Is Higher Demand for Biofuels Fuelling Food Prices?

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One reason for the increase in world food prices is that of food consumption, especially in developing countries. Another is the demand for cereals and food crops to produce biofuels. Which is the more dominant factor that can explain this surge?

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Against the mounting evidence that expansion of biofuels from food crops such as corn, rapeseed, soybean and even wheat and other coarse grains has been one of the key drivers of food prices during recent years, policymakers in both the United States (US) as well as European Union (EU) are trying to sidetrack attention by putting forward arguments that increasing demand for food in developing countries is the dominant factor pushing up food prices. While it is true that increased consumption of food in developing countries is an important factor, it has been so for some time now and is not a recent development. It is the sudden and phenomenal rise of biofuel production that has to be properly understood to make a fair judgment on the importance of food or fuel demand in pushing food prices.

Though the subject of "food versus fuel" has been debated for a while, the gravity of this vexed issue has still not been examined and understood properly. It is the lack of understanding that explains why most of the commentators on this issue have been giving more prominence to other factors over increased production of biofuels. Therefore, the objective of this article is to provide more clarity on this subject. To understand this objectively, we first review the factors triggering increases in food prices that have been identified by various international organisations. Then, we take up the issue of increased demand for biofuel production and rising consumption of food in developing countries including China and India to make clear so as to which is the more dominant factor that explains the recent rise in food prices.

What Has Triggered the Rise?

Commentary on factors that have led to pressures on supplies of food that seem to have contributed to the current price rise is already available from various international agencies including the World Bank, United Nations Conference on Trade and Development (UNCTAD), European Bank for Reconstruction and Development (EBRD), Food and Agriculture Organisation (FAO) and Asian Development Bank (ADB).

The World Bank (2008) says that demand for biofuels, needs of the increasing population, growing middle class in India and China with increasing purchasing power and erratic weather are among the reasons that have pushed food prices.

The EBRD and FAO (2008) are of the view that a part of the price increases is the result of temporary supply problems, such as droughts (including those that occurred in south-eastern Europe in mid-2007) and diseases.

UNCTAD (2008) concludes that the driving forces behind the current boom in commodity prices have been a combination of strong global demand, led by China and a slow supply response, together with low inventories for a number of commodities. Commodity prices have also been influenced by speculation, fed by high liquidity in international financial markets and relatively low interest rates, seeking higher returns in comparison to equity and debt securities. The increase in dollar-denominated commodity prices between 2002 and 2006 is also partly explained by the depreciation of the dollar against other major currencies. Finally, a major factor in the current rise in demand for some agricultural commodities, particularly maize and sugar, is the heightened demand for biofuels, which is closely linked to developments in energy prices.

The ADB (2008) has also identified a number of underlying causes for the recent surge in global food prices – some cyclical and some structural, which can be seen most prominently in the international prices of cereals, particularly for the two most important staple foodgrains produced and consumed in Asia – rice and wheat.

Clearly, there are several factors that have contributed to these developments in food prices but the general impression that emerges from all these studies is that the increase in prices of food is due to a combination of a series of different events that have more or less occurred at the same time. It is, however, important to note that while most of the supply and demand related factors that have contributed to the current as well as previous booms in commodity prices are easily identifiable, the emergence of biofuels during the more recent years has, however, added a completely new dimension to the demand for food crops.

Demand Originating from Biofuels

Even though the demand originating from biofuels is not an entirely new phenomenon as it has been there after the oil shock of 1970s when Brazil started producing ethanol from sugarcane[1] the main difference, however, is in the feedstock that Brazil has been using all these years and what other countries that have started producing biofuels more recently, have been using.

Therefore, policies with respect to biofuels, their impact in major economies that are pushing biofuel production more vigorously and the timing of these changes need to be examined closely. At the moment, there are three main biofuel producers in the world – the US, Brazil and EU. Estimates suggest that world ethanol production is dominated by the US followed by Brazil and these two account for nearly 73 per cent of world's ethanol supply [FAO 2007]. Bio-diesel is mainly produced in the EU and the US with the EU being the largest biodiesel producer and consumer in the world (66 per cent share). Other countries have also started producing ethanol and biodiesel but their individual shares in overall production are not very significant.

What is remarkable about the changes in the world market for biofuels is that the US, which was not a major producer of biofuels until a few years ago, has in fact overtaken Brazil as the topmost producer of ethanol in the world with a share of 39 per cent of total world ethanol output. Further, the EU has become the largest producer of biodiesel in the world with an overwhelming share of 66 per cent of world biodiesel output. These changes have been brought about through domestic policies that both the US and EU have pursued in the name of environment and achieving biofuel security.

The US Energy Policy Act of 2005, which was in the making for a long time, established a renewable fuel requirement for the nation mandating 7.5 billion gallons of renewable fuel by 2012. A more sweeping renewable fuel standard has been proposed as part of the Biofuels Security Act 2007, which recommended replacing at least 25 per cent of petroleum used as transportation fuels by the year 2025. The EU's Biofuels Directive (2003) mandated 2 per cent of the energy for transport to come from renewable sources, including both biodiesel and bio-ethanol, increasing to 5.75 per cent by the end of 2010 and 20 per cent by 2020.

The consequence of these policies has been the phenomenal increase in the consumption of corn, soybean, rapeseed-mustard and even wheat, barley and palm oil for making biofuels. As mentioned earlier, Brazil has been using sugarcane as the main raw material for producing ethanol. Now, of course, even Brazil has begun to use corn for producing ethanol and soybean for making biodiesel. The US has been using corn for making ethanol and soybean for producing biodiesel and the EU has started making use of rapeseed for producing biodiesel. To a limited extent, wheat and barley are also being used for making ethanol in the EU.[2] Majority of the analysts have argued that these programmes have just begun and are too small to have a significant impact on food prices. However, the question is – is this really true because the actual data tell an entirely different story.

In a span of four years, between 2004 and 2007, the share of US corn production that is used for making ethanol has shot up from 11 per cent of corn output in 2004 to 25 per cent of corn output in 2007 (Table 1). As the US is a major producer of corn in the world and has a share of 43 per cent in the world's corn output, the quantity of corn that was used for making ethanol is significant and jumped from 34 million tonnes in 2004 to 81 million tonnes in 2007. The amount of corn used for making ethanol is evidently not small when compared with the total world trade in corn, which was roughly 89 million tonnes in 2007-08. This figure is equally alarming when viewed in relation to the total world trade in coarse cereals, which in 2007-08 stood at 114 million tonnes.

Table 1: Usage of Corn and Soybean for Biofuel Production in US

Year	Corn (Maize)			Soybean		
	Used for Producing Ethanol (million tonnes)	Share in Total Output (%)	Share of World Trade (%)	Used for Producing Ethanol (million tonnes)	Share in Total Output (%)	Share of World Trade (%)
2004	33.6	11.2	45.9	0.5	0.5	0.7
2005	40.7	14.4	54.8	1.4	1.6	2.2
2006	53.8	20.1	63.6	4.5	5.2	6.8
2007	81.3	24.5	91.3	8.2	11.6	11.4

There may be a small variation in data on share of world trade because the production and usage data is for calendar year (2004, 2005, 2006 and 2007) and trade data is for financial year (2004-05, 2005-06, 2006-07 and 2007-08).
Sources: (1) National Corn Growers Association for production and quantity of corn used for producing ethanol and USDA for trade.
(2) National Soybean Growers Association for production and quantity of soybean used for producing ethanol and USDA for trade.

Similarly, the share of soybean production in the US that is used for making

biodiesel during the same period has increased from less than one per cent to 12 per cent of total soybean production.[3] The increase in the quantity of soybean used for making biodiesel in the US shot up from 0.5 million tonnes in 2004 to 8.2 million tonnes in 2007. Like in the case of corn, the US is also a major producer of soybean in the world as it accounts for a share of 39 per cent of total soybean output in the world. Hence, as a share of total world trade the quantity of soybean crushed for making biofuels in 2007 worked out to be 11 per cent, which is yet again a significant figure.

In the EU rapeseed oil is the main raw material that is being used to produce biodiesel along with soybean and sunflower though the shares of soybean and sunflower oils used for making biodiesel are not consequential (13.6 per cent in 2007). As the bulk of biodiesel output in the EU is being contributed by rapeseed oil, it is the increase in the consumption of rapeseed oil, which is amazing. Between 2002-03 and 2007-08, the share of rapeseed oil used for making biodiesel in the EU almost tripled from 22 per cent of total output to 64 per cent of the output (Table 2). The quantity of rapeseed oil used for making biodiesel shot up by five times from 1 million tonnes in 2002-03 to 4.7 million tonnes in 2007-08, which is more than the total world trade in rapeseed oil (119 per cent in 2007-08). In fact, for the past three years from 2005-06 onwards, the quantity of rapeseed oil used for making biodiesel in the EU has been consistently higher than the total world trade in rapeseed oil.

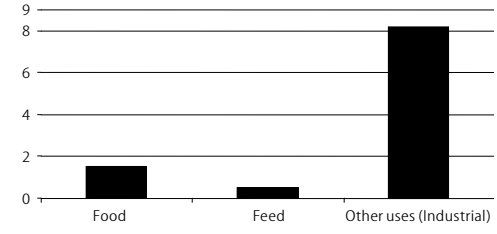
The pressure of demand originating from biodiesel industry in the EU has been so high that from being a net exporter of rapeseed oil until 2004-05, the EU has become a net importer of rapeseed oil. Though there has been a significant expansion in the output of rapeseed oil in the EU, it is clearly insufficient to meet the increasing demand. In the case of cereals, the demand for ethanol production has been low in comparison to rapeseed oil for biodiesel but it is likely to expand in the future if the EU has to meet the targets for biofuels by 2010 and 2020.

What is even more significant is that these changes in the US and EU markets for corn, soybean and rapeseed-mustard took place when inventories of cereals and oilseeds were falling. This is particularly true in the case of wheat and coarse cereals, which witnessed a significant decline in inventories after 2004-05 (Table 3). Clearly, the increased demand for cereals and oilseeds for making biofuels added further worries to the supplies, which was affected due to drought in Australia and other parts of the world.

As far as the argument of a sudden increase in demand for food and feed in developing countries including China and India is concerned, the facts reveal that this is simply not correct. The data from FAO reveals that cereal consumption in China and India has grown at a much slower pace than the average consumption in other net food importing countries (Table 4, p 40). For the period between 2004-05 and 2007-08, food and feed demand for cereals in both China and India increased by just about 0.2 per cent and 1.4 per cent per annum, respectively. Whereas the increase in demand for food and feed in other net food importing countries was 3.5 per cent per annum for food and 8.7 per cent per annum for feed.

These changes in consumption in developing countries are rather small when viewed against the changes in demand for biofuels. This is also evident from the growth in usage of cereals for other purposes (industrial use), which exhibited a growth of 8 per cent per annum as compared to 1.5 per cent expansion for food and 8.2 per cent growth for feed during the period between 2006-07 and 2008-09 [FAO 2008] (see figure 1).

Figure: Global Demand for Cereals – Food, Feed and Other Uses (Industrial), 2006-07 to 2008-09, % per annum



The correct explanation, therefore, is that the diversion of cereals from food and feed demand to biofuel production that has expanded significantly in the US and EU has caused more problems in the global supply than is the case with the usual food and feed demand. In addition, the trends suggest that with more ethanol and biodiesel plants that are being commissioned in some of these developed countries, the diversion of cereals and oilseeds to meet the growing demand for the biofuel industry is set to increase. This will certainly make the global food supply situation look even more complicated in the future if corrective steps are not taken.

Policy Implications

It is true that the major push for these policies for biofuels has been provided by the increase in prices of fuel oil and concerns for the environment (lowering emissions of greenhouse gases (GHGS)) but there are several questions that are being raised with respect to the potential of biofuels in meeting the demand for fuel

Table 2: Usage of Rapeseed and Cereals for Biofuel Production in EU

Year	Rapeseed Oil			Cereals (Wheat, Corn and Barley)		
	Used for Producing Biodiesel (million tonnes)	Share in Total Output (%)	Share of World Trade (%)	Used for Producing Ethanol (million tonnes)	Share in Total Output (%)	Share of World Trade (%)
2002-03	1.0	22.2	35.3	-	-	-
2003-04	1.6	37.5	71.5	-	-	-
2004-05	2.4	44.5	92.4	-	-	-
2005-06	4.1	69.2	129.8	2.0	0.8	1.1
2006-07	5.1	77.9	128.1	3.0	1.3	1.6
2007-08	4.7	63.9	119.1	2.9	1.3	1.6

Source: USDA.

Table 3: Supply, Utilisation and End of Season Stocks – Cereals (million tonnes)

Year	Supply			Utilisation			End of Season Stocks		
	Rice	Wheat	Coarse Cereals	Rice	Wheat	Coarse Cereals	Rice	Wheat	Coarse Cereals
2004-05	513	791	1,173	415	616	979	100	177	193
2005-06	524	805	1,195	420	621	1,001	105	180	186
2006-07	534	776	1,173	428	621	1,017	105	159	162
2007-08	538	765	1,231	436	621	1,069	104	144	157
Average annual change (%)	1.6	-1.1	1.7	1.7	0.3	3.0	1.3	-6.5	-6.5

Source: Food and Agriculture Organisation.

and also their effectiveness in reducing GHG emissions.

First, the potential for biofuels to replace fuel oil is relatively small, which implies that the scope to improve energy security through increased biofuel production is rather limited. The International Energy Agency [IEA 2007] estimates suggest that the share of biofuels in road transport is likely to increase from just about 1 per cent today to 7 per cent in 2030. What it essentially means is that considerable amounts of resources, particularly agricultural land would be needed to produce cereals and oilseeds to replace even a moderate amount of fuel oils.

Table 4: Domestic Utilisation of Cereals (Million tonnes)

	China and India		Other Net Food Importing Countries		Rest of the World	
Year	Food	Feed	Food	Feed	Food	Feed
2004-05	376.3	117.1	256.5	38.2	335.5	589.2
2005-06	372.8	118.5	271.6	46.4	342.1	582.3
2006-07	375.0	118.0	278.7	48.6	340.3	574.8
2007-08	378.3	122.0	284.2	48.5	344.1	586.3
Average annual change (%)	0.2	1.4	3.5	8.7	0.9	-0.2

Source: Food and Agriculture Organisation.

Second, there are huge inefficiencies in biofuel production, particularly in developed countries. It is widely recognised that domestic production and trade policies are promoting proliferation of the biofuel industry. For example, cereals and oilseeds such as soybean account for the bulk of subsidies that are provided to farmers in the US [OECD 2007]. Further, the new farm bill has promised a much bigger bonanza for producers of these commodities. For the biofuel industry, a significant amount of tax incentives are provided to ethanol blenders and producers. There is also a $ 0.54 per gallon tariff on imports of ethanol, which prohibits the entry of cheap ethanol from countries such as Brazil. Similarly, in the EU, wheat, coarse cereals and rapeseed-mustard also account for a major proportion of the total support that is provided by the EU (ibid). And, under the new Common Agricultural Policy, reform farmers in the EU would continue to get subsidies in the form of single farm payment every year. There are quite a lot of incentives for producers of biofuels under the EU energy policy, which plans to increase the share of renewable energy sources considerably.

Third, even the earlier positive assessment regarding the impact of biofuel production on environment has been questioned. Previous studies had found that substituting biofuels for fossil fuels will reduce greenhouse gas emissions but more recent evidence suggests that these studies failed to count the carbon emissions that occur as farmers worldwide respond to higher prices and convert forest and grassland to new cropland to replace the grain (or cropland) diverted to biofuels. Searchinger et al (2008) using a worldwide agricultural model have found that corn-based ethanol, instead of producing 20 per cent savings, nearly doubles greenhouse emissions over 30 years and increases GHGs for 167 years. And biofuels from switch grass, if grown on US corn lands, increase emissions by 50 per cent.

Similarly Fargione et al (2008) also question the low carbon content of food based biofuels. Their analysis shows that converting rainforests, peat lands, savannas or grasslands to produce food-based biofuels in Brazil, south-east Asia, and the US creates a "biofuel carbon debt" by releasing 17 to 420 times more carbondioxide than the annual GHG reductions these biofuels provide by displacing fossil fuels. In contrast, biofuels made from waste biomass or from biomass grown on abandoned agricultural lands planted with perennials incur little or no carbon debt and offer immediate and sustained GHG advantages.

The results of these studies and above analysis raise serious concerns about large biofuel mandates and in fact, highlight the value of using waste products or biomass grown on marginal and abandoned agricultural lands. Clearly, prime land meant for food production must not be diverted to meet the growing demand for the biofuel industry because the prognosis suggests that prices of food are likely to remain high over the medium-term. There are several reasons for being cautious due to factors such as reduced inventories, continued subsidisation of agriculture in the US, Europe and Japan, rising input costs and increased food and feed demand. The world must guard itself against the impending food crisis, which is leading to impoverishing the poor. Food and fuel issues have never been intertwined so closely, therefore, for the short to medium term nothing less than a suspension of biofuel production from food crops can only save the world from such crises.

NOTES

1 Initially the government of Brazil underwrote the price of ethanol, encouraged investment in new units by means of preferential interest rates and subsidised the purchase of vehicles running on pure ethanol. However, in the 1990s, the programme underwent a major overhaul. The government planned to encourage the use of blends by withdrawing public subsidies for the purchase of vehicles running on pure ethanol. During the period between 1997 and 1999, Brazil opened up the ethanol market and ended price guarantees. The volumes consumed were guaranteed in part, for the government required that 22-24 per cent of ethanol be added to gasoline.

2 In other countries, such as Canada, China and a few other Asian countries that have also joined the bandwagon, the quantity of raw materials used for making biofuels is rather small. Except for Canada and China these countries are not using grains, but crops such as sugarcane (Thailand and India) and palm oil (Indonesia and Malaysia) for making biofuel.

3 In addition to soybean, other food crops such as canola oil and other fats and oils are also being used to produce biodiesel in the US. However, their combined share in bio-diesel production is rather small, just about 8 per cent in 2007 [FAPRI 2008].

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