Potential Economic Impacts of the Northeast Interstate Dairy Compact on Vermont Dairy Farms

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The Northeast Interstate Dairy Compact has been established to regulate milk prices. Simulation models show impacts on Vermont farms of alternative milk prices and accelerated productivity growth. Enhancing prices (by $0.85/cwt) improves financial performance the most, while impacts of doubling growth in milk production/cow (to 2.6% per year) and setting a price floor (which reduces the standard deviation of the price by 19% and raises prices $0.12/cwt) are substantially smaller. These impacts are inversely related to farm profitability. However, impacts on larger farms are not proportionately larger than those on smaller farms. Reducing price variability has smaller impacts than the $0.12/cwt price increase.

Agriculture in New England operates in an environment full of challenges—high land and labor costs, a cool, moist climate, and hilly to mountainous terrain, to name a few. Much of New England has a rural heritage, however, and its residents value agriculture. They value it not only for its fresh, local products but for its contributions to their economy and landscape. Recognizing the challenges to and benefits of local agriculture, various programs and policies have been established to support agriculture in New England. The recently formed Northeast Interstate Dairy Compact is an example.

Dairy farming is the centerpiece of New England agriculture. Milk accounts for more farm receipts in the region than does any other farm product. In 1994, for example, cash farm receipts for milk were $607 million—more than 30% of total New England cash farm receipts (U.S. Department of Agriculture 1995). Dairy farming is even more important in Vermont, where it is part of the state's heritage and identity. In 1992, it accounted for 90% of the agricultural income, 80% of the commercial farms, and 75% of the agricultural land in the state. Vermont's agriculture is the most dairy-oriented of any state in the United States (U.S. Department of Commerce 1994). Its dairy farms produce the largest share of milk in the New England pool (Pelsue 1996).

In addition to the challenges other farms face, dairy farms are subject to their own specific challenges. The level and variability of milk prices have been identified as particular problems. Adjusted for inflation (with the Consumer Price Index), average farm prices of milk in the United States declined almost 50% between 1982 and 1996. Declining real milk prices put dairy farmers in a cost-price squeeze. In New England, zone 21 blend prices for milk trended slightly downward (without adjusting for inflation) from 1981 and 1995, and typically deviated almost $0.50/cwt from their trend-line (figure 1). With the low margins found in the dairy industry, these deviations cause financial stress and make financial planning difficult. For a garden-variety New England dairy farm producing one million pounds of milk, $0.50/cwt becomes a $5,000 change in annual net income. Class-I prices, over which the compact has authority, are a major component of the blend price, have typically been $1 to $1.50/cwt above blend prices, and account for about 40% of the variation in blend prices.

The establishment of the Northeast compact was based on recognition of (1) the importance of a "stable, local supply of pure, wholesome milk," (2) the essential role of dairy farms in "defining the rural character of our communities and landscape," and (3) the "recent, dramatic price fluctuations, with a pronounced downward trend, [that] threaten the viability and stability of the northeast dairy region" (U.S. Congress 1996). The compact has two goals—to improve the sustainability of dairy farms in New England and to assure consumers an adequate supply of locally produced milk. To achieve these goals, the Compact Commission

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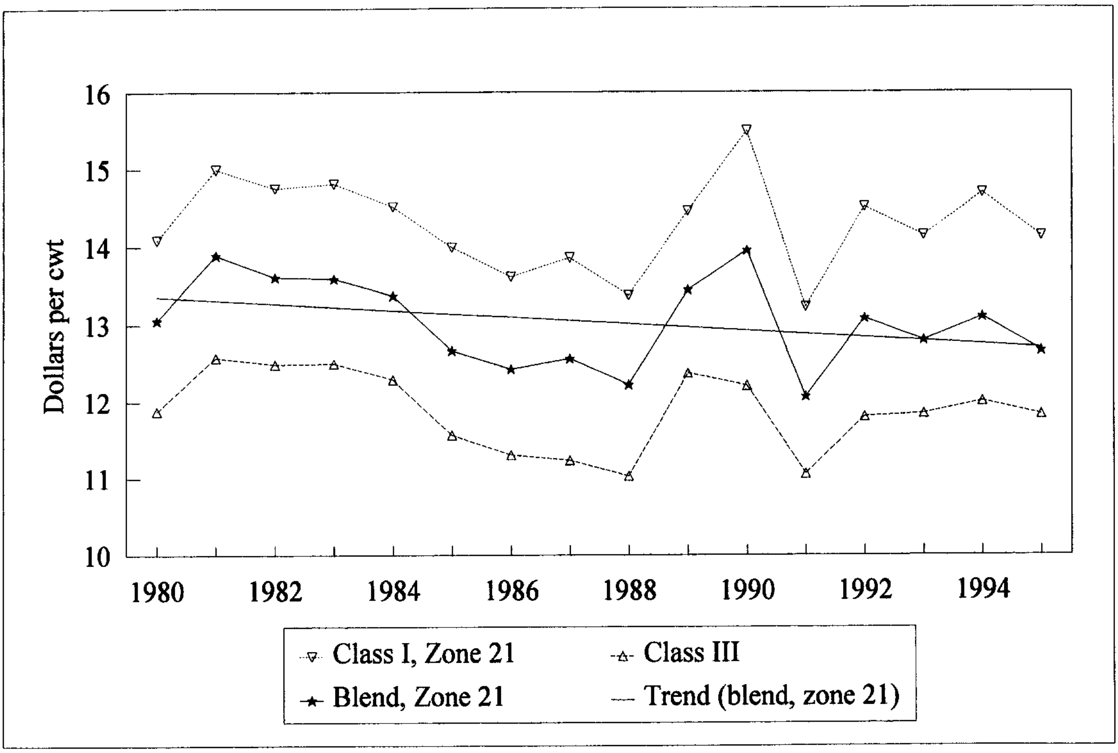

Figure 1. New England Milk Prices

has been given authority to regulate the fluid, or Class-I, milk market, including setting farm prices for Class-I milk.

Efforts to establish a dairy compact in the Northeast began in 1988. By 1993, all six New England states had passed resolutions to participate in the compact. In early 1996, the U.S. Congress, which has authority to establish interstate compacts, gave the Secretary of Agriculture authority to form a compact. After finding a compelling public interest in establishing one, he authorized the formation of the Northeast Interstate Dairy Compact to operate initially in New England. The Compact Commission was organized in late 1996 and includes representatives of dairy farmers, state agriculture officials, dairy processors, and consumers. In July 1997, the commission issued its first regulation, establishing a sliding overorder premium to create a Class-I price floor at $16.94/cwt. The commission assesses fluid milk processors the overorder obligation, pools the proceeds, and distributes payments to dairy farmers through cooperatives and other milk handlers. Although facing legal challenges, the commission continues to operate.

The compact is a major change in the economic environment of New England dairy farms. How and how much the compact will affect these farms are important questions for the members of the Compact Commission, the dairy farmers affected, and the New England residents who want their agriculture to thrive. To assess the potential impact of the dairy compact, we constructed computer models simulating Vermont dairy farms and subjected them to various milk-price regimes. We constructed other models to examine alternative methods of increasing income and factors influencing benefits received. The following sections of this report present the methods used, describe the data sources, discuss the results, and outline the conclusions.

Methods

FLIPSim

The farm models were built with the Farm Level Income and Policy Simulator, or FLIPSim (Richardson and Nixon 1986). FLIPSim is a dynamic, monte-carlo computer simulation model that uses accounting equations and probability distributions to simulate annual financial activities of a farm. It is recursive in that results of one year, such as cash reserves, are carried into the next year. The model was originally released in 1981 and was in version 5 when this study was conducted. It can currently simulate crop, dairy, hog, goat, and sheep farms, and cattle ranches.

FLIPSim typically uses data collected from farmer panels. It contains an economic environment with projected and historical annual prices, agricultural policies, interest and inflation rates, and income-tax provisions. Most of these environmental characteristics can be modified by the user to examine impacts of changes in the environment. Of particular relevance to this study is the fact that averages and distributions of prices are specified separately. Price and inflation projections come from a macroeconomic model at the Food and Agricultural Policy Research Institute (FAPRI 1997). The user specifies farm characteristics, such as resource bases, enterprise sizes, average crop and livestock yields, and operating costs. FLIPSim develops multivariate probability distributions for yields and prices based on ten years of historical data. It projects crop and livestock production, expenses, sales, and other cash flows for up to ten years. It calculates net farm income and a variety of other measures of financial performance. The model is run 100 times for each combination of factors studied. In each run, FLIPSim randomly chooses prices and yields based on target averages, the multivariate probability distributions, and a table of pseudo-random numbers. At the end of each iteration, FLIPSim records more than 200 variables. After 100 iterations, it calculates descriptive statistics for the recorded variables.

FLIPSim has been used to examine farm-level impacts of potential and actual farm policies (e.g., Anderson et al. 1993 and Gempesaw et al. 1993), new technologies (Outlaw et al. 1991 and Richardson et al. 1991), crop-insurance programs (Patrick and Rao 1989), and farming practices for complying with conservation programs (Helms, Bailey, and Glover 1987). Of particular relevance to this study, it has been used to examine effects of price variability on rice and cotton farms. Grant et al. (1984) analyzed effects of price variability and farm policy on growth in net worth and survival of rice farms. They found that higher price variability and more market-oriented policies reduced the probabilities that firms will remain solvent another ten years. Impacts depended on farm tenure. They concluded by noting that policy makers should consider impacts of policies on price variability and farm structure. Duffy, Richardson, and Smith (1986) examined the effects of price variability and farm-program participation on size, net worth, and survival of cotton farms. Farm growth was enhanced by combinations of high price variability and participation in farm programs protecting producers from low prices. Without price and income support programs, increased variability reduced both ending net worth and probability of survival. They concluded that farm-level policy simulations are sensitive to price variability assumed. Analyses of proposed programs should include alternative levels of price variability.

The Models

The models developed in this study show the financial impacts on representative Vermont dairy farms of raising milk prices and introducing a milk-price floor. As an alternative method of increasing farm income, rates of productivity growth are raised in some models. Other models show the effects of farm profitability and size on benefits of price stabilization, and divide the impacts of the floor into a price-raising effect and a price-distribution effect. The models are organized as scenarios with various combinations of five factors—milk-price trajectory,[1] milk-price distribution, productivity-growth rate, farm profitability, and farm size. The farms start with the same equity-to-asset ratios and operate in the same economic environments: they face the same input and output prices, and they deal with the same variations in crop and livestock yield.

Data sources for the farms include Vermont panel data collected for the FLIPSim model in July 1996 (Richardson 1996), the *Northeast Dairy Farm Summary* (Hastings 1995), benchmark reports from the Farm Credit system (Farmer 1996), a survey of dairy farms in Vermont in 1990 (Pelsue, Wackernagal, and Yu 1994), the Champlain Valley Crop Management Association (Hawkins 1996), and the Vermont Dairy Herd Improvement Association (Nault 1996). The panel data represent highly managed, high-profit farms. These data were adjusted, based on the other sources, to represent the low to moderate profitability farm typical of Vermont. Two herd sizes—85 cows and 350 cows—represent a typical herd size for Vermont and a common target for expansions, respectively. They were derived from different groups of farmers and differ in many other respects in addition to herd size (table 1). Differences in farm characteristics and cost structure that influenced results include land base, crop yields, labor structure, and equipment-replacement schedules. The models use two sets of productivity-growth rates. In normal

[1] The model covers a period of seven years and so has seven milk prices. The set of seven prices is a price trajectory through time.

Table 1. Farm Characteristics

	Typical Farm	Target for Expansions
Herd size	85 cows	350 cows
Tillable land	180 acres	700 acres
Corn silage yields	14.1 tons/acre	14.0 tons/acre
Hay yields	2.5 tons/acre	3.0 tons/acre
Owner and unpaid workers	1.5	1.5
Hired employees	1	7
Increase in farm machinery value over 7 years	54%	26%
Cash expense/cwt		
Low profitability	$12.70	$14.64
Moderate profitability	12.16	13.65
Milk sold/cow		
Low profitability	16,000 lbs	16,000 lbs
Moderate profitability	18,000 lbs	18,000 lbs
Investment/cow	$6,717	$5,252

growth, milk sold/cow and crop yields increase at 1.3% and 0.2% per year, respectively (FAPRI projections). With accelerated growth, productivity grows at twice the normal rate, milk sold/cow at 2.6% and crop yields at 0.4%. Increases in milk sales/cow are supported by proportional increases in feed given to lactating cows. Two profitability levels are included—low and moderate. Profitability is crudely adjusted by increasing milk sold/cow, i.e., animal productivity, from 16,000 lbs to 18,000 lbs. Forage and grain consumption/cow are increased in proportion to milk yield. Other than the farm characteristics identified here and below, the model characteristics are constant across scenarios.

Data defining the economic environment in which the farms operate come from FAPRI projections, our experimental design, and historical data. FAPRI projections for input prices, product prices, and inflation are incorporated in the Vermont panel data. Adjustment factors (FLIPSim's price wedges) translate FAPRI's national prices to regional prices.

To represent possible impacts of the compact on farm prices of milk, we put a floor under Class-I milk prices. The floor has two effects: (1) it changes the size and shape of the price distribution, and (2) it shifts the average price upward. In FLIPSim, the size and shape of a distribution are specified separately from the average values. By creating some scenarios with the truncated distribution and others with higher prices, we can determine how much each effect of the floor contributes to improvements in financial performance.

Target averages are specified in price projections, or trajectories. The models use three projections of blend prices of milk—unregulated, level Class-I floor, and enhanced Class-I (figure 2). Un-

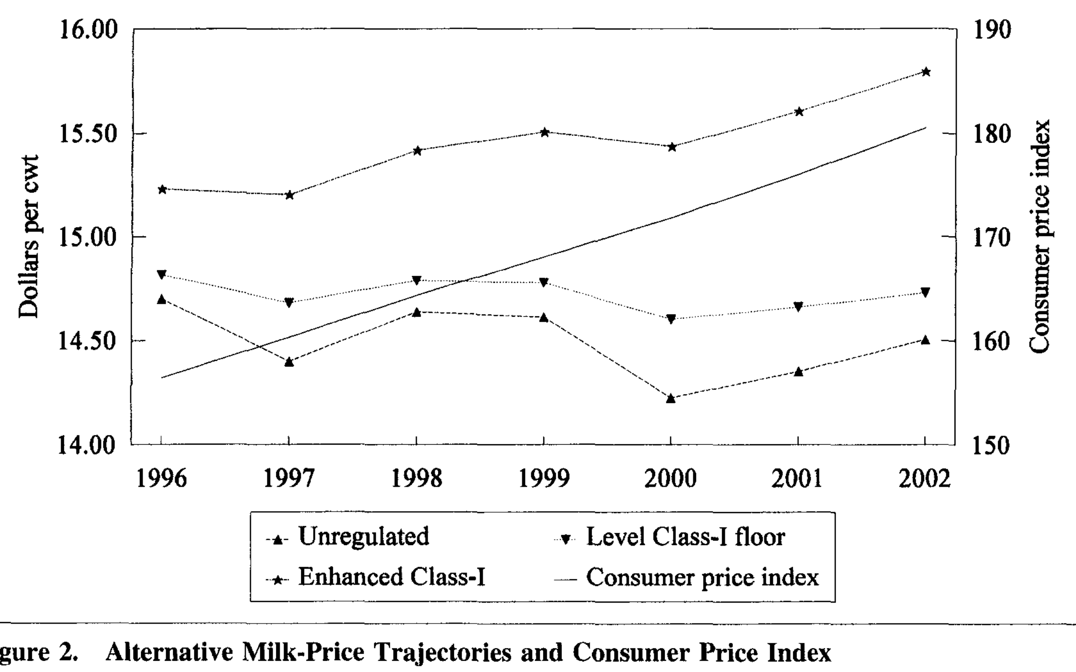

Figure 2. Alternative Milk-Price Trajectories and Consumer Price Index

regulated prices are blend-price projections for 1996 to 2002 from the FAPRI model. This trajectory starts at $14.70/cwt in 1996 and dips twice, to a low of $14.23 in 2000, before recovering to $14.51 in 2002. Both the downward trend and the dips are sources of financial stress for dairy farmers.

In the second trajectory, level Class-I floor, we place a floor under the Class-I portion of the FAPRI projection at the 1996 Class-I level. To get the new blend prices, FAPRI prices are split into Class-I and other prices; then the Class-I prices are adjusted and re-blended with the other prices. With New England Class-I prices typically 110% of blend prices between 1986 and 1995, a $14.70 blend price implies a Class-I price of $16.17. Factoring the floor into the prices moderates the dips considerably. The lowest milk price in this trajectory is $14.41.

In the third trajectory, enhanced Class-I, we raised the Class-I portion of the FAPRI prices to $17/cwt (approximating the commission's regulation) in 1996 and increased it at one-half the rate of inflation in subsequent years. We re-blend prices as above. This trajectory has an upward trend, starting at $15.12 and ending at $15.68/cwt. The seven-year averages of the unregulated, level Class-I floor, and enhanced Class-I trajectories are $14.49, $14.72, and $15.46/cwt, respectively.

The Consumer Price Index (CPI) shows another source of financial stress for these farms—inflation. In contrast to the downward trends of the first two trajectories, inflation progresses steadily upward, creating a cost-price squeeze.

Multivariate price and yield distributions come from historical data from the 1986–95 period. FLIPSim creates probability-density functions from the historical data as a basis for its stochastic variables. Prices for milk, beef, cows, dairy feed, hay, and corn silage are Vermont, New York, or New England averages from USDA statistical series. Other price distributions come from the Vermont panel data. Yield distributions are composites constructed from individual-farm data.

We change the size and shape of the distribution of milk prices by adjusting the historical data. The study includes two historical milk-price distributions—normal and truncated. The normal distribution uses actual New England zone-21 blend prices from 1986 to 1995. The coefficient of variation is expanded by a factor of 1.2 (assumed value), because prices received by an individual farmer generally vary more than regional averages. The truncated distribution is the series of prices that would have occurred from 1986 to 1995 if a floor had been put under Class-I prices at the level of their actual 1986–95 trend line. Truncating raises the average price by $0.12/cwt (0.8%) and reduces the standard deviation by $0.10/cwt (19%).

Of the forty-eight possible combinations of price trajectory, price distribution, productivity growth, farm size, and farm profitability, sixteen combinations have been selected as scenarios to examine (table 2). Accelerated productivity-growth, price-stabilization, and price-enhancement scenarios represent three ways to improve financial performance. Price stabilization represents a relatively light approach to regulation, and price enhancement a more aggressive approach. The moderate profit scenarios show the influence of farm profitability/animal productivity on the benefits due to

Table 2. Scenarios Examined

	Factors				
Scenario Name	Price Trajectory	Price Distribution	Productivity Growth	Herd Size	Profitability
Base 85	Unregulated	Normal	Normal	85	Low
Base 350	Unregulated	Normal	Normal	350	Low
Accelerated productivity 85	Unregulated	Normal	Accelerated	85	Low
Accelerated productivity 350	Unregulated	Normal	Accelerated	350	Low
Price stabilization 85	Level Cl-I floor	Truncated	Normal	85	Low
Price stabilization 350	Level Cl-I floor	Truncated	Normal	350	Low
Price enhancement 85	Enhanced Cl-I	Normal	Normal	85	Low
Price enhancement 350	Enhanced Cl-I	Normal	Normal	350	Low
Moderate profit 85	Unregulated	Normal	Normal	85	Moderate
Moderate profit 350	Unregulated	Normal	Normal	350	Moderate
Moderate profit, price stabilization 85	Level Cl-I floor	Truncated	Normal	85	Moderate
Moderate profit, price stabilization 350	Level Cl-I floor	Truncated	Normal	350	Moderate
Truncated distribution 85	Unregulated	Truncated	Normal	85	Low
Truncated distribution 350	Unregulated	Truncated	Normal	350	Low
Level floor 85	Level Cl-I floor	Normal	Normal	85	Low
Level floor 350	Level Cl-I floor	Normal	Normal	350	Low

price stabilization. With the truncated distribution and level floor scenarios, the effect of stabilizing prices can be decomposed into two parts—the effect of changing the shape of the distribution and the effect of raising its average level.

Results and Discussion

Base Scenario

The base scenarios are the standards to which the other scenarios are compared. While financial results are generally positive, net farm income and rates of return are both low (table 3). There is room for improvement with the alternative scenarios. Two of the results reported are measures of the likelihood of undesirable outcomes—probability of lower real equity (i.e., net worth adjusted for inflation) at the end of the seven years simulated and probability of negative net cash farm income in any year. With the unregulated milk-price projections, the risk of these undesirable outcomes is rather small for both farms. Probabilities of losing equity are just 9% and 14%. Probabilities of negative net cash farm incomes are even smaller. The 85-cow farm never has a negative net cash income in the 100 times the model repeats the seven years. (A zero probability of negative net cash income is not realistic, however, considering all possible economic and production factors. The program generates random prices [and yields] from probability-density functions that have upper and lower bounds—the highest and lowest prices [or yields] in the ten years of historical data given to the model. Thus, the tails of the resulting distributions do not extend forever.) On the 350-cow farm, negative incomes occur in about 7% of the years. The lower risk of negative income on the 85-cow farm is due to the higher proportion of unpaid (i.e., operator) labor than on the 350-cow farm.

The six other results in table 3 are measures of desirable outcomes. While these measures of financial success are mostly positive, they are marginal. Both farms end with cash deficits, after starting with $100/cow in cash reserves. Returns to assets and equity are positive. Ranging from 0.5% to 3.1%, they are small relative to interest rates that farmers would pay to borrow money, however. Ending equity ratios are above the 70% with which they started. While the 85-cow farm has a smaller change-in-equity ratio than the 350-cow farm has, it has a larger change in real net worth. The reason is that it replaces a higher proportion of its machinery during the seven years, and takes on debt to do so. While the new assets add to net worth, the new liabilities partly offset them.

Both farms grow in real net worth. At 10% on the 85-cow farm and 8% on the 350-cow farm, the growth is marginal when considering college education for children, funding retirement, and passing the farm to the next generation. Average annual net farm income shows how much money is available for principal payments on land, down payments on capital purchases, family living expenses, and income and self-employment taxes. Although net incomes look substantial, they are not adequate for covering all these uses. Net cash farm income is relatively stable over time (figure 3). With inflation, however, the cash goes less and less far. Ending cash reserves decline with time on both farms.

In summary, we have two farms at small risk for serious financial difficulties, but operating at low levels of profitability. Inflation, in addition to milk prices and cost structures, influences the financial condition of these farms.

Table 3. Performance of Base-Scenario Farms

	85-Cow Farm	350-Cow Farm
Probability of lower ending real equity	9.0%	14.0%
Probability of net cash farm income <0	0.0%	6.9%
Ending cash reserve	−$6,010	−$7,240
Average return to assets	2.6%	3.1%
Average return to equity	0.5%	1.1%
Average ending equity ratio	75.1%	79.9%
Change in real net worth 1996–2002	10.2%	7.7%
Average annual net farm income	$32,670	$71,290

Impacts of Milk-Price Regulation and Productivity Growth

The impacts, or changes in financial performance, due to alternative conditions and farm characteristics are determined by subtracting base-farm results from those achieved in the alternative scenarios. For example, the probabilities of lower ending equity on the 85-cow farm are 9% in the base scenario and 4% with price stabilization. The impact of stabilizing prices is −5%. Both price-regulation policies and the increased rate of productivity growth have beneficial impacts on all performance measures (table 4). The impacts of price enhancement are substantially larger than those of the other two scenarios. Accelerated productivity growth improves performance as much as or more than price stabilization does.

On the 350-cow farm, also, price enhancement has the most impact (table 5). Increasing the rate of productivity growth has larger impacts on cash re-

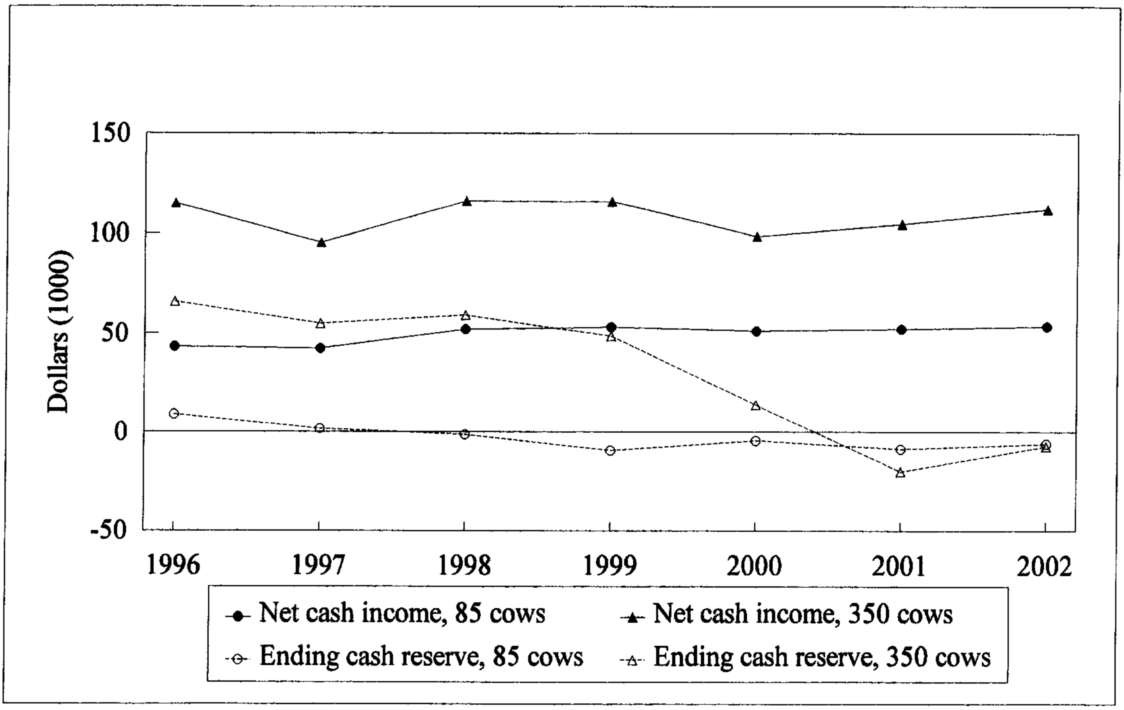

Figure 3. Financial Performance over Time, Base Farms

serves, net worth, and net income than price stabilization has. However, its impacts on probabilities of financial difficulty are smaller than those of price stabilization. Thus, accelerated growth improves average performance more, but reduces risk less.

Effects of Farm Profitability and Size

Farm profitability affects the benefits of price regulation. Impacts of price stabilization on farms of moderate profitability are generally smaller than those on low-profit farms (table 6). For example, price stabilization reduces the probability of losing equity by 5% and 11% on the low-profit farms and not at all on their moderate-profit counterparts. Increases in cash reserves and growth in net worth on the moderate-profit farms are 15% to 25% smaller than on their counterparts. Impacts on net income, however, are 7% and 8% larger on the moderate-profit farms. The moderate-profit farms sell more milk so the change in price is multiplied by a larger quantity. The larger impact on net income and smaller impacts on cash reserves and net worth seem inconsistent. The increase in net income leads to increases in income and social security taxes, and in family living expenses. These uses of cash reduce the amount of cash going into reserves and contributing to net worth.

Farm size also influences impacts of price stabilization. Impacts are larger on the 350-cow farm, regardless of farm profitability (table 6). Impacts on ending cash reserves and average annual net income, however, are not quite in proportion to the herd sizes.

Table 4. Impacts of Alternatives on 85-Cow Farm

	Price Stabilization	Price Enhancement	Accelerated Productivity Growth
		Change from base conditions	
Probability of lower real equity	−5.0%	−9.0%	−5.0%
Probability of net cash farm income <0	0.0%	0.0%	0.0%
Ending cash reserve	$13,690	$46,580	$18,790
Change in real net worth 1996–2002	2.7%	8.7%	3.2%
Average annual net farm income	$3,870	$14,740	$4,830

Table 5. Impacts of Alternatives on 350-Cow Farm

	Price Stabilization	Price Enhancement	Accelerated Productivity Growth
		Change from base conditions	
Probability of lower real equity	-11.0%	-14.0%	-9.0%
Probability of net cash farm income <0	-4.4%	-6.9%	-4.0%
Ending cash reserve	$52,040	$173,270	$79,900
Change in real net worth 1996–2002	3.1%	9.4%	4.1%
Average annual net farm income	$15,550	$59,690	$21,280

Decomposing Impact of Price Stabilization

The price-stabilization scenario reflects the impacts of putting a floor under Class-I milk prices. The floor changes the size and shape of the price distribution and raises the average price. By creating some scenarios with the truncated distribution and others with the higher prices, we can determine how much each effect of the floor contributes to improvements in financial performance. These effects do not contribute equally. On the 85-cow farm, for example, truncating the distribution reduces the probability of losing equity by 2% (table 7). Raising the average price reduces the probability by 5%. Combining these two changes (equivalent to the price-stabilization scenario) also reduces the probability by 5%.

Raising the average price is the dominant effect. The only performance measure on which truncating the distribution has a substantial effect is the probability of losing equity. Losses in equity occur when random milk prices picked by the model are low. Truncating the distribution means the lows are not as low, and so financial difficulties are not as severe. The effects on measures of success are smaller. Truncating affects them by reducing cash deficits and, thus, interest paid on money borrowed to cover the deficits. This interest is small relative to net farm income, so its impact is small.

The impacts of the two effects are not additive. For example, the individual impacts on probability of losing equity sum to –7%, but the impact of combining the shape change with the price shift is just –5%. Thus, the two changes in prices are partial substitutes for each other. The degree of substitution can be measured by the extent to which the sum of the individual contributions, in this case 40% and 100%, exceeds 100%. Only in the probability of losing equity is the substitution effect substantial. In the other measures, the degree of substitution ranges from 1% to 3%.

On the 350-cow farm, raising the average price is, again, dominant (table 8). For measures of financial success, the results are similar to those on the 85-cow farm. Truncating produces just 10% to 15% of the impact of price stabilization, and the degree of substitution ranges from 0% to 3%. However, the contributions of the two price changes to reducing risk of financial difficulty differ. Changes both in the distribution and in the target average make smaller contributions to reducing the probability of losing equity than on the 85-cow farm. The sum of the contributions, 91%, is less than 100%. Thus, the shape change and the upward shift are complements. Unlike the 85-cow farm, this farm has probabilities of negative net cash income. Truncating the distribution makes a large contribution, 58%, to the impact of price stabilization. The substitution effect, 39%, is quite large, too. The 350-cow farm, with a higher proportion of cash expenses, is more vulnerable to dips in milk prices.

The primary contribution of changing the shape of the milk-price distribution is in reducing the risk

Table 6. Impacts of Price Stabilization by Farm Profitability and Herd Size

	85-Cow Farm		350-Cow Farm	
	Low Profitability	Moderate Profitability	Low Profitability	Moderate Profitability
		Change from base conditions		
Probability of lower ending real equity	–5.0%	0.0%	–11.0%	0.0%
Probability of net cash farm income <0	0.0%	0.0%	–4.4%	–0.7%
Ending cash reserve	$13,690	$11,260	$52,040	$39,860
Change in real net worth 1996–2002	2.7%	2.2%	3.1%	2.3%
Average annual net farm income	$3,870	$4,140	$15,550	$16,820

Table 7. Decomposing Impact of Price Stabilization on 85-Cow Farm

	Truncated Class-I Distribution	Level Class-I Floor	Both Price Stabilization
		Absolute changes	
Probability of lower ending real equity	−2.0%	−5.0%	−5.0%
Ending cash reserve	$1,590	$12,320	$13,690
Change in real net worth 1996–2002	0.4%	2.4%	2.7%
Average annual net farm income	$330	$3,550	$3,870
		Percentage of price-stabilization impact	
Probability of lower ending real equity	40%	100%	100%
Ending cash reserve	12%	90%	100%
Change in real net worth 1996–2002	13%	89%	100%
Average annual net farm income	9%	92%	100%

of financial difficulty. The upward shift resulting from establishing a floor has much more impact on measures of financial success than the change in shape has. With these models, price level is more of a constraint to financial success than price variability is. Alternative financial-management strategies, levels of risk aversion, or beginning equity levels could result in greater sensitivity to price variability.

Conclusions

The three strategies for improving economic sustainability of New England dairy farms succeed to varying degrees. Price enhancement substantially improves all measures of financial performance. Price stabilization noticeably reduces probabilities of financial difficulties (losing real net worth or sustaining a negative net cash farm income) and has small impacts on measures of financial success (ending cash reserve, growth in real net worth, or net farm income). Accelerating productivity growth generally improves performance as much as or slightly more than stabilizing prices improves it. Accelerating growth is not as effective as price stabilization in reducing probabilities of financial difficulty on the 350-cow farm, however.

Impacts of price stabilization on moderate-profit farms are generally smaller than on those of low profitability. Thus, price stabilization is biased toward lower-profit farms. Impacts on larger farms are generally larger, but not proportionately larger, than on smaller farms. On a whole-farm basis, price stabilization is biased toward larger farms. On a per-cow basis, it is biased toward smaller farms. Larger farms are at greater risk of financial difficulty than smaller farms, probably because they have a higher proportion of cash expenses.

Price stabilization (i.e., putting a floor under Class-I prices at their current $16.17 level) both changes the size and shape of the price distribution (reducing the standard deviation of the distribution by 19%) and shifts the average price upward (by $0.12/cwt or 0.8%). The size and shape changes contribute substantially to reducing probabilities of financial difficulty. Raising the average price does much more for improving net farm income and other financial success measures. With the price changes and farm models used in this study, price

Table 8. Decomposing Impact of Price Stabilization on 350-Cow Farm

	Truncated Class-I Distribution	Level Class-I Floor	Both Price Stabilization
		Absolute changes	
Probability of lower ending real equity	−2.0%	−8.0%	−11.0%
Probability of net cash farm income <0	−2.6%	−3.6%	−4.4%
Ending cash reserve	$7,110	$46,300	$52,040
Change in real net worth 1996–2002	0.5%	2.7%	3.1%
Average annual net farm income	$1,260	$14,310	$15,550
		Percentage of price-stabilization impact	
Probability of lower ending real equity	18%	73%	100%
Probability of net cash farm income <0	58%	81%	100%
Ending cash reserve	14%	89%	100%
Change in real net worth 1996–2002	16%	87%	100%
Average annual net farm income	8%	92%	100%

level is more of a constraint to economic sustainability than price variability is.

The variability and level of milk prices and inflation are important factors in the survival and economic success of the Vermont dairy farms modeled here. Stabilizing Class-I prices could reduce the variability of the blend price by about 20%. Nevertheless, making Class-I prices completely predictable will not make blend prices completely predictable or eliminate risk in dairy farming. Simple methods for stabilizing milk prices have small, positive impacts on the economic performance, and thus sustainability, of these farms. The potential for improving financial performance through price stabilization is limited, however. Price enhancement can yield substantial performance improvement. Thus, to be effective, a compact's policies will have to recognize the impacts of inflation as well as the variability and level of milk prices.

Dairy farms throughout the United States are being challenged as the economic, social, and political environments evolve. Simple economic and physical challenges, such as land prices and climate, have been joined by new, and perhaps more complex, challenges, such as consumer interests, environmental impacts, nonfarm neighbors, and free-trade agreements. The restructuring of the U.S. milk market currently being planned will surely create additional opportunities to adjust. Dairy communities outside the Northeast region are watching the Northeast compact and wondering if a compact is in their future. With the compact in effect now, the next step is to observe its impacts on dairy farm profitability and sustainability in New England.

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