# How Do Forward Contracts Affect Strawberry Prices?

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The widespread use of contracts to market produce complicates the interpretation of market prices, and raises questions about the effects of contracting on the prices and risks faced by growers, shippers, and buyers who do not use contracts. This article examines the effects of informal forward contracts for strawberries on spot market prices and their volatility.

Both informal and formal contracting arrangements are increasingly used by growers and shippers to market agricultural commodities to food retailers. Both types of contracts complicate the interpretation of price signals, as indicators of trends and current conditions in agricultural markets. Increasingly, the "spot" prices observed at wholesale markets represent a small share of the total volume marketed. This is the case for a large number of produce items important in California.

Presumably both parties to a contract perceive that they are better off under the arrangement, or they would not continue with it. But it is difficult to predict the effects of contracting on the rest of the industry: what happens to the average price, or the variation in prices, for growers, shippers, and wholesale/retail firms who do not engage in contracting? In this article, we report our research results on the effects of pre-commitment (i.e., informal forward) contracts used to market California's fresh strawberries, focusing on the effects of pre-commitments on both the mean and variance of spot prices.

## Pre-Commitment Contracts and Strawberry Prices

We expected that we might find that spot prices become more volatile, and less representative of the true prices, as greater volumes are marketed under forward contracts. In effect, the prices for a portion of total production are fixed with forward contracting, meaning that price changes are concentrated on a subset of the volume sold. As a result, variation in spot prices may be magnified, as fluctuations in supply and demand are accommodated by a smaller share of the market—the spot market is said to be "thin." Thus, the traditional view implies that the reduction in price uncertainty that is enjoyed by participants in contractual arrangements comes at the cost of increasing the risks experienced by other market participants. This means growers and shippers who do not market strawberries using pre-commitments may bear more risk. Unless they also receive higher average prices, they would be worse off due to contracting.

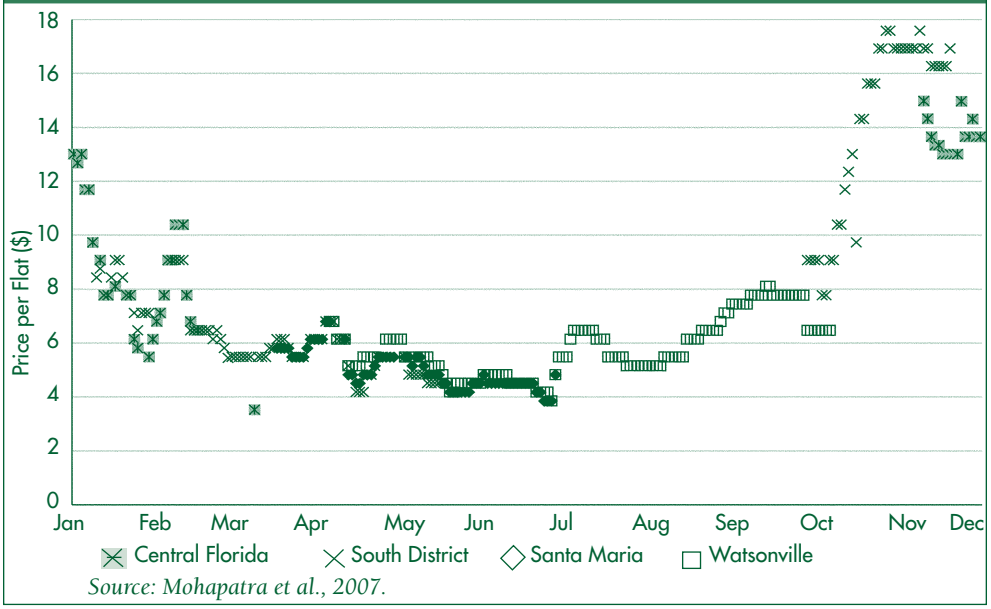
However, it may be that the belief that price stability in one part of the industry causes greater price instability in the other part is overly simplistic. Certainly, if nothing else were to change, it is natural to expect that stabilizing price at some average level, in some markets, causes the remaining markets to be subject to greater fluctuations from demand or supply shocks. But it is misleading to treat all other behavior as unaffected by contracting. For instance, retailers may be willing to commit more shelf space to strawberries, or to display them more prominently, if they have been able to guarantee supply, or insure against large price movements, through contracting. They may also commit to larger promotional efforts, which, if effective, increase the industry-wide demand and, hence, raises prices received by growers and shippers. The effect of contracting is therefore more complicated, and its effects potentially more varied, than the traditional view might imply.

It is therefore necessary to examine how both the mean and variance of spot prices are affected by contracts. Growers and shippers who do not use pre-commitments may receive higher prices to compensate for greater price risk, or they may actually enjoy lower risk, due to the possible market-stabilizing effects of pre-commitment contracts.

Increased use of contracts has paralleled increased concentration in food retailing, and increased vertical integration in the food markets. Agricultural economists studying market conditions therefore encounter substantial difficulty in determining the actual prices and volumes under contract. They must develop new ways to interpret price and volume data since, in general, contract terms are not publicly observed. Widely available market data tend to include only general comments about patterns observed. Fortunately, the use of pre-commitment contracts varies throughout the year, and by growing region, so it is possible to make inferences about the effects of contracting from publicly available data.

To investigate the effects of contracting, known as pre-commitments,

Figure 1. Daily Spot Prices by Region: 2003




*Source: Mohapatra et al., 2007.*

we made use of data from the USDA's *National Berry Report* to evaluate how these informal contracts in the market for fresh strawberries affect spot-market prices. The goal was to see if we could determine anything about the effects of contracting from the comments concerning pre-commitments in these USDA reports.

The contracts are between retailers and strawberry shippers, who market fresh strawberries for growers. Informal contracts arose during the late 1990s and early 2000s, and continue to coexist alongside formal contracts. These pre-commitment contracts specify a volume, a delivery date, and a "lid" price for a future sale. The retailer pays the minimum of the lid price or the spot price, at the time of delivery (about two to four weeks later). Because strawberries are highly perishable, shippers and retailers developed informal contracting as a means to manage their risk. This allows retailers to count on a supply of strawberries at some point in the future—for instance, to plan to advertise strawberries in weekly circulars, a commitment they might make perhaps two to four weeks in advance of a sale. Around holidays such as Easter and Mother's Day, it is common for retail food circulars to feature fresh strawberries prominently, and it is therefore in the retailer's interest to secure a known volume of berries adequate to support the promotional effort.

As the grocery retailing sector has consolidated, major retailers have sought to control their costs by altering procurement practices. One way to do this is to deal with a smaller number of larger shippers. By the late 1990s, five or six large shippers marketed approximately three-fourths of California's fresh strawberry production, out of roughly 60 shippers in total.

Shippers, similarly, have responded to retailers' preferences by altering their own strategies. Traditionally, shippers were concentrated in one or two of the five main North American growing regions for fresh strawberries (three primary California regions—South Coast, Santa Maria, and Watsonville—and Florida and Mexico). Each region had its own harvest season, and while they overlapped, each dominated a portion of the year. No single region provided strawberries throughout the year. Recently, major shippers lengthened their marketing seasons by expanding into more than one growing area, to allow them to market strawberries throughout the year.

These large shippers account for the vast majority of pre-committed strawberry sales. Similarly, large retailers represent the majority of pre-commitment purchases. This pattern adds an interesting wrinkle to the interpretation of spot-price volatility: the volatility in spot prices may be concentrated on a particular subset of the industry, namely the smaller firms.

The *National Berry Report* includes comments relating to market conditions, and sometimes these comments pertain to pre-commitment prices. If such a comment pertaining to pre-commitments appears—for instance, that pre-commitment prices were observed in a particular range—then there was at least one pre-commitment sale at a price below the spot price, on that day. Table 1 summarizes the data. The average spot prices vary by region, reflecting the higher early-season prices (beginning in December and extending into the early months of the new calendar year), a pattern that is also reflected in the spot prices shown for calendar year 2003, in Figure 1. Table 1 also shows the frequency with which pre-commitment comments were observed, for the four strawberry-producing regions we studied. For instance, in Central Florida pre-commitments were used in at least 42% of the weeks studied.

As the season progressed from winter months where Central Florida is the dominant growing region to those where California dominates (moving from south to north as the year progresses), both mean prices and the frequency of pre-commitments changes. Early in the season, especially tied to promotions surrounding Easter and Mother's Day, retailers are more likely to seek pre-commitments. The share of the national market promoting strawberries is highest, early in the season, so the notion that pre-commitments support promotions is consistent with this pattern. Later in the season,

retailers have less interest in pre-commitments, relative to shippers, and are less likely to promote strawberries.

The goal of our study was to see if there were patterns in the use of pre-commitments, to provide information about their effect on spot prices and producer welfare. One hypothesis is that pre-commitments exclude smaller shippers from certain markets, and the growers served by these small shippers do not share in any benefits from forward sales by pre-commitment. In contrast, another hypothesis is that the larger shippers provide a service, on which the smaller shippers and growers can effectively free ride, because pre-commitments bring stability to the market, smoothing week-to-week price fluctuations. Many studies have examined whether producers gain or lose from price volatility, and usually the results depend on very specific assumptions—for instance, can producers adjust production volumes after they observe price, or must they make their decisions about the price they receive before adjusting volume? For strawberries, certainly, most choices are made at the beginning of the season. As harvest occurs throughout the growing season, growers can do very little to respond to changes in prices. Thus, our analysis did not involve considerations of grower responses to price risk; once the strawberries are harvested, growers and shippers are interested in marketing them promptly at the best price.

## Conclusion

To determine the effects of pre-commitments, we studied the pattern of mean prices and their variance, to see how these depended on the region and the extent of pre-commitments. We used statistical techniques to study price behavior and we separated out factors affecting the mean level of prices from factors affecting their volatility.

**Table 1. Average Prices and Pre-Commitment Use, By Growing Region**

| | Spot Price ($ per flat) | | Pre-commitment (1 = contract observed) | |
|---|---|---|---|---|
| | Mean | Standard Deviation | Mean | Standard Deviation |
| All Regions | 6.36 | 2.64 | 0.25 | 0.43 |
| All Regions (1995) | 6.18 | 1.91 | 0.20 | 0.40 |
| All Regions (2003) | 7.19 | 3.38 | 0.27 | 0.44 |
| Central Florida | 8.51 | 3.16 | 0.42 | 0.49 |
| South District, CA | 7.52 | 3.29 | 0.23 | 0.42 |
| Santa Maria, CA | 5.15 | 1.30 | 0.16 | 0.37 |
| Watsonville, CA | 5.37 | 1.34 | 0.24 | 0.42 |

*Source: Mohapatra et al., 2007.*

Our finding is that pre-commitments raise average spot prices in all growing regions and, moreover, they reduce the volatility of spot-market prices in at least some regions. We found that pre-commitments reduced spot price volatility for Central Florida and the South District in California, while the effects of price volatility later in the season—for Santa Maria and Watsonville—were more difficult to measure. It is likely that the effect on volatility is not as strong for Santa Maria and Watsonville, or that the relationship is more complicated. As we noted, the interest on the part of retailers in pre-commitments varies throughout the season, so it may be that their role is more ambiguous, later in the season, when Santa Maria and Watsonville are the dominant growing regions.

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### Further reading pertaining to contracting:

"Effects of Forward Sales on Spot Markets: Pre-Commitment Sales and Prices for Fresh Strawberries." Mohapatra, S., R. E. Goodhue; C. A. Carter and J. A. Chalfant. *American Journal of Agricultural Economics* 92(1) (2010): 152-163.

"Grower-Winery Contracts in California: Use and Design." R. E. Goodhue, D. M. Heien, H. Lee, and D. A. Sumner. *California Agriculture* 56(3) (2002): 97-102.

"The Red Edge: Demand-Enhancing Strategies for California Strawberries." C. A. Carter, J. A. Chalfant, and R. E. Goodhue. *The Economics of Commodity Promotion Programs: Lessons from California.* Kaiser, Alston, Crespi and Sexton, eds. New York: Peter Lang Publishing Inc., 2005.

"Prices, Volumes and Promotions in the Fresh Strawberry Market." R. E. Goodhue and J. Jiang. *Agricultural and Resource Economics Update,* University of California, Giannini Foundation. 6(3). January/February 2003.

"Contract Usage in the California Winegrape Economy." R. E. Goodhue, D. M. Heien and H. Lee. *Agricultural and Resource Economics Update* University of California, Davis 3(3):7-9. Spring, 2000.