Box 3. Which drivers matter most in food price movements?

The post-2004 commodity price boom took place during a period when many countries were experiencing strong economic growth. Growth in low- and middle-income countries averaged 6.2 percent during 2005-12, one of the highest eight-year averages in recent history. Yet, economic growth was only one among numerous causes of the commodity price boom. Fiscal expansion in many countries, along with low interest rates, created an environment favoring high commodity prices. A depreciating U.S. dollar also strengthened demand from (and limited supply to) non-US$ commodity consumers (and producers). Other factors include low investment in agriculture in the past, especially in extractive commodities (in turn a response to a prolonged period of low prices); capital markets activity by financial institutions including commodities in their portfolios; and geopolitical concerns, especially in energy markets. In the case of agricultural commodities, prices were affected by higher energy costs, increasingly frequent adverse weather conditions, and the diversion of some food commodities to the production of biofuels. These conditions led to global stock-to-use ratios of some agricultural commodities down to levels not seen since the early 1970s. Lastly, policy responses including export bans and prohibitive taxes to offset the impact of high world prices contributed to creating the conditions for what has been often called a "perfect storm" (box table 3.1).

Which drivers matters most for food commodity prices? A reduced-form econometric model applied to five food commodities (wheat, maize, rice, soybeans, and palm oil) using 1960-2012 data shows that crude oil price is the most important variable by far, explaining almost two-thirds of the post-2004 food price increases. Stocks-to-use (S/U) ratio is also important, accounting for about 15 percent, as is exchange rate, accounting for 10 percent. The remaining 15 percent reflects, among other drivers, policies (details can be found in Baffes and Dennis 2013).

As an example, consider wheat. Between 1997-2004 and 2005-12 (roughly, the pre-and post boom periods), wheat prices increased by 81 percent; the S/U ratio declined by 17 percent; oil prices increased 228 percent; and the U.S. dollar depreciated 12 percent against the SDR. The three significantly different from zero estimated elasticities were: -0.50 (S/U ratio), 0.28 (crude oil), and –0.86 (exchange rate). These elasticity estimates are consistent with the literature—see FAO (2008), Bobenrieth, Wright, and Zeng (2012) for the S/U ratio, Gardner (1981) and Gilbert (1989) for exchange rates, and Borensztein and Reinhart (1994) and Baffes (2007) for oil prices. When these elasticities are applied to changes in the respective drivers, they give an 83 percent increase of the price of wheat during these two periods [-0.50*(-17%) + 0.28*228% -0.86*(-11.8%) = 8.7% + 64.3% + 10.2% = 83.2%]. These changes imply an 11 percent contribution by the S/U ratio, 77 percent contribution by oil, and 12 percent by exchange rate movements. Using related methodology, von Witzke and Noleppa (2011) arrived at a remarkably similar conclusions. World Bank (2012) used similar methodology.

Box table 3.1 Most of the post-2004 "perfect storm" conditions are still in place

	1997-2004	2005-12	Change
Food price index (nominal, 2005 = 100)	**89**	**154**	**73%**
MACROECONOMIC DRIVERS			
GDP growth (middle income countries, % p.a.)	4.6	6.2	35%
Industrial production growth (middle income countries, % p.a.)	5.4	7.3	35%
Crude oil price (nominal, US$/barrel)	25	79	216%
Exchange rate (US$ against a broad index of currencies, 1997 = 100)	118	104	-12%
Interest rate (10-year US Treasury bill, %)	5.2	3.6	-31%
Funds invested in commodities (US$ billion)	57	230	304%
SECTORAL DRIVERS			
Stocks (total of maize, wheat, and rice, months of consumption)	3.5	2.5	-29%
Biofuel production (tousand b/d of crude oil equivalent)	231	892	286%
Fertilizer price index (nominal, 2005 = 100)	69	207	200%
Growth in yields (average of wheat, maize, and rice, % p.a.)	1.4	0.5	-64%
Yields (average of wheat, maize, and rice, tons/hectare)	3.7	4.0	8%
Natural disasters (droughts, floods, and extreme temperatures)	174	207	19%
Policies (Producer NPC for OECD countries, %)	1.3	1.1	-15%

Source: Barclays Capital, Center for Research for the Epidemiology of Disasters, Federal Reserve Bank of St. Louis, Organization of Economic Cooperation and Development, US Department of Agriculture, U.S. Treasury, World Bank, and author's calculations.
Note: 2012 data for some variables are preliminary.