



Basis Considerations with MPP-Dairy

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Overview

The 2014 Farm Bill created the Margin Protection Program for dairy producers (MPP-Dairy). MPP-Dairy is a voluntary and flexible program, run by the USDA Farm Service Agency, which makes payments when the national average income-over-feed-cost margin index falls below a farmer-selected coverage level (see [Dairy Markets and Policy August, 29 2014](#) and [farmdoc daily February, 12 2014](#)). Different coverage options reflect a producer's ability to indemnify different margin levels (from \$4 to \$8 per hundredweight) and different coverage percentages of the farm's milk production (from 25% to 90%). In short, MPP-Dairy functions as a USDA sponsored put option, and is a financial loss management program which provides assistance to dairy farmers when the national measure of farm income, i.e., the MPP-Dairy margin, falls below a farmer-selected threshold. If the MPP-Dairy margin does not fall below the farmer-selected threshold it expires worthless and a farmer loses only the premium and administrative fees paid.

Recently traders and market analyst have encouraged dairy farmers to consider the difference between their actual farm gate prices for milk and feed and the national averages used in the MPP-Dairy margin formula, i.e. their "basis", before making a participation decision. That is, dairy farmers with lower (higher) cash prices for milk or higher (lower) cash prices for feed relative to the national averages should consider purchasing higher (lower) levels of MPP-Dairy coverage.

If basis between the cash margin and the MPP-Dairy margin is constant then the price series will fluctuate identically (perfect correlation) and there is no additional risk from the hedging strategy - what you see is what you'll get. However, if the basis is not constant and varies from month to month then price changes in the cash margins may not be offset by price changes in the MPP-Dairy margin index creating the potential for unanticipated gains or losses from MPP-Dairy. Basis risk would create additional financial uncertainty and make it difficult to determine what price floor MPP-Dairy is actually protecting. The purpose of this article is to explore how basis may be considered when making MPP-Dairy participation decisions.

First, to understand the basis relationship among farm gate milk and feed prices and the national MPP-Dairy index, state-level margins and the associated basis patterns using USDA data will be estimated. Then, this article will explain how more sophisticated dairy farm risk managers may consider basis in order to use MPP-Dairy to more directly manage farm-level margins. While basis considerations will not change

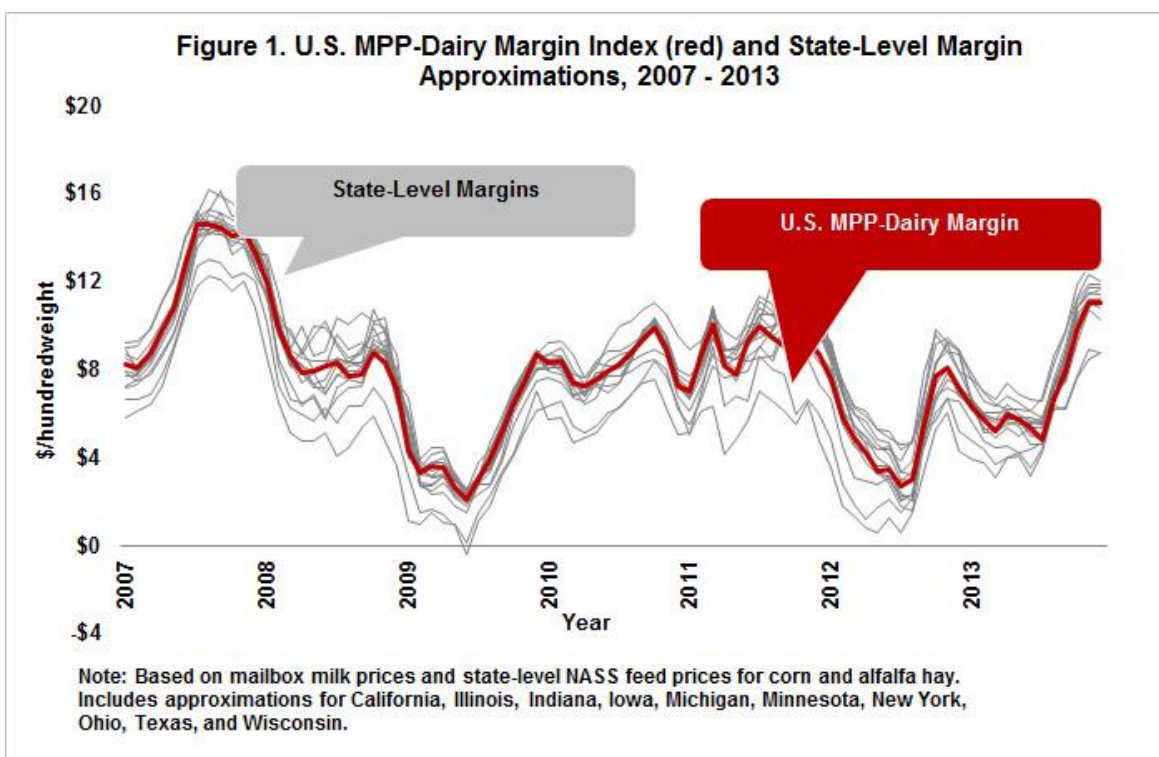
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the net benefit of MPP-Dairy participation for specific coverage options the final choice, to include basis, or not to include basis, must ultimately be made by producers and this article provides some guidance for making that decision.

Exploring MPP-Dairy Basis

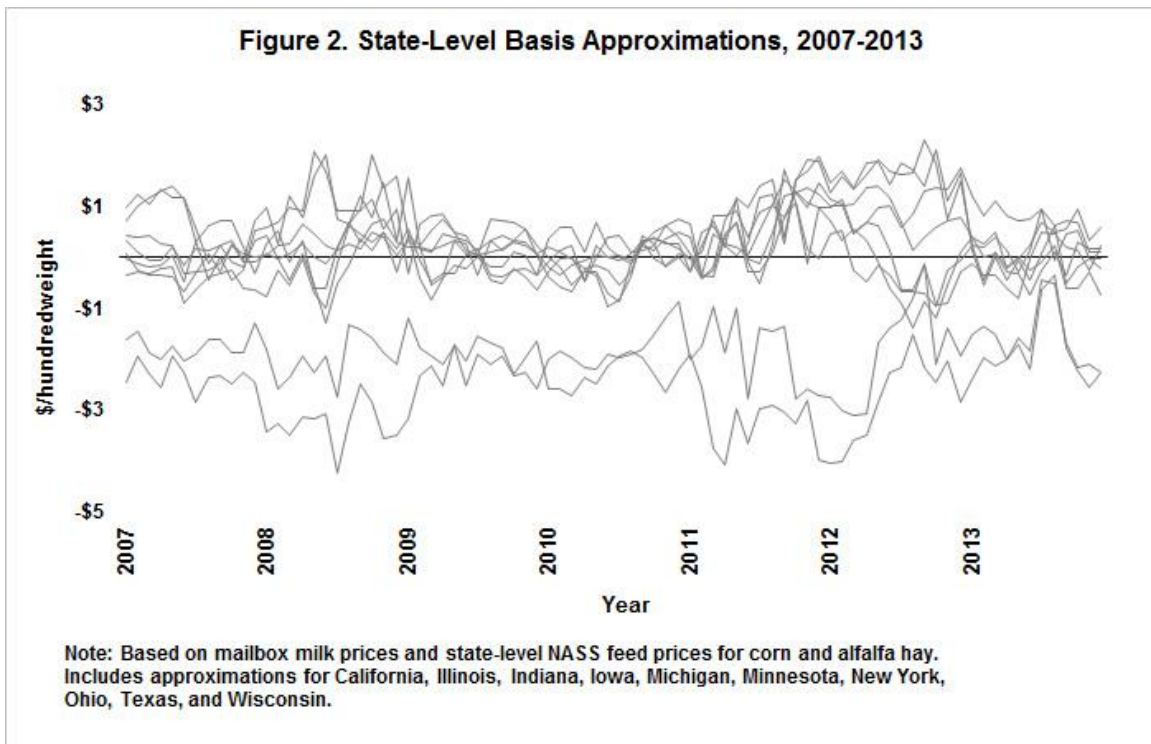
The implicit assumption of MPP-Dairy in determining safety net payments for dairy farmers is that the same amount of milk is produced each bi-monthly period, all milk is priced the same (i.e. milk tests, Federal and State Milk Marketing Order pool returns, and over-order premiums), and all dairy farm operations use the same allocation of ingredients to feed their dairy animals. However, across the U.S. not only do milk and feed prices differ considerably but so too does farm productivity. As a result margins vary considerably from month to month and from farm to farm. Due to this variation, it is important to understand how farm-gate margins relate to the MPP-Dairy index to assess risk exposure related to basis.

In order to analyze how basis may impact how MPP-Dairy ultimately performs in protecting a price floor, mailbox milk price data, state-level prices of corn, and state-level prices of alfalfa hay was collected from USDA (see [NASS Quick Stats](#) and [USDA Agricultural Marketing Service Dairy Programs](#)).¹ Using the MPP-Dairy margin index formula, the milk, corn, soybean meal, and alfalfa hay prices were then used to approximate state-level margins.



As demonstrated in Figure 1 state-level approximations of margins follow the U.S. MPP-Dairy margin closely. State-level cash margins are highly correlated with the national MPP-Dairy margin, i.e., correlation levels are greater than 95%. Despite the high level of correlation it is clear that price changes in the cash margin are not offset by identical price changes in the MPP-Dairy margin index. However, major turning points in the MPP-Dairy dairy margin are seen in all state-level price series. This is expected as milk prices across the U.S. are based on formula prices tied to wholesale commodity prices and systemic shocks to feed prices driven by supply and consumption have national implications on livestock feed prices.

¹ Due to data limitations no adjustment was made for soybean meal.



However, as illustrated in Figure 2 basis is not static. Rather, basis varies considerably from month to month and from year to year. Basis may be stronger or weaker at different times of the year or across calendar years. In fact, basis variability appears to increase during years in which margins are declining. Thus, due to basis variability and the option-style nature of MPP-Dairy what you see is not often what you'll get. In fact, the price changes in state-level cash margins may move in opposite directions from the MPP-Dairy margin during some months. This imperfect relationship will result in the basis strengthening or weakening from month to month and adds risk to the MPP-Dairy position.

The price floor protected at the farm-level using MPP-Dairy will depend on basis strength, and will vary from month to month as the basis strengthens or weakens. Local shocks to milk and feed prices will also impact basis at the farm-level, e.g., changes in over-order premiums or local adverse weather conditions. However, a critical component of basis variability is that basis is partially determined by the individual dairy farmer. That is, basis strength or weakness may be influenced by any futures or forward contract positions, the quality of milk, i.e., milk components, along with the amount and types of feed used on the farm, among other variables. As a result, an individual dairy farmer may improve the basis position through modifications in farm management practices.

Sophisticated MPP-Dairy Strategies May Include Basis

To narrow the focus on how the net price floor protected under the program is related to strength or weakness in basis, as well as variations in milk production, data for a representative dairy with four million pounds of production history and margins below the MPP-Dairy index during 2012 are highlighted in Table 1.¹

¹ The representative farm data is based on milk production and milk and feed price information for Texas reported by USDA.

Table 1. Sample Farm Margin Approximation Using USDA Reported Milk and Feed Prices with MPP-Dairy Protection, 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Milk Production (Lbs.)	344,727	333,472	365,152	351,396	353,064	327,220	324,719	318,883	307,628	321,801	317,216	334,723	4,000,000
Covered Production for 4 Mil. Lbs. Production History at 90% (Lbs.)	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	3,600,000
Uncovered Milk Production	44,727	33,472	65,152	51,396	53,064	27,220	24,719	18,883	7,628	21,801	17,216	34,723	400,000
Mailbox Milk Price (\$/cwt)	17.96	16.57	15.92	15.51	15.15	15.49	16.18	17.43	19.84	20.24	20.98	19.91	
Cash Feed Price (\$/cwt)	13.13	13.77	14.07	14.32	13.40	13.36	14.65	15.25	14.45	14.59	14.25	14.67	
Farm-Level Margin (\$/cwt)	4.83	2.81	1.85	1.19	1.75	2.14	1.53	2.19	5.39	5.65	6.73	5.24	3.39 ^{1/}
IOFC Revenue in Total Dollars	16,637	9,354	6,770	4,185	6,168	6,986	4,978	6,968	16,590	18,188	21,358	17,529	135,711
MPP-Dairy Margin (\$/cwt)	7.46	5.78	4.96	4.22	3.40	3.55	2.67	3.08	5.60	7.83	8.21	7.08	
MPP-Dairy Basis (\$/cwt)	(2.63)	(2.98)	(3.11)	(3.03)	(1.65)	(1.42)	(1.14)	(0.90)	(0.21)	(2.18)	(1.48)	(1.84)	
MPP-Dairy Benefit Under \$7.50/90% Coverage Option													
Total MPP-Dairy Payment	1,740	1,740	7,830	7,830	11,175	11,175	12,975	12,975	1,455	1,455	(900)	(900)	
Dollars per Hundredweight	0.58	0.58	2.61	2.61	3.73	3.73	4.33	4.33	0.49	0.49	(0.30)	(0.30)	
Total Revenue With MPP-Dairy	18,377	11,094	14,600	12,015	17,343	18,161	17,953	19,943	18,045	19,643	20,458	16,629	204,261
Dollars Per hundredweight	5.33	3.33	4.00	3.42	4.91	5.55	5.53	6.25	5.87	6.10	6.45	4.97	5.11 ^{1/}
Difference	0.50	0.52	2.14	2.23	3.17	3.42	4.00	4.07	0.47	0.45	(0.28)	(0.27)	1.71 ^{1/}

^{1/} Note: Value is a weighted average

As demonstrated in Table 1 the farm-level margin for the sample dairy during 2012 was well below the U.S. MPP-Dairy margin index. The average margin for this dairy was \$3.39 per hundredweight while the MPP-Dairy margin average was \$5.32 per hundredweight, a difference of \$1.88. The basis ranged from \$3.11 per hundredweight below the national index in March, to \$0.21 below the national index in September, 2012.

Suppose this operation wanted to protect a farm-level margin of \$5.00 per hundredweight during 2012. This is not easily achieved as 1) the farm does not know what the 2012 basis will be, and 2) throughout the year varying amounts of milk production are uncovered. Thus, a straightforward yet imprecise method to protect a target margin would be to find the coverage option which satisfied the following condition: MPP-Dairy Coverage Level - Premium > Target Margin – Expected Basis. This procedure should allow for a target margin to be protected on up to 90% of the production history (assuming a fixed basis). This example functions only to demonstrate how basis can be utilized when making coverage decisions under MPP-Dairy. To make the estimation more precise the coverage levels could be scaled up or down based on anticipated monthly basis and the amount of uncovered milk, e.g., more milk uncovered would require higher levels of MPP-Dairy coverage to ensure the same target margin on all milk marketings.

Continuing on this example, the dairy farmer does not know what the 2012 basis will be, but an approximation of -\$1.95 estimated from 2011 milk and feed prices is used. Thus, the farmer needs to find the Coverage Level - Premium > \$5.00 + 1.95 = \$6.95. For this operation this coverage level condition is not satisfied until \$7.50 coverage such that \$7.50 – \$0.30 = \$7.20 > \$6.95 (using the non-discounted premiums). Higher premium rates or lower expected basis would reduce the range of available target margins.

Analyzing the financial returns for this sample farm at the \$7.50 and 90% coverage options it's clear the loss support from MPP-Dairy would have smoothed the margins experienced during 2012 and increased the annual average farm-level margin by \$1.71 to \$5.11 per hundredweight (see [farmdoc daily May 1, 2014](#)). However, even though a target margin of \$5.00 per hundredweight was desired and achieved for the year, monthly strength or weakness in the basis changed the realized margin at the farm level and created unanticipated changes in the target margin throughout the year. For example, during May the cash margin and the MPP-Dairy index moved in opposite directions and at times the basis was more negative or positive than anticipated. As a result, despite customizing MPP-Dairy to achieve a \$5.00 target margin there were

times during the year when farm-level margins were significantly below \$5.00, e.g., February through May, and times when the farm-level margins were above \$5.00, e.g. June through November, Table 1.

This type of basis variability leads to an imperfect correlation between the farm-level cash margin and the MPP-Dairy index. As a result, basis should not be viewed statically as financial risks associated with basis variability are still possible throughout the year even when employing a targeted MPP-Dairy strategy. Strength or weakness in the basis will alter the results of a customized MPP-Dairy participation strategy. Still, by considering basis and the magnitude of price correlation a farmer is better able to anticipate the level of protection provided by MPP-Dairy and understand potential risks.

Implications

Is a strategy accentuating basis going to perform better than anticipating market risk in milk and feed markets? Since payments under MPP-Dairy are triggered when the national, not individual farm-level, MPP-Dairy margin falls below farmer-selected coverage levels all farmers purchasing the same MPP-Dairy coverage options will receive the same per hundredweight payment if MPP-Dairy enters payment status. It follows then that, regardless of basis, MPP-Dairy will provide risk protection and smooth the farm-level margin during times of national declines in the dairy production margin. Thus, while the net margins protected at the farm level may be higher or lower than the U.S. average, e.g. Table 1, the MPP-Dairy net benefit (payment minus premium) will be identical for farms of similar production histories selecting the same coverage options.

Perhaps factoring basis into the MPP-Dairy equation over-complicates what was designed to be a simple decision. The information on expected risk in milk and feed markets available to dairy producers during the annual registration process is identical. As a result, if the market's expectations about future milk and feed market conditions are considered rationally, without consideration of basis dairy farmers may select the coverage options which maximize expected benefits. Then, to compliment MPP-Dairy, other risk management tools can be used to provide additional protection and develop a customized risk management strategy (e.g. futures and forwards on milk or feed).

Nevertheless, dairy farmers may attempt to modify their MPP-Dairy coverage options to account for anticipated basis levels in order to protect a target farm-level margin. However, this article has demonstrated that basis is not constant and price changes in the cash margins may not be offset by price changes in the MPP-Dairy margin index. The lack of a one-to-one relationship in price movements creates the potential for movements in the MPP-Dairy protected price floor. Dairy farmers attempting to utilize a more sophisticated basis strategy to manage their farm-level margin should be aware of the potential basis risks and how it may impact their farm's financial health.

As part of a broader risk management objective understanding individual risk exposure is critically important for using MPP-Dairy. Dairy farmers should evaluate their financial balance sheet and carefully consider factors such as the debt-to-asset ratio, net farm income, liquidity constraints, and farm efficiency to understand how much of a margin decline can be sustained on the farm (see [Financial Factors to Consider, Program on Dairy Markets and Policy](#)). By understanding their farm-level financial risks dairy farmers can develop a customized hedging strategy and recognize if, when, and how MPP-Dairy should be employed.

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