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# Overview of the Literature on the Impact of Food Price Volatility

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**ABSTRACT.** Increased price volatility can increase investment risk and, at the same time, reduce investment. Food price volatility will have different effects on surplus and deficit households. Instead of investing, uncertainty in food prices can be a significant barrier for many deficit households to escape poverty. On the other hand, surplus households can save. Agricultural price shocks and volatility threaten the poorest people's access to food and economic welfare. The detrimental welfare impact on the consumers outweighs the gains to producers increasing the number of poor and in the depth of poverty. Decreased income in already low-income countries might result in malnutrition, death, and withdrawal of children from education. There is a substantial correlation between a country's food production index, poverty level, degree of urbanization and the risk that it will experience food riots, given the empirical evidence that shocks to agricultural prices can spark civil unrest and wars, as well as the devastating effects that civil wars and other forms of violence have on economic growth.

**Keywords:** Food price, empirical evidence, impact, volatility

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## INTRODUCTION

We sought to understand why food price volatility was the core of identifying the mechanisms of the real economy, particularly in developing countries. The main objective of this paper was to propose an analytical review of the academic literature on the consequences of food price volatility.

Even though price volatility and price shock are conceptually two separate concepts, it makes sense to examine their effects together. Knowledge of how individuals respond to a particular price shock might help one better comprehend the effects of price instability. Some high volatility episodes result from a series of price shocks.

Both the production and consuming sides of the economy affect price movements: Many farmers experience difficulties due to the risk associated with abrupt and unexpected price changes (volatility), as they are unable to predict their long-term revenue streams accurately. As a result, they limit their investment in productive capital, which is made worse by the fact that credit and insurance are frequently unavailable to them. The poorest people, for whom food costs make up a significant portion of their current budget and who frequently lack access to credit markets, are threatened by price shocks even when they are expected. The most common survival strategies used in emergencies were hiring women and children, stopping medical and educational services, and drastically reducing food intake. Economically speaking, price shocks frequently cause a halt to investments in human capital (Darpeix, 2019).

So, it makes sense to assume that fluctuations in food prices have a lot of impact and harm long-term economic growth because they weaken the structure of the productive capital stock and restrict productivity gains often linked to the population's health and education. The development literature contains substantial contemporary microeconomic evidence linking income volatility to lower investment in physical capital, human capital, and even research and development (Jacks, O'Rourke, and Williamson 2009).

Considering this issue, it seems logical to structure the essay by looking for empirical evidence of the impact of food price volatility on investment and human capital and the more distant impact of causing social conflict.

## EMPIRICAL EVIDENCE OF THE IMPACT OF FOOD PRICE VOLATILITY ON INVESTMENT

It is challenging to conclude market volatility's effect on investments and savings. It was likewise, viewing volatility as the manifestation of macroeconomic risk, the precautionary savings would grow. By itself, an increase in savings would result in a decline in interest rates (the cost of capital), increasing the amount of investment that is realized (Deaton, 1992).

The assumption that the accumulated savings would always be available on the financial markets would be a mistake. Prudent saving attempts to create a buffer that must be easily accessible in an emergency (if prices do indeed increase). It's a good idea to have a backup plan just in case (Timmer, 2002). However, the structure of precautionary saving presupposes the ability of businesses and households to save salaries enough above the subsistence threshold, which is not the situation for most people living in developing countries.

The volatility increase is problematic for investment for yet another reason extracting information from the price signal (Lucas, 1973). Timmer (2002) explains that investment decisions could be blurred by a wrong long-term estimation, estimations that are more complicated because of the disorderly movements of prices. In such circumstances, it is not the quantity of investment that is at stake but rather its quality. Savings still go to capital markets and are allocated to projects, but not necessarily to the more sensible ones.

Prices should accurately reflect genuine demand conditions and transmit the correct signals in the connections between speculation and food price volatility (Spratt, 2013). Producers need some confidence that price levels will be sustained to respond to high prices by increasing supply. Artificially high or low prices transmit false price signals, while excessive volatility distorts these signals. This tendency could be related to current accounts disequilibrium (funds glut), whereby excessive savings are directed toward investments that are increasingly risky yet do not provide high returns.

Finally, it is crucial to account for account limitations that are inherent in investment decisions, such as irreversibility (physical investments) or credit supply restrictions that might prevent agents from fully utilizing advantageous circumstances, preventing them from covering the risk of adverse world conditions (Aizenman & Marion, 1999). These restrictions are particularly noticeable in nations where markets have not yet evolved enough or where a large sovereign risk exists. Development that the growth of financial markets is a substantial role in reducing growth volatility (Easterly et al., 2000). This can be interpreted that increased price volatility can increase investment risk.

Increased volatility can decrease physical capital investment when investments are irreversible (Pindyck, 1988). According to the model created by Pindyck

and Solimano in 1993, more volatility should limit investment expenditure in the short term by raising the needed return on investments. On the other hand, Hartman (1972) and Abel (1983) show that it is conceivable to find circumstances when volatility boosts investment while assuming symmetrical adjustment costs, risk-neutral businesses, and perfectly competitive markers.

Aizenman & Pinto (2004) illustrate that volatility can raise predicted profits provided the profit function is convex. Caballero (1991) shows that when we suppose that companies are -neutral, volatility increases investments if we have perfect competition and increasing returns to scale. Aghion et al. (2010) examined the effect of financial development on the relationship between commodity price volatility and growth using a model with two types of investments (long-term, productivity-enhancing, and short-term).

Although the results linking price volatility and investment can be applied to the agricultural sector, it is nevertheless important to emphasize that this industry has unique features because of the nature of its products. Agricultural land is both a source of income and a guarantee of the family's food rations in emerging nations. So, to avoid rivalry for land and labour, it is important to distinguish between the two forms of production: cash crops and food crops. The most common aspect of agriculture, which Fafchamps (1992) built an analytical framework for, is that the poorest farmers devote a bigger portion of their land and labour to producing food crops.

Food crops often have lower yields and are more susceptible to climatic shocks. According to Fafchamps, farmers in the least developing nations are forced to rely primarily on themselves to feed their families because those marketplaces are often insufficient or non-existent (self-sufficiency). In other words, they cannot take the chance of growing crops with great yields without they secured their food supply first. Need to be considered to a minimum amount of land on which it would be feasible to converse to cash crops partially.

Yet, beyond this limit, farmers are caught in a cycle of poverty due to their specialization in low-return, high-volatility food crops, which are occasionally insufficient to provide necessities. According to Poulton et al. (2006), between 70 and 80 per cent of rural households in Africa are net deficit producers (who do not produce enough food to fulfil their requirements).

At the microeconomic level, price instability impacts agricultural investment patterns, mainly when markets are sparse or isolated. The characteristics of the farming population will determine how they react to increased volatility. From a theoretical perspective, food price volatility will have different effects on surplus and deficit households (Poulton et al., 2006). It will tend to encourage deficit households to continue investing limited resources in the production of staple foods, preventing the transition to -value crops, while discouraging investment in staple agriculture by surplus households, which are significant local and national food sources.

Uncertainty in food prices can be a significant barrier for many deficit households to escape poverty. A formal survey by Place, Adato, and Hebinck (2007) shows that few of the poor in Kenya tend to grow cash crops, use hybrid seeds, or use fertilizers. On the other hands, surplus households can save.

Looking at the bigger picture, fluctuating food prices might also result in a sharp decline in investment along the entire agricultural value chain, keeping the sector in a trap of low productivity and high volatility (Poulton et al., 2006).

In Pakistan Penjab, Kurosaki and Fafchamps (2002) showed that the level of price and yield risk that families were willing

to assume affected their crop choice. They predicted that by eliminating risk, the median household's area committed to cash crops might increase by up to 30%. Dercon and Christiaensen (2011) were also able to show link between vulnerability and technology adoption using Ethiopian household data. Those households whose consumption was more responsive to shocks were using less fertilizer (even after controlling for household characteristics).

In general, fertilizers boost yields, but they do not offer any weather-shock protection. They consequently represent a sunk cost in the current state of the globe and help to reduce further profits, which are unaffordable for needy farmers. Using data from India, Rosenzweig and Binswanger (1993) created a paradigm connecting the distribution of agricultural assets to weather risk. They were able to demonstrate that there was an actual inverse relationship between the riskiness of the portfolio and the farmer's exposure to weather risk.

Further research investigated how a climate (or economic) shock may affect agricultural households' investment plans. According to Zimmerman and Carter's (2003) research, farmers' investment behaviours vary depending on initial allocations. Wealthy farmers tend to invest in productive capital (high yield) to help control their consumption, while the poorest farmers tend to stock grains (more liquid but with a lower yield) to control their capital rather than their spending. Along the same line, Hoddinott (2006) found a considerable rise in cattle sales during Zimbabwe's 1994–1995 severe rainfall shock, particularly among households with more than two animals at the time.

These findings were supported by Kazianga and Udry (2006), who discovered very little evidence of consumption smoothing (with more than half of the income shock's value being passed directly on to consumption) and found that most of the shock absorption had come from increased labour and changes in grain buffer stocks. Carter and Lybbert (2012) conducted a more recent analysis of the data and found that asset and consumption smoothing can coexist depending on the asset level. The rich use livestock sales to almost stabilize their consumption perfectly, whereas the poor tend to hold onto their limited assets at the expense of current consumption.

Now let's discuss how output and volatility are related. Building on Sandmo (1971) and Newbery & Stiglitz (1981), Subervie (2008) explains that the supply response to price volatility depends on the producers' risk aversion traits: farmers who more specifically fear risk will tend to work harder (and thus increase supply) to protect themselves against particularly bad world conditions, whereas those with a moderate fear of risk will tend to decrease their production. In contrast, the author notes that from a strictly dynamic standpoint, supply is more likely to be adversely connected to price instability because it discourages investment and innovation with more uncertain returns.

Subervie (2008) can demonstrate a negative association between price variability and output using country-specific production and price indices for a wide range of agricultural commodities in a dynamic panel scenario. She also demonstrates how the absence of adequate infrastructure, unchecked inflation, and underdeveloped financial systems make the impact of fluctuating global agricultural prices on production more significant. These conditions are characteristics, in general, developing countries, which makes producers particularly prone to instability. Haile et al. (2016) create country and commodity-specific price data by leveraging the variation of planting months for four agricultural commodities. They use a dynamic panel model to break down the effects on planted areas and yields and study the effects of own

and cross price (and volatility) on production. Additionally, they conclude that price volatility negatively impacts the planting choices, yields, and ultimately productivity of the farmers.

Thorough analysis by Binswanger et al. (1993) performed on Indian data revealed a causal pathway connecting investment and agroclimatic endowment. They show that industries with favourable agroclimatic conditions (such as infrequent floods or droughts) attracted greater public infrastructure spending, which encouraged the establishment of banks and other financial institutions and ultimately promoted private investment. On the other hand, vulnerable areas received less attention, which had long-term effects on their capacity to attract investment flows and make investments.

We conclude that commodity price instability generally harms investment, barring relatively rare circumstances that are typically absent in developing countries.

## EMPIRICAL EVIDENCE OF THE IMPACT OF FOOD PRICE VOLATILITY ON HUMAN CAPITAL

There have been a ton of studies done to determine how price increases have affected well-being and poverty (see, e.g., Von Braun and Tadesse (2012) or Johnson Idan (2014) reviews). This section begins with a discussion of the various approaches taken to determine how food price shocks affect welfare. Next, we discuss the scant research on the effects of volatility in general.

Getting data on the household level's actual consumption and production patterns is the first and most important step. The proportion of food expenditures determines the likelihood of sensitivity to shocks in food prices. Vulnerability assessment Poulton et al. (2006) provide evidence that most African rural residents spend more than 50% of their income on food, and they issue a dire warning about the potential for resource exhaustion to result in sharp increases in food prices. Similarly, Verma & Hertel (2009) revealed that the poorest quartile of Bangladeshi society spent almost 70% of their expenditure on food.

Several authors concentrated on the poverty rate, which is easily calculated by comparing the simulated post-shock real earnings to an established poverty threshold. Ivanic et al. (2012) projected how the rise in food prices in 2010 will affect the number of people living in poverty in 28 different nations (including price and substitution effects). "On balance, the detrimental welfare impact on the consumers outweighs the gains to producers increasing the number of poor and in the depth of poverty," they find.

Verma & Hertel (2009) showed agricultural price and income instability to cause more erratic food intake. They also emphasized how vulnerable the poorest were to price hikes and changes due to the early malnutrition seen in this group. According to Myers (2006), the economic literature even went as far as to propose formulae connecting volatility with the survival likelihood of the poorest. It is not unreasonable to think that fluctuations in food prices can cause a decrease in nutritious rations, even below the level needed for subsistence, particularly in the most vulnerable households, and might affect the survival rate.

Households are "on average high price risk-averse over the prices of specific commodities as well as over co-fluctuations in the prices of the same commodities," according to research by Bellemare, Barrett, and Just (2010) using data from Ethiopia. The seven primary agricultural crops were willing to pay anything between 6 and 32% of their income to have full price stabilisation to their mean value.

Agricultural price shocks and volatility threaten the poorest people's access to food and economic welfare, but they also have greater negative consequences on their

capabilities, according to Sen. (1993). Jensen (2000) uses the phrase "investment in children," which refers to providing children with a healthy diet and ongoing education. He says "investment in children and the development of human capital are the cornerstones of boosting well-being and breaking the cycle of poverty. They are also important to national growth and economic development."

Naturally, cutting back on the number of meals and serving sizes can negatively affect health, but substituting unhealthy foods can also be detrimental. As stated in Shabnam et al. (2016), "Food substitution may alter nutrient intake" because substitutes for nutrients may not be close substitutes for tastes. To some extent, it is reasonable for the household's breadwinner to receive the most of the limited food allotment. Yet, women's and children's undernutrition can have long-term adverse effects on their physical and cognitive health (fatal and infant development).

According to Meerman and Aphane (2012), tight financial constraints cause both a drop in school attendance and a rise in child work. Health-related spending tends to decline when real household income is lower (drugs or visits to the doctor). Additionally, it is typically linked to a rise in the number of women working, which harms the health of the household. After all, women traditionally serve as the primary caregivers, and wage work implies that they have less time to look after the kids, prepare their meals, or breastfeed them. Budget restrictions in some situations may even force the sale of productive assets, which will only serve to further the dynamics of poverty.

These effects are succinctly summed up that "decreased income in already low-income countries might result in malnutrition, death, withdrawal of children from education, and continued high unemployment."

## EMPIRICAL EVIDENCE OF THE IMPACT OF FOOD PRICE VOLATILITY ON CONFLICT

The strongest correlations between civil conflict and economic growth are low per capita income and slow growth (Blattman and Miguel, 2010). Economic poverty, deteriorating health, and inadequate nutrition were all linked to an increased risk of armed conflict, according to research by Pinstrup-Andersen and Shimokawa (2008).

Bellemare (2015) showed that, between 1990 and 2011, high food prices had led to more food riots around the world using his food riot index. Arezki and Brückner (2011) showed that a rise in food costs related to social unrest using worldwide macro-level panel data.

Most researchers ended up instrumenting income with international commodity price shocks (including food commodities) and weather shocks to show a causal relationship between revenue and conflicts (see, e.g., Brinkman and Hendrix, 2011 for a review).

In Sub-Saharan Africa, Miguel et al. (2004) used an annual rainfall index to instrument income growth. They discovered a substantial causal relationship between economic growth and conflict and discovered that increases in rainfall had been linked to fewer conflicts. Yet, contrary to the impact of rainfall shocks, Ciccone (2008) contended that the impact of rainfall growth on civil strife was weak.

Some research investigated the effects of price shocks on commerce instead of weather shocks (most often commodity price shocks). According to Besley and Persson's (2008) research, both higher export prices and more expensive imports often increase violence (indicating the opportunity cost argument) (a finding coherent with the State as a prize theory). Similarly, Brückner and Ciccone (2010) found that Sub-Saharan African civil wars were more likely to break

out after a decline in the price of exporting goods.

Dube and Vargas (2013) used district-level data from Colombia to analyse the possibility of civil unrest in agricultural areas during declining global coffee prices (and, consequently, farmer real income). Their findings supported the opportunity cost argument. Their findings suggest that as export prices rise, disputes seem to decrease. Furthermore, they demonstrate that the main impact of price shocks is not an increase in the chance of conflict starting but rather an increase in the length of already ongoing disputes.

A different body of literature concentrated more intently on food riots. Bush (2010) showed that while the rise in food prices probably started the late 2000s food riots, the masses' messages were considerably broader (e.g., more civil, and political freedom, less globalization). Lagi et al. (2011) framed food-related demonstrations as a non-linearity after analysing the 2008 and 2011 incidents. They proposed that there might be a price barrier above which riots might break out.

According to their theory, "widespread discontent does not result from the system's historical political flaws, but rather from its apparent sudden inability to provide the public with basic security."

Data on urban unrest from 55 significant cities dispersed over 49 developing nations between 1961 and 2010 were examined by Hendrix and Haggard (2015). They noted that increases in food prices were more likely to cause civil unrest in democracies than in autocracies; they showed that autocracies implemented policies that disproportionately favoured the urban population in comparison to the rural population, thereby focusing their support on the denser areas that were logically more prone to civil unrest.

These results are consistent with Carter and Bates (2011), who demonstrated that a policy bias toward the urban population dramatically diminished the causal relationship between food prices and civil wars. Berazneva and Lee (2013) discovered a substantial correlation between a country's food production index, poverty level, and degree of urbanization and the risk that it will experience food riots during the 2007–2008 food crisis.

McGuirk and Burke (2017) examined the effects of food price shocks on violence across Africa. Their research allows them to demonstrate the significant influence of income shocks on conflicts and, to some extent, covers civil wars and food riots. They discovered that high food prices, which farmers see as a positive revenue shock, tend to reduce conflict in regions that produce food. Nonetheless, they observe a rise in food riots and theft, pointing to tensions over the limited incomes of low-income consumers.

Given the empirical evidence that shocks to agricultural prices can spark civil unrest and wars, as well as the devastating effects that civil wars and other forms of violence have on economic growth (see Blattman and Miguel, 2010 or Gates et al., 2012), one can conclude that changes in food prices have a firm but indirect impact on growth and development.

## RESULT AND DISCUSSION

To summarize all the explanations above, we created a chart regarding the impact of food price volatility (Figure 1). Increased price volatility can increase investment risk and, at the same time, reduce investment. Food price volatility will have different effects on surplus and deficit households. Instead of investing, uncertainty in food prices can be a significant barrier for many deficit households to escape poverty. On the other hand, surplus households can save. Agricultural price shocks and volatility

threaten the poorest people's access to food and economic welfare. The detrimental welfare impact on the consumers outweighs the gains to producers increasing the number of poor and in the depth of poverty. Decreased income in already low-income countries might result in malnutrition, death, and withdrawal of children from education. There is substantial correlation between a country's food production index, poverty level, and degree of urbanization and the risk that it will experience food riots, given the empirical evidence that shocks to agricultural prices can spark civil unrest and wars, as well as the devastating effects that civil wars and other forms of violence have on economic growth.

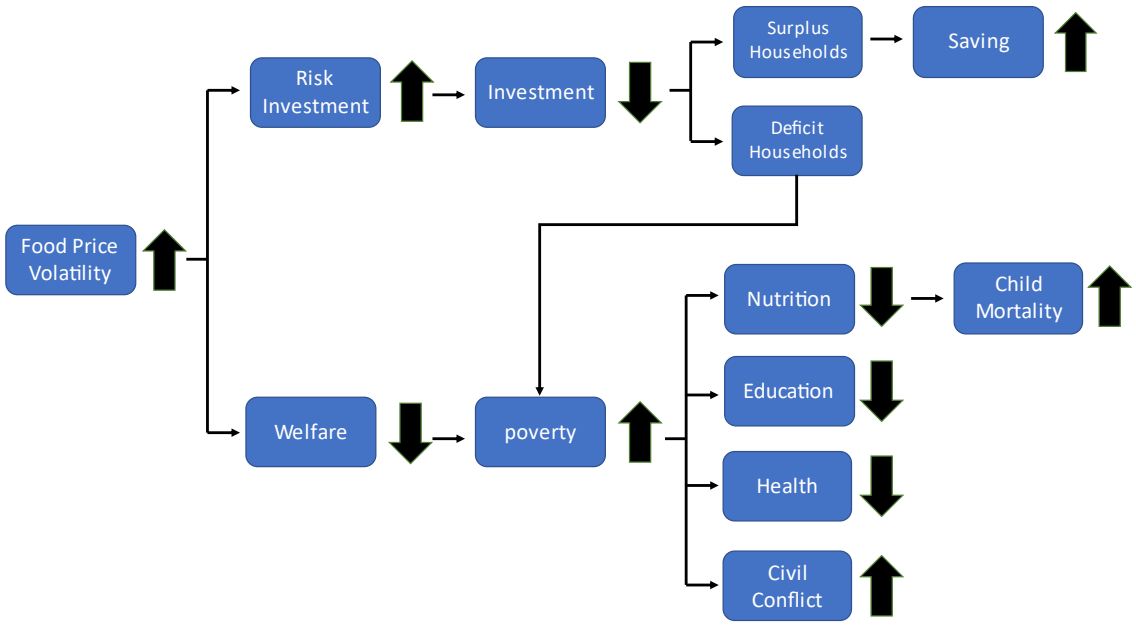


Figure 1. Food Price Volatility Impact

## CONCLUSION

Our investigation suggests that food price volatility could significantly impact the expansion and advancement of the economy. Increased price risk tends to deter private investment and skew production patterns, particularly in emerging nations: agricultural production shortfalls and insufficient agricultural investment. The composition of human capital was simultaneously shown to be dramatically altered by food price shocks, with adverse effects on nutrition and education being particularly severe. Moreover, they were linked to civil conflicts and, in general, social upheaval. The effects of food price volatility on long-term development sound formidable.

## REFERENCE

Abel, Andrew B (1983). Optimal investment under uncertainty. American Economic Review, 73: 228- 233.

Aizenman, Joshua and Nancy Marion (1999). Volatility and Investment: Interpreting Evidence from Developing Countries. Economica, 66: 157-179.

Aizenman, Joshua and Brian Pinto (2004). Managing volatility and crisis: a practitioner's guide overview. Working Paper of the National Bureau of Economic Research, 10602 (June).

Aghion, Philippe, George-Marios Angeletos, Abhijit Banerjee and Kalina Manova

(2010). Volatility and growth: credit constraints and the composition of investment. Journal of Monetary Economics, 57: 246-265.

Arezki, Rabah and Markus Brückner (2011). Food prices and political instability. IMF Working Paper, No WP/11/62: 22p.

Bellemare, Mark F., Christopher B. Barrett and David R. Just (2010). The Welfare Impacts of Commodity Price Fluctuations: Evidence from Rural Ethiopia. Munich Personal RePEc Archive Paper No. 24457: 1-52.

Bellemare, Mark F. (2015). Rising food prices, food price volatility, and social unrest. American Journal of Agricultural Economics, 97(1): 1-21.

Berazneva, Julia and David R. Lee (2013). Explaining the African food riots of 2007-2008: An empirical analysis. Food Policy, 39: 29-39.

Besley, Timothy and Torsten Persson (2008). Wars and State Capacity. Journal of The European Economic Association, 6:522-530

Blattman, Christopher and Edward Miguel (2010). Civil war. Journal of Economic Litterature, 48(1): 3-57.

Binswanger, Hans P., Shahidur R. Khandker and Mark R. Rosenzweig (1993). How infrastructure and financial institutions affect agricultural output and investment in India. Journal of Development Economics, 41: 337-366.

Brinkman, Henk-Jan and Cullen S. Hendrix (2011). Food insecurity and violent conflict: causes, consequences, and addressing the challenges. World Food Program Occasional Paper, No 24, 28p.

Brückner, Markus and Antonio Ciccone (2010). International commodity prices, growth and the outbreak of civil war in Sub-Saharan Africa. Economic Journal, 120(544): 325-594

Bush, Ray (2010). Food riots: poverty, power and protest. Journal of Agrarian Change, 10(1): 119- 129.

Caballero, Ricardo J (1991). On the sign of the investment-uncertainty relationship. American Economic Review, 81: 279-288.

Carter, Brett L. and Robert H. Bates (2011). Public policy, price shocks, and conflict: price shocks and civil war in developing countries. Mimeo (Harvard University): 27p.

Carter, Michael R. and Travis J. Lybbert (2012). Consumption versus asset smoothing: Testing the implications of poverty trap theory in Burkina Faso. Journal of Development Economics, 99: 255-264.

Ciccone, Antonio (2008). Transitory economic shocks and civil conflicts, CEPR Discussion paper, 7081.

Darpeix, Pierre-Emmanuel (2019). Literature review on the consequences of food price spikes and price volatility. HAL open science, 02072329

Deaton, Angus (1989). Household survey data and pricing policies in developing countries. *The World Bank Economic Review*, 3(2): 183-210.

Dercon, Stefan and Luc Christiaensen (2011). Consumption risk, technology adoption and poverty traps: Evidence from Ethiopia. Journal of Development Economics, 96: 159-173.

Dube, Oeindrila and Juan Vargas (2013). Commodity price shocks and civil conflict: evidence from Colombia. Review of Economic Studies, 80(4): 1384-1421.

Easterly, William, Roumeen Islam, and Joseph E. Stiglitz (2010). "Shaken and stirred: explaining growth volatility." In Boris Pleskovic and Joseph E. Stiglitz, eds., Annual World Bank Conference

on Development Economics 2000. Washington, D.C.: World Bank, 2010.

Fafchamps. Marcel (1992). Cash crop production, food price volatility and rural market integration in the Third World. American Journal of Agricultural Economics, 74(1): 90-99.

Gates, Scott, Håvard Hegre, Håvard M. Nygård and Håvard Strand (2012). Development consequences of armed conflict. World Development, 40(9): 1713-1722.

Hartman, Richard (1992). The effects of price and cost uncertainty on investment. Journal of Economic Theory, 5: 258-266.

Hendrix, Cullen S. and Stephan Haggard (2015). Global food prices, regime type, and urban unrest in the developing world. Journal of Peace Research, 52(2): 143-157.

Hoddinott, John (2006). Shocks and their consequences across and within households in Rural Zimbabwe. Journal of Development Studies, 42(2): 301-321.

Ivanic, Maros, Will Martin and Hassan Zaman (2012). Estimating the Short-run poverty impacts of the 2010-2011 surge in food prices. World Development, 40(11): 2302-2317.

Jacks, David S., Kevin H. O'Rourke and Jeffrey G. Williamson (2009). Commodity price volatility and world market integration since 1700. Working Paper of the National Bureau of Economic Research, 14748 (February).

Jensen, Robert. Agricultural volatility and investments in children (2000). The American Economic Review, 90(2): 399-404.

Johnson Idan, Matthew (2014). Food prices and poverty. DfID Agriculture and Growth Evidence Paper Series, June: 26p.

Kazianga, Harounan and Christopher Udry (2006). Consumption Smoothing? Livestock, insurance and drought in rural Burkina Faso. Journal of Development Economics, 79: 413-446.

Kurosaki, Takashi and Marcel Fafchamps (2002). Insurance market efficiency and crop choices in Pakistan. Journal of Development Economics, 67: 419-423.

Lagi, Marco, Karla Z. Bertrand and Yaneer Bar-Yam (2011). The food crises and political instability in North Africa and the Middle East. Mimeo New England Complex Systems Institute (August): 15p.

Meerman, Janice and Juliet Aphane (2012). Impact of high food prices on nutrition. Paper written as a chapter for the Proceedings for FAO's Expert Consultation on Policy Responses to High and Volatile Food Prices, November: 21p.

McGuirk, Eoin and Marshall Burke (2017). The economic origins of conflict in Africa. Working Paper of the National Bureau of Economic Research, 23056 (January), 79p.

Miguel, Edward, Shanker Satyanath and Ernest Sergenti (2004). Economic shocks and civil conflict: an instrumental variables approach. Journal of Political Economy, 112(4): 725-753.

Myers, Robert J. (2006). On the costs of food price fluctuation in low-income countries. Food Policy, 31: 288–301

Newbery, David, and Joseph Stiglitz (1981). The Theory of Commodity Price Stabilization, A Study of the Economics of Risk. Oxford: Claredon Press, 1981.

Pindyck, Robert (1988). Irreversible investment, capacity choice, and the value of the firm. American Economic Review, 78: 969-985.

Pindyck, Robert and Andrés Solimano (1993). Economic instability and aggregate investment. NBER Macroeconomics Annual, 1993(8): 259-318.

Pinstrup-Andersen, Per and Satoru Shimokawa (2008). Do poverty and poor health and nutrition increase the risk of armed conflict onset? Food Policy, 33: 513-520.

Place Frank, Michelle Adato and Paul Hebinck (2007). Understanding rural poverty and investment in agriculture; an assessment of integrated quantitative and qualitative research in Western Kenya. World Development, 35(2): 312-325.

Poulton, Colin, Jonathan Kydd, Steve Wiggins and Andrew Dorward (2006). State intervention for food price stabilization in Africa: Can it work? Food Policy, 31: 342-356.

Rosenzweig, Mark R. and Hans P. Binswanger (1993). Wealth, weather risk and the composition and profitability of agricultural investments. The Economic Journal, 103(416): 56-78.

Sandmo, Agnar (1971). On the theory of the competitive firm under price uncertainty. The American Economic Review, 61(1): 65-73.

Sen, Amartya (1993). "Capability and well-being". In The quality of life. Editors: M.C. Nussbaum and A. Sen. Oxford: Oxford University Press, 1993.

Shabnam, Nadia, Fabio Gaetano Santeramo, Antonio Seccia and Zahid Asghar (2016). The impact of the food price crises on the demand for nutrients in Pakistan. MPRA Working Papers Series, 72971: 30p.

Spratt, Stephen (2013). Food price volatility and financial speculation. Future Agricultures Working Paper, 47p.

Subervie, Julie (2008). The variable response of agricultural supply to world price instability in developing countries, Journal of Agricultural Economics, 59(1): 72–92.

Timmer, C. Peter (2002). "Chapter 29: Agriculture and economic development". In B. Gardner and G. Rausser eds., Handbook of agricultural economics – Volume 2. Elsevier, 2002, pp.1506-1510.

Verma, Monika and Thomas W. Herte (2009) Commodity price volatility and nutrition vulnerability. Selected paper prepared for presentation at the Agricultural and Applied Economic Association 2009, AAEA and ACCI Joint Annual Meeting, Milwaukee, Wisconsin, July 26-29 2009.

Von Braun, Joachim and Getaw Tadesse (2012). Global food price volatility and spikes: an overview of costs, causes, and solutions. ZEF Discussion Papers on Development Policy, 161.

Zimmerman F. J. and Michael Carter (2003). Asset smoothing, consumption smoothing and the reproduction of inequality under risk and subsistence constraints. Journal of Development Economics, vol. 71, issue 2, 233-260