

Reconciling the Global Supply and Demand for Food



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Introduction

Can we meet the world's growing demand for food? In many ways, that is the most important question facing mankind. And yet the answer depends on who you talk to. If you go to international food conferences, you find two groups of people: farmers and neo-Malthusian alarmists. The neo-Malthusians claim they see "clear signs" that the world is running out of food, characterized by gruesome images of people on the verge of starvation across the globe.

Not surprisingly, farmers see things differently. Their livelihood responds to price signals, not theories about long term trends. When prices are low, they lose money and cut their losses by planting fewer crops. The world hopes that surplus food stocks are enough to temporarily fill the gap. When food prices are high, farmers get their cue and make money by planting more crops. Therefore, farmers argue that the cure for high food prices is high food prices. That free market mindset frustrates neo-Malthusian alarmists, who expect farmers to always grow as much as possible, regardless of free market price signals. Throughout these conferences the two groups remain worlds apart.

Malthus

At first glance, recent United Nations warnings about a possible famine in places like Yemen seem to confirm the theories advanced in 1798 by Thomas Malthus, a UK economist who gave

his name to predictions of mass starvation. The Malthus thesis is that populations will always outstrip the food supply because food supplies grow arithmetically while populations grow geometrically. Pessimists claim that the imminent famine in Yemen is merely the tip of the proverbial iceberg. They claim that food shortages in those regions are indicative of something far more ominous: the world food supply-- the total amount of food available to all of the people in the world--is being squeezed. If they are right, humanity itself can ultimately be at risk.

Green Revolution

Thanks to Norman Borlaug's research, we had a steady rise in production known as the Green Revolution. His ingenuity and innovation combined modern, higher yielding seed varieties of rice, wheat, and maize with intensive and innovative use of inputs such as fertilizers, irrigation, and pesticides. Most of the recent growth in food production in developing countries is a result of the higher yields stimulated by Borlaug's research. For many years, the Green Revolution allayed fears that the world could not increase food production at rates that matched population growth. The results speak for themselves. Agricultural experts were amazed at the impressive growth rates in the global yields of wheat, rice, and maize. And countries such as China, which adopted Green Revolution methods of farming in their entirety, showed astounding yield increases. Even countries that adopted only parts of Borlaug's methods have shown substantial increases in yields.

As the Green Revolution began to slow down in the early 21st century, the UN jumped onto global warming as the “major driver” reducing the supply of food and causing food prices to rise. On March 31, 2014, the UN Intergovernmental Panel on Climate Change (IPCC) released a report which added new urgency to its argument that climate change was responsible for rising food prices. The IPCC cited three periods when food prices had risen since 2007.

Price Rises

The first big price rise was in 2007-08, when the cost of wheat, rice, corn and soya beans surged, triggering the worst global food crisis in 30 years. Food riots in countries from Haiti to Senegal followed, and exporters and importers engaged in beggar-thy-neighbor tactics, including export bans and hoarding. The second price surge came in 2010-11, after the Black Sea region of Russia, Ukraine and Kazakhstan, which normally accounts for roughly a third of global wheat exports, suffered a crop failure. Russia rocked the grains market by banning all exports, triggering a wave of panic buying in the Middle East and North Africa, the world's biggest regional importers of cereals. Agricultural markets jumped in 2012, after the worst drought in 50 years hit the United States. The price of maize, used to feed poultry and livestock, reached an all-time high.

These three periods of high food prices helped to persuade the UN that rising food prices were now a structural trend. It also added new urgency to the conventional wisdom that the world's population will relentlessly grow to 9 billion by mid-century. This population growth will put enormous demands on the global food supply. To meet these demographic demands, UN argues that the world will need to grow 70% more food between now and 2050. Is the UN right?

If so, what should developing countries do to boost food production? Nathan Mueller's research has shown how focusing on improved soil nutrition and water availability is key to boosting crop yields around the world. Mueller's research shows that in developing countries many places exhibit substantial “yield gaps” - the difference between the crop yields we see today, and the crop yields that are possible with improved farming practices - which can be largely closed by improving

agronomic practices, such as adding organic matter, small doses of fertilizer (chemical or organic), and extra water (especially with efficient systems like drip irrigation). Are the neo-Malthusians finally right? Is the world running out of food? Should we press the panic button? Not so fast. Before we jump on the alarmist bandwagon based on these three price rises over five years (2007-2012), let's explore what was driving global food prices before this period of high food prices. Maybe the mid-1990s can provide insights into what to expect in the current period.

Case Study #1: 1990s

In 1993, the alarmists argued once again that the world is running out of food. They cited high food prices as indications that they are right. Was the UN right? We know that the food supply was squeezed during 1994 and 1995 and there's no denying that food prices rose and food stocks fell during this period. Between June 1993 and May 1996, food prices rose by 47% after many years of decline. In particular, corn futures prices rose 57%. Wheat futures prices also jumped to an all-time high up until that point in time.

Impact

The higher prices also did severe damage to many African nations, which were net importers of food. The higher prices in 1995 alone sharply increased the cost to developing countries of cereal imports. Between June 1993 and May 1996 the world's grain stocks fell to 13 percent of annual consumption, the lowest level ever recorded. Even in the US, “the breadbasket of the world,” US granaries in early 1996 held a precariously low amount of grain, the lowest level since the 1970s.

Should one conclude that the whole world, as opposed to Africa and South Asia, is in fact running out of food? Not so fast. Back in 1974 alarmists also predicted dire consequences, even mass famine, which proved wildly wrong. Admittedly, the market signals in 1994 and 1995 did show some kind of shortage, but not all shortages are the same. A close examination of data from this period reveals no structural shortage that one would anticipate if the world food supply had in fact reached full production capacity.

Three Reversible Factors

Instead, unusual circumstances of a short-term and reversible nature account for the rising prices and de-stocking of grains. Three factors-- the weather, the fall of the Soviet Union, and the withdrawal of land from production--are particularly atypical of a systemic crisis in food production. First, the high prices reflected a record low crop production due to unfavorable weather. Conditions for wheat and soybeans were especially dry. Second, food production in the former Soviet Union fell 40%. That trend was reversible. And third and most importantly, the fall in grain stocks reflects policy changes in the US and Western Europe to rein in the huge overproduction of grain that had occurred in the 1980s.

After their grain surpluses had reached embarrassingly high levels, the governments in Washington and Brussels (the EU) began paying grain farmers handsomely to let some of their land lie fallow. Over the past ten years, for example, US farmers took about 37 million acres of cropland out of cultivation.

Prices Fall

But not long after concerns about grain supply pushed grain prices to record-breaking high levels, grain prices dropped. Corn futures prices fell about 50% between July and December 1996. Similarly, wheat futures prices fell abruptly almost as much. Why the nosedive in grain prices? The two main reasons were the better-than-expected weather and a significant surge in worldwide grain supply. First, timely summer rains and warm temperatures late in the 1996 growing season boosted the 1996 US corn and soybean crops to near-record levels. Second, farmers responded to higher prices by bringing land back into production. US farmers alone added eight million acres of corn in 1996, and large crops came from Europe, Australia, and South America. In short, markets are adjusting to the weather and to various policy decisions, just as Adam Smith, the English free-market economist, would have expected.

Case Study # 2: Dec 2014 – April 2015

Now let's look at the food prices in the spring of 2014. For instance, on April 10, 2014, the S and P GSCI agricultural and livestock index jumped almost 17% since the start of 2014. Was this 17% rise just a minor blip or is it a sign that a fourth structural rise in food prices since 2007 is happening once more? The answer was clear by September 2014. After almost a decade of grain shortfalls and periods of rising food prices, global grain production made an astounding rebound. Global grain supplies were soaring, with grain stocks the highest since 2003. And food prices were the lowest in six years. The FAO global food price index fell to its lowest level since September 2009.

FAO said its new January 2015 food price index was the third consecutive yearly fall in food prices. At a minimum, alarmist fears of a trend in rising food prices back in 2012 were allayed. Time will tell whether or not three years of falling food prices is a structural trend. This new abundance is all the more remarkable because the four long term negative trends – such as population growth, more meat eaters, diversion of grain to biofuel, and climate change – were still putting downward pressure on global grain supplies and upward pressure on food prices.

Case Study # 3: August 2016

Our last case study addresses the debate over ethanol. This food versus fuel debate was especially heated in Washington, DC a few years back. The debate centered on the US government's corn ethanol mandate. The ethanol debate raged when corn prices spiked in 2008 and again in 2012, seemingly in concert with rising biofuels volumes. Was this a long term trend or an aberration?

Alarmists argued that this mandate would squeeze scarce grain supplies and push up food prices. One thing is for sure. Biofuels refineries have been producing record volumes of over 1m barrels a day of corn ethanol. The US Department of Agriculture (USDA) estimated the American ethanol industry used 5.3bn bushels of corn in 2016, the most ever and 35 per cent of the domestic harvest. If ever alarmists would be proven right, this would arguably prove their case.

But guess again. The last week of September 2016, corn dropped to \$3.01 a bushel, a level last consistently seen before lawmakers enacted the mandate in 2007. Supermarkets would raise food prices less than 1 per cent, well below the historical average, according to the USDA. The UN's international food price index is also lower than in 2007. Why are corn prices so low? The US just had a huge corn harvest. Simple economics: the supply of corn completely outstrips the demand for corn. The USDA predicted a corn crop totaling 15.2bn bushels in the fall of 2016, the most in history. Why did the supply of corn completely outstrip the demand for corn? The grain market managed to absorb strong ethanol industry demand because a) farmers cultivated more corn acreage, b) corn yields have continued to march higher and c) growing regions have been blessed by years of beneficial weather. As a result, the "food versus fuel" debate is passé.

The Real Drivers

But on a broader front, what lessons have we learned about why there's such a remarkable rebound in the food supply and a fall in global food prices? First, FAO reports that high food prices enticed farmers worldwide to plant aggressively in the main grain regions. Even Ukraine, engulfed in conflict, planted more. Second, widespread planting was followed by unusually good weather across much of the northern hemisphere's growing season. Third, low oil prices happily caused fertilizer prices to fall and made fertilizer more affordable to producers, and enabled farmers in developing countries to grow more food at lower prices. Fourth, the pace of population growth has slowed. Women are now having fewer babies worldwide. The fertility rate is at the replacement rate everywhere except Africa. And even so, women are having fewer babies in Africa.

For years, environmentalists told us the world was running out of oil. Today, the world is flooded with oil. Cheap oil equals cheap fertilizer. Cheaper fertilizer enabled farmers to buy more fertilizer and generate more grain. Moreover, Adam Smith is still relevant: trust the free market. The farmers are in business to make money or at least minimize their losses. Farmers are not helpless bystanders watching a movie that says the world is running out of food. Farmers are drivers who have the free will to make sensible decisions. When the price of food is too low they plant fewer crops. When

the price of food is too high they plant more crops. Farmer sovereignty calls the shots, not asphalt farmers with their neo-Malthusian theories.

Conclusions and Recommendations

To sum up, global strategists should consider promoting a balanced strategy which puts an equal emphasis on reducing the demand for food as much as increasing the supply of food. On the demand side, we need to reduce waste, improve the food supply chain, promote stronger economic development, reduce population growth, shift diets for people and animals and wean our transportation off biofuel. On the supply side we need to increase yields, use resources more efficiently, grow diverse crops and grow them differently, apply better farming techniques, invest in research and development, capitalize on urban farming, increase aquaculture's productivity, develop new technologies and strengthen free trade. We also need to develop a more sustainable agricultural strategy which improves the environment by stopping farmland expansion, especially in the rainforest, shifting to more organic farming and improving land and water management. Finally, we need to eliminate global hunger by reducing poverty and supporting economic development.

About Author

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Dr. Rosenberger's specialty is connecting economics and security. His last assignment was Chief Economist at US Central Command (CENTCOM) in Tampa, Florida from 2008-2016. Before that he held a similar position as the Chief Economist at the US Pacific Command (PACOM) in Hawaii from 1998 to 2008. He previously worked at the U.S. Army War College (USAWC) from 1986 to 1998 where he rose to the position of Full Professor of Economics and was a prolific writer in the Strategic Studies Institute where he held the General Douglas MacArthur Academic Chair of Research.

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