Household-specific food price differentials and high-value crop production in rural Ghana

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ABSTRACT

Using panel data from Ghana we have examined the relationship between household-specific producer–consumer price differentials and rural household cropland allocation between food and high-value crops. We test the hypothesis that cereal price bands induce a shift of resources away from high-value crop production, making smallholders appear unresponsive to price incentives. Our results lend support to this hypothesis, implying that a policy aiming at increasing farmers' income through high-value crop production may fail if hard and soft infrastructure does not improve in rural areas, and if staple crop productivity does not increase significantly.

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Introduction

Do smallholder farmers respond to market price incentives? For example, why did the global food price hikes of 2007–2008 and more recently in 2010 and 2012 not provide an opportunity for smallholder farmers to increase production? The reason smallholders may appear unresponsive to price incentives as manifested in their resource allocation decisions between food and cash crops boils down to the use of 'wrong prices' in assessing relative profitability of these crop categories (Jayne, 1994) and often ignoring that price risk reduces farmer response to incentives (Haile et al., in press). This article provides some empirical evidence.

In a rural economy with missing or incomplete markets and entry barriers into high-return niches of economic activity (Barrett et al., 2001; Haggblade, 2007), choice of economic livelihood strategy may be constrained by the need for self-provision of home consumed goods and services. Underdeveloped 'soft' and 'hard' infrastructure and institutional bottlenecks induce high cost of market transactions, which creates a wedge between producer and consumer prices. This wedge could serve as a disincentive for cash crop production because of the attendant increase in the opportunity cost of production. Indeed, falling consumer price of

staples has been shown to stimulate cash crop production in grain deficit regions (Jayne, 1994).

Motivated by the missing markets and food security literature (e.g. de Janvry et al., 1991; Jayne, 1994; Sadoulet et al., 1998; Key et al., 2000; Dzanku and Sarpong, 2011), this article tests the hypothesis that consumer–producer staple crop (SC) price bands constrain household cropland allocation to high-value crop (HVC) production. Thus, although food markets exist, gains from market transactions (i.e. the relatively higher incomes from cash crop production) could be lower than household-specific cost (i.e. the acquisition cost of SCs).

Seasonal food price movements are commonly observed in developing countries including Ghana (Alderman and Shively, 1996). But why might producer prices differ from consumer prices even at the household level for home-produced commodities? This is because rural households often engage in what Stephens and Barrett (2011) refer to as the 'sell low, buy high' behavior? Possible reasons include: impatience or high discount rates and inappropriate storage technology leading to high inter-temporal storage losses. Since the majority of rural African smallholders are both buyers and sellers of food staples – often net buyers (Barrett, 2008) – even if transactions took place in the same market, temporal variations could create price differentials. Another reason why there might be a price differential is the spatial configuration of the market place—selling at the farmgate versus buying in the market. It might be that rural smallholders mostly sell at the farmgate

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but buy in the market, but market prices normally lead farmgate prices.

Stephens and Barrett (2011) have shown, both analytically and empirically, that this 'sell low, buy high' puzzle that creates the price band results essentially from financial market failures in the presence of temporary liquidity constraints which farm households try to resolve by converting grains into cash with the de facto interest rate being the price band. For example, it is typical for households to be liquidity constrained due to inelastic demand for school fees, hospital and funeral expenses in the current study villages as noted by Stephens and Barrett (2011). Under such circumstances households may exhibit a high rate of time preference, and are thus forced to sell SCs at lower current price than future acquisition price.

These reasons combine to create the price wedge attributable generally to the 'distance' between points of production and markets, where 'distance' in this context refers to both space and time between SC harvest cycles. This is similar to the household-specific market failure argument (de Janvry et al., 1991; Kurosaki, 1995) and the transactions cost argument (Omamo, 1998a,b), and can also be viewed as a consequence of missing crop insurance and financial markets in rural SSA.

A well-known distinctive feature of farm households is that their consumption and production preferences are linked. The possibility that SC prices and price bands or factors that affect these could influence HVC production has been documented (e.g. de Janvry et al., 1991; Fafchamps, 1992; Jayne, 1994; Omamo, 1998a,b). However, one is not aware of any empirical test of the price band hypothesis in spite of the implications for agricultural growth and policies counting on market incentives and agriculture-led poverty reduction. This article fills the gap in the empirical literature on household cropland allocation behavior under food marketing constraints within the context of a three-period panel dataset from Ghana.

The rest of the article proceeds as follows. Section 'An overview of the crop choice literature' contains an overview of the crop choice literature. Existing theoretical foundations which motivate the present analysis are presented in Section 'Conceptual framework'. The empirical econometric models and estimation strategies are discussed in Section 'Empirical econometric model'. A description of the data and descriptive statistics follow in Section 'Data' after which results of the estimated models are presented and discussed in Section 'Regression results'. Concluding remarks appear in Section 'Concluding remarks'.

An overview of the crop choice literature

Crop choice played a role in the unequal gains from growth and poverty reduction observed in Ghana in the 1990s and 2000s, with HVC producers benefiting more from poverty reduction (Aryeetey and McKay, 2007). Some have cast doubt on a policy that chooses the promotion of HVCs over SCs because the former is seen as less pro-poor (Diao and Dorosh, 2007). However, the extent to which each crop category contributes to poverty reduction may vary substantially across space such that the two may not be competitors (von Braun, 1995).

But what influences farmers' crop choice? A rural household chooses to allocate resources to the production of a given crop based on natural, commercial, institutional and technological factors (Goldstein and Udry, 1999; Field and Field, 2007; Seo and Mendelsohn, 2008; Kurosaki, 2008; Wang et al., 2009). Agroecological location of a household determines rainfall, soil and seasonal weather variations. These factors are important because most smallholders in rural Africa produce under rainfed conditions and apply low quantities of fertilizer. For example, only about 0.2% of arable land is under irrigation in Ghana and fertilizer use is low—estimated at between 8 kg ha^{-1} and 13 kg ha^{-1} of arable land (Minot and Benson, 2009; Banful, 2011). Recently, Salazar-Espinoza et al. (2015) studied the effect of weather shocks and cropland allocation decisions in rural Mozambique and found that farmers respond to weather shocks by allocating land away from HVCs to SCs albeit temporarily.

Markets play an important role, but not in the manner hypothesized by the neoclassical model (Timmer, 1997; Barrett, 2008); market inefficiencies impose restrictions. Due to transactions cost, market moderating factors include: proximity to good roads and urban centers, product market accessibility, access to information about crop(s), relative prices and cost of adopting a new crop. For example, Kurukulasuriya and Mendelsohn (2008) studied farmers' crop choice in eleven African countries, including Ghana, and found that proximity to urban markets increased considerably the probability of HVC production.

Profit maximization is an important economic motive for diversifying into HVC production. However, in the absence of insurance markets, for example, the 'profitability' of a HVC may not matter to smallholders if its production risk is higher than crops already being produced. For example, in spite of the relatively higher profits from pineapple production in south eastern Ghana, Udry and Anagol (2006) found many famers not to be interested because profits were highly skewed. Attitude towards risk is thus an important determinant of farmers' crop choice (Dercon, 1996), and most farmers are known to be risk averse (Binswanger, 1980; Bar-Shira et al., 1997).

For high-value export crops, high international market standards may require that local farmers receive training through organized groups. So, membership of farmer associations and the availability of agricultural extension services could play an important role in a farmer's crop choice (Kurosaki, 2008). The relatively higher investment and technology requirements for the production of such crops (compared with SCs) suggest that there exist entry barriers to their production (Goldstein and Udry, 1999; Field and Field, 2007). It is not surprising that access to credit matters for HVC production (Field and Field, 2007; Kurosaki, 2008).

Conceptual framework

The conceptual model underpinning the arguments in this article already exist in the relevant literature (e.g., de Janvry et al., 1991; Fafchamps, 1992; Omamo, 1998a,b). The present study contributes by testing an important implication of the theory not yet accomplished empirically. Missing or incomplete markets are common in rural SSA. This results in production and consumption decisions being nonseparable (Singh et al., 1986; Taylor and Adelman, 2003). This is the basic underlying conceptual framework for studying the SC price band effect on HVC production decisions.

Theoretically, the outcome of the argument contained in this article can be obtained under varied assumptions but mainly risk aversion and market failures. If under these conditions rural households are concerned about meeting their food needs through own production (de Janvry et al., 1991; Fafchamps, 1992; Di Falco and Chavas, 2009) then this quest for self-sufficiency will play a role in household resource allocation to HVCs.

The conceptual model result that smallholders allocate land to HVCs if their food security is assured can be derived under the assumption of missing markets (for food) but pertains even where food markets exist (Fafchamps, 1992). Fafchamps's (1992) conceptual results show that consumption preference and food price volatility determine households' optimal crop portfolio, and that SC price variance induces inclination towards SC production and reduces cropland allocation to HVCs.