



The overwhelming responsibility of the United States (US) and European Union (EU) in the explosion of world prices of cereals

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The explosion in the world prices of cereals from 2005-06 to 2007-08 and then since the fall of 2010 stems from many factors – climate, oil price, dollar exchange rate, speculation, rise in global demand – but we will concentrate here on the three main factors: the fall in the level of global cereals stocks, largely linked to the sharp rise in the share of the US corn production converted into fuel ethanol, the financial speculation having only amplified this rise in surfing on the hike of corn prices due to corn ethanol.

1) The US and EU responsibility stems first from the fall in their cereals stocks

As there is very generally a reverse correlation between the level of global stocks and their price level for all commodities, the US and EU27 responsibility in the surges of world prices of cereals is overwhelming. Whereas the Western media finger pointed the responsibility of emerging countries in those prices surges, particularly China and India given their increasing consumption of animal products, we must acknowledge that their cereals stocks rose, hence they permitted a lower surge in world prices. In the following tables the data, taken from the US monthly WASDE reports, are for marketing years which, in the US, go from September to August for coarse grains and particularly maize and, for wheat, from June to May.

Table 1 – The US and EU overwhelming responsibility in the fall of final cereals stocks: 2005/06-2012/13

Million t	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2009/10-11/12	2012/13 [⌘]	2009/10-12/13
All cereals										
World	388.42	341.96	360.88	451.33	489.79	461.73	471.11	-18.7(-3.81%)	431.77	-58 (-11.85%)
US	71.68	49.85	54.32	65.89	75.83	57.27	50.01	-25.8(-34%)	29.15	-46.7(-61.6%)
EU27	47.23	30.32	26.24	40.32	39.56	39.31	37.35	-2.2(-5.6%)	21.84	-17.7(-44.5%)
US+EU27	111.92	80.15	80.56	106.21	115.39	71.72	87.36	-28(-24.3%)	50.99	-64.4(-55.8%)
% world	28.81%	23.44%	22.32%	23.53%	23.56%	15.53%	18.54%		11.81%	
Wheat										
World	147.84	128.18	121.07	165.34	195.40	197.97	197.59	2.2(+1.1%)	177.17	-18.2(-8.9%)
US	15.55	12.41	12.34	17.87	26.55	23.47	20.21	-6.3(-23.9%)	19.00	-7.6(-28.4%)
EU27	23.39	14.03	12.34	18.47	14.40	11.84	13.53	-0.9(-6%)	10.93	-3.5(-24.1%)
US+EU27	38.94	26.44	20.66	36.34	40.95	35.31	33.74	-7.2(-17.6%)	29.93	-11(-27%)
% world	26.34%	20.63%	17.06%	21.98%	20.96%	17.84%	17.07%		16.89%	
US price*	138	171	310	206	187	282	261	74(+39.6%)		
Coarse grains										
World	163.74	138.89	159.32	194.34	199.02	165.17	168.52	-30.5(-15.3%)	152.13	-46.9(-25.6%)
US	54.77	36.17	45.06	47.06	48.13	32.29	28.74	-19.4(-40%)	19.24	-28.9(-60%)
EU27	22.66	15.13	12.77	20.83	24.14	16.41	13.81	-10.3(-42.8%)	10.00	-14.1(-58.6%)
US+EU27	77.43	51.30	57.83	67.89	72.27	48.70	42.55	-29.7(-41.1%)	29.24	-43(-59.5%)
% world	47.29%	36.94%	36.30%	34.93%	36.31%	29.48%	25.25%		19.22%	
US price*	105,9	155,1	217,7	172,8	163	277,2	284,3	78.7(+74.4%)		
Rice										
World	76.83	74.90	80.49	91.66	95.37	98.59	105.00	9.6(+10.1%)	102.47	7.1(+7.4%)
US	1.37	1.27	0.94	0.96	1.15	1.51	1.06	-0.9(-7.8%)	0.91	-0.24(-21%)
EU27	1.18	1.14	1.13	1.02	1.02	1.06	1.01	-0.1%(-1%)	0.91	-0.11(-10.8%)
US+EU27	2.55	2.41	2.07	1.98	2.17	2.67	2.07	-1(-4.6%)	1.82	-0.35(-16.1%)
% world	0.77%	3.22%	2.57%	2.16%	2.28%	2.83%	1.97%		1.78%	

Source: USDA, WASDE reports; [⌘] for 2012-13 USDA projection on 10 August 2012; * FOB Gulf price of Soft Red Winter and of maize in \$/tonne

If this responsibility is to be seen over the whole period 2005-06 to 2012-13 (year for which only the USDA prospects of 10 August 2012 are available), this is already clear during the first phase of prices explosion, from 2005-06 to 2007-08 when the fall in US+EU cereals stocks of 31.4 million tonnes (Mt) exceeded by 14.2% that of global stocks of 27.5 Mt.

The main responsibility lies on coarse grains for which the US+EU stocks fell by 19.6 Mt when the global stocks fell by only 4.4 Mt, whereas, for wheat, the fall in the US+EU stocks of 18.3 Mt represented 68.3% of the fall of 26.8 Mt in global stocks. It is not necessary to deal with the final stocks of rice as those of US+EU are very tiny, even if their level fell also along the whole period when the global stocks rose.

If the global cereals stocks rose significantly in 2008-09, the previous prices explosion having fostered production, they fell again by 18.7 Mt (or 3.8%) from 2009-10 to 2011-12. But those of US+EU fell by 28 Mt (or 24.3%), i.e. by 50% more than global stocks. Here also the main responsibility lies on coarse grains for which the US+EU stocks fell by 29.7 Mt (or 41.1%) and accounted for 97.4% of the fall in global stocks of 30.5 Mt (by 15.3%). For wheat the US+EU stock fell by 7.2 Mt (by 17.6%), i.e. much less than for coarse grains, but the global stock increased by 2.2 Mt (by 1.1%).

The situation will deteriorate sharply for the marketing year 2012-13 following the very severe US drought in Summer 2012 and, to a lower extent, in the countries exporting through the Black Sea (Russia, Ukraine, Kazakhstan, Turkey), Argentine and Australia. Over the 2009-10 to 2012-13 period, the collapse in the US+EU cereals ending stocks of 64.4 Mt (by 55.8%) would exceed by 11% the fall of global stocks of 58 Mt (falling by 11.9%). Here again the overwhelming responsibility would lie on coarse grains stocks (mainly maize) as the fall of 43 Mt in the US+EU (or by 59.5%) would account for 91.7% of the fall in global stocks of 46.9 Mt (a 25.6% fall). The fall of 11 Mt (by 27%) in the US+EU ending stock of wheat would represent 60.4% of the expected fall of 18.2 Mt (by 8.9%) in global stocks.

The table 1 shows also the decreasing share of the US+EU stocks in global stocks over the whole period. They declined from 28.8% in 2005-06 to 18.5% in 2011-12 and would collapse to 11.8% in 2012-13. These shares would fall respectively by 26.3%, 17.1% and 16.9% for wheat and by 47.3%, 25.3% and 19.2% for coarse grains.

On the other hand the table 2 shows that China and India increased their cereals stocks over the whole period. And this rise is under-estimated because USDA does not provide data on Indian stocks of coarse grains. In the first period of prices explosion, from 2005-06 to 2007-08, the rise of 18.6 Mt (by 15.8%) of all cereals stocks of China+India contrasts with the fall of 27.5 Mt of global stocks (already analyzed above). This rise concerned more wheat (8.3 Mt) than coarse grains (4.6 Mt) and rice (3.7 Mt).

Over the recent period 2009-10 to 2011-12 total stocks of China+India increased by 13.1 Mt (by 7%) when global stocks decreased by 19 Mt (by 3.8%). Whereas the global stocks of coarse grains fell by 30.5 Mt (by 15%) those of China (those of India are unknown) rose by 5.7 Mt (by 10.4%). For wheat the China+India stock rose by 8 Mt (by 11.4%), 4 times more than the 2 Mt in global stocks (by 1.1%).

Given USDA prospects for the 2012-13 marketing year, the cereals stocks of China+India would rise by 18.5 Mt (by 11%) over the period 2008-09 to 2012-13 whereas global stocks would collapse by 58 Mt (by 11.9%) as already seen. That rise in China+India's stocks would distribute itself almost equally between wheat (6.1 Mt or by 8.6%), coarse grains (6.6 Mt or

by 11.2%) and rice (5.8 Mt or by 5.8%).

Table 2 – China and India's cereals stocks increased from 2005-06 to 2012/13

Million tons	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	09/10-11/12	2012/13	09/10-12/13
All cereals										
World	388.42	341.96	360.88	451.33	489.79	461.73	471.11	-19(-3.8%)	431.77	-58 (-11.9%)
China	107.08	113.72	117.41	138.73	149.59	151.79	153.35	3.8(+2.5%)	161.68	12.1 (+10.8%)
India	12.52	16.93	18.80	32.43	36.60	38.86	45.95	9.4(+25.5%)	43.00	6.4 (+11.7%)
China+India	117.60	130.65	136.21	171.16	186.18	199.09	199.30	13.1(+7%)	204.68	18.5(+11%)
" % world	30.27%	38.21%	37.74%	37.92%	38.01%	46.63%	42.30%		47.40%	
Wheat										
World	147.84	128.18	121.07	165.34	195.40	197.97	197.59	2.2(+1.1%)	177.17	-18.2(-8.9%)
China	34.49	38.45	38.96	45.69	54.31	59.09	58.47	4.2(+7.7%)	55.47	1.2(+1%)
India	2.00	4.50	5.80	13.43	16.10	15.36	19.95	3.9(+23.9%)	21.00	4.9(+13%)
China+India	36.49	39.35	44.76	59.12	70.41	77.87	78.42	8(+11.4%)	76.47	6.1(+8.6%)
" % world	24.68%	30.70%	36.97%	35.76%	36.03%	45.14%	39.69%		43.16%	
Coarse grains										
World	163.74	138.89	159.32	194.34	199.02	165.17	168.52	-30.5(-15%)	152.13	-46.9(-25.6%)
China	35.81	39.35	40.43	54.14	54.43	50.13	60.11	5.7(+10.4%)	61.04	6.6(+11.2%)
India*										
China+India	35.81	39.35	40.43	54.14	54.43	50.13	60.11	5.7(+10.4%)	61.04	6.6(+11.2%)
" % world	21.87%	28.33%	25.38%	27.86%	27.34%	30.35%	35.67%		40.12%	
Rice										
World	76.83	74.90	80.49	91.66	95.37	98.59	105.00	9.6(+10.1%)	102.47	7.1(+7.4%)
China	36.78	35.92	38.02	38.90	40.85	42.57	44.77	3.9(+9.6%)	45.17	4.3(+11.1%)
India	10.52	11.43	13.00	20.50	20.50	23.50	26.00	5.5(+26.8%)	22.00	1.5(+10.7%)
China+India	47.30	47.35	51.02	57.90	61.35	60.28	70.77	9.4(+11.5%)	67.17	5.8(+5.8%)
" % world	61.56%	63.22%	63.39%	63.17%	64.33%	63.94%	67.40%		65.55%	

Source: USDA, WASDE reports. * USDA does not provide data for India's coarse grains stocks.

The table 2 shows also the increasing share of China+India's stocks in global stocks over the whole period. They rose from 30.3% in 2005-06 to 42.3% in 2011-12 and would rise to 47.4% in 2012-13. These shares would rise respectively by 24.7%, 39.7% and 43.2% for wheat and by 21.9%, 35.7% and 40.1% for coarse grains. And their share in the global stock of rice rose from 61.6% in 2005-06 to 67.4% in 2011-12, even if it would drop slightly to 65.6% in 2012-13.

2) Without US corn ethanol the world prices of cereals would have fallen from 2005-06

The table 3 shows that the global production of cereals exceeded the global demand on average by 8.2 Mt from 2005-06 to 2011-12 as the deficits registered in 2005-06, 2006-07 and 2010-11 were compensated by the surpluses of 2007-08, 2008-09, 2009-10 and 2011-12. And, over the period 2005-06 to 2012-13 – marketing year for which we have only the USDA prospects of 10 August 2012 with an expected deficit of 40 Mt –, global production would also exceed global demand on average by 2.1 Mt. Those calculations do not take into account exports and imports or beginning and ending stocks as they cancel each other out.

Above all the table shows that, without the US corn ethanol, not a single year would have been in deficit and the surplus of global production over global demand would have been on average of 99.2 Mt from 2005-06 to 2011-12 and of 93.9 Mt from 2005-06 to 2012-13. And, if we add the smaller but significant amount of EU cereals devoted to fuel ethanol, the surplus of global production over global demand would have been on average of respectively 105.6 Mt and 103 Mt.

One can deduct that this large permanent surplus of global production over global demand would have likely led to a fall in world cereals prices instead of the prices explosions registered from 2005-06 to 2007-08, then from 2009-10 to 2011-12 and that expected for 2012-13. If the fall would have been the most noticeable on maize it would have spilled over

the other cereals, oilseeds and animal products through a dominos effect, as was acknowledged already since 2005-06.

Table 3 – Without the US+EU ethanol there would have been a global surplus of cereals

Million tonnes	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	Average 2005-11	2012/13*	Average 2005-12
1- Production	2017.2	2005.3	2121	2240.8	2241.1	2199.2	2309.2	2162	2247.5	2172.6
2- Demand	2031.6	2052.9	2100.2	2158.5	2203.1	2230.5	2299.9	2153.8	2287.5	2170.5
3- Prod ^o -demand	-14.4	-47.6	20.8	82.3	38	-31.6	9.3	8.2	-40	2.1
4- US corn to ethanol	40.7	53.8	77.4	94.2	116.6	127.5	127	91	114.3	93.9
5- EU cereal to ethanol	4	3.5	4	6.2	8	9.1	10	6.4	10.9	7
6-: 3 – (4 + 5)	30.3	9.7	102.2	182.7	162.6	105	146.3	105.6	85.2	103

Source: USDA, WASDE reports. * Prospects for 2012-13 in the WASDE report of 10 August 2012 and, for the EU cereals to ethanol: USDA, Gain report EU27 Biofuels annual, 25 June 2012

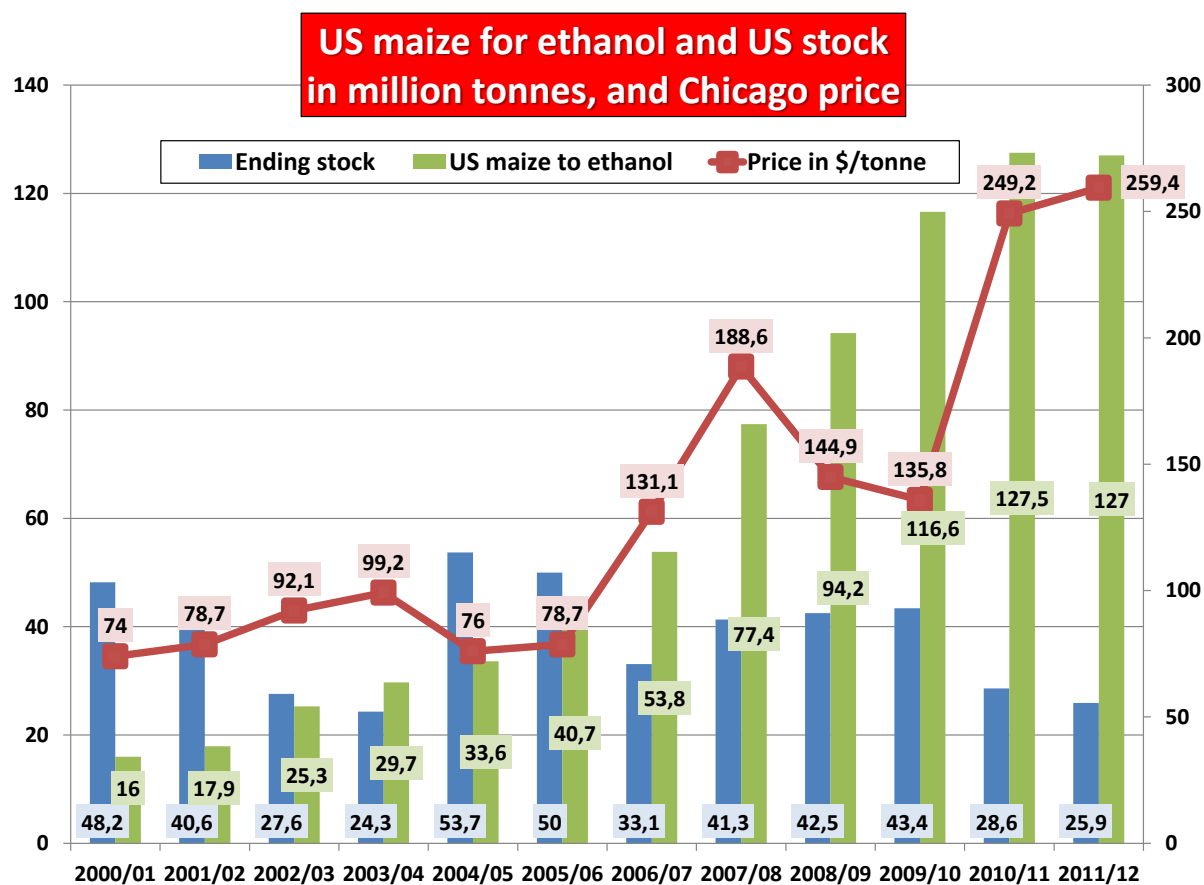
(http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-27_6-25-2012.pdf)

The tables 4 and 5 and corresponding graphs compare the evolution of the US and global ending stocks of maize with the US price of maize in Chicago (for the US stock) and the FOB Gulf price (for the global stock) together with the US maize production processed into fuel ethanol, from 2000-01 to 2011-12.

Table 4 – US maize for ethanol, US ending stock and Chicago price: 2000/01 to 2011/12

Million tonnes	2000 /01	2001 /02	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12
US maize production	251.9	241.5	227.8	256.3	299.9	282.3	267.6	331.2	307.1	332.6	316.2	313.9
US maize ending stock	48.2	40.6	27.6	24.3	53.7	50	33.1	41.3	42.5	43.4	28.6	25.9
US maize to ethanol	16	17.9	25.3	29.7	33.6	40.7	53.8	77.4	94.2	116.6	127.5	127
Chicago price in \$/tonne	74	78.7	92.1	99.2	76	78.7	131.1	188.6	144.9	135.8	249.2	259.4

Source: USDA



The first graph shows well the reverse correlation between the evolution of the US maize stock and the evolution of maize price in Chicago: when the stock falls from 2000-01 to 2003-04 the price rises then it falls in 2004-05 when the stock rises; the new price rise in 2005-06 and 2006-07 corresponds to a falling stock but the continuous rise of price in 2007-08 does not correspond to a falling stock which rises instead. The explanation is to be found in the combined influence of the Congress mandate to incorporate an increasing share of ethanol in petroleum and of the strong signal thus given to speculators that, as long as the oil price will rise, the ethanol price will follow suit and hence the maize price. The sharp price fall in 2008-09 and 2009-10 can be explained again for one part by the slight rise in stocks but more by the reversal from bull to bear of the excessive speculation of 2007-08. On the other hand the collapse in stocks of 2010-11 and 2011-12, reinforced by a higher level of maize processed into ethanol, has fueled a large surge of prices.

The table 5 and the corresponding graph compare the evolution of the global ending stock of maize with the world price – which is in fact the US FOB Gulf price, itself derived from the Chicago price plus transports costs up to FOB – and also with the increasing share of US maize going to ethanol. The same evolutions and explanations can be observed as in the case of US stocks with Chicago prices. The only difference appears in 2011-12 when the price continues to rise along with the global stock, but the price rise can be explained first by the very large amount of maize going to ethanol.

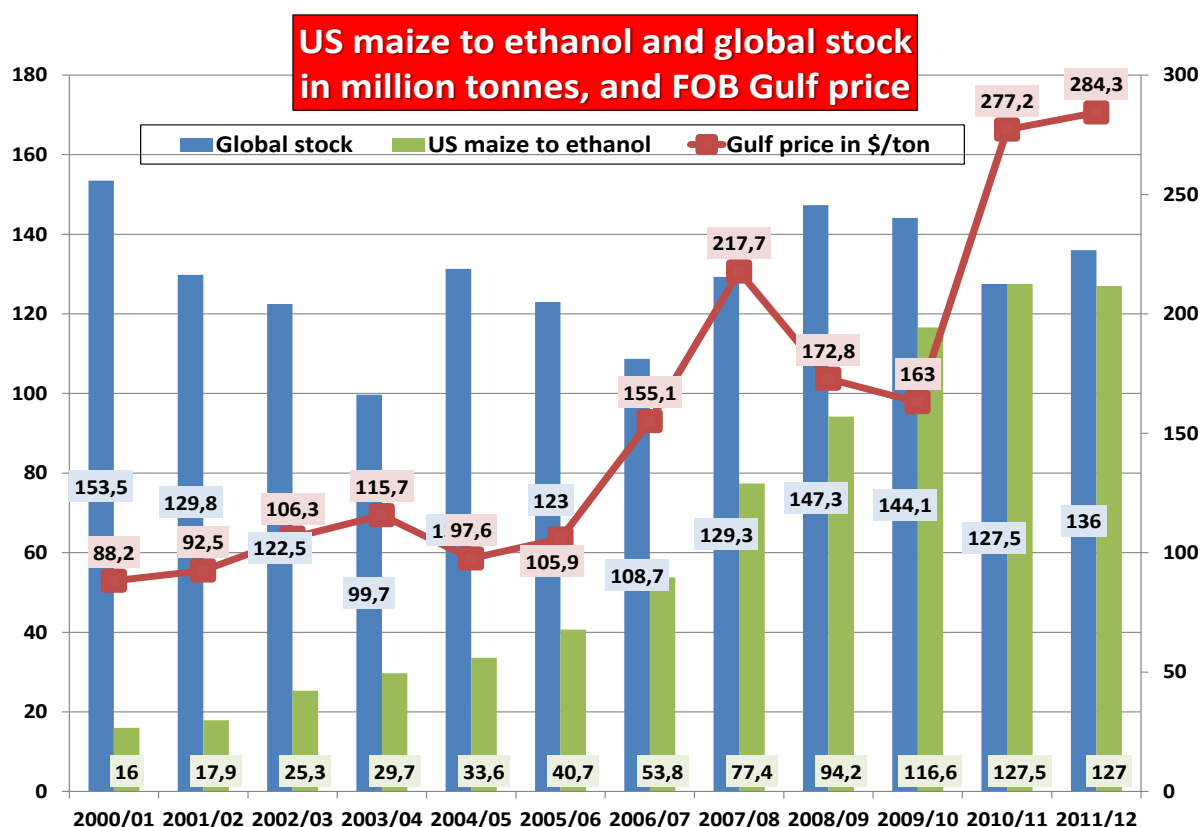


Table 5 – US maize to ethanol, global stock and FOB Gulf price: 2000/01 to 2011/12

Million tonnes	2000 /01	2001 /02	2002 /03	2003 /04	2004 /05	2005 /06	2006 /07	2007 /08	2008 /09	2009 /10	2010 /11	2011 /12
Global production	587.3	599.4	601.1	623	712.8	696.4	712.5	791.9	797.8	813.4	830.8	876.8
Global stock	153.5	129.8	122.5	99.7	131.3	123	108.7	129.3	147.3	144.1	127.5	136
US maize to ethanol	16	17.9	25.3	29.7	33.6	40.7	53.8	77.4	94.2	116.6	127.5	127
Gulf price in \$/tonne	88.2	92.5	106.3	115.7	97.6	105.9	155.1	217.7	172.8	163	277.2	284.3

Source: USDA

3) A US econometric study confirms the main responsibility of corn ethanol in the explosion of cereals prices, base of the amplification by financial speculation

The best is to quote large extracts of this rigorous study of September 2011:

"In 2007 and early 2008 the prices of grain, including wheat, corn and rice, rose by over 100%, then fell back to prior levels by late 2008. A similar rapid increase occurred again in the fall of 2010. These dramatic price changes have resulted in severe impacts on vulnerable populations worldwide and prompted analyses of their causes. Among the causes discussed are (a) weather, particularly droughts in Australia, (b) increasing demand for meat in the developing world, especially in China and India, (c) biofuels, especially corn ethanol in the US and biodiesel in Europe, (d) speculation by investors seeking financial gain on the commodities markets, (e) currency exchange rates, and (f) linkage between oil and food prices. Many conceptual characterizations and qualitative discussions of the causes suggest that multiple factors are important. However, quantitative analysis is necessary to determine which factors are actually important and which are not. While various efforts have been made, no analysis thus far has provided a direct description of the price dynamics. Here we provide a quantitative model of price dynamics demonstrating that only two factors are central: speculators and corn ethanol. We introduce and analyze a model of financial speculator price dynamics describing speculative bubbles and crashes. We further show that the increase in corn to ethanol conversion can account for the underlying price trends when we exclude speculative bubbles. A model combining both the shock due to increasing ethanol conversion and speculators quantitatively matches food price dynamics. Our results imply that changes in regulations of commodity markets that eliminated restrictions on investments, and government support for ethanol production, have played a direct role in global food price increases"¹.

And the conclusion is even more explicit: "A parsimonious explanation that accounts for food price change dynamics over the past seven years can be based upon only two factors: speculation and corn to ethanol conversion. We can attribute the sharp peaks in 2007/2008 and 2010/2011 to speculation, and the underlying upward trend to biofuels. The impact of changes in all other factors is small enough to be neglected in comparison to these effects... Thus, a very strong social and political effort is necessary to counter the deregulation of commodities and reverse the growth of ethanol production. A concern for the distress of vulnerable populations around the world requires actions either of policymakers or directly of the public and other social and economic institutions".

¹ Marco Lagi, Yavni Bar-Yam, Karla Z. Bertrand and Yaneer Bar-Yam, *The Food Crises: A quantitative model of food prices including speculators and ethanol conversion*, New England Complex Systems Institute, Cambridge, Massachusetts, USA, September 21, 2011, http://necsi.edu/research/social/food_prices.pdf