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QUANTITY OR QUALITY?

Examining sugar beet contracts

Contract designs between growers and intermediaries can differ substantially across agricultural commodity sectors. Contracts in any given commodity may include design features such as quality measurement by a third party, relative performance evaluation, multi-year commitments, and direct intermediary involvement in farm-level decision-making. It is not unusual to see variation in contract design across commodity sectors. Differences in the nature of the final output, the structure of the relevant production and processing technologies, and institutional features of the relevant markets (e.g., farm policy), will alter the coordination needs of contracting parties.

It is less usual, however, to see contract variation within a single commodity. One striking example occurs in North American sugarbeet markets. In these markets, contract payments to growers in one set of production regions depend only on measured sugarbeet quantity, while in another set of production regions payments depend on both quantity and *quality* (as represented by the degree of sugar purity). This variation might be expected if processors had different end uses for sugarbeets, and therefore valued quality differently. Yet, there is very little product differentiation in the production and marketing of refined sugar, so this explanation seems unlikely. Another possible explanation is that firms that condition payment on quality often are cooperatives, which more closely align grower and "firm" objectives.

MODELING CONTRACTS

Previous attempts to explain the variation in sugarbeet contracts focused on differences in organizational form across firms. The FSRG-funded study offers a new explanation. A grower's ability to control the relevant measures of sugarbeet quality will vary depending on the production region; the study argues that the nature of the tradeoff in different production regions between quantity and quality can lead to variations in the structure of contracts.

Producing beets with a high degree of sugar purity comes at the cost of reduced beet yield. Because total refined sugar from an acre's production depends on sugar purity and yield, there is no obviously "optimal" way to manage this tradeoff. It may be efficient, for example, to produce relatively impure beets (an outcome that can be achieved by paying growers only on sugarbeet quantity) if increasing purity results in very large reductions in yield.

In the production of sugarbeets, nitrogen is the input that most affects measures of quantity and quality. Nitrogen applications tend to increase production. Conversely, a high degree of sugar purity is achieved through reduced nitrogen use. Conditioning payment on sugar purity is a means of addressing the perverse effect of nitrogen on total extractable sugar. The benefit of using quality incentives will therefore be largest in environments where this effect is most acute, and it is natural to expect the nature of this tradeoff to vary across production regions. Imagine, for example, that nitrogen applications increase sugar quantity substantially in a region but have little impact on sugar purity. Intuitively, the benefits from conditioning payment on quality in this region will tend to be low, because there is not much need to moderate nitrogen use.

THE COST OF QUALITY

The study provides a general conclusion on how agronomic practicalities can drive contract design—in this case, the ability to control quality. The study shows that the *value* of measuring sugarbeet quality drops as farmers have less control over quality. Also, as the time and resources needed to measure quality increase, so too does the complexity of the contracts, both in design and implementation. Where measuring quality exceeds the benefits, processors are likely to avoid the extra contract design costs.

To this point, the study's hypothesis regarding contract variation is consistent with observations. Further research is needed to empirically validate this explanation, and the study provides suggestions for testing the hypothesis: collecting agronomic data across the various production regions, for example, in order to quantify the degree of potential control over sugar purity.

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ISSUES: Variations in contracts used in the North American sugarbeet industry. Quantity vs. quality measurements to condition contracts. Benefit and cost of quality measurement.

FINDINGS: Creation of a model and formal analysis to demonstrate why one might expect to observe different sets of performance measures used in grower/processor contracts in sugarbeet regions.

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