Effects of stockholding policy on consumer price: Evidence from Zambia

Yujun Zhou

January 25, 2019

## Introduction

Volatile food prices can bring about economic and civil unrest (Bellemare 2015; Fjelde 2014; Weinberg and Bakker 2015). Households are vulnerable to price hikes for staple commodities. As a result, many developing countries have intervened in their domestic agricultural markets to stabilize food prices, through domestic food subsidies, building public grain reserves and imposing export bans. In Zambia, the stockholding policy is mainly carried out by the Food Reserve Agency (FRA). Established in 1996, the FRA has supported domestic maize prices received by farmers and holding maize stocks in case of production shortages (Govereh, Jayne, and Chapoto 2008).

In this paper, we look at the effects of stockholding policy in Zambia on maize prices in more than 30 markets during the lean season from 2003-2009. In particular, we are interested in the effects of FRA purchases and sales on local consumers prices.

Gouel and Jean (2012) proposed that a theoretically optimal food price stabilization policy for a developing country is to maintain a public stock along with a subsidy on agricultural production. They argue that the restrictions on grain exports are necessary since price soothing effect generated through buffer stocks would leak to the external market when there is both a domestic production shock and an international price spike. This is exactly the policy combination used in Zambia with its public stock building policy with FRA, farm-input subsidy and restrictions on maize exports.

The buffer stocks are intended to stabilize maize price and provide available maize supply to the market. The FRA purchases substantial maize from small households in various geographic regions since the 2003/04 marketing year (corresponding to the study period in this paper). The high pan-territorial buying price makes the FRA the dominant buyer in the market (Mason and Myers 2013). In 2006 and 2007, the FRA bought more than half of the surplus maize by smallholder farmers (Ricker-Gilbert et al. 2013), which helps to build higher maize stocks. In part to protect the dominant market position of the FRA, the government implemented a series of policies including export bans, import tariffs, and imports through the FRA (Tschirley and Jayne 2010). According to grain traders, millers also get subsidized maize stocks from FRA. These measures to build higher stocks have led the national maize stocks to reach historically high levels after 2009.

The endogeneity issue of identifying the effects of FRA purchases and sales is multiple. First, several policies were at play, and all to a certain degree endogenous to grain production and maize prices. These policies include but not limited to temporary export bans, government subsided imported maize from South Africa and targeted fertilizer subsidy program for smallholder farmers.

Second, the major districts markets are in a certain degree connected through trade. According to the rule of one price, the prices of these markets are driven towards the same price because of potential arbitrages. However, previous study () show that due to the incomplete infrastructure and a lack of market information system, the level of price integration in developing countries is not so much. Prices in markets far away from the major production and consumer centers respond little (see appendix on price integration) to prices shocks outside. This makes these remote markets good control groups to study the effects of

So purchase and sales decision from the FRA will not only impact the price at the local level, but also the nearby district markets.

the

Ignoring the weather effects will lead to biased estimates of the influence of the export ban.

Much of this is time variant and work on all the markets (control and treatment) alike, and can be controlled by adding in the policy variable when the policies are in place. Also by adding in the weather shocks in the previous year.

We are comparing district maize price with FRA purchases in the same month with markets that don’t have FRA purcase at all.

can be controlled by weather shocks at the local level. Local price matters because of

The source of variation are seasonal price changes, across year production/stock changes, across year policy changes and across markets price differences within the same year.

This paper makes the following contributions to the literature.

Weather-induced production shocks usually motivate the implementation of export bans. Despite authors who argue that discressionary trade policies may generate higher price volatility (Rapsomanikis and Mugera (2011) and Sassi (2015)), the frequent changing policy and unpredictable policy environment are likely to be the result of production shocks or price hikes from the international market. Hence, these studies may overestimate the effects of export bans on price volatility. Third, the drought index used in this paper offers a more accurate measure of drought in the country than the precipitation index used in previous papers, as it is based on cropland area compared to using .

Understanding the nature and the changes in price variability is essential to ensure political and social stability in developing countries (García-Germán et al. 2013). Mitigating the effects of price instability on smallholder farmers and rural consumers has been longstanding concerns of developing countries. This paper provides empirical evidence on how governments’ efforts intervening in agricultural trade may have affected price volatility. Research results have relevant policy implications and can guide future domestic policies aiming at improving domestic food security.

## Background

Zambia ranks 139 out of 188 countries in the 2015 UNDP Human Development Report and is classified as a lower middle-income country by the World Bank (Cammelbeeck 2015). With sixty percent of its population below the poverty line and almost fifty percent malnourished, the country suffers from a prevalent poverty and food insecurity (Sitko et al. 2011).

The agricultural sector in the country comprises of roughly 1.5 million smallholders and 2,000 large-scale farmers. More than ninety percent of maize productions and eighty percent of total maize sales come from smallholder farms (Tembo et al. 2009). Maize production is not evenly distributed across farms. Around two percent of the small and medium farmers generate roughly half of maize output. A large number of small farm households are still net buyers of maize (Sitko et al. 2011). The dependence on the volatile rainfall and a lack of irrigation systems make the agricultural output extremely unstable. Years of drought, flood, and insufficient input supply, which represent on average one year out of three, lead to deficient maize production to satisfy food demand at the national level (Dorosh, Dradri, and Haggblade 2009). Since weather shocks are localized, certain production regions experience more severe shocks than others. Substantial production shortages result in the domestic maize price rising to the Republic of South Africa’s maize import parity (Myers and Jayne 2012). Trade is thus a potential valuable tool to stabilize the domestic price.

However, past maize price fluctuations and the consequent social unrest have led the government of Zambia to believe food prices are far too strategically and politically important to leave to the market (Chapoto 2012). The government mistrusts private traders in their ability to bring in enough maize to stabilize the market (Myers and Jayne 2012). Private traders, on the other hand, blame the government for implementing unpredictable policies on tariffs, import licenses, and maize import subsidies. Short-term export bans are often imposed to restrict maize outflows to ensure food security and access to food when the country experiences a maize production deficit. These export bans are often carried out in an ad-hoc, stop-go nature (Chapoto & Jayne 2009). The effects of export bans on domestic price volatility are not clear. While in some countries such as India, export bans appear to have decreased prices and price volatility (Baylis, Jolejole-Foreman, and Mallory 2013), in other countries such as Russia the restriction on exports actually increases the food price at the exporting market because of a higher transaction cost (Porteous 2012; Welton 2011).

Stockholding is expensive for poor economies, which makes trade the usual alternative. However, the uncertainties in imports and the transmission of shocks from other countries makes trade a less reliable tool to address domestic food shortage. Besides, storage is needed to supply the market before imports arrive. Consequently, developing countries have been rethinking their policies on grain storage and dependence on international trade to secure domestic food security (Dorosh 2009). There were reports of Zambia traders suggesting to the government the existence of sufficient amount of local stocks, which would make maize imports unnecessary (Chapoto 2012). However, the series of agricultural and trade policies that the government of Zambia has conducted in the recent years suggest a turn to the option of building more grain stocks.

## Theoretical Model

imports maize and sells it to select large-scale millers at below-market prices.

a government

sell low during season and buy high during lean season

## Method

#### Spatial model : more markets

Use annual data instead of monthly

Focus consumer price during the lean seasons

consider temporary export ban too

foucs on the FRA sales effect: how it decreases its spatial lag due to cost

partial control

differentiate the effect

model: differnetiate the FRA buying and selling effect

use a road-distance based, continous treatment effect

effects on previous year’s FRA purchase

apart from the FRA sales, also need to consider the exports and imports

FRA purchase months: 6-10, FRA sales month: 12-4 , sold at the nearest district market, so no distance measure is needed.

Lean Season 2-4

1. Panel regression

Price\_lean = Price\_year\_average + imports\_t-1 \* distance + FRA\_sales\_t + FRA\_purchase t\_1 (locally) + annual stock + weather\_i,t-1

FRA purchase price , the same through out the year

The identification strategy is to make use of the step by step roll out of the FRA throughout the years. The intensity of treatment is measured in terms of FRA purchase as % of smallholder maize sales at the district level, No. of districts they are buying (as it affects to the price transmission and price expectation).

## Empirical Application

The variables of interest are maize price levels, price spread between district market and Lusaka, and coefficient of variation of district level maize price.