increase plantings of the higher valued crop but would suffer the effects of a price decline for dry edible beans. Because participants already account for the vast majority of dry bean acreage, the price decline would substantially offset the revenue effects of new plantings.

These modeling results should be viewed as illustrative, given uncertainty about the underlying parameters. The estimated impacts depend on the assumptions of the model.[26] Nevertheless, several points emerge clearly from the illustration:

- Eliminating planting restrictions induces a shift in planting of dry edible beans. Dry bean acreage would expand for program participants and decline for nonparticipants.
- A net increase in dry bean acreage would push down the average return per acre. Plantings of other crops simultaneously would decline slightly, and prices would increase slightly.
- Program participants would not necessarily gain market revenue from the policy change. Price declines for dry beans would negate some of the potential gain from planting flexibility. The effect on nonparticipants would also be ambiguous, with losses in revenue from dry beans offset (in part) by gains in revenue from other crops.

[26]Results of sensitivity analysis—moving individual parameters up and down by 50 percent—support the view that, for dry edible beans, market impacts from relaxing planting restrictions are likely to be fairly modest (table 7).

Market Adjustments for Other Fruit and Vegetables

The previous section illustrates that, at the aggregate level, removing planting restrictions would lower dry edible bean revenues but have offsetting revenue impacts for program crops. Whether or not similar impacts would occur for other commodities that use less land and for which prices might be more sensitive to shifts in supply is not clear.

Rather than attempt to model market adjustments for other crops in a similar way, we discuss potential adjustments in qualitative terms. The preceding sections provide the basis for observations on barriers to entry, where land use shifts would be most significant, and how different categories of farmers would be affected.

As described earlier, entry into fruit and vegetable production frequently requires a detailed understanding of marketing arrangements and demand potential as well as specialized production requirements. For a producer of program crops, switching into production of processed vegetables is likely to require small startup costs. However, many of these products are sold under contractual agreements with processors, so potential for market expansion may be constrained by the ability to get a contract. Products for

the fresh market must meet stringent standards for taste and appearance. Meeting these standards requires unique production skills and access to labor for harvest to ensure product quality. If a producer can overcome these barriers, the magnitude of government payments may be small relative to the differences in expected net returns. FSA reports that many producers have already made this kind of switch when economic conditions warrant.

As we have seen, the importance of base acreage varies substantially across regions, which has implications for the types of commodities that might be affected by a policy change (fig. 10). If sufficient nonbase cropland is available, current planting restrictions are not a limiting factor for producers who want to expand production of fruit and vegetables. Base acreage is less important in regions where citrus crops are grown, for example, but are more important in areas where dry beans, processing vegetables, and potatoes are grown. The regional variation in average payment levels is a complicating factor. With the much higher average levels of payments per acre in such areas as California and southwest Georgia, removal of planting restrictions could induce increased production of some commodities, such as processing vegetables.

Impacts on farmers would also vary across the three general groups affected: program producers with a planting history, program producers with no planting history, and nonparticipants. For participants with history, startup costs would be lower because they have experience and may have made some of the necessary capital investments. These producers can expand under current rules by giving up payments on an acre-for-acre basis, and many have already done so. Producers without history face a high payment reduction with current rules, but they also face higher startup costs, making it difficult for us to draw firm conclusions about their likely response to a policy reform. For nonparticipants, changes in net returns would be driven by price changes resulting from acreage shifts by current program participants.

The analysis thus far indicates that removing planting restrictions for wild rice, fruit, and vegetables could result in changes in crop production and prices. As our market-level analysis for dry beans illustrates, market adjustments would not be limited to fruit and vegetables. Plantings of both fruit and vegetables and program crops would adjust to the new market environment. Based on experience with other policy reforms, we would expect much of the market adjustment to occur in the first couple of years (see box, “Lessons Learned From Policy Changes for Peanuts: Markets Adjust”). After some initial market adjustments, prices would be likely to stabilize near longrun equilibrium levels as producers gain experience in the new market environment.

Lessons Learned From Policy Changes for Peanuts: Markets Adjust

With passage of the 2002 Farm Act, the longstanding peanut marketing quota and price support system was replaced by the same set of supports available to producers of other program crops—with marketing loans, direct payments, and countercyclical payments, including planting flexibility. With the policy change, less competitive peanut producers reduced output, most likely by switching to other crops (Dohlman et al.). At the same time, production began to expand in areas where peanut yields tend to be higher—perhaps reflecting better growing conditions or management practices. This outcome is not entirely surprising because the old quota program constrained production and supported prices.

Removal of marketing restrictions for peanuts in 2002 resulted in measurable shifts in production and adjustments in prices. Although planted acreage remained stable in Alabama and Georgia and increased in Florida and South Carolina, acreage significantly fell in other peanut-producing States. In Virginia and Oklahoma, plantings fell about 55 percent between 2001 and 2003; in Texas, they fell 35 percent. The transition was marked by somewhat lower prices, reflecting the loss of quota price support. However, markets quickly found equilibrium production and price levels and, by 2003 and 2004, production patterns appeared to be responding to market incentives.

Regional and local shifts in fruit and vegetable production are likely as more efficient producers expand their market share at the expense of less efficient producers. Specialized production practices and marketing arrangements associated with many fruit and vegetable crops will mitigate the adjustments somewhat.

Discussion and Implications

In principle, eliminating planting restrictions could expand the supply of fruit or vegetables, reducing grower prices. However, the results of our analysis suggest that market effects are likely to be limited and confined to specific regions and commodities. Supply shifts would be more likely in regions where the land and climate are suitable for vegetable production and nonbase acreage is in limited supply. However, acreage in these regions would not necessarily change significantly because current restrictions are not always binding for producers.

Analysis of market effects is complicated by the lack of comprehensive and consistent data, a large number of commodities, and limited estimates of relevant economic parameters. Our research reflects these limitations. Impacts could be significant for individual producers, commodities, and regions. Our examination of a specific commodity (dry beans) and regions (Cass County and 18 States) should be viewed as illustrative.

Land Is a Minor Constraint for Many Farms

About half of the area devoted to fruit and vegetables is grown on farms that certify their acreage with the FSA and therefore are likely to receive program payments. Farm program rules permit these farmers to plant fruit and vegetables under certain conditions. A farmer can plant fruit and vegetables on the portion of his or her cropland that is not base acreage without a reduction in payments. If nonbase cropland is not available, the farmer can lease or purchase nonbase cropland and reconstitute the farm to include the new acreage, again without incurring a payment reduction.

Farm program rules permit fruit and vegetables to be produced on base acreage if the farm has a history of planting fruit and vegetables, but in these cases, payments are reduced on an acre-for-acre basis. In 2003 and in 2004, payments on over 600,000 acres were forgone in order to plant fruit and vegetables on base acreage. Thus, nearly 5 percent of fruit and vegetable production was on base acreage. On average, these farms gave up payments of about $22 per acre.

For farms that do not have base acreage—farms that are likely to be primarily fruit or vegetable farms or livestock farms—planting fruit and vegetables is not restricted. These farms can expand their production based on land availability and expected market returns.

Effects of Base Acreage Constraints Vary Regionally

Commercial production of fruit and vegetables is concentrated regionally (fig. 4). Florida and California account for most production. We examined the regional distribution of base acreage, total cropland, and current fruit and vegetable production (figs. 7-9). Eliminating planting restrictions would most likely enable some producers to switch from producing program crops to producing fruit and vegetables in such areas as California, southeastern Washington, southern Idaho, the area stretching from North Dakota throughout the upper Midwest to northwestern New York, and the coastal

plain in the Southeastern States. Opportunities to expand production in Florida onto base acreage are limited by the small amount of base available.

Barriers to Entry Would Limit Incentives To Expand Production of Many Fruit and Vegetables

Startup costs for a new (and sometimes for an existing) grower of fruit or vegetables can be substantial. Agronomic and economic constraints limit incentives to expand production of many fruit and vegetables. Remember that fruit and vegetables include a diverse group of more than 100 individual commodities; each has specific production and marketing characteristics and limitations. Specialized production and marketing constraints limit incentives to expand acreage devoted to these commodities. A new grower would need to (1) develop specialized expertise, (2) invest in capital equipment and irrigation, (3) hire expensive and often difficult-to-obtain labor to harvest the crop, (4) modify program crop production practices by restricting herbicide use before switching to a food product, and (5) locate and develop markets or contracts for the crops.

Complicating an assessment of possible market impacts from relaxing planting restrictions is the considerable overlap that exists between growers of vegetables and program crops. Most vegetable production occurs on farms that certify their acreage with the FSA (i.e., generally recipients of direct and countercyclical payments); 80 percent of land planted to vegetables, dry beans, and potatoes is located on these farms. Four commodities (sweet corn, tomatoes, dry beans, and potatoes) account for most of this acreage. Relaxing the planting restrictions could result in expanded production of these four commodities because many producers have experience producing them. Markets would likely adjust to the policy change within 1 or 2 years, as was the case for peanuts.

Lower Valued Commodities Are More Likely To Expand

The per acre value of fruit and vegetables are generally much higher than for program crops, reflecting higher per unit production costs. Consequently, investments in fruit and vegetables per acre may be far greater than for program crops.

The highest production costs are associated with some fruit and fresh vegetables. Given the cost structure, switching to less capital-intensive crops, such as dry beans, or processing vegetables, such as sweet corn or tomatoes, is more likely. When net returns are high, we would expect acreage to shift, as already occurred for almonds in California, despite forgoing as much as $130 per acre of program payments.

Variation in rates of return is also an important factor for farmers in determining new investments. A comparison of the annual variation in per acre value of production for selected commodities found that the year-to-year variation greatly exceeds the annual value of direct payments. All else equal, a farmer would be more likely to continue planting program crops

and receiving direct payments than to switch to planting a commodity that has a greater variation in returns.

Illustration of National Market Impacts Suggests Relatively Small Effects

We used a simple supply and demand model to illustrate potential adjustments that might occur for the dry bean market. Dry beans were selected because they are one of the commodities where producers would likely expand production if planting restrictions were eliminated due to their agronomic and economic characteristics. Based on our assumptions for the analysis, we found that, if planting restrictions were eliminated, program participants would expand dry edible bean plantings by about 83,000 acres. Nonparticipants would reduce dry bean plantings by 56,000 acres, leaving a net increase of about 27,000 acres. The price of dry edible beans would decline, reducing gross returns per acre, while prices and gross returns per acre would rise slightly for other crops.

However, Net Returns Would Increase for Some Farmers, But Would Decline for Others

Various pieces of information presented throughout this report support the conclusion that, while overall market impacts are likely to be small, impacts could be significant for individual producers. Some current producers would find that production of fruit and vegetables is no longer profitable, while others would gain. The producers who have base acreage stand to benefit from elimination of current payment reductions. Under current program rules, these producers could expand production by forgoing direct and countercyclical payments for the current year, if expected net returns to producing the fruit and vegetables exceed expected net returns from producing the program crop including program payments. If planting restrictions were eliminated, these producers would continue to receive direct and countercyclical payments. Their crop production decision would be based on expected profit from producing the fruit and vegetables compared with expected profit from producing the program crop. Finally, we note that the peanut market adjusted similarly in 2002 when marketing quotas were ended. More efficient producers expanded, while others reduced production as the peanut market adjusted.

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Appendix: Area Planted and Value of Production for Selected Fruit and Vegetables

Appendix table 1

Vegetables and melons: Acres planted, crop value, and value per acre, 2003-05 and average

Commodity	Acres planted				Crop value				Value per planted acre			
	2003	2004	2005	Average	2003	2004	2005	Average	2003	2004	2005	Average
	Acres				*1,000 dollars*				*Dollars*			
All fresh vegetables	2,016,450	2,032,830	2,022,290	2,023,857	9,769,278	9,701,288	9,819,240	9,763,269	4,845	4,772	4,856	4,824
Tomatoes	125,600	135,400	136,000	132,333	1,332,361	1,439,197	1,637,394	1,469,651	10,608	10,629	12,040	11,106
Bell peppers	55,500	55,100	59,300	56,633	494,663	558,863	482,960	512,162	8,913	10,143	8,144	9,043
Lettuce, romaine	76,500	75,300	84,500	78,767	624,898	442,863	458,068	508,610	8,169	5,881	5,421	6,457
Lettuce, head	185,800	181,700	185,100	184,200	1,235,193	1,118,970	990,905	1,115,023	6,648	6,158	5,353	6,053
Onions	172,960	179,600	168,820	173,793	929,274	777,339	905,451	870,688	5,373	4,328	5,363	5,010
Spinach	37,500	40,000	46,100	41,200	207,247	233,037	157,473	199,252	5,527	5,826	3,416	4,836
Broccoli	131,600	133,900	135,000	133,500	615,534	638,079	563,673	605,762	4,677	4,765	4,175	4,538
Cabbage	76,900	80,130	77,900	78,310	294,564	344,719	325,462	321,582	3,830	4,302	4,178	4,107
Squash	54,600	56,900	58,400	56,633	197,020	222,718	210,155	209,964	3,608	3,914	3,599	3,707
Cucumbers	58,600	60,400	61,770	60,257	187,391	223,602	234,516	215,170	3,198	3,702	3,797	3,571
Asparagus, all	62,000	66,000	57,000	61,667	162,901	217,060	158,350	179,437	2,627	3,289	2,778	2,910
Snap beans	101,100	101,900	103,200	102,067	280,605	260,993	286,878	276,159	2,776	2,561	2,780	2,706
Watermelon	161,300	163,000	146,000	156,767	342,918	313,217	410,281	355,472	2,126	1,922	2,810	2,268
Sweet corn	271,500	256,900	255,300	261,233	550,024	580,320	601,519	577,288	2,026	2,259	2,356	2,210
Pumpkins	44,800	50,300	49,900	48,333	81,054	103,742	105,705	96,834	1,809	2,062	2,118	2,003
All processed vegetables	1,392,930	1,346,940	1,322,160	1,354,010	1,289,353	1,395,774	1,267,265	1,317,464	926	1,036	958	973
Tomatoes	310,030	321,230	285,940	305,733	576,441	719,285	622,143	639,290	1,859	2,239	2,176	2,091
Cucumbers	120,900	115,800	116,600	117,767	178,328	158,793	148,324	161,815	1,475	1,371	1,272	1,374
Snap beans	200,900	210,010	216,930	209,280	114,520	131,865	115,545	120,643	570	628	533	576
Sweet corn	438,400	412,700	421,610	424,237	229,788	213,993	217,096	220,292	524	519	515	519
Green peas	245,600	214,700	215,700	225,333	117,087	99,280	101,080	105,816	477	462	469	470
Other crops:												
Strawberries, all	50,000	53,100	53,900	52,333	1,375,142	1,460,077	1,383,064	1,406,094	27,503	27,497	25,660	26,868
Sweet potatoes	95,800	96,900	91,000	94,567	305,448	281,559	309,090	298,699	3,188	2,906	3,397	3,159
Potatoes, all	1,272,600	1,193,300	1,110,000	1,191,967	2,685,822	2,575,204	2,903,137	2,721,388	2,110	2,158	2,615	2,283
Potatoes, summer	63,400	58,400	53,400	58,400	164,245	147,811	—	156,028	2,591	2,531	—	2,672
Potatoes, fall	1,106,000	1,039,700	968,600	1,038,100	2,149,570	2,090,058	—	2,119,814	1,944	2,010	—	2,042
Dry beans	1,406,100	1,354,300	1,665,000	1,475,133	422,793	452,871	526,044	467,236	301	334	316	317
Chickpeas	43,500	45,000	89,800	59,433	8,495	14,939	26,564	16,666	195	332	296	280
Dry lentils	246,000	345,000	450,000	347,000	41,407	60,893	58,940	53,747	168	177	131	155
Dry peas	337,500	530,000	808,000	558,500	39,352	66,476	63,167	56,332	117	125	78	101

— = Not available.

Source: National Agricultural Statistics Service, USDA, Vegetables 2005 Summary, Crop Production 2005 Summary.

Appendix table 2

Fruit and tree nuts: Acres planted, crop value, and value per acre, 2003-05 and average

Commodity	Bearing acres				Crop value				Value per bearing acre			
	2003	2004	2005	Average	2003	2004	2005	Average	2003	2004	2005	Average
	Acres				*1,000 dollars*				*Dollars*			
Citrus	1,031,900	983,600	939,000	984,833	2,259,976	2,500,539	2,389,255	2,383,257	2,190	2,542	2,544	2,420
Oranges	791,700	761,400	732,100	761,733	1,564,658	1,782,157	1,498,063	1,614,959	1,976	2,341	2,046	2,120
Grapefruit	128,500	114,800	103,500	115,600	269,381	317,218	397,909	328,169	2,096	2,763	3,845	2,839
Lemons	61,800	59,800	58,500	60,033	291,425	269,753	351,897	304,358	4,716	4,511	6,015	5,070
Tangelos	9,100	8,000	6,400	7,833	11,489	10,021	8,004	9,838	1,263	1,253	1,251	1,256
Tangerines	36,600	36,200	35,600	36,133	117,432	116,475	130,068	121,325	3,209	3,218	3,654	3,358
Temples	4,200	3,400	2,900	3,500	5,591	4,915	3,314	4,607	1,331	1,446	1,143	1,316
Noncitrus	2,078,535	2,052,775	2,042,750	2,058,020	7,242,447	7,498,796	8,572,112	7,771,118	3,484	3,653	4,196	3,776
Apples	390,450	384,460	378,860	384,590	1,817,240	1,646,801	1,893,580	1,785,874	4,654	4,283	4,998	4,644
Apricots	17,840	17,340	15,840	17,007	34,702	35,012	39,880	36,531	1,945	2,019	2,518	2,148
Avocados	66,900	68,670	67,600	67,723	394,367	291,244	362,808	349,473	5,895	4,241	5,367	5,160
Bananas (HI)	1,350	1,000	980	1,110	9,225	8,085	9,175	8,828	6,833	8,085	9,362	7,953
Blackberries (OR)	6,400	6,300	6,500	6,400	28,986	34,057	36,867	33,303	4,529	5,406	5,672	5,204
Blueberries:												
Cultivated	41,670	44,430	48,310	44,803	220,649	275,963	342,311	279,641	5,295	6,211	7,086	6,242
Wild (ME)	—	—	—	—	26,880	20,970	39,040	28,963	—	—	—	—
Boysenberries	1,000	1,050	910	987	3,725	7,168	7,158	6,017	3,725	6,827	7,866	6,098
Loganberries (OR)	70	60	60	63	189	131	188	169	2,700	2,183	3,133	2,674
Raspberries:												
Black (OR)	1,100	1,100	1,300	1,167	3,132	5,357	10,418	6,302	2,847	4,870	8,014	5,402
Red	11,200	10,900	11,400	11,167	40,774	51,723	45,184	45,894	3,641	4,745	3,964	4,110
All (CA)	3,000	4,100	4,200	3,767	127,920	188,100	164,175	160,065	42,640	45,878	39,089	42,495
Sweet cherries	74,990	78,275	79,010	77,425	342,113	437,133	484,348	421,198	4,562	5,585	6,130	5,440
Tart cherries	36,970	36,950	37,050	36,990	80,210	69,501	64,232	71,314	2,170	1,881	1,734	1,928
Cranberries	39,600	39,200	39,100	39,300	209,834	202,670	214,812	209,105	5,299	5,170	5,494	5,321
Dates (CA)	5,200	5,500	5,300	5,333	24,840	22,532	20,960	22,777	4,777	4,097	3,955	4,271
Figs (CA)	13,000	12,800	12,300	12,700	15,373	20,214	22,122	19,236	1,183	1,579	1,799	1,515
Grapes	951,010	933,100	934,850	939,653	2,609,289	3,010,958	3,459,407	3,026,551	2,744	3,227	3,700	3,221
Guavas (HI)	530	525	630	562	925	1,166	1,126	1,072	1,745	2,221	1,787	1,909
Kiwifruit (CA)	4,500	4,500	4,500	4,500	20,472	19,977	23,326	21,258	4,549	4,439	5,184	4,724
Nectarines	36,500	36,500	37,700	36,900	119,028	86,184	126,942	110,718	3,261	2,361	3,367	3,000
Olives (CA)	36,000	32,000	32,000	33,333	48,289	60,643	79,511	62,814	1,341	1,895	2,485	1,884
Papayas (HI)	1,565	1,235	1,480	1,427	13,069	12,361	11,241	12,224	8,351	10,009	7,595	8,568
Peaches	145,530	146,070	140,160	143,920	454,286	461,624	511,268	475,726	3,122	3,160	3,648	3,305
Pears	64,150	63,950	62,150	63,417	273,142	292,969	294,697	286,936	4,258	4,581	4,742	4,525
Pineapples (HI)	16,000	13,000	14,000	14,333	101,470	83,104	79,288	87,954	6,342	6,393	5,663	6,136

See notes at end of table.

Continued—

Appendix table 2

Fruit and tree nuts: Acres planted, crop value, and value per acre, 2003-05 and average—Continued

Commodity	Bearing acres				Crop value				Value per bearing acre			
	2003	2004	2005	Average	2003	2004	2005	Average	2003	2004	2005	Average
	Acres				*1,000 dollars*				*Dollars*			
Plums (CA)	36,000	36,000	36,000	36,000	87,362	74,347	92,463	84,724	2,427	2,065	2,568	2,353
Prunes (CA)	72,000	70,000	67,000	69,667	129,696	72,000	130,500	110,732	1,801	1,029	1,948	1,589
Prunes and plums	4,010	3,760	3,560	3,777	5,260	6,802	5,085	110,732	1,312	1,809	1,428	29,320
Tree nuts	896,800	923,200	946,300	922,100	2,472,480	3,527,904	3,967,114	3,322,499	2,757	3,821	4,192	3,603
Almonds (CA)	550,000	570,000	580,000	566,667	1,600,144	2,189,005	2,337,140	2,042,096	2,909	3,840	4,030	3,604
Hazelnuts (OR)	28,000	28,400	28,300	28,233	39,037	54,000	61,824	51,620	1,394	1,901	2,185	1,828
Macadamias	17,800	17,800	18,000	17,867	32,330	41,245	44,400	39,325	1,816	2,317	2,467	2,201
Pecans	—	—	—	—	277,629	326,924	406,830	337,128	—	—	—	—
Pistachios	88,000	93,000	105,000	95,333	145,180	464,980	577,320	395,827	1,650	5,000	5,498	4,152
Walnuts (CA)	213,000	214,000	215,000	214,000	378,160	451,750	539,600	456,503	1,775	2,111	2,510	2,133

— = Not available or applicable.

Sources: National Agricultural Statistics Service, USDA, Citrus Fruit 2005 Summary, Noncitrus Fruits and Nuts 2005 Summary.