

PolicyPennings by Daryll E. Ray & Harwood D. Schaffer

Forces affecting investment in agricultural technology and infrastructure

Recently, we wrote a column making the case that the low prices of the late 1990s resulted in the increased political and economic investment of farmers in ethanol production. With local corn prices in the sub-\$2.00 range, farmers were desperate for anything that would bring them even a couple of cents a bushel more than they were finding at the local elevator and ethanol held out the best promise.

In our reading of the overview of the just released FAO (Food and Agricultural Organization of the United Nations) publication “Safeguarding Food Security in Volatile Global Markets,” edited by Adam Prakash, we ran across a statement asserting that as a result of the low agricultural prices that followed the 1974 crisis and the increased reliance on global markets, “public and private sectors in both developed and developing countries saw a limited need to invest in agricultural production and infrastructure.” We have seen similar assertions before and have always wondered what was being talked about—acreage, yield, production, government investment in crop research, investment by farmers?

Looking at the trends of the increase in wheat and rice yields we can see why people might make the assertion that there was limited investment in agricultural production and research over the last 40 years of mostly low prices and a few peaks. The world average rice yield increase in the 1970s was 17 percent and in the 1980s it was 28 percent. In the 1990s and the first decade of this century it was 11 percent and 9 percent respectively.

Wheat shows a similar trend. The increase in the world wheat yield in the 1970s was 24 percent and in the 1980s it was a whopping 38 percent. In the 1990s, it had plummeted to 5.1 percent and, by the first decade of this century, it slightly rebounded to 9 percent.

Corn shows a slightly different story with decadal increases of 30 percent, 20 percent, 16 percent and 18 percent respectively over the last 40 years.

Looking at these numbers alone, it would seem that a case can definitely be made that low prices caused the diminished investment. But let’s look further. We see two factors at work. First, the years of high yield increases are the years where there was a focus on the green revolution with its emphasis on short-stemmed grains with heavy heads. The factor that drove much of that research had little to do with price and a lot to do with hunger and the goal of Norman Borlaug and others to eliminate hunger in the world.

During the years following WWII and into the 1980s, there was a significant amount of research, funded by governments and foundations, on basic agricultural research as a part of what came to be known as the green revolution.

In addition to genetic research, one component of the green revolution was the use of farm chemicals, particularly the use of commercial fertilizers, especially nitrogen. The addition of nitrogen alone to nutrient depleted soils will bring about immediate yield increases. But eventually a limit is reached on what nitrogen can do and yields begin to flatten out in the absence of other changes. Another factor with the role of fertilizer is that in the early years, many governments had programs to subsidize its availability to encourage farmers to use it. With the structural adjustment programs later imposed on many developing nations, the distribution of fertilizers was left to commercial firms and availability and use in remote areas dwindled.

In the developed nations, if the US is any example, publicly funded research dollars at major public universities have slowly declined in relation to funding provided by commercial firms. Much of this decline is more the result of a change in philosophy about the role of government and less about price.

At the farm level and to the revulsion if not disbelief of economists, low prices often have a perverse effect upon farmers—the lower the price the more farmers have an incentive to increase production. With little control over price, farmers exercise control over the inputs they use. As long as the increase in costs per acre for a new seed or chemical application is less than the expected increase in revenue per acre, even at low prices, farmers are likely to apply the technology. The only major limit to this is the availability of capital to pay for the technology.

With low prices, farmers may use their equipment years longer. They may not bid up the price of land. They may keep their old pickup instead of buying a new model. They may even take a part-time job over the winter to help their cash flow. But, from our observation, they seldom skimp on the inputs that are important in determining yields. In periods of low prices they need every extra dollar they can get to apply to their fixed costs.

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When it comes to agribusiness, we have seen little decline in their investment in the food system. In fact to us, it seems that they have made major increases in their investment—though we are not privy to the actual numbers. In large part this comes from two factors. The first is that their profits do not come from the absolute value of agricultural commodities, but rather from the margin that they charge to handle and process the products. Whether prices are high or low, they still make their margin, so as population and trade expand agribusiness continues invest in their part of the agricultural sector.

Secondly, as long as farmers respond the way they do, adopting new technology whether prices are low or high, as long as there is an expected net gain from adopting the technology, agribusiness will continue to invest in new yield enhancing technologies—witness the announced goal of 300 bushel per acre corn yields as typical yields. We remember when 100 bushels per acre was unheard of.

Clearly, “high prices” make adoption of new technologies easier and greatly expand investments

in durables, such as machinery and land. Also just as clearly, the current extraordinarily high prices will bring additional resources into agricultural production worldwide and intensify technology development, especially among multinationals.

Having said that, we believe that it is important to look more broadly than just low prices when considering changes in agricultural investments in technology and infrastructure. We are not defending low prices, far be it. It is just that there are other factors besides price that affect agricultural investments including a focus on hunger, the nitrogen limit, the macroeconomic policies of institutions like the World Bank and the International Monetary Fund, and changes the philosophy of the role of government in society.

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