

# Did the Fertilizer Cartel Cause the Food Crisis?

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*Food prices escalated during the 2007/2008-food crisis and have remained at historically high levels since. We show that an international export cartel for fertilizers was an important driver of the crisis, explaining up to 60% of the price increase. While biofuel subsidies, high energy prices and financial speculation doubtlessly put stress on food markets, our findings suggest new avenues for policy in the fertilizer market to stabilize food markets.*

Food prices rose, on average, by 45% from 2007 to 2008, leading to food insecurity and instability in the developing world (Timmer, 2010), where households spend roughly half their income on food (Mitchell, 2008). Finding ways to improve food security is thus an important challenge for policy and research alike (see Grote, 2014 for a survey).

In a recent [working paper](#) (Gnutzmann and Spiewanowski, 2014), we show that the formation of an international export cartel for fertilizer played an important role in the crisis. Fertilizer costs loom large in industrial agriculture. Since the cartel was able to exert significant pricing power on fertilizer, its formation explains a considerable share of the crisis food-price increase. Indeed, our time series model can attribute around 60% of the 2007/2008-food price increase to the fertilizer cartel.

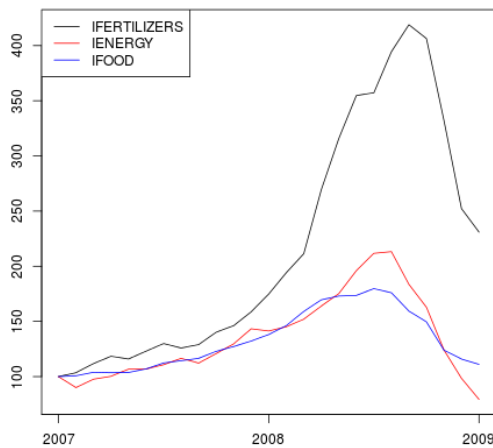
Lack of competition in the fertilizer industry is based on heavy concentration of the essential mined inputs - potassium and phosphorus - where reserves are being exploited only in a few countries and by a few firms. Together

with the high investment required in mining operations, and the presence of the export associations PhosChem and Canpotex, the fertilizer industry provides favorable conditions for collusion; indeed, cartel episodes have been documented since the late 19th century (see Taylor and Moss 2013 for a detailed study of the industry). Since the producers of these inputs are central to their local economies – e.g. PotashCorp for the Saskatchewan region of Canada – or indeed leading national exporters, as in the case of the Belarusian Potash Corporation, they are politically entrenched and backed by legal or de facto exemptions from usual antitrust enforcement.

Given the complexity of global commodity markets, many potential causes of the crisis come to mind. On the food demand side, the rollout of biofuel subsidies probably had an important impact on the market (Wright, 2011). Moreover, supply shocks – such as high energy prices (Harri et al., 2009) and trade shocks (Headley, 2011) – may have played a role. While much uncertainty remains about these factors (cf. Headley and Fan 2010 for a

broad survey), the literature has not acknowledged the importance of fertilizer. According to our econometric findings, discussed in the following section, this is an important omission.

*Figure 1: Food, Energy and Fertilizer Prices During the Crisis*



*Source:* own calculations based on data in Gnutzmann and Spiewanowski (2014)

## Why Fertilizer Matters

In our paper, we estimate a long-run cost function for agricultural production. The particular goal of our model is to isolate the cost contributions of fertilizer and energy respectively, using annual price indices provided by the World Bank's *Global Economic Monitor*. Following the literature, standard controls for time trends and manufacturing cost inflation are included in the model. The structure of the model allows us to estimate cost shares of the individual production factors from the available price data.

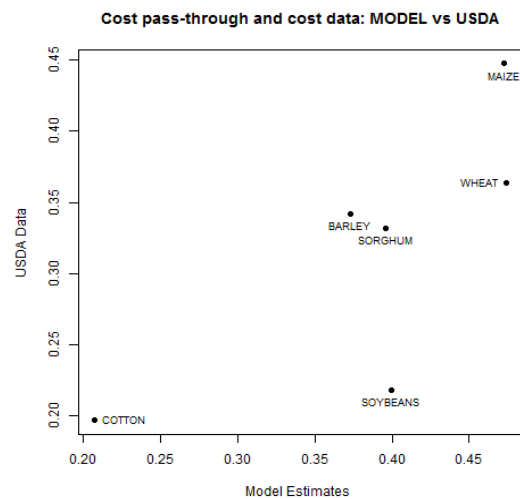
The central result of this exercise is that fertilizer accounts for a 42% cost share in the World Bank's general food price index. Moreover, after controlling for fertilizer

prices, energy prices enter with only a 4.7% cost share – qualitatively small and statistically insignificant.

Turning to key individual agricultural commodities, we find fertilizer cost shares to range from 20% for cotton, to 47% for maize and wheat. Thus, while the degree of fertilizer dependence varies across commodities, its importance looms large across the range of commodities.

Our econometric cost share estimates are consistent with farm survey data. In fact, as Figure 2 illustrates, our cost shares closely match those indicated in the US Department of Agriculture (USDA 2014) operating cost survey. Since the methodologies are so different, the close agreement of the results gives us confidence in our model.

*Figure 2: Fertilizer Cost Shares: Model and Farm Survey Compared*



*Source:* Based on Gnutzmann and Spiewanowski (2014)

## Role of the Fertilizer Cartel

Having established the role of fertilizer in food production, we are naturally interested in getting an estimate of the “pure” cartel effect on prices. Taylor and Moss (2013) conduct a

detailed micro-level study to identify different competitive periods in the fertilizer industry; they conclude that the cartel exercised market power in the 2008-2012 period. Hence, we consider these years to be the collusive period in our sample.

Isolating the cartel impact on prices is complicated by the fact that the food crisis period coincided with high energy prices, which – given the energy-intensive nature of fertilizer production – should have a direct impact on fertilizer cost. Thus, we estimate a cost function for fertilizer, with energy prices as an input factor and the usual controls. Moreover, we incorporate a dummy variable for the cartel period based on the dates provided by Taylor and Moss (2013).

We find that the cartel was able to impose an average price overcharge of 63% in the years 2008-2012. Again, this estimate is very large in practical terms and statistically highly significant. Interestingly, such overcharges are not untypical for export cartels: in a meta-study of cartel overcharges, Connor and Bolotova (2006, table 3) report an average overcharge of 54.2% for successful international cartels.

Combining these estimates with our earlier results allows us to get some first-pass results on the contribution of the fertilizer cartel to the food crisis. Given the cost share of fertilizers in food, a 63% fertilizer price increase is predicted to lead to a 26% food price increase. Given the observed price increase of 40%, the cartel contribution to the price increase is thus indicated as 65%. At a minimum, these results make a strong case for further research into the role of the fertilizer cartel in the food crisis.

## Understanding High Food Prices

High energy prices are often cited as an important factor behind the food crisis (e.g.

Harri et al. 2009), and earlier studies have found high energy cost-passthrough on food (Baffes 2010). While we can reproduce these earlier results when excluding fertilizer, the direct impact of energy on food effectively disappears in our preferred model.

This seems to indicate that earlier studies may suffer from omitted variable bias, and have picked up an indirect effect of energy prices – through generally higher manufacturing costs and fertilizer prices. In line with this, the USDA farm survey indicate 9-12% energy cost share – comparable to the energy share in US GDP, for example. Moreover, as in Zhang et al. (2010), we do not find evidence of co-integration between food and energy prices.

Food markets were subject to two structural changes in the last decade or so, whose importance for the food crisis will require more research. Firstly, the introduction of a biofuels mandate (Wright 2014) led to an expansion in grain demand; this may have had an important impact on the short-run food price dynamics. Second, financial speculation in commodity markets has been rapidly rising (Irwin and Sanders 2012), although the evidence on financialisation has been challenged (e.g., Steen and Gjolberg 2013). Since these factors are both new, their role is less amenable to the long-run research conducted in our working paper.

## Conclusion

High food prices are an important challenge for research and policy alike. In this brief, we have drawn attention to the role of collusion in the fertilizer industry, illustrating the potentially powerful role the cartel may have played in the crisis.

Export cartels are clearly difficult territory for competition policy – the fertilizer cartel enjoys a degree of state backing and is protected by explicit legal exemptions (Marqius 2014), but our findings suggest that policy measures to

tackle such cartels (Hoekman and Saggi 2007) may play an important role in mitigating or avoiding future crises.

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