

Assessment of Average Prices and Average Net Farm Operating Income Over Different Time Horizons Under the Dairy Security Act of 2011 (H.R. 3062) and the Dairy Provisions of the Rural Economic Farm and Ranch Sustainability and Hunger Act of 2011 (S. 1658)

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Introduction

Our previous analyses of the Dairy Security Act and the similar REFRESH Act indicated that these programs could have significant impacts on the All-milk price, both the pattern of prices (Figure 1) and the average observed during the period in which the legislation is assumed to be active, 2012 to the end of 2018¹. A similar impact was simulated for monthly and average Net Farm Operating Income (NFOI). The previous studies reported that the average all-milk price from 2012 to 2018 was lower under the two DSA scenarios analyzed, by about \$0.53/cwt in the “low participation” scenario and \$0.92/cwt in the “high participation” scenario, respectively. The average annual NFOI for a medium-sized (250 to 499 cow) farm was simulated to be lower by about \$26,000 and \$42,000 per year under the DSA scenarios during this same period². Given this information about all-milk prices and NFOI, the question has been raised about whether the use of a shorter time horizon—that is, the particular time period selected—for calculating the average all-milk price or NFOI would make a qualitative difference to the reported results. It has been suggested that the time frame extending to 2018 may be “too long” in some sense, given the time horizon for management decisions by dairy producers and the potential uncertainty about developments in US and international dairy markets³. The objective of this document is to provide additional information about the average prices and NFOI from our previous results, and to examine whether the time horizon used for averaging affects the nature of the outcomes.

Average All-Milk Price Impacts

Our analyses assumed implementation of the DSA or REFRESH in January 2012. Because this is a period in which current dairy programs (the “Baseline”) were simulated to result in lower all-milk prices, the DSA and REFRESH provisions result almost immediately in higher all-milk prices than with the continuation of current programs (Figure 1). Due to projected fluctuations in milk prices on a roughly three-year cycle in future years, there are other periods in which the all-milk price will be higher with proposed DSA and REFRESH programs than with the Baseline (for example, parts of 2015 and 2018). This can be viewed more clearly by examining the differences between the DSA program with “low” and “high” participation scenarios (Figure 2). Under both scenarios, there are time periods in which the price under DSA is higher. Much of

¹ For more details, see Nicholson and Stephenson (2011a), Nicholson and Stephenson (2011b) and Stephenson and Nicholson (2011).

² As noted in our previous documents, the costs of volatility to farmers are not fully accounted for in our analysis, but the lower prices and NFOI with the programs suggest that there are relevant trade-offs between *variability* of prices and income and the *levels* of prices and income.

³ This time horizon was chosen primarily because it aligns with the potential time frame for the Farm Bill.

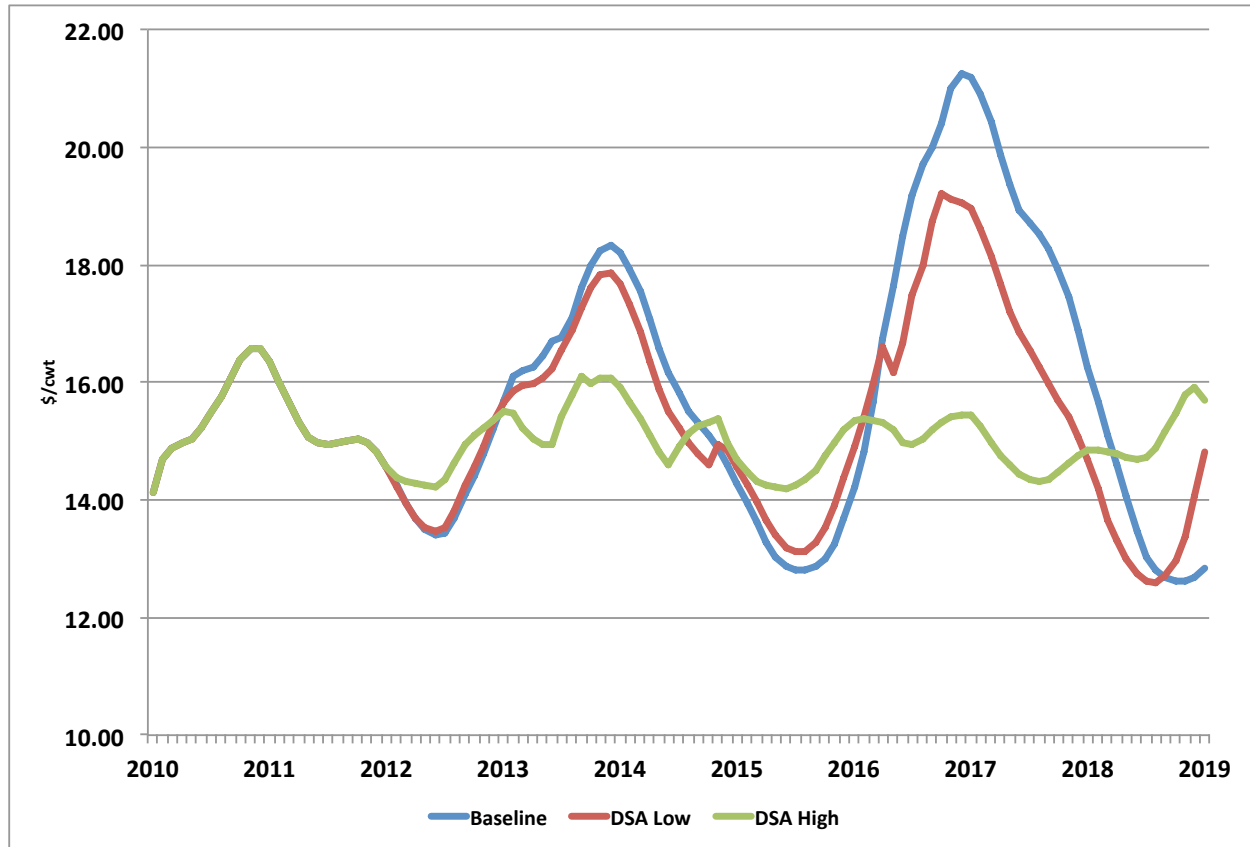


Figure 1. Simulated Monthly All-Milk Price, Two DSA and Baseline Scenario

the time, however, the all-milk price is lower, and the “negative” differences (indicating that the Baseline has a higher price) are larger than the “positive” differences (indicating that the DSA scenarios have a higher price). Larger and more frequent negative differences are consistent with the lower average all-milk prices reported for the time period 2012 to 2018.

Another way to assess this is to examine the average annual prices with current programs (the “Baseline”) and the DSA provisions, and calculate the average difference in milk prices in a given calendar year. This analysis shows that for the years after the program is assumed implemented, there are three calendar years in which the average all-milk prices would be higher with the DSA, and four calendar years in which average all-milk prices would be higher with the Baseline (Figure 3, solid lines). In addition to a larger number of years with a lower average price, the average negative differences tend to be larger than the average positive differences, which is again consistent with lower average prices over the entire time period. However, the year 2012 does show higher average prices with the DSA program than under the Baseline.

It is also possible to show the average all-milk price beginning at the start of the program in January 2012, through a given future month. For example, a three-year time horizon (rather than a seven-year time horizon as reported in the previous documents) may be considered more relevant. To assess the average price for the three years beginning January 2012, we take the average all-milk price from January 2012 to December 2014. We can do this same calculation for all the months beginning in January 2012 through December 2018, and plot the average value

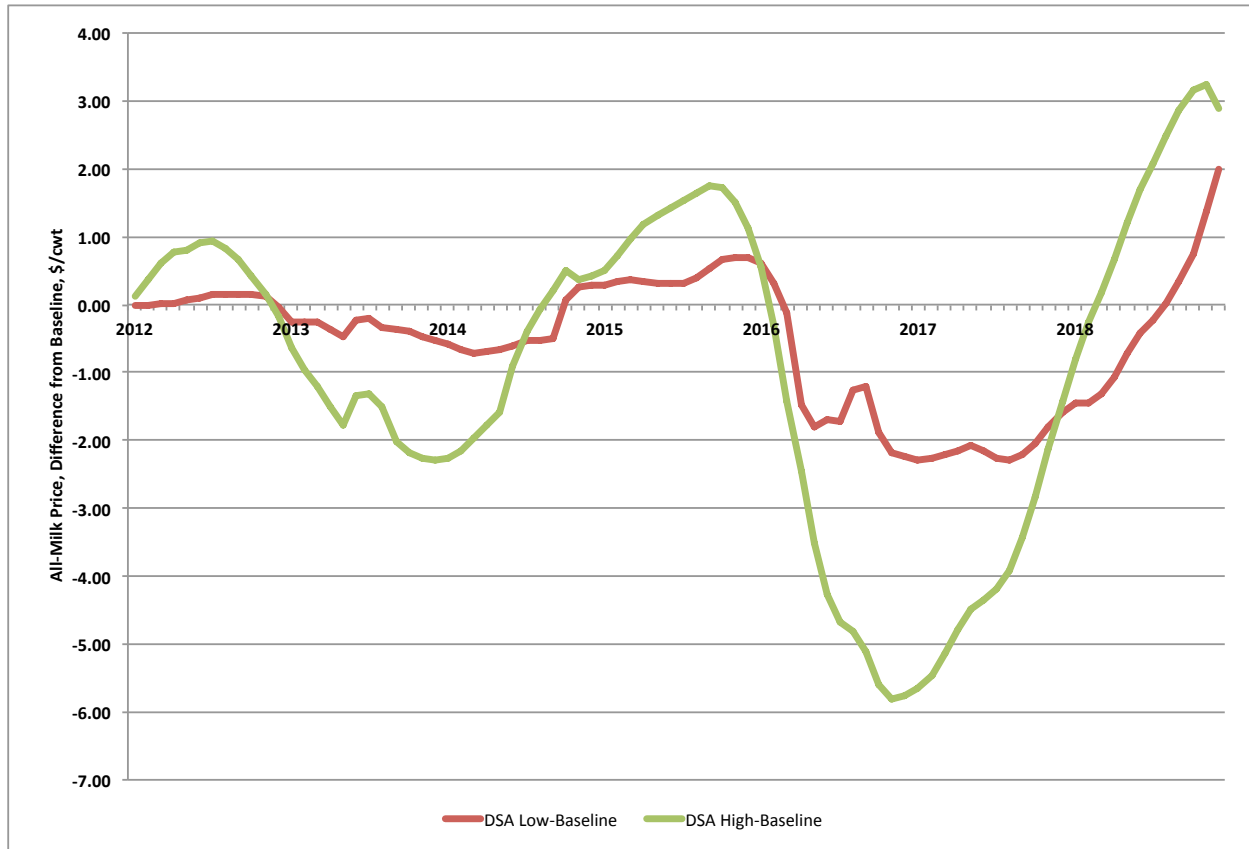


Figure 2. Simulated Difference in All Milk Price, Two DSA Scenarios Less Baseline Scenario

of the all-milk price through that month. This allows us to assess the average for any future time horizon on a single graph. The results of this analysis suggest that for any time horizon longer than about 18 months beginning in January 2012, the average price will be lower with the DSA than with the Baseline (Figure 3, dashed lines). With a time horizon of three years, for example, the average all-milk price would be about \$0.50/cwt lower under the “high participation” scenario, but about \$0.20/cwt lower under the “low participation” scenario. If the time horizon is extended to four years, the differences between the DSA and Baseline scenarios are smaller. However, for much of the time period from 2012 to 2018, the difference in average prices is larger than \$0.50/cwt for the “high participation” scenarios and greater than \$0.25/cwt for the “low participation” scenarios. The values reported at the end of 2018 are those reported in our previous documents, reflecting the average difference during January 2012 to December 2018.

Average Net Farm Operating Income Impacts

The all-milk price is an important indicator of the state of the US dairy industry, but it does not account for the changes in quantities of milk sold, which would be affected by the Dairy Market Stabilization Program (DSMP) provisions of the DSA and REFRESH. To complement the assessment of average price impacts, it is appropriate to examine the impacts on average NFOI, using the same approach as used above for the all-milk price. Our previous analyses indicated there will be periods when the NFOI for a medium-sized farm will be higher with DSA than

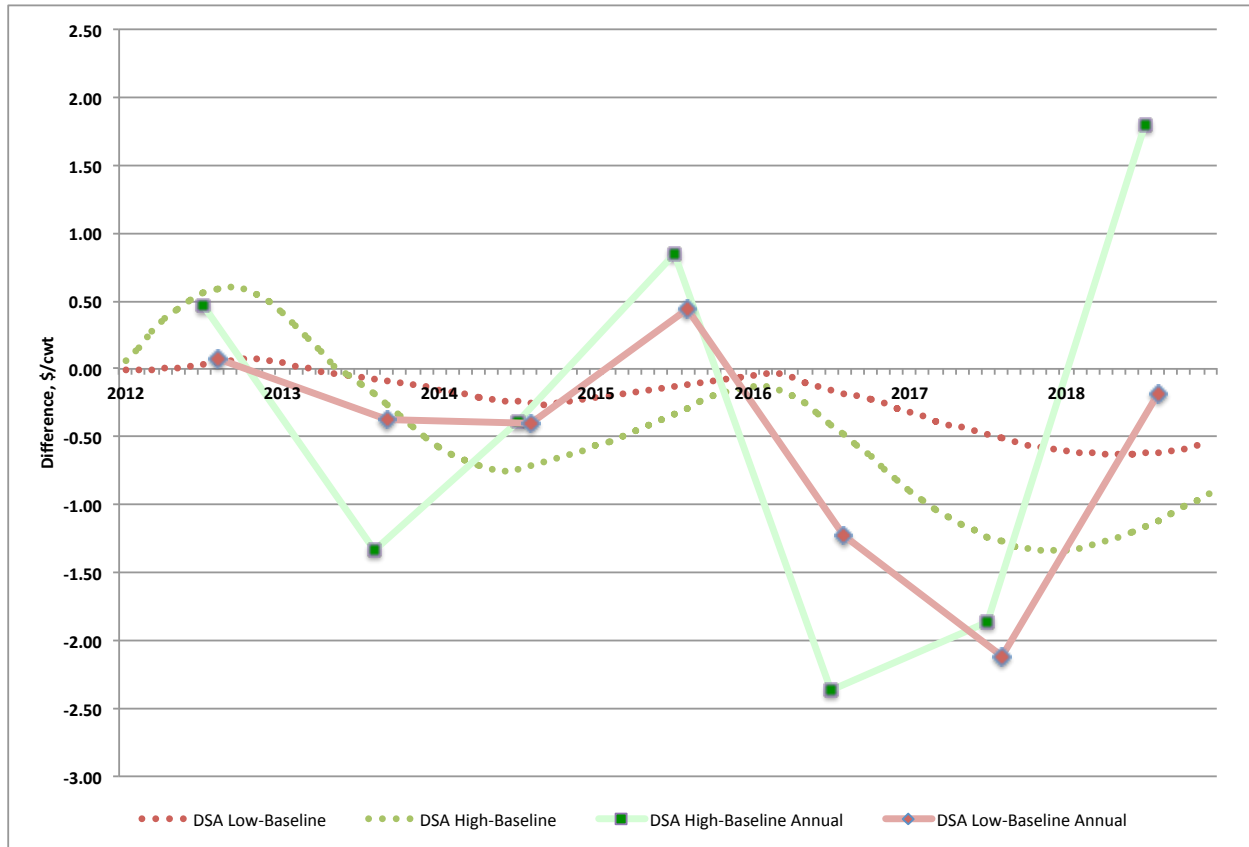


Figure 3. Simulated Annual Average Differences in All-Milk Price, Two DSA Scenarios Less Baseline (solid lines with annual midpoints), and Simulated Difference in Average All-milk Price, January 2012 to Month Indicated (dashed lines)

with the Baseline, but many more periods when the NFOI would be higher under the Baseline (Figure 4). One principal advantage of the DSA is that it reduces variability of NFOI and essentially eliminates periods of negative NFOI. The differences in NFOI for the medium-size farm indicate that during parts of 2012, 2015 and 2018, NFOI would be higher with the provisions of DSA (Figure 5). This results primarily from higher prices, but also from differences in milk marketed. However, as for the all-milk price, the periods of negative difference are more frequent and larger, consistent with the lower average NFOI reported in our previous results. Similar to all-milk price, we can examine the average annual NFOI with current programs (the “Baseline”) and the DSA provisions, and calculate the average difference in NFOI in a given calendar year. This analysis shows that for the years after the program is assumed implemented, there are two calendar years in which the average NFOI would be higher with the DSA, and five calendar years in which average NFOI would be higher with the Baseline (Figure 5, solid lines). In addition to a larger number of years with a lower average NFOI, the average negative differences tend to be larger than the average positive differences, which is again consistent with lower average NFOI. However, the year 2012 does not show higher average NFOI with the DSA program than under the Baseline, despite higher prices, because of the reductions in milk marketed that were implemented to achieve the price increases.

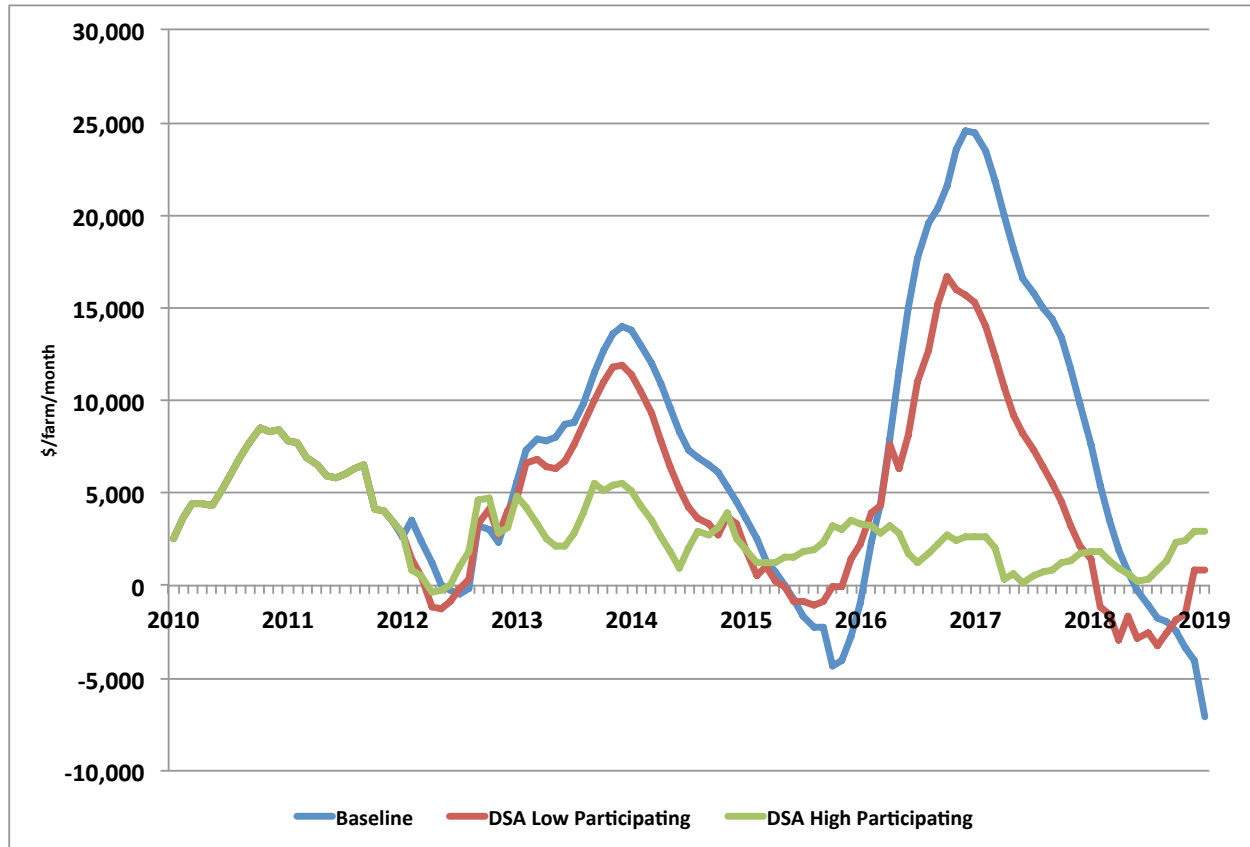


Figure 4. Simulated NFOI for Medium-sized Participating Farm, Two DSA Scenarios Less Baseline Scenario

Similar to the all-milk price, it is also possible to show the difference in the average monthly NFOI beginning at the start of the program in January 2012, through a given future month. For example, a three-year time horizon (rather than a seven-year time horizon as reported in the previous documents) may be considered more relevant. To assess the average NFOI for the three years beginning January 2012, we take the average of monthly values of NFOI from January 2012 to December 2014. We can do this same calculation for all the months beginning in January 2012 through December 2018, and plot the average value of the NFOI through that month. This allows us to assess the average for any future time horizon on a single graph. The results of this analysis suggest that there is no time horizon during January 2012 to December 2018 in which the average monthly NFOI would be higher with the DSA than with the Baseline (Figure 3, dashed lines). With a time horizon of three years, for example, the average monthly NFOI would be about \$3,000 per farm lower than the Baseline under the “high participation” scenario, but about \$1,500 per month lower under the “low participation” scenario. Note that this implies that the cumulative difference in NFOI for a farm would be equal to the average monthly difference times the number of months. If the time horizon is extended to four years, the differences in average monthly NFOI between the DSA and Baseline scenarios are smaller. However, for much of the time period from 2012 to 2018, the difference in average monthly

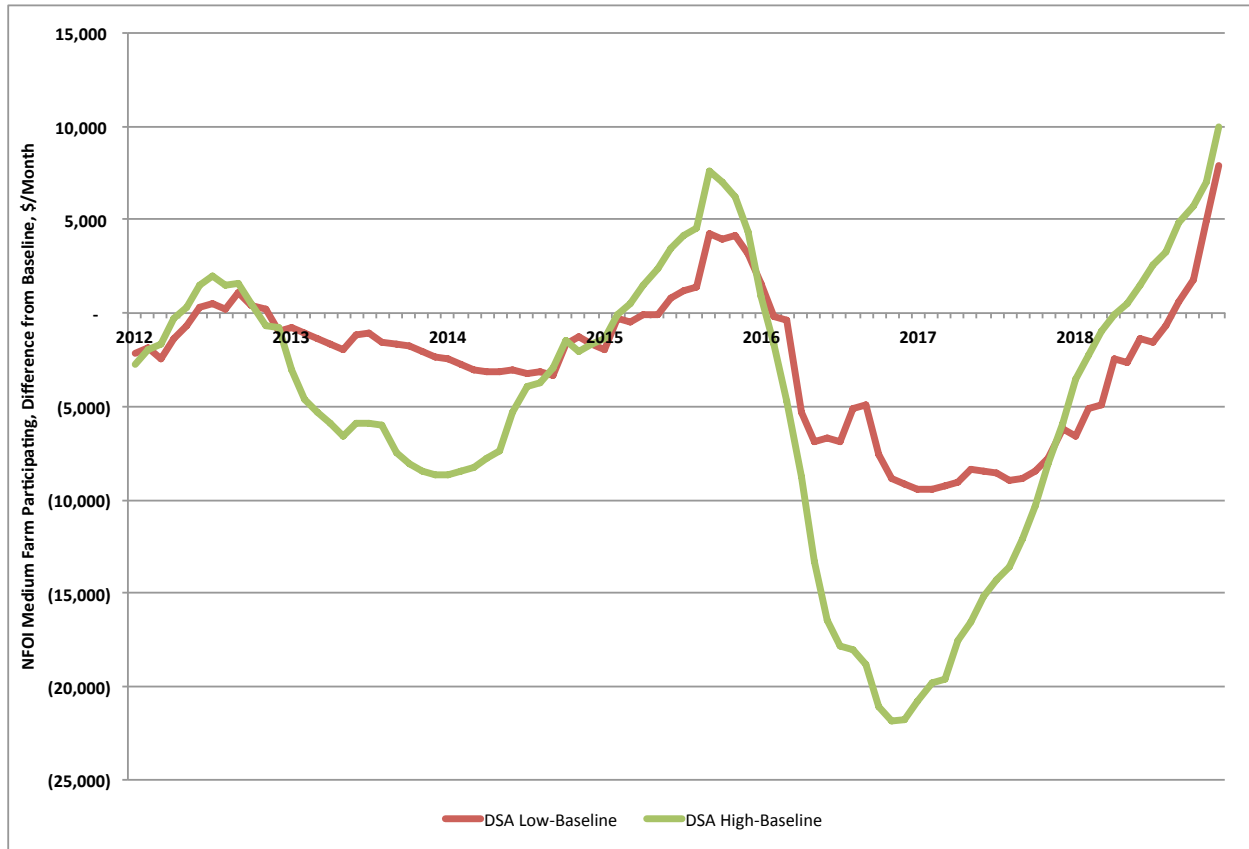


Figure 5. Simulated Difference in NFOI for Medium-sized Participating Farm, Two DSA Scenarios Less Baseline Scenario

NFOI is larger than \$3,000 per farm for the “high participation” scenarios and greater than \$1,500 per farm for the “low participation” scenarios. The values reported at the end of 2018 are the monthly equivalents of the annual values reported in our previous documents, reflecting the average difference during January 2012 to December 2018.

Summary

The results above suggest that the choice of time horizon over which the monthly results are averaged can affect the numerical value of the differences in the average all-milk price and the average NFOI under the DSA and Baseline. However, for most time horizons beginning in January 2012, the average all-milk price would be lower with the provisions of the DSA and for essentially all time horizons, and the average NFOI for a medium-sized participating farm would be lower⁴. As noted previously, this suggests that there are trade-offs in the implementation of the DSA between variability and average returns, and these trade-offs can be evaluated by individual dairy producers.

⁴ This result is similar for medium-size non-participating farms and for both non-participating and participating farms of other sizes.

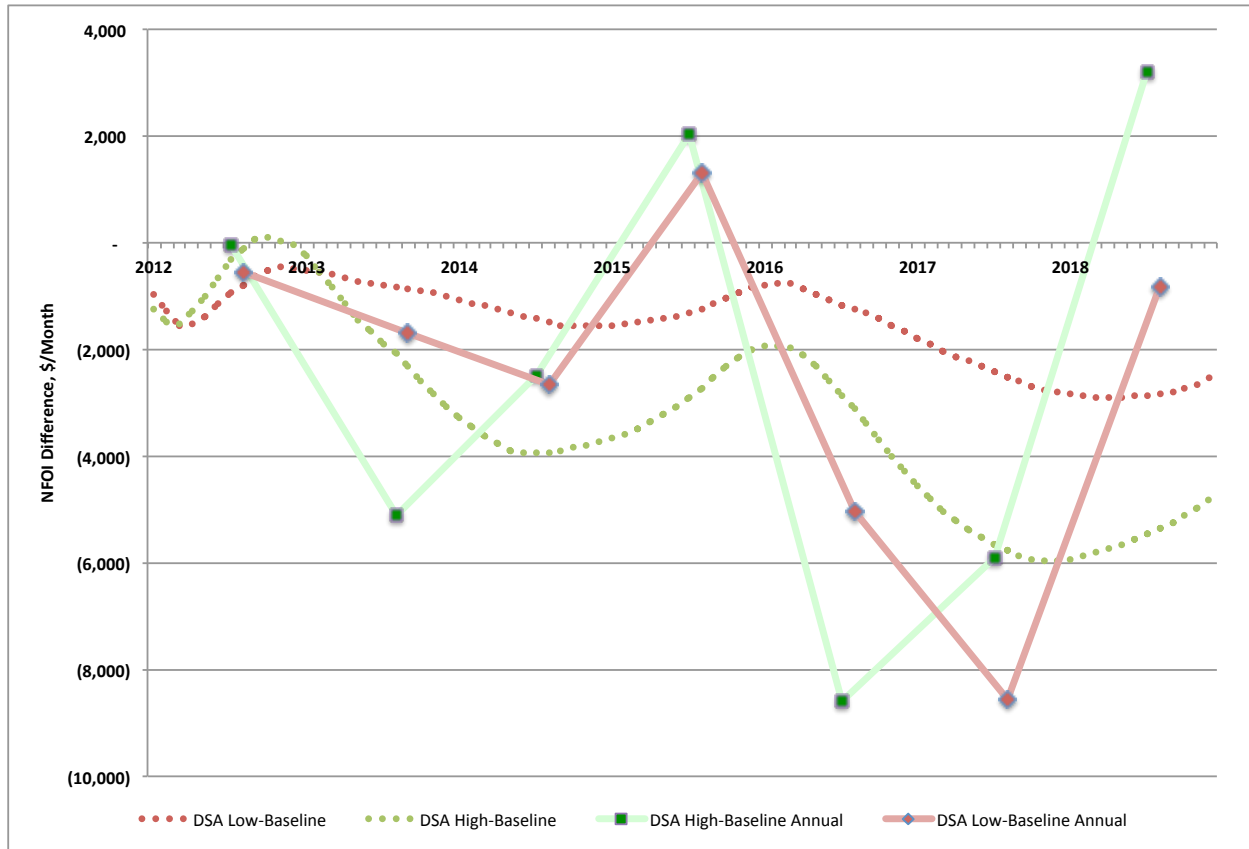


Figure 6. Simulated Annual Average Differences in NFOI for the Medium Participating Farm, Two DSA Scenarios Less Baseline (solid lines with annual midpoints), and Simulated Average Difference in NFOI, January 2012 to Month Indicated (dashed lines)

References

Nicholson, C. and M. Stephenson. 2011a. Market Impacts of the Dairy Security Act of 2011 (H.R. 3062) and the Dairy Provisions of the Rural Economic Farm and Ranch Sustainability and Hunger Act of 2011 (S. 1658). Dairy Markets and Policy Information Summary, October.

Nicholson, C. and M. Stephenson. 2011b. Farm-Level Financial Impacts of the Dairy Security Act of 2011 (H.R. 3062) and the Dairy Provisions of the Rural Economic Farm and Ranch Sustainability and Hunger Act of 2011 (S. 1658). Dairy Markets and Policy Information Summary, October.

*Stephenson, M. and C. Nicholson. 2011. Provisions of the Dairy Security Act of 2011 (H.R. 3062) and the Dairy Provisions of the Rural Economic Farm and Ranch Sustainability and Hunger Act of 2011 (S. 1658). Dairy Markets and Policy Information Summary, October.

APPENDIX A: SIMULATED ALL-MILK PRICE DIFFERENCE DATA, TWO DSA SCENARIOS

Month	Year	Diff DSA Low-Baseline	Diff DSA High-Baseline	Average Diff Jan 2012 to Date, DSA Low-Baseline	Average Diff Jan 2012 to Date, DSA High-Baseline	Annual Average Difference , DSA Low-Baseline	Annual Average Difference , DSA High-Baseline
January	2012	-0.02	0.12	-0.01	0.06		
February	2012	0.00	0.36	-0.01	0.16		
March	2012	0.01	0.61	0.00	0.27		
April	2012	0.03	0.76	0.00	0.37		
May	2012	0.06	0.81	0.01	0.44		
June	2012	0.10	0.92	0.02	0.51		
July	2012	0.14	0.94	0.04	0.56	0.07	0.47
August	2012	0.16	0.84	0.05	0.59		
September	2012	0.16	0.68	0.06	0.60		
October	2012	0.14	0.43	0.07	0.59		
November	2012	0.12	0.15	0.07	0.55		
December	2012	-0.04	-0.17	0.07	0.50		
January	2013	-0.25	-0.63	0.04	0.41		
February	2013	-0.25	-0.95	0.02	0.32		
March	2013	-0.27	-1.22	0.01	0.23		
April	2013	-0.38	-1.51	-0.02	0.12		
May	2013	-0.47	-1.78	-0.04	0.02		
June	2013	-0.24	-1.35	-0.05	-0.05		
July	2013	-0.21	-1.32	-0.06	-0.12		
August	2013	-0.34	-1.51	-0.07	-0.18	-0.38	-1.34
September	2013	-0.38	-2.01	-0.09	-0.27		
October	2013	-0.40	-2.17	-0.10	-0.35		
November	2013	-0.48	-2.27	-0.12	-0.43		
December	2013	-0.53	-2.28	-0.13	-0.50		
January	2014	-0.59	-2.26	-0.15	-0.57		
February	2014	-0.68	-2.16	-0.17	-0.63		
March	2014	-0.71	-1.97	-0.19	-0.68		
April	2014	-0.69	-1.76	-0.21	-0.71		
May	2014	-0.65	-1.58	-0.22	-0.74		
June	2014	-0.60	-0.91	-0.23	-0.75		
July	2014	-0.54	-0.39	-0.24	-0.74	-0.41	-0.39
August	2014	-0.52	-0.06	-0.25	-0.72		
September	2014	-0.51	0.21	-0.26	-0.69		

Month	Year	Diff DSA Low- Baseline	Diff DSA High- Baseline	Average Diff Jan 2012 to Date, DSA Low- Baseline	Average Diff Jan 2012 to Date, DSA High- Baseline	Annual Average Difference , DSA Low- Baseline	Annual Average Difference , DSA High- Baseline
October	2014	0.06	0.50	-0.25	-0.66		
November	2014	0.26	0.37	-0.24	-0.63		
December	2014	0.28	0.42	-0.22	-0.60		
January	2015	0.29	0.51	-0.21	-0.57		
February	2015	0.35	0.71	-0.19	-0.54		
March	2015	0.37	0.96	-0.18	-0.50		
April	2015	0.35	1.17	-0.17	-0.46		
May	2015	0.32	1.32	-0.16	-0.42		
June	2015	0.31	1.44	-0.14	-0.37		
July	2015	0.32	1.53	-0.13	-0.33	0.44	0.84
August	2015	0.41	1.65	-0.12	-0.29		
September	2015	0.54	1.76	-0.11	-0.24		
October	2015	0.66	1.73	-0.09	-0.20		
November	2015	0.69	1.50	-0.07	-0.16		
December	2015	0.69	1.12	-0.06	-0.14		
January	2016	0.61	0.56	-0.05	-0.12		
February	2016	0.32	-0.30	-0.04	-0.13		
March	2016	-0.13	-1.41	-0.04	-0.15		
April	2016	-1.47	-2.46	-0.07	-0.20		
May	2016	-1.81	-3.52	-0.10	-0.26		
June	2016	-1.71	-4.26	-0.13	-0.33		
July	2016	-1.73	-4.67	-0.16	-0.41	-1.22	-2.37
August	2016	-1.27	-4.81	-0.18	-0.48		
September	2016	-1.20	-5.10	-0.19	-0.56		
October	2016	-1.89	-5.61	-0.22	-0.65		
November	2016	-2.19	-5.81	-0.26	-0.74		
December	2016	-2.24	-5.77	-0.29	-0.82		
January	2017	-2.29	-5.65	-0.32	-0.90		
February	2017	-2.27	-5.45	-0.35	-0.97		
March	2017	-2.22	-5.13	-0.38	-1.03		
April	2017	-2.16	-4.79	-0.41	-1.09		
May	2017	-2.08	-4.50	-0.43	-1.14		
June	2017	-2.17	-4.36	-0.46	-1.19		
July	2017	-2.27	-4.18	-0.49	-1.23	-2.12	-1.86
August	2017	-2.30	-3.91	-0.51	-1.27		

Month	Year	Diff DSA Low- Baseline	Diff DSA High- Baseline	Average Diff Jan 2012 to Date, DSA Low- Baseline	Average Diff Jan 2012 to Date, DSA High- Baseline	Annual Average Difference , DSA Low- Baseline	Annual Average Difference , DSA High- Baseline
September	2017	-2.21	-3.43	-0.54	-1.30		
October	2017	-2.04	-2.82	-0.56	-1.33		
November	2017	-1.81	-2.13	-0.58	-1.34		
December	2017	-1.57	-1.41	-0.59	-1.34		
January	2018	-1.45	-0.80	-0.60	-1.33		
February	2018	-1.44	-0.26	-0.61	-1.32		
March	2018	-1.31	0.19	-0.62	-1.30		
April	2018	-1.07	0.68	-0.63	-1.27		
May	2018	-0.73	1.22	-0.63	-1.24		
June	2018	-0.41	1.70	-0.63	-1.20		
July	2018	-0.23	2.07	-0.62	-1.16	-0.18	1.80
August	2018	0.02	2.47	-0.61	-1.12		
September	2018	0.33	2.85	-0.60	-1.07		
October	2018	0.75	3.16	-0.58	-1.02		
November	2018	1.38	3.24	-0.56	-0.97		
December	2018	1.99	2.88	-0.53	-0.92		

APPENDIX B: SIMULATED NFOI DIFFERENCE DATA, MEDIUM PARTICIPATING
FARM, TWO DSA SCENARIOS

Month	Year	Diff DSA Low- Baseline	Diff DSA High- Baseline	Average Diff Jan 2012 to Date, DSA Low- Baseline	Average Diff Jan 2012 to Date, DSA High- Baseline	Annual Average Difference, DSA Low- Baseline	Annual Average Difference, DSA High- Baseline
January	2012	(2,143)	(2,709)	(969)	(1,252)		
February	2012	(1,895)	(1,910)	(1,277)	(1,471)		
March	2012	(2,429)	(1,625)	(1,565)	(1,509)		
April	2012	(1,335)	(276)	(1,519)	(1,263)		
May	2012	(667)	265	(1,377)	(1,008)		
June	2012	328	1,471	(1,134)	(654)		
July	2012	494	2,012	(930)	(321)	(560)	(52)
August	2012	178	1,480	(807)	(121)		
September	2012	1,085	1,642	(618)	56		
October	2012	389	491	(526)	95		
November	2012	219	(657)	(464)	32		
December	2012	(940)	(808)	(501)	(32)		
January	2013	(758)	(3,075)	(519)	(250)		
February	2013	(1,057)	(4,588)	(555)	(539)		
March	2013	(1,333)	(5,284)	(604)	(835)		
April	2013	(1,691)	(5,870)	(668)	(1,132)		
May	2013	(1,998)	(6,606)	(742)	(1,436)		
June	2013	(1,192)	(5,950)	(765)	(1,673)		
July	2013	(1,108)	(5,863)	(782)	(1,883)		
August	2013	(1,546)	(5,985)	(819)	(2,078)	(1,695)	(5,101)
September	2013	(1,690)	(7,521)	(858)	(2,326)		
October	2013	(1,779)	(8,099)	(898)	(2,577)		
November	2013	(2,103)	(8,488)	(949)	(2,823)		
December	2013	(2,367)	(8,651)	(1,005)	(3,056)		
January	2014	(2,476)	(8,642)	(1,062)	(3,271)		
February	2014	(2,740)	(8,504)	(1,124)	(3,465)		
March	2014	(3,028)	(8,224)	(1,192)	(3,635)		
April	2014	(3,115)	(7,742)	(1,258)	(3,776)		
May	2014	(3,111)	(7,369)	(1,320)	(3,896)		
June	2014	(3,040)	(5,299)	(1,376)	(3,941)		
July	2014	(3,234)	(3,927)	(1,434)	(3,941)	(2,656)	(2,475)
August	2014	(3,177)	(3,765)	(1,487)	(3,936)		
September	2014	(3,362)	(2,974)	(1,542)	(3,907)		

October	2014	(1,683)	(1,475)	(1,546)	(3,838)		
November	2014	(1,260)	(2,035)	(1,538)	(3,788)		
December	2014	(1,650)	(1,623)	(1,541)	(3,729)		
January	2015	(1,944)	(1,330)	(1,551)	(3,666)		
February	2015	(278)	(56)	(1,519)	(3,573)		
March	2015	(518)	496	(1,494)	(3,472)		
April	2015	(99)	1,529	(1,460)	(3,350)		
May	2015	(116)	2,366	(1,428)	(3,214)		
June	2015	773	3,425	(1,377)	(3,059)		
July	2015	1,172	4,204	(1,319)	(2,894)	1,326	2,031
August	2015	1,394	4,518	(1,258)	(2,730)		
September	2015	4,227	7,559	(1,139)	(2,506)		
October	2015	3,976	7,026	(1,030)	(2,303)		
November	2015	4,146	6,199	(922)	(2,126)		
December	2015	3,172	4,347	(839)	(1,994)		
January	2016	1,606	863	(790)	(1,937)		
February	2016	(173)	(1,683)	(778)	(1,932)		
March	2016	(338)	(4,705)	(769)	(1,985)		
April	2016	(5,334)	(8,769)	(856)	(2,113)		
May	2016	(6,866)	(13,305)	(967)	(2,320)		
June	2016	(6,701)	(16,443)	(1,071)	(2,577)		
July	2016	(6,899)	(17,876)	(1,175)	(2,850)	(5,026)	(8,604)
August	2016	(5,158)	(18,072)	(1,245)	(3,117)		
September	2016	(4,928)	(18,858)	(1,309)	(3,389)		
October	2016	(7,571)	(21,072)	(1,415)	(3,688)		
November	2016	(8,820)	(21,847)	(1,538)	(3,991)		
December	2016	(9,130)	(21,797)	(1,663)	(4,283)		
January	2017	(9,432)	(20,805)	(1,788)	(4,549)		
February	2017	(9,436)	(19,847)	(1,909)	(4,792)		
March	2017	(9,278)	(19,622)	(2,024)	(5,024)		
April	2017	(9,040)	(17,542)	(2,132)	(5,217)		
May	2017	(8,390)	(16,506)	(2,227)	(5,388)		
June	2017	(8,455)	(15,195)	(2,320)	(5,534)		
July	2017	(8,606)	(14,272)	(2,413)	(5,662)	(8,564)	(5,914)
August	2017	(8,920)	(13,550)	(2,507)	(5,777)		
September	2017	(8,851)	(12,078)	(2,597)	(5,867)		
October	2017	(8,434)	(10,362)	(2,680)	(5,930)		
November	2017	(7,728)	(8,081)	(2,750)	(5,960)		
December	2017	(6,202)	(5,874)	(2,797)	(5,959)		
January	2018	(6,574)	(3,576)	(2,848)	(5,927)		
February	2018	(5,107)	(2,215)	(2,878)	(5,877)		
March	2018	(4,871)	(962)	(2,904)	(5,812)		

November 2011

April	2018	(2,429)	(120)	(2,898)	(5,739)		
May	2018	(2,637)	519	(2,895)	(5,658)		
June	2018	(1,411)	1,465	(2,876)	(5,568)		
July	2018	(1,548)	2,540	(2,860)	(5,467)	(824)	3,201
August	2018	(638)	3,238	(2,832)	(5,359)		
September	2018	617	4,810	(2,790)	(5,235)		
October	2018	1,790	5,779	(2,735)	(5,103)		
November	2018	4,970	7,035	(2,643)	(4,958)		
December	2018	7,945	10,010	(2,519)	(4,782)		