Forecast Errors and Farm Firm Growth

Ebenezer F. Kolajo, Neil R. Martin, Jr., and Gregory D. Hanson

Abstract. Researchers should be wary of the expectations framework and optimization method employed when drawing conclusions about the likely production behavior of farmers. The article compares the predictive accuracy of two expectational schemes, supply-based expectations (SBE) and adaptive expectations (ADE), and two modeling approaches, multiperiod linear programming (MPLP) and recursive strategic linear programming (RSLP). Estimated costs of expectational error were sensitive to expectational assumptions and modeling methods. Unanticipated annual revenue gains for the model farm ranged as high as $75,000 for the SBE scheme with the MPLP model, and shortfalls ranged as high as $52,000 for the ADE scheme with the RSLP model. The magnitude of unanticipated gains and shortfalls increased disproportionately with greater use of debt financing.

Keywords: Expectational error, mathematical programming, financial leverage, farm growth

Profit expectations in farming tend to be stochastic. To the extent that forecast errors reduce profits, prediction is an indirect factor of production. Farm firms are likely to acquire additional “outlook” information so long as its marginal value exceeds its acquisition costs. In this article, we compare the predictive accuracy of alternative expectational schemes. We analyze the cost of expectational errors in relation to alternative modeling approaches for optimizing growth in the net worth of a 600-acre representative Alabama farm raising cotton/soybeans/wheat.

Analysts can better understand the costs associated with input misallocation due to forecast error by reflecting on the developments in U.S. agriculture from the mid-seventies to the mid-eighties. Demand for agricultural inputs dramatically increased in the seventies in response to several years of high incomes. Land prices in nominal terms rose by 284 percent, machinery purchases by 192 percent, and farm debt by 181 percent during 1972-79. Investors expected that the high cost of agriculture could be funded through continued stability or by increases in commodity prices. Compared with 1973-76, however, nominal corn, wheat, and soybean prices in 1987 were 20-40 percent lower. The price decline in real terms was approximately 60-70 percent, although the fall in prices was partly offset by increases in Government payments to farmers.

The effect of forecast error in the seventies and early eighties cannot be measured precisely. However, long-run financial consequences can be viewed in the light of agricultural loan writeoffs of approximately $11 billion during 1984-86. They are estimated to reach $16-18 billion by the end of the eighties (3). Accumulated forecast errors in the past decade were characterized by higher than optimal investment, high borrowing rates, and high cost structure that contributed to record high expenditures for farm programs.

The beef sector in 1985 is a recent example of the adverse effects of forecast error. Because of weaker than anticipated prices in the first quarter, producers resorted to a longer feeding period, thereby increasing the weight equivalent to 897,000 slaughter steers and heifers during the first 9 months of 1985 (3). The U.S. Department of Agriculture (USDA) outlook for Choice steer slaughter prices for the third quarter of 1985 ranged from $64-68 per hundredweight (13). The actual price of $58 per hundredweight (11) was about $6 less than initially projected for 1985. Given the inelastic demand for red meat, the lower price was directly related to the increased supply of heavyweight cattle. The production-related reduction in price of $6 per hundredweight affected the 21,457,000 steers and heifers slaughtered during the first 9 months of 1985. Thus, the expected loss (that is, the negative price reaction) associated with the decision to market heavyweight cattle may have been as much as $60 per head, or $1.3 billion. This estimate would increase to the extent that the value of the heavyweight gain was less than the cost of production specifically associated with that gain. The financial impact was recognizable almost immediately. Average cash income declined by $25,000, and debt increased by $16,000 for the typical commercial-sized beef producer with sales greater than $40,000 in 1985 (16).

This illustration shows that, if resource demand is adjusted to respond to expectations that are not fully realized, output is likely to be suboptimal. The costs of expectational error are determined by the net differ-

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1. Italicized numbers in parentheses refer to items in the References at the end of this article.

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ence between optimal and realized incomes. Economists can use a farm-level evaluation of economic losses due to errors in forecasts in examining the value of information to decisionmaking.

**Effect of Credit Constraints in Expectational Errors**

External financing is typically required by commercial-sized producers. But interest expenses in agriculture increased from less than 5 percent of total cash expenses in 1957 to an estimated 15 percent in 1987. Interest expenses are now at the same level as the sum of important manufactured inputs, such as fertilizers, fuels and oils, electricity, and pesticides. The rapid increase in the use of debt and the corresponding increase in the cost of servicing debt were associated with severe farm financial stress in the mid-1960s. Although financial stress stabilized or lessened in the Midwest and Northern Plains in 1986, financial conditions worsened in the Southeast and Delta States.

Credit can be used to increase profits. However, if the rate of interest on assets is less than the rate of interest on borrowed funds, the use of financial leverage tends to lower net income. As the ratios of debt to total assets increase, the difference between the rate of return on assets and the interest rate “magnifies” farm profits or losses. Thus, if price expectations are not realized, farm losses that are translated into additional indebtedness may eventually cause an operator to lose control of the farm. The risk of income shortfalls associated with financial decisions became more likely in the mid-1960s when prices of both commodities and long-term assets were declining.

**Theoretical Considerations**

As Shackle noted, “decision is choice, but not choice in face of perfect foreknowledge, not choice in face of complete ignorance. Decision, therefore, is choice in face of bounded uncertainty” (9, p. 5). Expectations are the foundation of economic decisions, that is, production and investment decisions derive from the decisionmaker’s expectations of future outcomes.

The extent by which intended and executed plans deviate from actual outcomes may be expressed in terms of unanticipated net revenue gains or shortfalls. Unanticipated revenue shortfalls can be viewed as missed opportunities resulting from unrealized expenditures. Unanticipated revenue gains occur when expectations are exceeded. Although both revenue gains and shortfalls have opportunity costs, large shortfalls can threaten the financial survival of farm firms with high debt-to-asset ratios.

Larger than anticipated profits represent lost profit opportunities. This paradox can be explained as follows: If market prices exceed the expected price, the marginal physical product of fertilizer, for example, will exceed the ratio of input to output prices. Less than optimal use of inputs can lead to the loss of a firm’s competitive edge, as fixed resources are gradually bid away by other firms that more nearly equate marginal factor cost (MFC) with marginal value product (MVP). Land prices, in particular, can be bid up rapidly by the more efficient firms during periods of farm profitability.

Unanticipated revenue shortfalls often cause borrowing to increase. The interest rate premium for loans (that is, above the interest rate on savings) increases the adverse consequences of shortfalls in income. Higher financing costs or a tightening of credit can increase cost structure. If asset restructuring (especially in the case of asset-downsizing) is required, loss of size economies could further reduce long-run competitiveness.

Denoting expectational error by \( L \), we can express net revenue gain or shortfall in terms of output \( Y \), realized or actual price per unit \( P \), the amount of input \( x_i \), and input price per unit \( w_i \).

\[
L = f(Y, P, x_i, w_i)
\]

(1)

\( L \) can be represented in terms of net revenue changes induced by changes in input-output relations.

\[
L = P \Delta Y - w_i \Delta x_i
\]

(2)

where \( \Delta x_i \) and \( \Delta Y \), respectively, denote changes in input and output levels induced by the decisionmakers’ expectations of future outcomes. Equation 2 assumes a simplistic evaluation of \( L \) given that input and output change and that \( w_i \) and \( P \) are known. Although partly determined by \( P \), \( L \) is not generally known during the planning period. The more relevant change-causing price may then be termed the planning price, \( P_e \). Thus, one source of expectational error is the divergence between \( P \) and \( P_e \).

For ease of exposition, assume one product, one variable input in combination with fixed inputs, and a given production function with fixed technology. Planned output fully adjusts to the planning price, that is, there is a corresponding quantity adjustment path to each planning price \( P_e \). Figure 1 uses the concept of a production function to illustrate expectational error by distinguishing among consequent total value products (TVP). Actual TVP differs from the notional TVP (that is, total physical product multiplied by the planning price \( P \)). Figure 1 assumes that a change in output is motivated by a change in expected output price. A “negative” notional TVP (pessimistic price outlook) could be associated with reducing variable input costs (for exam-
ple, by reducing the number of sprayings for leaf spot in peanut production), whereas a “positive” notional TVP could increase input use (for example, spraying).

Expected prices exceeding actual prices reduce profits (triangle BCD in fig 1). The optimistic, but unfulfilled, price expectation (P+) increased input use, thus, MFC exceeded MVP. However, anticipation of the low price (P-) and corresponding contraction of input use dropped MFC below MVP (P*). The triangle ABE represents the lost profit opportunity associated with pessimistic, but overfulfilled, price expectations.

**Procedure**

We estimated opportunity costs resulting from expectational errors from income streams based on (1) actual prices and yields and (2) expected prices and yields. The actual income streams were developed from the “historic” price and yield data of a typical crop farm in north Alabama over an 8-year period (1978–85). After scaling for the relative productivity of the typical farm, we assumed expected yields followed a 5-year moving average of the Colbert County yield data for 1973–85 (1). Enterprise budgets were developed from the farm’s production records. The formula for calculating the expected annual yield for each enterprise can be expressed as

\[ Y_t^* = \alpha (1/n \sum_{i=1}^{n} Y_{t-i}) \]

where \( Y_t^* \) represents the expected annual yield per acre in year \( t \), \( Y_t \) represents the actual yield per acre in \( t \), \( n = 5 \), and \( \alpha \) is the scaled productivity adjustment factor. Year-to-year variability in actual yields exhibited greater dispersion than within-year differences between actual and expected yields (7).

To reflect the effect of alternative price expectations on incomes, we assumed two expectational schemes: supply-based expectations (SBE) and adaptive expectations (ADE). We formulated the SBE by using the fundamental approach to price forecasting in commodity markets, which was based on the applied supply and demand paradigm (2). We considered supply variables, such as intended plantings, harvested acres, yields, beginning stocks, and production level vis-a-vis demand variables, including domestic use of output, exports, ending stocks, and carryover of unused output, in estimating expected prices under the SBE scheme. This information is synthesized from USDA’s annual estimates of aggregate crop production and use (15).

The ADE approach is a variant of Nerlovian adaptive expectations. Expected net returns per acre in year \( t \) were expressed in terms of the expected yield per acre \( (Y_t^*) \), the actual price received in the previous year \( (P_{t-1}) \), and estimated production costs in the current year. Expectations based on returns per acre maximize the expected value of producer surplus (5). The ADE scheme is a conservative approach to estimating planning prices. Although ADE may be conceived as a naive approach, because the search cost of information is minimized, it acknowledges learning from experience as superior.

Table 1 shows actual and expected returns received and estimated. The representative farm we analyzed produces cotton, soybeans, corn, and wheat. The farm operator was

<table>
<thead>
<tr>
<th>Item</th>
<th>Cotton¹</th>
<th>Soybeans</th>
<th>Corn</th>
<th>Wheat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>SBE</td>
<td>ADE</td>
<td>Actual</td>
</tr>
<tr>
<td>1978</td>
<td>80.68</td>
<td>160.53</td>
<td>127.53</td>
<td>74.94</td>
</tr>
<tr>
<td>1979</td>
<td>149.47</td>
<td>182.37</td>
<td>221.37</td>
<td>217.98</td>
</tr>
<tr>
<td>1980</td>
<td>168.62</td>
<td>156.03</td>
<td>100.83</td>
<td>51.27</td>
</tr>
<tr>
<td>1981</td>
<td>280.73</td>
<td>131.55</td>
<td>128.75</td>
<td>117.86</td>
</tr>
<tr>
<td>1982</td>
<td>197.64</td>
<td>62.24</td>
<td>47.48</td>
<td>157.00</td>
</tr>
<tr>
<td>1983</td>
<td>176.76</td>
<td>152.06</td>
<td>10.46</td>
<td>41.74</td>
</tr>
<tr>
<td>1984</td>
<td>22.11</td>
<td>24.33</td>
<td>136.08</td>
<td>46.45</td>
</tr>
<tr>
<td>1985</td>
<td>284.84</td>
<td>225.78</td>
<td>91.53</td>
<td>41.74</td>
</tr>
<tr>
<td>Average</td>
<td>170.11</td>
<td>136.93</td>
<td>108.00</td>
<td>102.92</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>89.87</td>
<td>64.71</td>
<td>63.20</td>
<td>62.04</td>
</tr>
<tr>
<td>CV²</td>
<td>52.83</td>
<td>47.25</td>
<td>58.52</td>
<td>60.28</td>
</tr>
</tbody>
</table>

* Expected net returns for cotton were generated under the assumptions that cottonseed yield was 1.6 times the pounds of lint and that seed prices were equivalent to the State’s season average prices. Gross income from cotton is thus an addition of incomes from both seed and lint.

¹ CV means coefficient of variation
assumed to own 600 acres of land at the beginning of the planning period plus a sizeable complement of machinery, valued at $402,961. The farm operator was assumed to have no initial outstanding debt. With no cash on hand at the beginning of the year, the farmer initiated the farming operation through financing. Average annual effective interest rates on current operating expenses were used for short-term loans. We analyzed the trajectories of farm firm growth for low, medium, and high financial leverage. This procedure permitted alternative upper limits to debt financing of 25, 40, and 70 percent of the farm asset value. Survival was described as the ability to meet cash obligations without liquidating capital assets. The overall measure of a farm's well-being was indicated by its growth in net worth.

Given the assumption that any amount of land could be purchased at prevailing market prices, farm growth at the extensive margin was limited only by maximum feasible debt-to-asset ratio assumptions. We used historical land values per acre in Alabama and effective annual interest rates on new farm loans provided by the Federal Land Bank of Jackson, MS, to determine land purchase and mortgage financing terms. We applied two modeling approaches to this analysis, namely a conventional multiperiod linear programming (MPLP) model and a recursive strategic linear programming (RSLP) model. The conventional MPLP model derives optimal solutions over an entire planning period. The RSLP model is a sequential, optimizing procedure that incorporates the outcome from current-year decisions into the subsequent year's planning process. The models are distinguished by their treatment of information. In the MPLP framework, a unitary elasticity of expectations is assumed, whereas in the RSLP model expectations are revised annually (as more information becomes available). We used the following procedure (1) selected an optimization method, for example, MPLP, (2) ran the model with known net returns per acre, and (3) ran the model again with net returns estimates based on producer expectations, for example, SBE. Changes in profits (in effect, changes in net worth) could then be compared between the two model runs.

Given the MPLP and RSLP optimization techniques and the alternative credit constraints discussed earlier, the implications of expectational (forecast) errors on farm firm decisions are analyzed below.

### Annual Cost of Expectational Errors

A plausible way of quantifying expectational errors in monetary terms is to subtract the net revenue generated from a specified farm plan under a given expectational scheme from that of the optimum farm plan with known prices. The net revenue difference thus obtained represents the cost of expectational errors. A positive difference (that is, when the monetary outcome is larger than anticipated outcome) represents the cost of unrealized opportunities (area ABE in fig 1). A negative difference (that is, the monetary outcome is less than anticipated) indicates a sustained loss (area BCD) in fig 1. Marginal economic analysis would suggest that too few inputs were allocated in the former situation and too many inputs were allocated in the latter.

Tables 2 and 3 show revenue differences obtained under the SBE and ADE schemes with respect to both MPLP and RSLP models and alternative leverage conditions. In all situations analyzed, the extent of overshooting or undershooting realizable returns increased as the debt-to-asset ratio increased. Negative entries signify a shortage in cash-flow compared with the expected level. Several large negative entries would correspond to extreme cash-flow difficulties and possible farm failure. However, one can view the presence of (both) large positive and negative entries (tables 2 and 3) as constraining farm growth.

The MPLP model results generally indicated greater income shortfalls and gains than did the RSLP model results. In both approaches, the cost of errors increased as debt-to-asset ratios increased. Average shortfalls were greater in the ADE scheme. One cannot infer from the results that the cost of expectational errors increased or decreased over the years analyzed across financial leverages and modeling techniques. The size of average gains and shortfalls increased with the use of financial leverage, but the pattern was nonsystematic and nonproportional. However, enterprise organizations

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2. The farm's beginning assets included $316,200 in land and $86,751 in machinery, for a total asset value of $402,961. We assumed that the tractors and machinery could handle timely operations over a 5-year period. Specialized harvesting equipment could handle only 200 acres of cotton annually for 8 years and 400 acres of soybeans, corn, wheat, or a combination of the three (not exceeding 400 acres) in the first 5 years, while machinery capacity declined by 50 percent in subsequent years. For business accounting purposes, straight-line depreciation was assumed. The accelerated cost recovery system applied to tax depreciation. Other tax features (prior to 1986) included the progressive income tax, the social security self-employment tax, the investment tax credit, the Alabama income tax, and the alternative minimum income tax. Consumption expense in the first year of the model was based on a minimum of $10,000 per year plus 25 percent of the aftertax expected annual income. This amount was adjusted by the average inflation rates for food and services.

3. Kolajo has discussed technical details concerning similarities and differences between the MPLP and RSLP models (7) that are beyond the scope of this article.
Effects of expectational errors in input use and profit potential

TVP = Total value product.
The top chart indicates alternative total revenue functions resulting from different output price expectations.
The bottom chart shows the opportunity loss (triangle ABE) and sustained loss (triangle BCD) due to underutilization and overutilization of inputs, respectively.
Table 2—Expectational errors associated with supply-based expectations and alternative models and credit constraints, 1978-85

<table>
<thead>
<tr>
<th>Year</th>
<th>MPLP model results</th>
<th>RSLP model results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low leverage</td>
<td>Medium leverage</td>
</tr>
<tr>
<td></td>
<td>Dollars²</td>
<td>Dollars²</td>
</tr>
<tr>
<td>1979</td>
<td>-21,680</td>
<td>56,181</td>
</tr>
<tr>
<td>1981</td>
<td>-8,838</td>
<td>-12,400</td>
</tr>
<tr>
<td>1982</td>
<td>44,500</td>
<td>56,202</td>
</tr>
<tr>
<td>1983</td>
<td>28,134</td>
<td>39,532</td>
</tr>
<tr>
<td>1984</td>
<td>-22,738</td>
<td>-30,588</td>
</tr>
<tr>
<td>1985</td>
<td>45,366</td>
<td>57,180</td>
</tr>
<tr>
<td>Average shortfall</td>
<td>-21,138</td>
<td>-28,371</td>
</tr>
<tr>
<td>Average gain</td>
<td>39,363</td>
<td>52,274</td>
</tr>
</tbody>
</table>

¹ Alternative models used are multiperiod linear programming (MPLP) and recursive strategic linear programming (RSLP), while credit constraints are represented by low, medium, and high leverage.

² Unanticipated gains and shortfalls are associated with positive and negative dollar amounts that indicate unrealized opportunities and sustained losses, respectively, resulting from price and yield forecasting errors of enterprise organizations. Researchers obtain both gains and shortfalls by subtracting realized net income from optimum net income, given the enterprise organizations chosen.

Table 3—Expectational errors associated with adaptive expectations and alternative models and credit constraints, 1978-85

<table>
<thead>
<tr>
<th>Year</th>
<th>MPLP model results</th>
<th>RSLP model results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low leverage</td>
<td>Medium leverage</td>
</tr>
<tr>
<td></td>
<td>Dollars²</td>
<td>Dollars²</td>
</tr>
<tr>
<td>1978</td>
<td>-25,002</td>
<td>-25,002</td>
</tr>
<tr>
<td>1979</td>
<td>71,486</td>
<td>59,801</td>
</tr>
<tr>
<td>1980</td>
<td>-51,029</td>
<td>-60,283</td>
</tr>
<tr>
<td>1981</td>
<td>30,154</td>
<td>35,623</td>
</tr>
<tr>
<td>1982</td>
<td>49,917</td>
<td>58,570</td>
</tr>
<tr>
<td>1983</td>
<td>43,097</td>
<td>50,844</td>
</tr>
<tr>
<td>1984</td>
<td>16,841</td>
<td>25,031</td>
</tr>
<tr>
<td>Average shortfall</td>
<td>-33,069</td>
<td>-37,462</td>
</tr>
<tr>
<td>Average gain</td>
<td>42,299</td>
<td>45,854</td>
</tr>
</tbody>
</table>

¹ Alternative models used are multiperiod linear programming (MPLP) and recursive strategic linear programming (RSLP), while credit constraints are represented by low, medium, and high leverage.

² Unanticipated gains and shortfalls are associated with positive and negative dollar amounts that indicate unrealized opportunities and sustained losses, respectively, resulting from price and yield forecasting errors of enterprise organizations. Researchers obtain both gains and shortfalls by subtracting realized net income from optimum net income, given the enterprise organizations chosen.

under the ADE scheme were more diversified than those under the SBE scheme.

**Farm Growth Under SBE and ADE Schemes**

We analyzed farm growth, measured in terms of cumulative net worth, under the supply-based expectational (SBE) scheme and the adaptive expectational (ADE) scheme with respect to alternative leverage conditions. Figures 2 and 3 highlight the trajectories of farm growth described with the RSLP model.⁴

⁴ Although the MPLP model indicates a faster rate of growth than the RSLP model, similar qualitative inferences can be drawn from both. In a quantitative sense, however, the results are different. RSLP model results indicate that, as the farm business became increasingly leveraged, a disparity developed between the effects of SBE and ADE schemes on farm growth (figs. 2 and 3). Using the net worth criterion, we discovered that farm growth under the SBE scheme generally lagged behind the ADE scheme in low-leverage situations. However, at the end of the planning period, the net worth of $672,788 in the SBE scheme exceeded that in the ADE scheme by more than $122,000. For most years, the SBE scheme generated higher net worth than the ADE scheme, particularly as the debt-to-asset ratio increased. The ending net worth with the SBE scheme in both medium- and high-leverage situations exceeded its ADE counterparts by more than $100,000. The disparity of these results indi-
Figure 2
Net worth growth with medium leverage - RSLP model results

Net worth growth (1,000 dollars)

Legend
- SBE
- ADE

End of year 78 79 80 81 82 83 84 85

RLSP = Recursive strategic linear programming

Figure 3
Net worth growth with high leverage - RSLP model results

Net worth growth (1,000 dollars)

Legend
- SBE
- ADE

End of year 78 79 80 81 82 83 84 85

RLSP = Recursive strategic linear programming
cates the importance of the accuracy of economic forecasts. The growth paths of several farms with size and enterprise attributes similar to the model farm were more characteristic of the ADE scheme (6).

**Analysis of Income Dispersions**

Theoretically optimal plans were derived on an *ex post facto* basis from actual yields and prices received by the farmer. Using the theoretically optimal plans as the target, we can derive differences between "certainty incomes" and incomes obtained in the presence of expectational errors. The mean incomes derived for the optimal (certainty) plans, the SBE scheme, and the ADE scheme were plotted against the standard deviations of the annual returns. This exercise was conducted for each alternative credit constraint and modeling approach (fig 4).

The certainty optimal plans have less risk for any mean than do the corresponding expectational schemes. The three points identified on each curve correspond with alternative debt-to-asset ratios. Each curve represents the locus of expected net returns and the associated standard deviations of such income with respect to debt-to-asset ratios. The certainty optimal plans conform to Tisdell's claim that, under perfect knowledge, price

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**Figure 4**

**Expected net returns and standard deviations with respect to alternative credit constraints**

Expected returns of a specified farm plan (1,000 dollars)

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Note: Single value expectations (certainty optimal), supply based expectations (SBE), adaptive expectations (ADE), multiperiod linear programming (MPLP) model, and recursive strategic linear programming (RSLP) model.
instability (as exhibited by the variances of actual prices received (7) is often associated with greater expected returns than in the case of stable farm prices (10). Expected return-risk plans with the SBE scheme and the RSLP model approximated the certainty optimal plans better than the remaining combinations. With both models, the ADE scheme was associated with low-return/low-risk strategies. A disproportionate level of risk (compared with income) corresponded to the ADE (RSLP) scheme when the debt-to-asset ratio exceeded 40 percent. The MPLP model tended to underestimate the range of income variability relative to expected returns under alternative plans.

Implications

Substantial uncertainty about agricultural yields and prices often makes it difficult for farmers to formulate expectations. However, the nature of these expectations influences the size of the farm, the organization of the enterprises, the combination of resources employed, and the portfolio of assets held. Because expectations often deviate from realizations, farmers’ decisions are inherently associated with errors.

Given the same initial assets and resources, our model results show that farm growth may follow divergent paths, depending both on the nature of a farmer’s expectations and on the level of financial risk undertaken. When supply-based expectations (SBE) and adaptive expectations (ADE) were applied to production and price data of a crop farm in north Alabama, the cost of errors associated with SBE was lower. The SBE scheme also supported a faster rate of farm growth in most instances. Formulating production plans based on past prices and yields, however, was associated with risk-adverse behavior.

From a modeling perspective, the MPLP model generated a greater cost of expectational errors when evaluated in terms of unanticipated revenue gains and shortfalls. When the SBE scheme was assumed, unanticipated revenue gains for the MPLP model ranged from $39,963 to $74,842, for the RSLP model, gains ranged from $26,986 to $68,349. Under the SBE expectation scheme, unanticipated revenue shortfalls ranged from $21,138 to $41,131 with the MPLP model and ranged from $20,677 to $37,681 with the RSLP model. Under the ADE scheme, unanticipated gains ranged from $42,299 to $65,178 with the MPLP model and from $28,308 to $52,181 with the RSLP model. Unanticipated losses ranged from $33,069 to $51,021 with the MPLP model and from $28,981 to $66,937 with the RSLP model. Both unanticipated gains and losses increased disproportionately as debt-to-asset ratios increased.

As Havhcek and Seagraves (4) have noted, an analysis of costs associated with making the wrong decision provides a logical framework for assessing the benefits to research. Forecast errors can be transmitted from the researcher to the farmer by recommendations derived from a particular modeling technique. Thus, the choice of model and the assumptions incorporated into the model may constitute a source of errors. For example, generalizations of the results under the ADE scheme often suggest a pessimistic prospect. The MPLP model, as shown by the expected return vis-à-vis risk, may also understate the extent of income variability associated with increasing financial leverage. This situation is less likely with the RSLP model, which updates information over time. Thus, our main conclusion is methodological and may be useful to USDA’s representative farm model research project and to similar modeling efforts in the land-grant universities.

We have shown the importance of information management in farm growth processes. We have demonstrated that the formation of expectations is a crucial element in micromodeling firm-level responses to technical and socioeconomic changes.

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