The Relative Impact of Corn and Energy Prices in the Grocery Aisle

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Retail food prices measured by the Consumer Price Index (CPI) for food have begun to accelerate and are beginning to approach rates of increase last seen in mid-2004. Critics of renewable fuels are blaming the recent increases on high prices for corn caused by increasing ethanol production. They fail to point out that corn prices are only one of many factors that determine the CPI for food, and in fact, directly affect a small share of retail food prices. Increases in energy prices for example exert a greater impact on food prices than does the price of corn. A 33 percent increase in crude oil prices – which translates into a $1.00 per gallon increase in the price of conventional regular gasoline – results in a 0.6 percent to 0.9 percent increase in the CPI for food while an equivalent increase in corn prices ($1.00 per bushel) would cause the CPI for food to increase only 0.3 percent.

The purpose of this study is to examine and compare the impact on consumer food prices resulting from increases in petroleum and corn prices.

Background

The ethanol and corn industries are under attack by a wide range of critics for causing everything from sharply higher food prices for American consumers to shortages of and high prices for Mexican tortillas and even potentially higher tequila prices. Expansion of the ethanol industry to meet clean air standards and reduce dependence on imported petroleum has boosted demand for corn, the primary feedstock for U.S. ethanol. This increased demand has caused corn prices to rise to their highest levels since the drought of 1995. Critics contend that the recent increase in retail food prices measured by the CPI for food is the direct result of higher corn prices caused by ethanol demand and that an even larger increase in food prices is in store for American consumers.

The actual record on the relationship between ethanol, corn, and retail food prices is less clear. Over the past five years, ethanol production has more than doubled, increasing from 2.14 billion gallons in 2002 to 4.86 billion gallons in 2006. Over this same period, the demand for corn to produce ethanol has grown from 996 million bushels to 2.2 billion bushels. Over most of this period, cash market

corn prices were relatively stable. From January 2002 through September 2006, corn prices averaged $2.18 per bushel. However, between September 2006 and May 2007, corn prices jumped 61 percent to $3.56 per bushel in May 2007.

During this same period, the CPI for food averaged a year-over-year increase of 2.4 percent. In fact, the inflation rate for food declined from a five-year peak of 4.1 percent in May 2004 to a 2.5 percent year-over-year rate in September 2006. However, since September 2006 the CPI for food has accelerated to a year-over-year rate of 3.7 percent in April 2007, an increase of 1.2 percent. During this same period, cash market corn prices increased $1.15 per bushel. While it is tempting to blame the entire increase in food price inflation over the past eight months on higher corn prices, most of the increase in food prices was the result of foods not impacted by corn such as fish, fruits and vegetables, sugar and sweeteners, and food away from home. *Meat, poultry, eggs, and dairy products – the foods where corn is a major input and are most affected by rising corn prices – accounted for about 0.2 percent of the 1.2 percent acceleration in food price inflation between September 2006 and April 2007.* <u>Rising energy prices had a more significant impact on food prices than did corn.</u>

Year-over-year increases in the CPI for all Items, CPI for food and selected components are shown in Table 1.Table 1

<div align="center">CPI Urban Workers
Percent Change, Year-Over-Year</div>

	All Items	All Food	Cereals Bakery Prods	Meat Poultry Fish	Beef & Veal	Pork	Poultry	Eggs	Dairy
2002	1.6%	1.8%	2.2%	0.5%	0.1%	-0.4%	1.3%	1.3%	0.6%
2003	2.3%	2.2%	2.4%	4.0%	9.0%	1.9%	1.3%	13.8%	-0.1%
2004	2.7%	3.4%	1.6%	7.4%	11.5%	5.6%	7.5%	6.2%	7.3%
2005	3.4%	2.4%	1.5%	2.4%	2.6%	2.0%	2.0%	-13.7%	1.2%
2006	3.2%	2.4%	1.8%	0.8%	0.8%	-0.2%	-1.8%	4.9%	-0.5%
Jan-07	2.1%	2.4%	2.7%	1.7%	0.2%	1.4%	0.2%	11.8%	-0.1%
Feb-07	2.4%	3.1%	4.1%	1.7%	1.4%	0.5%	1.0%	29.1%	0.2%
Mar-07	2.8%	3.3%	3.6%	2.8%	2.3%	2.2%	2.1%	20.8%	1.5%
Apr-07	2.6%	3.7%	4.5%	3.7%	4.7%	0.7%	4.6%	18.6%	2.5%

Annual average and recent monthly average market prices for corn, soybean meal, Distiller's Grains and regular gasoline are shown in Table 2. The shift in corn prices that occurred in late 2006 is

clearly evident and has been mirrored by soybean meal and Distiller's grains. During this same period energy price also accelerated rapidly. For example, the national average price of conventional regular gasoline increased 89 cents per gallon (39 percent) between October 2006 and May 2007.

Table 2
Market Prices for Feed and Gasoline

Cal Year	Corn No. 2 Yel Cent Ill ($/bu)	SBM High Pro Decatur ($/cwt)	DDG L'burg ($/cwt)	Reg Gasoline $/gal
2002	$2.17	$167.36	$81.55	$1.38
2003	$2.29	$200.00	$91.66	$1.60
2004	$2.39	$237.01	$105.18	$1.89
2005	$1.90	$188.08	$75.71	$2.31
2006	$2.41	$175.85	$89.01	$2.62
Jan-07	$3.66	$190.56	$118.00	$2.29
Feb-07	$3.90	$208.81	$129.00	$2.32
Mar-07	$3.76	$205.26	$130.88	$2.61
Apr-07	$3.36			$2.89
May-07	$3.56			$3.19

Livestock and poultry producers are beginning to respond to higher feed costs by slowing the growth in animal numbers and market prices are reflecting these changes. However, corn prices are only one of several factors that impact livestock and meat production.

- Heavy cow and calf slaughter and early placement of feeder cattle in feedlots have combined with poor fall and winter pasture conditions and higher grain prices to set the stage for slower growth in cattle numbers through early 2008. This will in turn slow growth in beef production in 2008 and support higher beef prices.

- Growth in hog inventories are expected to be constrained by higher feed costs. However, this will be offset by growth in domestic demand supported by a stronger consumer economy and increases in exports as China turns to the U.S. to offset sharply reduced domestic pork production.

- Higher feed costs will dampen broiler producer's zest to sharply expand production. However, producers will respond to higher prices for red meat and growth in real disposable income that will support demand growth. This will moderate any potential sharp increases in broiler prices in 2008.

Recent data for beef, pork, and broiler production and market prices are summarized in Table 3

Table 3
Selected Livestock and Poultry Production and Prices

	Cattle on Feed (Thou hd)	Beef & Veal Production (Mil lbs)	Steer Price Om. Direct ($/cwt)	Pork Production (Mil lbs)	Barrows & Gilts Nat. Base ($/cwt)	Hogs and Pig Inventory (Thou hd)	Broiler Production (Mil lbs)	Broiler Price 12-City Avg ($/cwt)
2002	9,910	27,090	$67.04	19,664	$34.91	59,722	32,240	$55.52
2003	9,124	26,238	$84.69	19,945	$39.45	59,554	32,749	$62.00
2004	11,253	24,547	$84.75	20,511	$52.48	60,444	34,063	$74.10
2005	11,299	24,682	$87.28	20,685	$50.01	60,975	35,365	$70.80
2006	11,726	26,071	$85.41	20,999	$47.28	61,449	35,752	$64.30
Jan-07	11,974	2,178	$86.75	1,898	$44.04	62,149	3,015	$70.43
Feb-07	11,726	1,965	$88.68	1,636	$48.60		2,656	$75.89
Mar-07	11,599	2,131	$96.39	1,861	$46.00		2,903	$78.66
Apr-07	11,644	2,027	$98.04	1,711	$48.43		2,905	$78.63
May-07		2,279	$95.90	1,759	$54.00		3,259	$80.50

Analysis

Retail food prices are not likely to accelerate significantly in 2008 and beyond, even as ethanol production continues to expand. In fact, consumers will be more severely affected by rising gasoline and energy prices than by increases in corn prices.

Increasing petroleum prices have about twice the impact on consumer food prices as equivalent increases in corn prices. A 33 percent increase in crude oil prices – the equivalent of $1.00 per gallon over current levels of retail gasoline prices – would increase retail food prices measured by the CPI for food by 0.6 to 0.9 percent. An equivalent increase in corn prices – about $1.00 per bushel over current levels – would increase consumer food prices only 0.3 percent.

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The reason for the larger impact on food prices from petroleum and energy prices stems from the relative importance of energy in food production, packaging, and distribution compared to that of a single ingredient. While petroleum and energy prices affect virtually all aspects of agricultural raw material transportation, processing, and distribution of all finished consumer food products, corn prices affect only a segment of consumer foods – livestock, poultry and dairy. Corn is an important feed ingredient for livestock and poultry producers and changes in corn prices can have significant impacts on profitability and production. However, meat, poultry, fish, eggs and dairy products account for only a fifth of the CPI for food which, in turn, is only 15 percent of the overall CPI.

Crude oil and refined petroleum prices have increased sharply over the past several years and have put considerable pressure on consumers. Energy plays a significant role in the production of raw agricultural commodities, transportation and processing, and distribution of finished consumer food products. Several studies have looked at the impact of increased energy prices on food prices.

- Reed, Hanson, Elitzak and Schluter utilized three different model structures to examine the impact of a doubling of crude oil prices on the CPI for food.[1] They conclude that the short run impact of a doubling (e.g. 100 percent increase) in crude oil prices would cause a 1.82 percent rise in average food prices in the short run and 0.27 percent in the long run.

- A more recent analysis published by Chinkook Lee examined the impact of energy price increases as an intermediate input for food processing and concluded that a 10 percent increase in energy prices results in a 0.2709 percent increase in the purchase (consumer) price of food and kindred products prices.[2]

As pointed out, earlier corn prices also have increased significantly over the past year as the markets have recognized the impact of increasing ethanol production on corn demand. The price of No. 2 Yellow corn at Central Illinois averaged $3.56 per bushel in May 2007, nearly 60 percent higher than year-ago levels. The USDA and many private sector forecasters project ethanol production to

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[1] A.J. Reed, Kenneth Hanson, Howard Elitzak, and Gerald Schluter. "Changing Consumer Food Prices: A User's Guide to ERS Analyses". USDA Economic Research Service. Technical Bulletin 1862. June 1997.
[2] Lee, Chinkook. "The Impact of Intermediate Input Price Changes on Food Prices: An Analysis of "From-the-Ground-Up" Effects." *Journal of Agribusiness* 20, 1 (Spring 2002).

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exceed 15 billion gallons by 2017, utilizing more than 4 billion bushels of corn and maintaining corn prices well above $3.00 per bushel for most of the decade.

We evaluated the impact of an increase in petroleum prices on consumer prices food prices by applying the impact elasticities summarized above to an assumed 33 percent increase in crude oil (the equivalent of a $1.00 increase in retail gasoline prices from current levels). To determine the impact of an increase in corn prices on livestock, poultry, dairy and consumer food prices we imposed a 33 percent increase in corn prices (about $1.00 per bushel from current levels) on the current LECG agricultural sector baseline forecast over the five year period 2007 through 2012. This is consistent with the increase in corn prices that has occurred over the past year.

The analyses by Reed and Lee indicate that a 33 percent increase in oil/energy prices would increase retail food prices by 0.6 percent and 0.9 percent. Reed indicates that a 100 percent increase in crude oil prices results in a short-term increase of 1.82 percent in consumer food prices while Lee reports that a 10 percent increase in energy prices provides a 0.2709 percent increase in retail food prices. Restating these on an equivalent 33 percent basis (1.82 percent times .33 and 0.2709 times 3.3) provides the 0.6 to 0.9 percent range.

As shown in Table 1, the equivalent 33 percent increase in corn prices over the five-year period is expected to reduce beef, pork, and broiler production by 2.6 percent between 2008 and 2012 and increase prices by 2.4 percent. Combined with higher turkey, egg, and dairy prices, the CPI for food is projected to increase an additional 0.3 percent. *This result is consistent with the 0.2 percent contribution to food price inflation between September 2006 and April 2007 from meat, poultry, fish and dairy and the $1.15 per bushel increase in cash market corn prices.*

Table 1
Impact of a $1.00 Corn Price Increase on
Livestock, Poultry, and Consumer Food Prices
(Average 2008-2012)

	Baseline	Scenario	% Chg
Corn Price, Average Farm ($/bu)	$3.10	$4.10	33.0%
Beef and Veal Production (Mil lbs)	25,778	25,749	-0.1%
Pork Production (Mil lbs)	21,057	20,696	-1.7%
Broiler Production (Mil lbs)	35,530	33,740	-5.0%
Steer Price, Nebraska Direct ($/cwt)	$98.41	$98.59	0.2%
Barrows and Gilts, Market ($/cwt)	$49.95	$50.99	2.1%
Broilers, 12 City Average (cents/lb)	$77.90	$82.09	5.4%
CPI, Food	2.3%	2.6%	0.3%
CPI, Food at Home	1.9%	2.2%	0.3%
CPI, Meats, Poultry, Eggs	1.4%	2.1%	0.7%

Conclusion

The days of cheap corn are more likely than not over. Livestock and poultry producers who enjoyed low and relatively stable corn (and other feed) prices over most of the past decade are now faced with the challenge of adjusting to an environment of higher feed prices. The new reality is that corn prices are likely to remain nearer to the $3.00 per bushel than the $2.00 per bushel mark for an extended period. The good news is that prices may be more stable as corn production expands to meet ethanol requirements and new ethanol feedstocks and technologies emerge. Livestock and poultry producers also will have an incentive to increase use of the ethanol co-product Distiller's grains in order to control feed costs. This medium protein feed component can be used in place of corn in a substantial portion of the feed ration. As ethanol production expands, so will production of Distiller's grains and thus putting downward pressure on prices.

Corn and energy prices both affect consumer food prices. However, since increases in corn prices are limited to a relatively small portion of the overall CPI for food, an increase in corn prices

resulting from higher ethanol demand or a supply disruption such as a major drought is expected to have about half the impact of the same percentage increase in petroleum and energy prices.

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Appendix Table 1
CPI All Urban Workers
(Percent Change from Previous Year)

	All Items	All Food	Cereals & Bakery Products	Beef	Pork	Poultry	Eggs	Dairy Products	Fruits & Vegetables	Fats Oils
Jan-04	1.9%	3.5%	2.1%	20.4%	5.4%	5.5%	30.5%	3.6%	2.3%	3.1%
Feb-04	1.7%	3.3%	1.3%	16.1%	3.6%	4.1%	31.2%	2.9%	2.9%	2.3%
Mar-04	1.7%	3.2%	1.3%	12.8%	5.5%	6.1%	33.2%	2.9%	2.9%	5.5%
Apr-04	2.3%	3.4%	1.8%	13.2%	4.8%	5.9%	26.4%	4.9%	3.2%	6.5%
May-04	3.1%	4.1%	1.5%	15.9%	6.6%	9.5%	19.0%	12.4%	2.4%	7.5%
Jun-04	3.3%	3.7%	1.5%	16.0%	6.3%	8.9%	10.1%	15.2%	-0.3%	9.5%
Jul-04	3.0%	4.0%	1.3%	15.4%	7.0%	9.5%	6.3%	14.0%	-0.9%	10.0%
Aug-04	2.7%	3.5%	1.3%	14.2%	7.4%	10.5%	-1.0%	10.4%	-0.4%	7.6%
Sep-04	2.5%	3.3%	1.4%	12.2%	6.2%	9.8%	-9.6%	6.6%	0.7%	8.1%
Oct-04	3.2%	3.4%	1.9%	7.4%	5.3%	8.3%	-12.4%	6.0%	6.1%	6.6%
Nov-04	3.5%	3.2%	2.1%	0.6%	5.2%	6.3%	-21.1%	5.7%	9.1%	6.7%
Dec-04	3.3%	2.7%	1.7%	-0.9%	4.7%	5.1%	-19.9%	4.1%	7.9%	6.2%
Jan-05	3.0%	2.9%	1.8%	1.5%	5.5%	5.3%	-23.0%	6.3%	4.5%	6.0%
Feb-05	3.0%	2.6%	2.0%	3.5%	6.3%	4.5%	-21.5%	5.6%	2.2%	4.3%
Mar-05	3.1%	2.5%	1.8%	6.0%	4.5%	4.0%	-27.0%	5.5%	1.6%	0.5%
Apr-05	3.5%	3.1%	1.8%	5.3%	7.0%	3.4%	-25.9%	4.7%	5.2%	1.9%
May-05	2.8%	2.4%	1.7%	5.0%	2.8%	1.2%	-18.6%	-1.4%	5.6%	-0.9%
Jun-05	2.5%	2.2%	1.3%	3.3%	1.8%	1.3%	-17.3%	-4.1%	5.2%	-4.0%
Jul-05	3.2%	2.1%	1.1%	0.8%	0.1%	0.5%	-11.9%	-3.2%	7.0%	-2.7%
Aug-05	3.6%	2.2%	1.4%	0.8%	-0.7%	0.1%	-12.2%	-1.1%	5.6%	-1.2%
Sep-05	4.7%	2.5%	0.9%	0.5%	-1.0%	1.3%	1.4%	0.1%	6.5%	-0.6%
Oct-05	4.3%	2.2%	1.2%	1.4%	-0.8%	-0.2%	-0.6%	0.3%	2.4%	-0.9%
Nov-05	3.5%	2.2%	1.1%	1.2%	-0.2%	2.3%	5.3%	1.4%	-0.8%	-1.0%
Dec-05	3.4%	2.3%	1.0%	2.2%	-0.1%	0.3%	1.4%	1.7%	0.6%	-1.3%
Jan-06	4.0%	2.6%	1.4%	2.8%	-1.7%	-1.3%	8.3%	0.2%	6.4%	-0.3%
Feb-06	3.6%	2.8%	0.9%	1.3%	-1.7%	-0.3%	-3.1%	0.9%	7.9%	0.6%
Mar-06	3.4%	2.6%	1.2%	1.2%	-1.0%	-1.6%	5.5%	0.9%	6.3%	0.9%
Apr-06	3.5%	1.8%	0.9%	0.7%	-1.9%	-2.0%	8.7%	-0.5%	2.7%	-2.6%
May-06	4.2%	1.9%	1.0%	-1.7%	-0.8%	-2.0%	2.4%	-1.3%	1.3%	0.5%
Jun-06	4.3%	2.2%	1.6%	-1.9%	-1.0%	-1.4%	8.9%	-0.8%	4.0%	1.7%
Jul-06	4.1%	2.2%	2.5%	-0.5%	0.2%	-2.7%	0.5%	-0.4%	3.7%	-0.2%
Aug-06	3.8%	2.4%	2.1%	1.4%	1.1%	-1.7%	6.0%	-1.6%	5.3%	-0.1%
Sep-06	2.1%	2.5%	2.5%	1.6%	1.3%	-2.6%	-0.8%	-1.0%	7.2%	-0.9%
Oct-06	1.3%	2.6%	2.5%	2.0%	1.6%	-1.9%	1.5%	-0.3%	6.5%	0.3%
Nov-06	2.0%	2.3%	2.6%	2.4%	0.1%	-3.1%	6.6%	-1.6%	4.2%	1.1%
Dec-06	2.5%	2.1%	3.1%	0.5%	0.7%	-0.7%	14.1%	-1.2%	1.9%	0.9%
Jan-07	2.1%	2.4%	2.7%	0.2%	1.4%	0.2%	11.8%	-0.1%	1.7%	0.2%
Feb-07	2.4%	3.1%	4.1%	1.4%	0.5%	1.0%	29.1%	0.2%	6.0%	0.8%
Mar-07	2.8%	3.3%	3.6%	2.3%	2.2%	2.1%	20.8%	1.5%	6.2%	1.4%
Apr-07	2.6%	3.7%	4.5%	4.7%	0.7%	4.6%	18.6%	2.5%	6.2%	2.9%

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