Discussion

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The paper, "Contracting, Imperfect Information and the Food System," by Ian Sheldon was a very interesting and innovative application of principal-agent theory to vertical integration and contracting. Clearly, the model presented is already quite complex, and my comments are meant to suggest possible improvements for current and future work although I realize it may not be feasible or practical to implement some of them.

In the principal-agent model of contracting described in equations (1) - (5), Sheldon defines a random variable, θ, which represents production uncertainty. While there is some production uncertainty for poultry and hogs (his two major examples), most authors suggest that production uncertainty is relatively unimportant for these commodities and will continue to become less important as production technology continues to improve. (For example, for the most modern hog confinement systems, temperature is no longer an issue, and environments are so closely controlled that disease is rare). However, there are other kinds of uncertainty I feel are much more important that I will mention later.

I found the principal-agent model incorporating agent (or grower) effort (or product quality and/or cost efficiency) to be very relevant and important. Certainly, as more contracting occurs in the marketing system, processors will more likely require commodities of a particular quality. And as Sheldon suggests, growers will need economic incentives (in terms of tournaments, etc.) that will induce them to produce high quality commodities efficiently. I believe the issue of agent "effort" will be a continuing concern that must addressed by the principal.

One area in which Sheldon could put a bit more thought and which would also add an interesting extension to the principal-agent literature is the following. In equation (5), he defines the principal's payment scheme Y as a function of P(X) which is the output price received by the principal. It is this price that I believe is the most important source of uncertainty in this model although if I understand his model correctly, Sheldon does not view this price as uncertain. One could argue that perhaps in the very short run when the principals and agents are entering their contracts, this price is indeed known with certainty. Perhaps it is fixed in the contract and the principal can eliminate much of the uncertainty by hedging in futures and options or by forward integration. However, I would argue that this price is surely quite variable and uncertain in both the intermediate and long run. The price that the processor (or wholesaler or retailer) receives for the processed commodity will be influenced by primary or consumer demand which can by affected many unknown variables. A few of the most obvious ones include: prices of substitutes and complements, income, tastes and preferences, development of international markets (the

focus of Henderson and Padberg's work), etc. In addition, the price of the commodity at the retail level is also affected by the primary supply of that commodity as well as the price of competing commodities. For example, Hurt suggests that the industrialization of the pork sector (as characterized by megaproducers and increased vertical coordination of production and processing) may result in a net growth of 15 percent in the pork industry. Clearly, this will have a significant impact not only on pork prices, but also on the prices of competing commodities such as poultry and beef. I also think this price uncertainty will have other long-run implications. For example, Hurt suggests that many smaller hog operations have left and will continue to leave the industry. If contracting is one option for these smaller operations to remain in the industry, these producers will have to anticipate future prices to determine whether or not it might be profitable to remain in the industry even if they are contracting or vertically integrating.

Sheldon has some insightful comments regarding the public supply of current price information and commodity outlook information. I agree that as contracting becomes more prevalent in a market, the markets become thin and price information (at the grower-first handler level) may be difficult to obtain or may be inaccurate. In accordance with my previous comments, I wholeheartedly agree with Sheldon when he states, "there would be economic value to information on the long-run prospects for demand for the principal's product and, hence, the potential rate of return to capital." In addition, I would suggest that publicly provided information on current and future consumer demand for agricultural commodities will be very important particularly as more contracting occurs. Also, it will be important to provide public information about other aspects that are likely to influence price of the commodity such as new production technology or marketing systems and their likely impacts on industry structure and total supply and hence market price.

Henderson and Padberg's paper, entitled "Should We Have an Industrial Policy for Food and Agriculture?", provides an excellent explanation of the distinction between horizontal and vertical policies. I would agree that most of our policies are "horizontal" rather than "vertical," and that these horizontal policies often lead to conflict and waste. Their example of crop subsidies and environmental degradation illustrates this point very well. However, I am not comfortable with the strong negative tone they have regarding horizontal policies. They even go so far as to say that these horizontal policies have an anti-growth effect. I think it is clearly necessary and appropriate for the government to engage in the horizontal policies that they list. If the government did not play a so-called "watch dog" role, particularly with respect to environmental policy, food safety and industrial safety, it is quite likely the American people would suffer at the expense of profit-maximizing firms. There is also little doubt that policies regarding particularly these three issues are likely to have an anti-growth effect. However, the goal of public policy is to improve the total welfare of our society as a whole which will no doubt come at the expense of producers.

While I feel Henderson and Padberg may have been a little overly harsh on some of our horizontal policies, I agree that a more vertical policy relating to food and agriculture has much appeal. An industry advocate, as they suggest, who can balance issues relating to the environment, food safety, education and science, etc. may be a

change that could potentially benefit both consumers and producers.

They also discuss vertical policy in food and agriculture which would fund and support investments in educational capital. Educational capital is initially defined as education, science and technology. Clearly, the government's establishment and support of the land grant university system has maintained a long history of this. More interestingly, however, they further define educational investment as "product quality (science and technology) and brand establishment (consumer acceptance)." There is already quite a bit of federal funding of research related to product quality and perhaps there should be even more. However, I am not entirely comfortable with their suggestion about supporting research on brand establishment and consumer acceptance. There is a very fine line here. For example, it may be reasonable to support research on consumer acceptance of generic meat products in the international market. Publicly supported research on aspects such as cuts of meat, packaging and nutritional and attribute content that would be readily accepted in various countries plausibly should be funded (and probably already is). However, public support for brand acceptance of Kellogg's breakfast cereals or McDonald's restaurants will no doubt meet some resistance from the public and with good reason. Hence, we must be very careful and cautious in suggesting public support for consumer acceptance and brand advertizing. Roe and Gopinath address a related issue. They discuss research spillovers and evidence suggesting "that public expenditure in more basic research induces further private sector investments to adapt and apply this new knowledge for commercial advantage." Hence, I would feel more comfortable recommending additional public support for basic research in education, science and technology with the hope that there will be spillover to the private sector in the form of increased support for research on consumer acceptance and brand advertizing.

At one point in their paper, Henderson and Padberg ask what they call "the most fundamental question"—what industries should be targeted? They go on to discuss four criteria commonly used to identify targeted industries. However, would food and agriculture rank highly on such a list compared to other possible industries? If it does rank high on the targeted industries list, how much more needs to be spent on market development activities? To answer this question, it would be essential to actually estimate the potential benefits to U.S. agricultural producers, U.S. consumers and multinational firms. I think this would be the critical next step in Henderson and Padberg's research.

Roe and Gopinath provide the reader with various models incorporating dynamic comparative advantage, growth and research and development in their paper entitled "Private vs. Public Incentives for Market Development Investments: Is There a Role for Public Policy?" I believe that one of the most important points of their work is that the potential for growth in food and agriculture lies within the value-added sector rather than in the production and export of primary commodities. They also emphasize that public support of research and development will contribute to growth in the competitiveness of food and agriculture as well as the value-added sector. What is not clear to me, however, is the definition or link between research and development and the product and process innovations that they discuss and what economists define as market development. I think economists use the

term "market development" more narrowly than research and development. Henderson and Padberg make this distinction clearer. However, it is precisely the definition we use for market development that begs the question of whether or not public support and public policy are appropriate. It might be insightful to combine the ideas of Henderson and Padberg's with those of Roe and Gopinath by concluding that public support of investments in educational capital (including education, science, technology, product and process innovations, and other basic research) will have many positive spillovers in terms of growth as well as stimulating additional private sector investment in market development more typically defined as consumer acceptance and brand establishment.

REFERENCES

Hurt, Chris. "Industrialization in the Pork Industry." *Choices*, Fourth Quarter, 1994, pp. 9-13.