The Backward-Bending Supply Curve:
A Myth That Persists

By Don Paarlberg

A phantom lurks in the background, here and abroad, when farm and food policies are considered. It is the persistent but erroneous idea that if prices of farm products fall or are held low, farmers will increase production. The idea is that if prices fall, farmers will expand output in order to maintain income.

Economists use the phrase "backward-bending supply curve" to describe this supposed phenomenon. In respected economic theory, the effect of price on supply is the opposite, other things equal: a fall in price results in a diminished supply and an increase in price induces an increase in supply. The backward-bending supply curve is therefore in direct conflict with received economic doctrine.

When prices of farm products are low or falling, American farmers and their spokesmen share a deeply felt desire to believe in the backward-bending supply curve. Beset by the twin problems of excessive supplies and depressed prices, they very much want to believe that an increase in the level of government price supports will relieve both problems.

Leaders in developing countries, where food is scarce and seen as high-priced by the politically influential city people, also embrace the backward-bending supply curve concept. Architects of food policy in these countries want earnestly to believe that holding down farm product prices will simultaneously increase the supply and reduce the cost of food.

Two questions arise. What are the facts? And, where did the idea of a backward-bending supply curve come from?

The Facts

The facts, as nearly as competent researchers can determine them, are that, other things equal, higher prices result in higher production and lower prices bring about a reduction in output. The effect is very limited in the short run, but it becomes more pronounced over time. Research shows that the supply curve slopes upward and to the right, as economic theory says it does, not backward as the myth has it. The researchers who have produced studies confirming the positive slope include: Bean, Black, Elliot, Falcon, Farnsworth, Galbraith, Haas, Houthakker, Johnson, Jones, Kohls, Lorie, Paarlberg, Pearson, Purdols, Nerlove, Schultz, Timmer, Waite, Walsh, Warren, and Wells.

I know of no competent study showing that, other things equal and in aggregate terms, a lower price results in higher production. The myth of the backward-bending supply curve for farm commodities is so well purged from the body of agricultural economic knowledge that researchers no longer study the subject, just as chemists no longer study alchemy and biologists no longer study spontaneous generation.

In the United States residual belief in the backward-bending supply curve remains strong.

Why, then, is the myth so persistent? Because many farmers desperately want to believe it and because sometimes, in individual cases, it is verified. Some dairy farmers with unused resources and no alternatives will, if the price of milk falls, milk more cows. Some Great Plains wheat growers who have the equipment, the labor, some rangeland, and no other possible source of income will, if the price of wheat falls, plow up some rangeland and seed it to wheat.

If the price of hogs falls, some farmers decide to cut production and market some of their breeding stock. Thus, the supply of pork temporarily increases, seeming to authenticate the backward-bending supply curve. But these are the exceptions and aberrations, not the typical case. It is human nature to observe and generalize from the unusual. For an analyst, the greatest danger is to be misled by atypical cases.

Its Origins

The concept of a backward-bending supply curve was originally developed by the mercantilists, a group of scholars who dominated economic thinking from the sixteenth to the eighteenth centuries. They reasoned and wrote that holding down farm commodity prices was a way of getting an abundance of cheap food. But its true legacy was to inhibit agricultural development and to increase the threat of famine in the Third World.

Adam Smith confronted the mercantilists and wrote that a lower price would inhibit production. Alfred Marshall had no doubt about which way the supply curve sloped—forward, not backward. But, for some analysts and policymakers, the mercantilist idea persisted.

Acceptance Today

Economic enlightenment is now slowly changing the food policies of the developing world. Various countries are beginning to adopt policies more in keeping with economic reality. They are permitting increased prices of farm products and so are encouraging greater production. India, Malaysia, Indonesia, and Argentina have, with some trepidation, now embarked on that path.

Here in the United States residual belief in the backward-bending supply curve remains strong enough to help hold prices at a high level. The belief, coupled with loans and deficiency payments, increases the inducement to produce even more products already in surplus. Some farmers and farm leaders do not give heartfelt credence to the backward-bending supply curve, but continue to voice belief in it. They are unwilling to forego any argument that might help legislate higher farm commodity prices. Legislators hear one thing from the farmers and the opposite from economists. Though confused about the facts, they are sure that there are more farmers than economists and some vote accordingly.

The backward-bending supply curve is a nimble acrobat. It

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the perceived problem is a need for more production, the curve quickly bends forward instead of backward, and farmers argue that a higher price is needed to help increase production. In the farmer's view, a higher price will accomplish whatever is socially desirable, either less or more production. Economists thought the problem was overcome when they made their studies and determined the directional slope of the supply curve. But the backward-bending supply curve phantom is like the Little Man Who Wasn't There: "He wasn't there again today. I really wish he'd go away."

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Hungry People:
Their Numbers and How We Know
By Leroy Quance

Hunger, long the forgotten issue on the world agenda, blazed briefly in the Western public's consciousness during the African famine of 1985 and abruptly faded from attention again. But even if hunger has vanished from public debate, the gnawing problem continues and grows. Half a billion people endure numbing malnutrition each day, often too weak to work or too debilitated even to produce the food they need to energize themselves.

— Orville L. Freeman (as reported in the International Herald Tribune, November 16, 1987).

How do we know there are half a billion hungry people in the world? How does Orville Freeman, a former U.S. Secretary of Agriculture, or anyone for that matter, know that "this gnawing problem continues and grows?" The most authoritative source of estimates of the number of hungry people in the world is the "World Food Survey" published periodically by the Food and Agricultural Organization of the United Nations (FAO).

The first thing to note is that the World Food Surveys published in 1946, 1952, 1963, 1977, and 1985 respectively, were not global in the estimates of the hungry nor were they surveys, in the statistical sense of a probability sample and formal questionnaire. Each of these surveys rigorously attempted to do the following: (1) muster all available information relevant to total and per capita food supplies (not necessarily consumption); (2) compare these estimates of per capita food supplies with an educated guess of per capita food/nutritional requirements in the developing market economies; and (3) use the gap between supplies and requirements, as a basis in estimating the number of people at risk of malnutrition due to inadequate food supplies.

Here's how it was done. Household survey data was used to estimate the per capita consumption of food—dietary-energy—by different income groups within each country or group of countries. Unfortunately, available household surveys differ greatly in the information they provide. Some provide household-level information on dietary-energy intake, others provide only average intakes for broad income groups, and still others include no intake data at all. Many are limited to data on income and food expenditures. Consequently, a theoretical distribution of dietary-energy intake was assumed. Then available data were used to estimate the distribution parameters for each country. This theoretical model approach was used to check the validity of available intake data for different income groups. The approach also made it possible to estimate an intake distribution where there were gaps in the data.

While the lack of reliable data was the biggest problem in estimating food consumption, determining the amount of food necessary to avoid being hungry was even more difficult. Nutritional research is not adequate to answer this question, and nutritionists do not agree on the causes of variations in dietary-energy requirements among people of different size, age, sex, and living conditions.

In the end, the Fifth WFS is based on the report of a 1981 FAO/WHO/UNU ad-hoc Expert Consultation on Energy and Protein Requirements Committee. This report includes estimates of the minimal energy intake level or "cut-off point" that would be necessary to allow for activities associated with eating, dressing, etc., as well as minimum movement and other activity needed for communication. The expert group decided that this level is 1.4 times the basal metabolic rate (1.4 BMR).

In preparing the fifth WFS, it was decided that the factor 1.4 BMR may be too high because individual energy maintenance requirements vary greatly. In turn, a second lower cut-off point of 1.2 BMR was also used. These basic factors of 1.4 and 1.2 BMR's were then used to specify the minimum caloric requirement for different groups of people, that were necessary if they were not to go hungry. However, the BMR factors were not used for children under 10 years of age. Instead, the caloric requirements based on body weight that had been developed by the expert group were used. Also adjustments were made for pregnancy and lactation. Here are some of the minimum calorie cutoffs that were used to estimate the number of malnourished adult people.

<table>
<thead>
<tr>
<th>Country</th>
<th>1.2 BMR (Kcal/day)</th>
<th>1.4 BMR (Kcal/day)</th>
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<tbody>
<tr>
<td>India</td>
<td>1,447</td>
<td>1,608</td>
</tr>
<tr>
<td>Sudan</td>
<td>1,491</td>
<td>1,648</td>
</tr>
<tr>
<td>Brazil</td>
<td>1,518</td>
<td>1,683</td>
</tr>
</tbody>
</table>

The resulting estimates show a slight rise during the 1970's in the absolute number of undernourished people. Under the more conservative Alternative A (dietary-energy: 1.2 BMR), the number of undernourished increased from 325 million in 1969-71 to 335 million in 1979-81. Under Alternative B (dietary-energy: 1.4 BMR), the number increased from 472 to 494 million.

Under both alternatives, however, the proportion of the total population undernourished declined over the decade from 19 to 15 percent according to the more conservative estimate and from 28 to 23 percent according to the higher estimate. Given an increase in the population of the developing market economies equal to 470 million, both estimates imply that employment and income growth was sufficient for the vast majority, but not all of these people, to obtain at least minimum food intake during the 1970's.

The number of undernourished people rose slightly during the 1970's in all developing regions except the Near East. The largest increase in the undernourished was in Africa. It now surpasses the Far East as the region with the greatest proportion of undernourished people. Because of the very large populations in countries like India, the Far East still has the greatest number.

The Fifth World Food Survey also contains a detailed analysis of changes in per capita food supplies during the 1970's and provides important insights about the multidimensional aspects of malnutrition and related policy implications. These contributions are, in fact, more useful than the estimates of the...