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Data at our fingertips, myths in our minds: recent grain price jumps as the 'perfect storm'

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The onset of the grain price spikes in late 2007 heralded a heated discussion among economists and policy makers on the source of the problem and appropriate policy responses. The subsequent rounds of price surges hit landless poor consumers hard, and transferred billions of dollars from them to landowners worldwide. Economists offered a list of highly plausible explanations for the recent jumps in grain price levels. Key findings included the large harvest shortfalls caused by climate change, energy prices, and fertilizer prices, as well as demand increases due to the large and persistent annual income increases in India and China. Several declared various combinations of the above factors to be a 'perfect storm' in grain markets. In fact little more than a quick series of online searches easily reveals that only the last is plausible as a major cause of recent grain price jumps. In particular there was no major global grain production shortfall. On the other hand biofuels mandates, relatively neglected in many studies, introduced a new source of grain demand that tightened markets and drove up prices. The disconnect between economic analysis and easily verified facts is a disturbing feature of recent economic analyses of grain markets.

Key words: biofuels, commodity prices, grain markets, price analysis, information, storage.

1. Introduction

This short paper addresses tensions between assumptions we maintain about key empirical facts and observable states of the world. It draws on examples related to the controversy over recent grain price jumps.

The onset of the steep rises in grain prices in late 2007 initiated a heated and confused discussion among economists and policymakers on the source of the problem and appropriate policy responses. The crisis was framed by key policy analysts as akin to a natural disaster, with causes beyond the reach of public policy in the West. These included droughts, climate change, petroleum price rises, jumps in input costs including energy costs, and increased meat consumption in China and India. Discussions of policy responses have been dominated by advocacy of safety nets for the vulnerable and increased funding for research and development, along with critiques of mitigation efforts by

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developing countries including grain export bans and removal of grain import restrictions.

This framing of the problem as a 'perfect storm' (Sheeran 2008) placed it beyond the responsibility of Western environmental and energy policies. In particular, it allowed politicians to avoid confronting the central role of biofuels mandates and fuel blending restrictions in the United States and Europe as key drivers of the crisis.[1] The issue is of far more than academic interest. While biofuels policies proceeded as planned, successive rounds of price surges hit landless poor consumers hard and transferred billions of dollars from them to nonsubsistence landowners and other input providers worldwide (Wright 2014).

Controversy and confusion on the causes of recent grain market volatility might seem natural, given that the dynamics of grain prices are inherently difficult to model. While many (but not all) participants in the debate seem to have at least a tenuous grasp of the basic supply–demand model presented by Marshall, the complications induced by storage and speculation remain a challenge to both theoretical and empirical analysis even now.

Fortunately, most of the disagreements about the causes of the recent crises in grain markets do not hinge on obscure issues regarding the dynamics of stochastic markets. Rather, they reflect differences in assumptions about variables seen as exogenous drivers of volatility in grain prices. Prior to considering the implications of dynamic stochastic market models about which experts continue to dispute,[2] we can make substantial progress by asking whether the assumptions about key exogenous 'drivers' of these markets are in fact verifiable. Examining statements and beliefs about drivers of volatility that are exogenous to partial equilibrium models of the agricultural sector, I focus on what they reveal about how we all can hold opinions about the state of the world that are clearly at odds with data that are easily accessible to researchers.[3]

It is understandable that we all tend to accept stylised facts about the global economy that are consistent with other widely discussed developments important to pressing global issues. They are easy to grasp and often intuitively appealing. They might also seem all the more credible because, thanks to the development of the information economy, they are easily verifiable. When a few minutes on Google could falsify any claim sharply at variance with reality, we naturally have greater confidence than ever in the veracity of basic facts identified by prominent participants in the debate,

[1] For discussion of the role of biofuels see Wright (2014). Early papers by Runge and Senauer (2008) and Mitchell (2008) emphasizing the role of biofuels tended to be neglected or marginalized in the subsequent literature on the topic.

[2] For a discussion that discusses recent grain market dynamics in this context, see Wright (2014).

[3] In a previous draft, referees asked for more citations to justify my claims about the prevalence of the beliefs I discuss below. I have provided some, reluctantly, including several excellent papers. My focus is not on a critique of the papers of colleagues I admire, but instead on the relation between perception and reality in the current 'information age.'

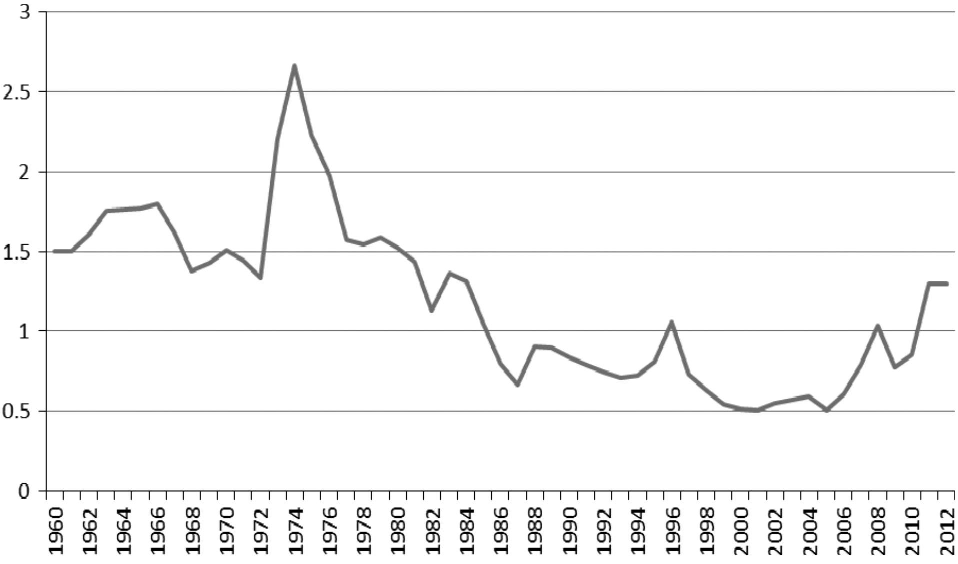

Figure 1 Real price for Maize (1960–2013). Source: Nominal price is obtained from the World Bank pink sheet. Deflator is US CPI, US city average, all items, 1982–1984 = 100, from the United States Bureau of Labor Statistics.

including agricultural and applied economists. Surprisingly, this confidence is misplaced.

Let us consider some widely held beliefs in turn.

2. Real grain prices in 2008 reached levels not seen since for at least a quarter century

In the early years of the recent grain price crises, audiences of professionals (for example, World Bank staff[4]) working in areas related to commodity markets appeared to agree that it was necessary to go back to the 1970s or at least the early 1980s to see real prices of the major grains as high as in 2008. Yet in maize, for example, a similar annual price level was seen as recently as 1996, as is clear in Figure 1, prepared using data readily available from the United States Department of Agriculture website.

To be fair, although the information presented here was easily accessible, several other sources could have generated different answers. One source of confusion (at least for me) was that, around 2008, the food 'price index' issued by the United Nations Food and Agriculture Organization (FAO) was presented in such a way that it was easy to overlook the fact that it was

[4] At a World Bank DEC seminar on October 26, 2009, I extemporaneously asked the audience when was the last time real grain prices had been as high as in 2008. I later asked a similar question in a meeting of the World Bank Executive Committee on May 13, 2011; see http://siteresources.worldbank.org/DEC/Resources/84797-1298663992214/7759647-1298919834173/Brian_Wright_Presentation.pdf

nominal, not deflated. A second source of confusion is that two deflators of grain prices are commonly used, the United States Consumer Price Index (CPI) and the Manufactures Unit Value Index (MUV). Until 1995, they moved more or less together, but subsequently they began to diverge widely. Deflation by the CPI renders the 2008/09 prices lower than 1996 prices, while use of the MUV deflator (which eliminates the direct effect of United States dollar depreciation) makes the 2008/09 grain prices much higher than 1996 prices. Nevertheless, it would be interesting to know why the 1996 price spikes were not more broadly recalled, little more than a decade later.

Had the 1996 spikes in grain prices been common knowledge, the idea that energy prices determine grain prices might have been less influential in recent years. There was only a modest change in energy price in 1996, as shown below.

3. Recent harvest shortfalls are important drivers of grain price spikes

This belief actually rests on two assumptions: first, there were significant and unusual harvest shortfalls beginning around 2007/08. Second, such shortfalls drive grain spikes.

Recent droughts such as the prolonged Australian drought figure prominently in discussions of the 2007/08 grain price spikes.[5] But were there aggregate shortfalls in calories produced from the major grains around 2007? To address this question, consider the graphs shown in Figure 2. The left vertical axis measures the percentage difference between the calories from the major grains from the current global harvest and the previous harvest.

It is clear that downside moves in the production of global calories from major grains – due mainly to yield drops (complemented in some cases by mandated area reductions) – are centred in the middle years in this sample, from the mid-1970s through the mid-1990s. More recently, we have seen significant upside aggregate harvest deviations (on average faster growth), but negligible production drops until 2012.

The price change graph (right axis) reveals the early 1970s was a time of huge price spikes. But it was not a time of exceptional yield shortfalls. Although many mention the Australian drought and its effect on the wheat harvest as a catalyst of the price spikes of 2007/08,[6] the quantitative effect is not prominent in aggregate wheat production. In the one and a half decades between 1996 and the 2012 drought in the American midwest, there were no major global yield drops in any of the three major grains.[7]

Second, are harvest shortfalls sufficient to cause price spikes? The right axis in Figure 2 measures the annual change in deflated price of calories. There is obviously no clear inverse relation between differences in aggregate produc-

[5] See, for example, Congressional Research Service (2008); Headey and Fan (2010), p. xiii.

[6] See, for example, Piesse and Thirtle (2009); and the highly informative paper of Mitchell (2008), p. 5.

[7] See Wright (2014), p. 89.

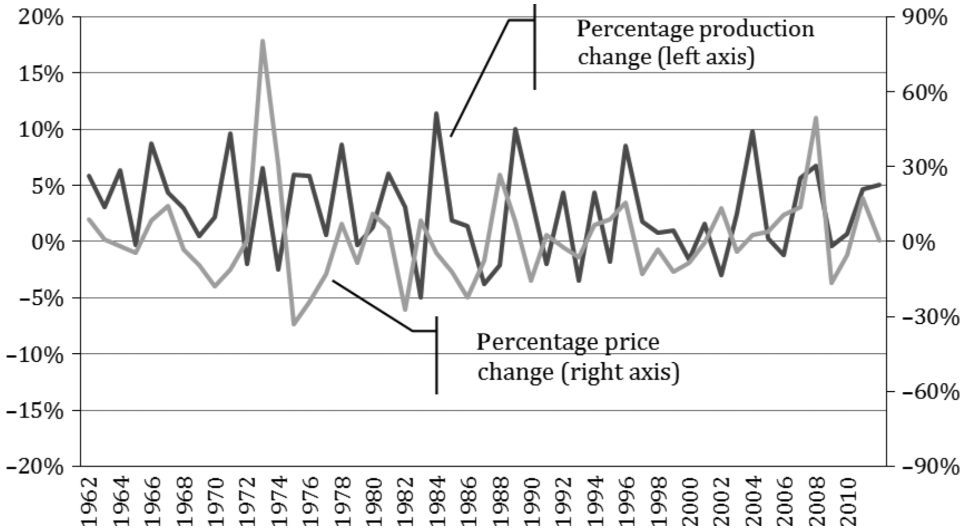

Figure 2 Difference from previous year in production and real prices of calories from the major grains. Note: Global aggregates exclude China due to data problems. Weights for converting the global calendar year production of corn, rice and wheat from the FAOSTAT database to calorie units are the calorie content data for these grains from the USDA National Nutrient Database. The world real prices of the three grains are from the World Bank 'pink sheets' deflated using the Manufactures Unit Value (MUV) index from the World Bank. The real price of calories from major grains is the total real value of calorie production divided by the calories produced. Source: USDA PSD online database.

tion and price of calories. Figure 3 complements this result by showing the detrended price (measures on the right axis) and detrended production of global calories from the major grains, wheat, rice and maize.

It is clear that price spikes are not generally associated with large production shortfalls. So, neither element of this second proposition holds up very well.

One might naturally suspect that this negative conclusion reflects trade barriers, transport costs and taste differences that effectively prevent the global price data from reflecting global supply fluctuations. But consider Figure 4, which presents detrended real calorie prices, measured on the right axis, and the ratio of global stocks to global consumption. Because its stocks data are problematic, I exclude China, a market with proportionally little trade with the rest of the world in these grains.

SUR is Stocks-to-Use Ratio excluding Chinese stocks and use. The stocks and consumption (use) data for corn, rice and wheat are from the PSD Online Database of the USDA. Construction of grain calorie consumption and stocks is analogous to the construction of calorie production described in the notes to Figure 3, which also describe construction of the index of detrended price of calories.

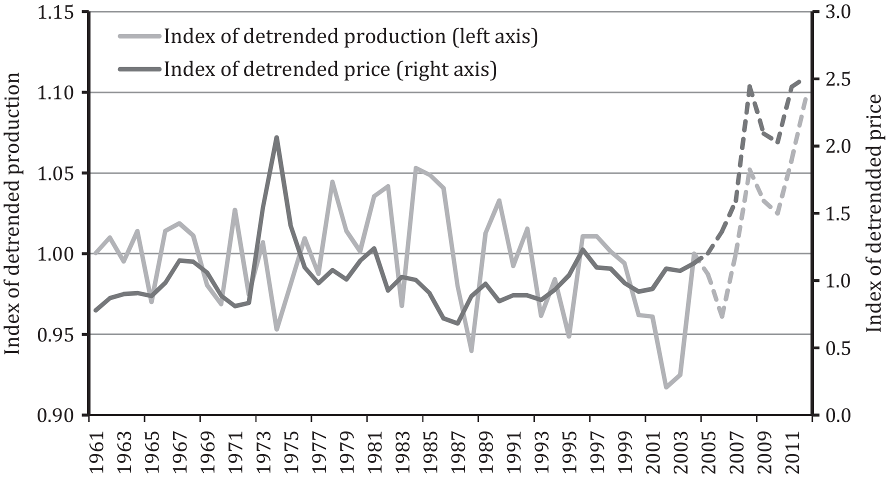

Figure 3 Calories: index of world detrended price vs. index of world detrended production. Note: Construction of aggregate calorie production and price is described in the note to Figure 2. The index of detrended price is the exponential of the residuals from regressing log real price against a constant and time through 2004. Global calorie production is assumed to be a linear function of time and a stationary shock. The index of detrended production is the result of removing the time trend.

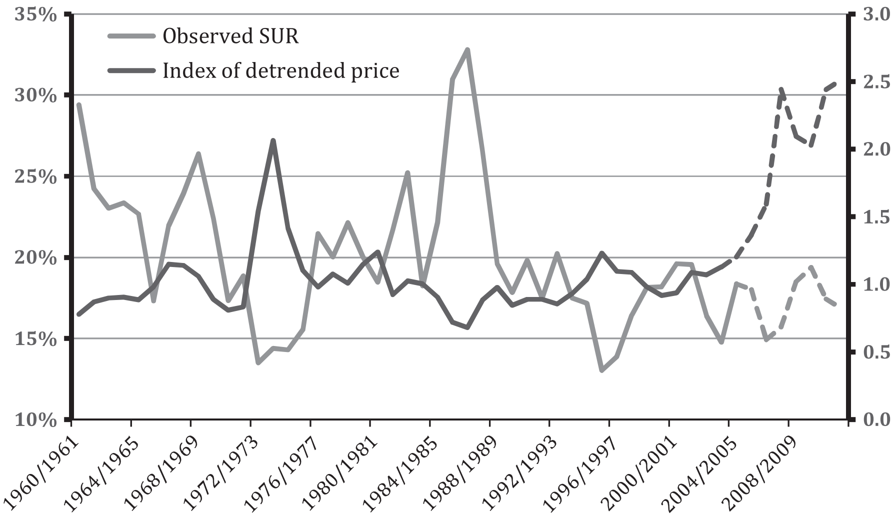

Figure 4 Index of detrended price versus observed stock-to-use ratio for calories.

The aggregate inverse relation is now quite clear, despite trade barriers and transport costs. Price spikes occur only when stocks are low.[8]

[8] The graph lines are dashed after 2005 to indicate that the relation is disrupted by the introduction of an announced schedule of mandates in the United States, and by similar policy changes in Europe. See Wright (2014), which also shows that similar conclusions hold when the production differences are reported separately for wheat, rice, and maize.

4. Recent price spikes have been caused by climate change

A succession of United Nations Intergovernmental Panel on Climate Change (IPCC) reports have stated with increased confidence that the effects of human-induced changes are now causing observable effects on climate. These render weather extremes, which have been mentioned with increasing frequency in the press, more credible as causes of greater grain price volatility. Indeed, a 2012 United Nations report on food-security and climate change states: 'Climate change is already affecting food security. … As its effects become more pronounced, climate change will make the challenge of achieving food security even harder' (HLPE 2012, p. 28). McCreary (2011) suggests that recent droughts in Australia and Western Canada were related to climate change. Whether either of the above reflected the influence of climate change is, in my view, impossible to know at this time. But as noted above, there was no sharp drop in the supply of grain calories when gain prices began to surge in 2007/08. Nor was there a crash in the supply of wheat.

More generally, the data in Figure 2 clearly do not support the notion that global grain yield shortfalls have recently been increasing in magnitude or frequency, whatever the cause. This is interesting, as there are at least three other plausible reasons to expect that vulnerability of individual crop plants to climatic variation should be increasing, even if climate was not undergoing secular change.

First is the fact that some types of stress on crop plants are increasing for crops in regions with significant shares of global grain supply. At the intensive margin, in crops where plant densities per hectare have increased, interplant competition for nutrients, water and sunlight is heightened. For example, United States maize plants are now growing at much higher densities per acre than in the 1930s; this is a major source of the yield increases observed since the advent of hybrid maize (Duvick 2005). Yet maize yields do not appear to have been increasing in volatility – indeed, the coefficient of variation of yield is, if anything, declining.

Second, at the extensive margin, planted acreage of grains has been expanding in less stable production areas (including importantly nations of the former Soviet Union), as well as sub-Saharan Africa. As planted area expands in these regions, it moves onto lands with above-average susceptibility to short-run climate variation. In the South American southern cone, where area expansion is achieved via double cropping involving soya beans, it seems natural to assume that the practice reduces the ability to adjust planting time to weather variation, and places plants in competition with the previous crop for nutrients and water.

A third plausible argument for increased vulnerability, sometimes heard from supporters of production using traditional landraces rather than improved varieties, is that breeding for high yield favours plants that have superior performance under optimal conditions, but are less tolerant of environmental variation. On the contrary, modern maize hybrids appear to be superior because they are bred to include disease resistance traits from multiple parental lines and to withstand the environmental stress associated with the crowding induced by high seeding rates. Those genetically modified for disease resistance might in fact be particularly adapted to withstand this and other types of stress. Moreover, it is well known that 'shuttle breeding' of wheat at the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico selects for adaptability to very different growing environments. Future new cultivars might exhibit a clear trade-off between stress tolerance and high yield under good conditions, but such a trade-off is not yet currently evident in aggregate grain production data.

5. Petroleum prices drive grain prices

Many market observers have confidently expressed this view, although it is not commonly advanced by agricultural economists without significant qualification. For those who infer causality from temporal orderings (as we all do frequently in daily life), recent evidence might be persuasive. As Figure 5 shows, petroleum prices started rising around 2003 at the latest, while grain calorie prices did not begin their recent surge until 2006 at the earliest. Note, however, that since 2007 the series seem to display roughly contemporaneous peaks and valleys, neither being a clear leader. Indeed, the main evidence of a strong link between the price of petroleum and grain calories is the sharp dip in the price of both in 2008. But this is not a causal link. Both dips are no doubt influenced by the financial crash of 2008, which

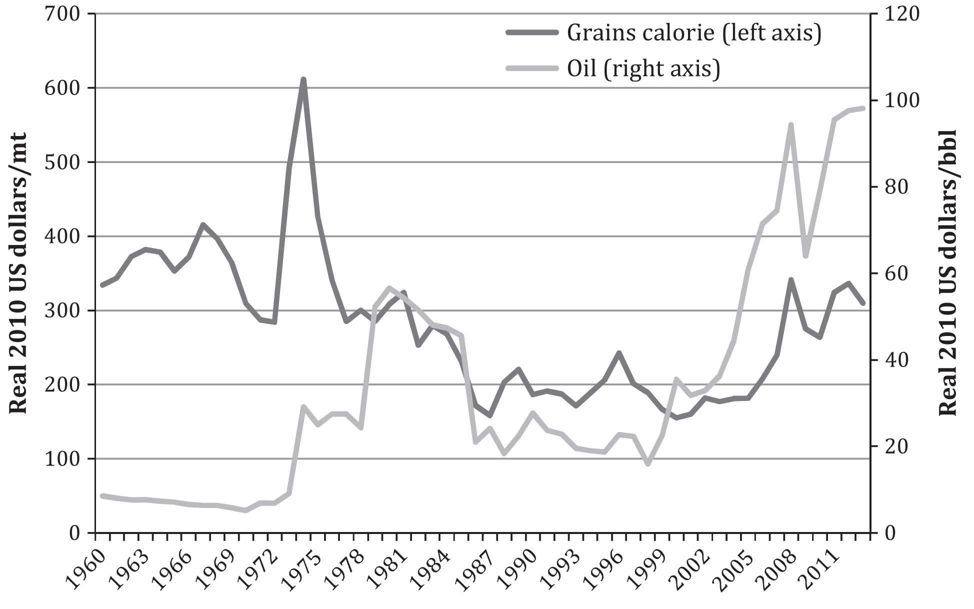

Figure 5 World grain calorie price vs. world oil price deflated using MUV. Source: World Bank commodity price data (pink sheet).

reduced demand for commodities in general, at least in part by reducing funds available for trade financing.

On the other hand, the temporal ordering of price changes was different in previous booms. Indeed, the 1970s oil spike began after the spike in grain prices was well under way, and another huge oil price surge starting in 1978 had no counterpart in the grain market. The sharp but forgotten spike in maize and wheat in 1996 was not matched by a similar movement in oil prices. When energy prices doubled after 1998, grain prices on average barely moved until 2006.

Some observers interpret the recent evidence as indicating that oil is driving grain prices through the ethanol market. As Timmer (2008 p.18) puts it, 'If high fuel prices are here to stay, high food prices are, too.' He might well be right, if governments permit continued expansion of use of grains for biofuels. But like many others, Timmer does not mention the fact that biofuels expansion depends on biofuels policy and the expansion of the supply of vehicles adapted to high ethanol blends and of fuelling stations offering these blends. This is an important qualification. For example, Abbott (Forthcoming) identifies two different market regimes. In his view, much of the time the ethanol price reflects the shadow price of capacity constraints, rather than the oil price.

6. Energy price rises are causing cost increases that cause grain price increases

Several studies have included higher energy costs as a key factor in recent grain crop price increases.[9] Elementary microeconomics reveals that this is implausible as the primary explanation of price increases. A cost increase can, of course, cause a price increase. If the rising supply curve shifts up as cost increases, this can increase price if demand is stationary. The price rises if the quantity produced and consumed decreases.[10]

There are two factual problems with respect to the relevance of this argument in the United States context. Relative to 2005, the index of US farm prices received to input prices paid was higher every year through 2012 (Zulauf and Rettig 2013a, Figure 3), as was net cash farm income as shown in Figure 6. Not surprisingly, between 2004 and 2012, United States farm values also increased, by about \$0.81 trillion.[11] Second, aggregate quantity produced (for all uses combined) also increased relative to 2005.

On the other hand, energy costs possibly had a subtler secondary role. They might have increased the extent of the rise in grain prices caused by demand shifts, by reducing the rate of the expansion of inputs and hence the rate of increase in grain supplies.

[9] See, for example, United States Government, Government Accountability Office (2009), pp. 5–6 and p. 43, and Baffes and Dennis (2013), p.10.

[10] Some observers have concluded that the higher land rents are also driving up prices. This mistake reflects a failure of elementary economic reasoning, not observation.

[11] For calculations on this see Wright (2014).

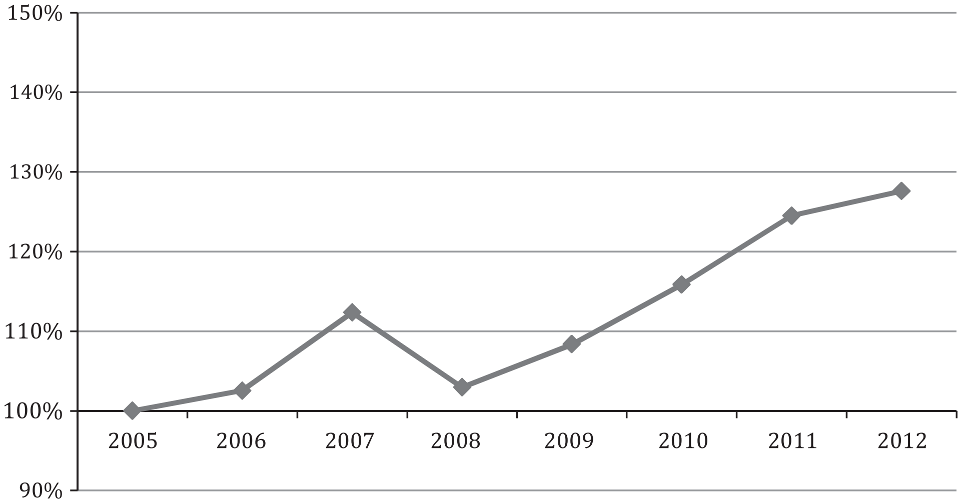

Figure 6 Net United States cash farm income 2005–2012. Source: Zulauf and Rettig 2013b, updated, based on USDA data, and using GDP deflator.

7. Price spikes in grains are a consequence of growth of the middle-class in certain economies, in particular China and India, where consumption has increased directly, or via increased feed use for beef and chicken production

One reason we all continue to believe plausible claims that fly in the face of available data is that the assumed facts behind our beliefs are sometimes subsequently vindicated. Occasionally, indirect information plus a little theory can make a claim about the causes of price movements seem so obvious that it is widely accepted without, or indeed in opposition to, direct empirical evidence. Thus, the proposition that growing middle-class incomes in middle-class consumption in India and China have caused grain price jumps has attracted widespread support in commentary on the food price surges.[12] Paul Krugman (2008) referred to the 'march of the meat-eating Chinese – that is, the growing number of people in emerging economies who are, for the first time, rich enough to start eating like Westerners. As it takes about 700 calories' worth of animal feed to produce a 100-calorie piece of beef, this change in diet increases the overall demand for grains.' It is well known that China and India have had rapid and sustained income growth of around 10 and 9 per cent per year, respectively, between 2003 and 2008. It is also widely understood that the income elasticity of demand for meat tends to be quite large until individuals reach a middle income level. So, the claim seems plausible, perhaps self-evident.

Such facts as economists were able to uncover about this issue painted a very different picture. Data presented by Baffes and Haniotis (2010, p. 22) show per capita levels of beef and pork consumption growth slowing in India

[12] See for example HLPE (2011) p.31.

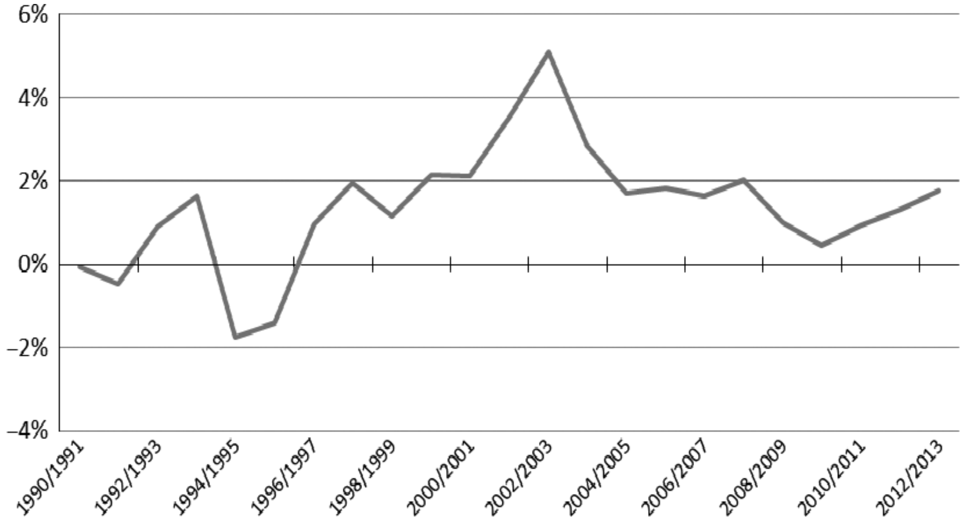

Figure 7 Ratio of calorie net export from China and India to world total calorie consumption. Notes: Trade and consumption data are from the PSD Online of the USDA. Weight units are converted to calorie content using the conversion from the National Nutrition Database of the USDA.

and China in 2003–2008 relative to the previous half decade, although income growth accelerated to unprecedented sustained rates in both countries. Chicken consumption accelerated in India, but its base is so small that grain demand shifts due to recent changes in Indian meat consumption could not be of great significance for the global market.

Indeed, we have strong evidence that India's and China's meat demands are not directly causing global grain price increases. Figure 7 shows net exports of grain calories from India and China as a per cent of world consumption.

Net exports have been positive since 1994/5, and their net imports have never been even 2 per cent of world consumption in the years since 1990. China, in particular, has been close to a cereal autarky. On the basis of such empirical evidence, I among others have been skeptical of Chinese and Indian meat demand increases as drivers of global grain prices.[13] In the case of India, the case is fairly clear. Indian meat consumption even now is too small to figure significantly in a global price-disrupting demand shock.

The evidence, however, raises a further puzzle with respect to China. Soya exports to China have been growing fast.[14] China apparently decided at the turn of the century to be approximately self-sufficient in the major staple grains – rice and wheat – and to import significant amounts of soya beans and maize, if needed.

[13] See Wright (2012), p. 7.
[14] See Abbott *et al.* (2011), p. iii.

On the other hand, modernisation of the livestock sector in China must surely be increasing average feed conversion efficiency by better genetics and better production methods. If meat consumption growth per capita is slowing, feed conversion rates for meat production are rising, and population growth is not accelerating, then why have Chinese soya imports increased so fast over the recent decade or so?

On a recent visit to China I found my confusion to be well justified. Meat consumed away from home is not counted in the surveys that form the basis of official meat consumption data. The missing meat includes fast-rising restaurant meat consumption and meals eaten by students and employees away from home. On the other hand, informed sources believe that production of pork, the main meat in the Chinese diet, has been significantly over-estimated. It seems that Chinese meat consumption is rising faster than previous reports indicate, but from a lower base.[15] The surge in China's soya imports appears to be driven by an officially undocumented surge in meat consumption per capita. It is reducing land available for expansion of major grains production outside China and contributing to the pressure on grain prices. It now seems to be true that Abbott *et al.* 2008, Krugman, 2008, and others were right to suspect that fast rising incomes were significantly raising meat consumption per capita in China, at although we do not yet have the evidence needed to settle the issue.

But were increased Chinese soya bean imports causing a jump in grains prices? A further confusing piece of the continuing empirical puzzle is that palm oil production, a substitute for soya oil, has also been growing rapidly on land generally not competing with the major grains. (Unfortunately, this land includes former tropical forests that release large stocks of carbon to the atmosphere on conversion to palm oil plantations). As Figure 8 shows, since 2003, the global increase in palm oil production has closely paralleled the net increase in calorie imports by China. Although a full consideration of the oilseed and palm oil sector is beyond the scope of this analysis, it appears that, as noted earlier by Abbott *et al.* (2011), the large increase in soya bean imports by China is an important force increasing demands directly for oilseeds and, through substitution in inputs and output markets, indirectly for grains. The net effect, however, taking account of palm oil production, is likely to be far from sufficient to explain the post-2007 surge.

8. The 2007/08 food crisis was a 'perfect storm' in grain markets

This claim was prevalent in early retrospectives on the price jumps of 2007/08 from the World Food Program (Sheeran 2008), the International Food Policy Research Institute (Headey and Fan 2008, 2010), and the World Bank (Baffes and Haniotis 2010). The analogy is to the huge extratropical low across the

[15] See Qiu and van Veen (2014).

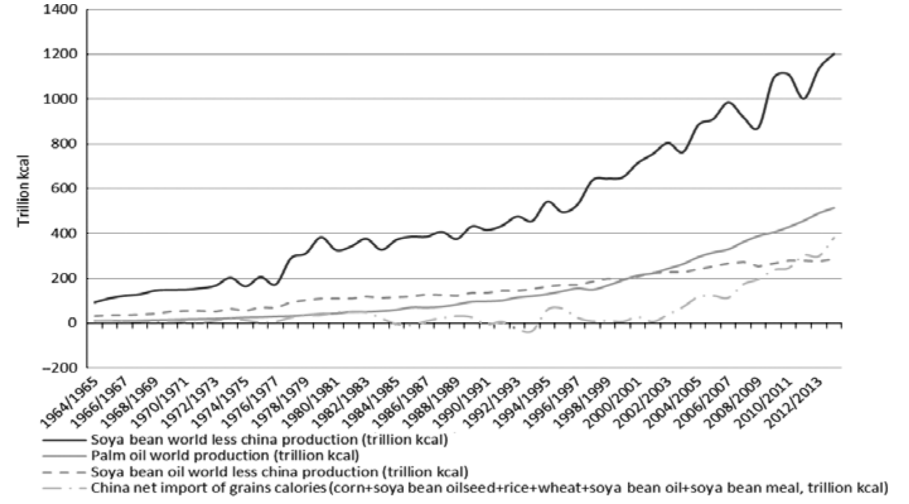

Figure 8 Calories from soya beans and palm oil production, and from Chinese net grain imports. Notes: Production and trade data from PSD Online of the USDA, with calorie conversion using USDA National Nutrient Database. China net import of grains calories includes calories from soya beans.

Eastern Atlantic Seaboard on October 30, 1991, labelled a 'perfect storm' by the National Weather Service.[16]

The analogy is inappropriate for two reasons. First, even if considered as analogous to a confluence of atmospheric phenomena clearly beyond human control,[17] the events of 2007/08 were far from equivalent to the effects of a 'perfect storm.' As emphasised above, there was not even an aggregate drop in international grain supplies in those years.

Second, grain market disruptions in 2007/08 were hardly exogenous 'Acts of God.' Nevertheless, many observers appear to treat them as if they were exogenous to the policy process. Consider, for example, successive assessments from the International Food Policy Research Institute, the leading international institution responsible for food policy.

In testimony to the United States Senate Committee on Energy and Natural Resources, Director-General von Braun (2008, p. 1) stated cogently, 'Biofuel production has … introduced new food-security risks and new challenges for the poor, particularly when resource constraints have lead to trade-offs between food and biofuel production and rising food prices.' An IFPRI model indicated that 'the increase in crop prices resulting from expanded biofuel production is also accompanied by a net decrease in availability and access to food. Calorie consumption is estimated to decrease across regions under all scenarios' (von

[16] See http://www.ncdc.noaa.gov/img/satellite/satelliteseye/cyclones/pfctstorm91/Halstmpk.gif [accessed 7 February 2014].

[17] Yet perhaps even this so-called 'Act of God' can be partially attributed to human error: the loss of the crew of the sword fishing vessel, the *Andrea Gail,* chronicled in a best-selling novel by Sebastian Junger (2000), reportedly could perhaps have been avoided, had the 406-megahertz Emergency Position-Indicating Radio Beacon been switched on.

Braun 2008, pp. 5–6). He offered specific policy advice: accelerate agricultural productivity, increase efficiency of biofuels trading and develop social protections for the poor including employment programmes, school feeding and food for schooling programmes, conditional and unconditional cash transfer programmes and social security systems for the poorest. But not a word was uttered, in testimony to the United States Senate committee responsible for energy and natural resources, about adjustments of United States biofuels mandates or fuels blending rules.

A subsequent assessment co-authored by the Institute's next Director-General similarly viewed food diversion to biofuels as a problem beyond the reach of policy that could only be ameliorated by technology or investment:

> In the foreseeable future, biofuels production does not look good for global food security, unless ways can be found to minimise the diversion from food production or involve poor farmers in biofuels production. But technologies and investments that would achieve these outcomes seem a long way off.[18]

Thus, IFPRI's leadership fully acknowledged the effects of the increase in biofuels production on the poor, but treated it like an 'act of God,' beyond the reach of policy advice and subject only to longer run mitigation of its worst effects.[19] Government mandates greatly expanded installed capacity for biofuels production, and approval of higher biofuels blends in transport fuels was a necessary enabling measure, even if biofuels investments and production would have been economical at existing oil prices. If, as in China, governments in Europe and the United States had called a halt to policies mandating or encouraging expansion of use of food and feedgrains and oilseeds in biofuels, there would have been no price spikes like those observed in the world outside China since 2007.

Inappropriate use of the term 'perfect storm' is no semantic quibble. Institutions responsible for food policy and food security should be realistic in construing worst-case scenarios and avoid framing them in a fashion that rules out direct and effective policy options. It was a serious mistake to conceive of biofuels expansion in 2007/08 as a truly exogenous 'act of God' such as the

[18] Headey and Fan (2010, p. 97). It is not explained exactly why involving poor farmers in biofuels production would solve the problem of food diversion to biofuels (to which substance farmers are little exposed). Later statements from IFPRI have been more specific regarding the importance of reducing biofuels mandates to control grain prices in the face of a serious United States drought.

[19] Export bans were also policy choices. Given the circumstance of an international coordination failure (Martin and Anderson 2012), they were neither clearly irrational nor against the interests of the most vulnerable citizens, as Gouel (2013) has clearly established. Yet many developed country trade economists who urge that export controls be banned under WTO rules are mute regarding biofuels policy as trade-distorting price discrimination, reducing supply on the market with price inelastic demand (food), and diverting supplies to a market with elastic demand (transport fuels).

eruption of Mount Tambora in Indonesia in 1815. That eruption spewed a huge dust veil that obscured global temperatures by 0.4 to 0.7 degrees Celsius in the 'winter without sun' of 1816, leading to catastrophic disruptions of grain production in Europe, China and the United States (Stothers 1984).

9. Concluding comments

The recent grain price crisis was framed in policy discussions as a 'perfect storm' beyond the reach of immediate Western policy response. This allowed policymakers in the West to largely avoid confronting the key role of their own biofuels policies in generating and sustaining the crisis.

The principal figures in the standard crisis narrative included droughts, climate change, petroleum price jumps and surges in the incomes of meat eaters in China and India. But (with the possible partial exception of Chinese meat demand) these factors can be ruled out by reference to easily accessible facts. Why this disconnect between available facts and the information in our heads that informs our judgment and actions?

For agricultural economists, adoption of the perfect storm narrative restricted the space of policy responses to measures of mitigation, minimising the role of the biofuels policies favoured by key supporters of land grant universities, relevant agricultural policy research institutions and academic consultants. But how could such an inappropriate analogy be so convincing, not only to other applied economists, but also to the interested public?

The answer might reflect a paradox peculiar to the so-called 'Information Age.' Access to salient data has become so easy, economical and instantaneously retrievable that we leave that information in our databases and computers; no longer do we see a need to commit them to memory. But when the information is not already in our heads, sound bites, slogans and propaganda inconsistent with reality might well more persuasive. After all, if the key facts are so easy to access, any errors would surely be checked and corrected by others. Or would they?

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