

From futures markets to the farm-gate: assessing the impact of the financial crisis along coffee chains

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1. Introduction

The pro-cyclical nature of commodity prices imply that commodity exporting countries (many of which are in the developing world) suffer during periods of economic down-turn in commodity importing advanced and rapidly industrialising economies. The current global economic down-turn has led to a serious contraction of demand for primary commodity inputs as investment levels fall across the world and in the BRICs particularly where high demand has helped to maintain high commodity prices between 2002 and 2007.

The current financial crisis, and its implications for commodity exporting low income countries (LICs), has been unprecedented in terms of the way in which its architecture has been based upon the intensive financialisation of everyday life (Dumenil and Levy 2005). In addition to falling commodity prices as a result of falling demand from emerging economies such as India and China, commodity prices have increasingly been influenced by the activities of financial investors (Newman 2009). The rise of commodities as an asset class in portfolio investment has resulted in commodity prices becoming intimately linked to price behaviour in equities and other financial markets (Gorton and Rouwenhorst 2004; Domanski and Heath 2007; Doyle, Hill et al. 2007).¹

Given the serious implications of falling commodity prices for low income exporting countries, it is imperative that the way in which international commodity prices are transmitted to the local level are understood as well as the impact that prices have on different actors engaged in the production and marketing of primary commodities.

¹ Commodities represent an attractive asset class for investors since commodity prices move in line with inflation their inclusion in an investment portfolio can act as an inflation hedge. More importantly, commodity prices display a negative correlation with the price of other financial instruments such as bonds and equities and therefore constitute a good asset class in terms of diversifying portfolios and risk reduction. It is therefore not surprising that commodity markets see increasing investment during the initial periods of economic downturn.

We present the case study of coffee chains originating in Tanzania to demonstrate how the joint forces of global financialisation and domestic liberalisation in producing countries have acted to reorganize coffee chains into structures in which chain actors have become increasingly vulnerable to violent and unjustified price swings.² We show that way in which world prices are transmitted along coffee chains and their implications at all levels of the chain have been asymmetric and varied.

This paper goes beyond previous studies of price transmission along commodity chains by studying activities of and impacts upon actors at the extremities of the coffee chain. We look at the way in which prices are transmitted from futures markets to the physical chain, as well as the differentiated impact of price behaviour for heterogeneous producers. In this way, we are particularly concerned with the way in which international and domestic structures interplay in forming outcomes at the producer level.

2. Current Attempts at Assessing the Transmission and Impact of Commodity Price Changes

Research on the effects of the current global financial crisis and its repercussions in commodity markets and elsewhere have tended to limit their analysis to a consideration of world price developments (Willem te Velde, Ackah et al. 2009). However, in order to understand why commodity markets have become so closely linked to financial markets, and to make a thorough assessment of the possible impact of the downswing in prices for individual commodities, an alternative approach is needed. This review therefore considers some of the mainstream and alternative approaches to assessing the transmission and impact of commodity price changes.

2.1 Economics Literature on Price Transmission

Recent studies on the impact of the current commodity crisis on developing countries have tended to analyse the commodity price problem from the perspective of supply and demand in a series of stacked horizontal markets along the supply chain. However, in order to fully understand how and why prices are passed on from one market to another, research on price transmission can be helpful. Economic studies on vertical and horizontal price transmission have traditionally been related to competitive pricing behaviour³.

² Increasingly price swings are not explained by changes in supply and demand conditions in the physical markets for coffee. (Newman 2008)

³ Vertical price transmission refers to the transmission of price signals along the supply were as horizontal price transmission refers to the transmission of price signals between geographically separated markets at the same level of the supply chain.

The law of comparative advantage dictates that resources will be allocated efficiently in the absence of impediments to free trade. This in turn implies that factor and product prices in spatially separated markets will differ only by transfer costs. In this way, the existence of strong price linkages is seen as a necessary condition for the efficient allocation of resources (Samuelson 1952). Given that the definition of market integration implied by the standard spatial equilibrium model links directly to price outcomes, cointegration analysis has become the most prominent analytical tool employed in empirical studies on market integration. Cointegration analyses rely entirely on price series. In addition, cointegration and error correction models allow the researcher to test notions such as completeness, speed, and asymmetry of the relationship between prices (Rapsomanikis, Hallam et al. 2003; Meyer and Von Cramon-Taubadel 2004).

This research agenda has been matched by the increased interplay in the real world of financial and commodity markets. Commodity futures markets are viewed as functioning to complete markets in the Arrow-Debreu sense by enhancing efficient allocation across geographically separate markets (Arrow and Debreu 1954). Neoclassical economic theory argues that highly liquid futures markets are efficient in the sense that they incorporate all knowable market information into price outcomes and therefore enable efficient price discovery (Fama 1970).⁴ On the basis of the above understanding of the functioning of commodity markets and price determination, cointegration analysis has been applied in a number of empirical studies into the statistical relationship between prices on futures and physical markets, and vertical and horizontal price transmission in physical markets (Abdulai 2000; Rapsomanikis, Hallam et al. 2003; Krivonos 2004).

For the most part, research on the co-movement of international and domestic prices has purported to reveal an improvement in the integration of prices, following the removal of policies that distort the market. Rapsomanikis et al. (2006) find evidence of greater integration in markets where government intervention is lower. Krivonos (2004) also finds support for improved transmission of prices from world coffee prices to producers across sub-Saharan Africa and Latin America. Imai et al. (2008) show that, in the case of India and China, the transmission of prices from world to domestic markets is incomplete due to government intervention.

⁴ The function of price discovery on futures markets for commodities implicitly relies upon a theory of price determination based upon supply and demand of the physical commodity. That is, it is information about the supply and demand conditions of the physical commodity that are incorporated into the formation of the futures price, since the supply and demand of futures contracts are strictly related to future supply and demand of the physical commodity. Rather than explicitly studied, the relationships and interactions between futures and physical markets are assumed away as if there was a seamless interface between the two.

Evidence from cointegration analysis applied to the study of efficient price discovery on commodity futures markets has been mixed (Bosco Sabuhoro and Larue 1997; Fortenbery and Zapata 1997; Bowman and Husain 2004; Fortenbery and Zapata 2004).

“Researchers have come to varying conclusions regarding the efficiency of commodity futures markets and whether futures prices as unbiased predictors of future spot prices” (Bowman and Husain 2004, p4).

In their study, Bowman and Hussain (1994) found that most commodity prices appeared to be cointegrated with at least their 3-month or 6-month futures price series.

It would appear that most studies on price transmission have focused on demonstrating the positive aspects of greater integration between financial futures and international and domestic commodity markets. Three major issues with the literature and evidence in the area of price transmission are noted here. The first relates to counter-evidence through a deeper understanding of structural factors; the second highlights some important caveats with the data and the focus on prices rather than incomes; and finally, the third returns to the issue of impact and possible asymmetric price transmission effects.

While most analyses of futures and cash price cointegration have exclusively focused on the relationship between price series, some recent studies have illuminated some of the structural factors underlying these relationships. In a recent study of cointegration between monthly futures and cash prices for Arabica coffee between March 1989 and June 2008, Newman (2009) finds evidence of structural breaks in the cointegrating relationship occurring in February 1994, December 2000 and March 2003. The dates of these structural breaks coincide with changes in the composition of traders on the New York Coffee Exchange with increasing proportions of financial investors operating on the exchange (Newman 2008).⁵

Newman (2008) finds that during periods where financial investors dominate futures trading volumes on the New York Coffee Exchange, there is a loosening in the relationship between futures prices and supply and demand conditions for physical coffee. Rather than providing evidence for efficient price discovery on futures markets, a finding that futures and cash prices are cointegrated,

⁵ 1994 saw a number of large hedge funds diversifying their portfolios to include commodities. The wake of the dot-com bubble burst saw a large shift in investment from equities into commodities.

with futures prices leading cash prices could be interpreted as evidence for financial investment activity on futures markets driving prices on cash markets.⁶

Most analyses of price transmission between world and domestic markets also do not sufficiently link their observations to underlying structural causes. Institutional and policy factors tend only to enter the price transmission debate to support agricultural liberalisation policies and clear, transparent output and input markets which are seen as the main policy goals. The only contrast to this arises from commodity or value-chain literature, which puts questions of institutional structure and power at the centre of discussions of price transmission and income shares (Morisset 1998; Shepard 2004; Fafchamps and Vargas Hill 2008).

A second major issue with most standard price cointegration studies relates to the data used to derive these results. Producer price data from low-income countries is notoriously unreliable and will therefore not necessarily represent the true price received by a particular producer at a particular point in time (Baffes 2005). Research on price co-movement and market integration also falls short of addressing the distribution of *income* between different vertical markets and actors. Where research has focused on producer *price* shares out of world prices, a relatively positive picture emerges.

“Throughout Africa farmers are now confronted directly with the market and therefore are responsible for the marketing of their crops and for the prices obtained. In most cases this has meant greater uncertainty, but the compensation to farmers is that the liberalization process has also tended to result in a higher share of the FOB prices for them.”(Shepherd and Farolfi 1999, p28)

This is for the most part reflected in studies on Tanzanian coffee. Temu et al. (2001) find the percentage of the coffee export price going to Tanzanian producers to have doubled between 1992/93 and 1997/98 seasons. Baffes (2005) similarly demonstrates the positive impact of coffee market liberalisation on producer shares of coffee export prices. Krivonos (2004) also noted a general increase in producer shares for coffee, with the notable exception of Tanzania. Her explanation turns to the limited nature of liberalisation in this market compared to other countries such as Uganda, where liberalisation has gone further and where she finds producer shares to have risen.

⁶ The transmission mechanisms from prices that appear on the futures market and prices that appear on the ground are discussed in section 3.

Evidently however, considering producer prices themselves does not give us a clear indication of the relative *income* received by producers and other chain actors. Following liberalisation, many producers in low-income countries face higher input costs as well as increased costs associated with transportation of their crop as markets are no longer fixed (Bargawi 2009).

Finally, the objectives of greater price transmission and market integration in the context of commodity-dependent LICs can be questioned. From the perspective of producers, greater transmission leads to greater pass-through of price volatility and may therefore be second-best to a situation where producer incomes are stabilised. Improved co-movement of prices in different vertical markets may also result in faster and asymmetric price transmission along the chain.

From the retail perspective there is evidence of such asymmetric effects that mean increases in wholesale prices are more quickly passed on to consumers and retail markets than negative downturns (Morisset 1998; Abdulai 2006). There is some suggestion that the opposite is the case on the production side, with negative changes passed down more quickly than positive ones (Shepherd 2004). Results from East African coffee markets indicate that coffee producers in Tanzania and Uganda have not benefited from positive price movements in the same way as they have been detrimentally impacted by negative changes (Krivonos 2004; Fafchamps, Vargas Hill et al. 2008). Limited access to market information and exploitation by traders is often cited as the reason for this phenomenon (Fafchamps, Vargas Hill et al. 2008), although deeper analysis of these structural causes is limited.

Evidence from price transmission studies can be summarised as demonstrating mixed and sometimes conflicting results. Markets appear more integrated and therefore price transmission between vertical markets is improved. Structural factors that may explain the increased cointegration between markets tend not to be analysed and concerns over data mean that, at the bottom end of the price chain, analysis is questionable. The distribution of incomes across vertical commodity markets and actors is far from clear from this research, as the determination of prices has become more diverse and factors influencing incomes have changed (Kaplinsky and Kimmis 2006). Finally, evidence of asymmetric price transmission is a particular cause for concern in the current commodity price crisis.

2.2 Commodity chain approaches

By contrast to the mainstream economic literature, commodity chain approaches to the study of commodities have placed issues of structure and power at the centre of their analyses (Gereffi 1994; Kaplinsky and Fitter 2001; Fold 2002; Gibbon and Ponte 2005). The strength of the various chain

approaches to the study of contemporary commodity markets lies in their focus on endogenous explanations for changes in the functioning of chains, offering the potential for dealing with the political economy. In this way they are able to offer answers to some of the short-comings of pure price-series analyses of commodity markets.

Many studies within the commodity-chain tradition have considered aspects of risk, price and income distribution within particular commodity chains. However, crucially, these studies investigate the possible structural origins of these price and risk features in greater depth. The issue of price shares between world and producer markets is therefore explained through competitive, institutional and power structures (Jaffee and Gordon 1993; Kaplinsky and Fitter 2004; Kaplinsky and Kimmis 2006). The following quote demonstrates the types of market and non-market aspects essential to a study of commodity prices in LICs but excluded from the econometric investigations discussed above.

“Prices at different nodes of a value chain are not exclusively determined by the volumes of demand and supply. They are also determined by oligopolistic behaviour, the ownership of stocks, and the actions of investment funds in futures markets.” (Daviron and Ponte 2006, p256)

The commodity-chain approach is also useful in offering policy solutions other than those previously proposed. Where previous studies have focused on ensuring uniform and symmetric price transmission between markets through domestic liberalisation and transparent pricing, commodity chain literature has demonstrated the need for low-income country commodity producers to retain a greater share of prices and incomes, through upgrading (Gibbon 2003; Kaplinsky and Kimmis 2006) and exploitation of niche markets (Jaffee and Gordon 1992; Amani 2005). These policy options are a step away from the standard prescriptions of liberalisation and price-risk management through market-based solutions and while not directly confronting price stability, may bring this with them as an additional benefit (Yeats 1991; Cramer 1999).

While commodity-chain literature has filled many of the gaps of current economic analyses of commodity markets by taking a holistic approach and incorporating structural and policy issues, investigations into commodity prices have not been entirely complete. Where commodity pricing and income shares have been considered, the focus has been on the separation of groups according to certain activities and points in the production and marketing system (Gibbon and Ponte 2005).

Overlaps between markets and agents at each point in the commodity chain are usually not fully explored in the commodity-chain literature, although these will be relevant in understanding the role of particular institutions, such as cooperatives, in performing more than one task within the commodity chain (Bernstein 1996).

Furthermore, each point in the chain tends to be seen as encompassing a homogeneous set of actors (Oya 2002). The focus of most commodity chain analyses is therefore on power relations and heterogeneity between these groups rather than within them. Investigations of price and income shares concentrate on the “vertical” differences between these at the world, export, trader and producer level rather than “horizontal” differences between prices received by heterogeneous producers or other actors.

There has also been a tendency for the various chain approaches to neglect the relationship between commodity chains and their wider economic context as well as inter-chain relationships. One way in which this has occurred has been the failure to consider the role of finance and financial markets within commodity chains. Financial markets have shaped the structure and functioning of physical chains and have acted as a bridge and coordinating mechanism across chains. Chain analyses have also neglected to consider the role played by powerful agents (from within as well as outside the chain) in seeking out profits from their participation on commodity derivatives markets. (Milberg 2007; Newman 2009 forthcoming) The rise of commodities as an asset class in portfolio investment together with the increasing participation on derivatives exchanges by powerful chain actors has shifted the relationship between finance and production. These changes in the structure of international coffee markets have important implications on the way in which the current financial crisis is transmitted to commodity producing developing countries.

While commodity chain approaches have been very useful in developing the standard price transmission literature further, they have, so far, not been able to address how and why the recent downturn in commodity prices is affecting different actors across and within commodity chains.

2.3 Building upon commodity chain approaches

Gaps and weaknesses remain both with the standard price transmission studies and the commodity chain approaches. They are not able to provide clear answers to the concerns of the recent commodity crisis and how this might impact different actors, particularly in low-income countries. Crucially, fundamental changes in the marketing system both at the international level, with increased financial involvement in commodity markets, and domestically, through widespread trade

and domestic liberalization, are not brought together in current analyses. The vertical approach to studying commodities and prices also misses important horizontal structures and forces, which may be crucial to understanding how and why prices are transmitted in different ways for different commodities and at different points in time.

Some of the analytical problems of existing chain methodologies and their application can be overcome by taking a systems approach to commodity studies along the lines of the Systems of Provision (SOP) approach in which a commodity is defined by the vertical *and* horizontal structures, relations and processes that bring about the supply of a commodity from production to consumption. (Fine 2002) As well as describing physical supply chains, a commodity system includes the relationships across chains either through their intersections at particular levels of the vertical supply system, or horizontally in the context of the global and national political and economic structures.

We therefore hope to compliment some of the above research by investigating the nature and impact of the current commodity price crash from a more holistic perspective, incorporating financial market developments at the international level and a clearer post-liberalisation institutional picture within Tanzania and for coffee. By also considering the impact of unstable commodity prices on groups of heterogeneous producers and market actors, this paper adds to the limitations of standard commodity-chain research.

3. Study of price transmission along Tanzanian coffee chains

The following study of price transmission along Tanzanian coffee chains constitutes a synthesis of results from primary research conducted by the authors in 2007 for their PhD research projects. (Bargawi 2009; Newman 2009) Results are drawn from stakeholder interviews and village level surveys conducted during field research in Europe and Tanzania.⁷

3.1 From futures to cash prices: price transmission from the New York coffee exchange to physical markets

As discussed above, observed co-movements and long-term statistical relationships between futures prices and physical prices for coffee tell us nothing of the way in which prices appearing on the international exchange appear in the actual prices at which physical coffee is transacted.

⁷ The field research was funded by grants awarded by the University of London Central Research Committee and the SOAS Research Committee.

This section focuses on the trading practices of international traders located in consuming countries, particularly in Europe and the US. International traders sit between roasters and exporters in the vertical organisation of the international coffee supply system. The coffee industry at the international trader level is highly concentrated, with the top 5 companies accounting for a market share of over 55%.

As well as the large international coffee trading companies, there exist a number of small coffee trading companies, each accounting for a very small share of world market.

The small international coffee trading companies often operate in speciality and niche markets such as fair-trade. While these companies do supply some of the large roasters their buyers, the relatively small volumes that they deal in mean that their buyers tend to be small or artisan roasters.

As a matter of course, the largest of the trade houses hedge all green coffee trades.

ED&F Man and the Neumann Kaffee Gruppe have their own in-house options and futures brokerages in ED&F Man Commodity Advisors Limited and TRX Futures, respectively. Smaller traders, particularly those dealing in speciality grades of coffee, either do not hedge or will hedge only a proportion of their traded volume. The main reason for this difference in the hedging practices of these two types of firms stems from difference in the process of coffee trading and pricing for the bulk grades compared with the speciality grades. A coffee trader sums up the practice of trading bulk coffee in the following quote:

That's the first thing you look at, New York and London....And a differential against the market. On a commercial grade it will be a description, let's say Columbia Excelsior, that grade will sell for between level money (which means the same price on New York) to plus 2, plus 2.5. It won't fluctuate far from that band, fob. And so when we're buying we try and buy at level money and when we're selling we try to sell at plus 2 and that's our 2 cent margin, and if we can make 2 cents we're a very happy trade house. On that sort of commercial grade, that's the sort of business it is. And if people aren't selling at level money then we are not buying, pretty much as simple as that.⁸

Trade in bulk grades are conducted by larger traders. The margins on such trades are small and trading companies derive their incomes from dealing in very large volumes, usually supplying the

⁸ Quote taken from an interview with coffee trader from an international trading company conducted in 2007

largest multinational coffee roasting companies. The sourcing of bulk quality coffee from around the world takes place on a continuous basis.

International trading companies purchase coffee from local exporters or companies within their trading group located at origin. For coffee from a particular origin, the international trader decides upon a differential to the international exchange at which he is willing to purchase coffee on that day. This differential reflects difference in quality of the contracted coffee compared with minimum quality deliverable on either of the international exchanges. The trader then contacts his suppliers with this offer price and the negotiation proceeds based upon local market conditions. Coffee is purchased on a price-to-be-fixed basis, at a differential, fob, with the seller's option to fix. It is up to the seller to decide to fix the price at a particular time. The actual price at which the coffee is exchanged will be the futures price at the point of fixing, plus or minus the agreed differential. Since the international trader hedges by offsetting his position in physicals with futures contracts, the time at which the price is fixed is of little importance. On the other hand local exporters tend not to be hedged so the time at which they fix can be of great importance. A seller may hold off fixing the price if he expects the futures price to rise further, he can also lose money if the futures price falls below the price at which he purchased coffee.

The large roasting companies do not purchase commercial grades of coffee on a continuous basis but will be in the market at a particular time for a particular grade. For example, a roaster will enter the market at some point in order to secure the Central American coffees that he needs for the following three to twelve months. The roasting company will make the trading companies aware of their needs, and invite offers from the various traders. Once again the contract price will be based on a differential of the relevant international exchange but with the buyer's option to fix. The price at which physical coffee of commercial grades is bought and sold at the international trade is inextricably linked to the price of coffee futures contracts on the New York and London exchanges.

Trade in speciality coffee usually begins with a phone call from the buyer requesting a small amount of coffee of a specific quality, based upon taste its profile and origin. The roaster will offer a price and, based on these instructions, the trader seeks out the required coffee from his suppliers at origin. The price that the trader will pay for this coffee is calculated from the price offered by the roaster, with his costs and margin deducted. The contracts used for buying and selling speciality coffees differ from those used in the bulk trade. To begin with, contracts are for much smaller volumes, typically between 0.5 and 2 containers. Since the quality of the coffee is paramount in

these sales, contracts are usually made subject to approval of sample (SAS). Prices can be based upon a large positive differential against the New York or London markets but often speciality coffees are bought and sold on a fixed price that may or may not be determined by the prevailing futures prices. In this way, prices for speciality coffee are to some extent de-linked from the prices that appear on the international exchanges. For this reason, the need to hedge against price movements on the exchange is tempered, which explains the fact that many of these firms will hedge only a portion of their coffee trades, dependent on the portion of coffee sold on a price-to-be-fixed basis as opposed to a fixed price. Traders of speciality coffee are not exposed to volatile prices on the international exchanges to the same extent as bulk traders.

At times of physical surplus, the roasting companies have a comparatively strong bargaining position vis-à-vis the trade houses. The largest coffee roasting companies have been known to run so called reverse auctions where traders are invited to place offers of coffee and the one who can offer his coffee at the lowest price secures the contract. The price can be bid down so low that the winning trader can be forced to default on the trade since he cannot purchase coffee at a price lower than his contracted selling price.

The wholesale use of price-to-be-fixed contracts in the bulk coffee trade at the international trader level cements the relationship between the physical and the futures markets for coffee. The use of these contracts, as opposed to fixed price forward contracts, means that the volatile prices on international exchanges are transmitted more rapidly and fully into the actual prices at which physical coffee is traded. This has implications on the way in which futures prices are transmitted from international exchanges, via international traders, upstream along individual coffee chains towards the production end of the chain. As another coffee trader observed:

[T]he futures price is the determinant all along the chain. It feeds right down through because at any point on any given day there is not going to be anyone who is able to put a price that is drastically much higher or lower than anyone who is basing themselves on the futures market....This is not so much in the speciality market but in the trading in the bulk commodities, it is very much the futures market.⁹

⁹ Quote taken from an interview with a coffee trader from an international trading house conducted in 2007.

The rise of commodities as an asset class in portfolio investment has led to a dislocation between prices appearing on the futures market and supply and demand conditions in physical markets for coffee. The inclusion of coffee futures in a number of hedge and commodity index funds has meant that coffee prices have increasingly reflected changes in financial markets more widely. For example, Newman (2008) shows that the commodities boom between 2002 and 2007 that was in the first instance driven by increasing demand from India and China for industrial inputs also put upward pressure on coffee prices despite the absence of an associated change in the supply and demand for physical coffee. The onset of the financial crisis with the collapse of the US sub-prime mortgage market in the latter half of 2007 saw an acceleration in the increase of commodity prices despite the anticipation of falling demand in the near future associated with a global economic downturn (figure 1). Prices increased until they peaked in August 2008 as funds were withdrawn from falling equity markets and reinvested into commodities.

The current financial crisis has therefore been transmitted through commodity markets in at least two ways. Firstly as a sharp short-term increase in commodity prices at the international level as investors turn towards commodity markets in the wake of failing equities and secondly as a longer term fall in commodity prices associated with shrinking demand.

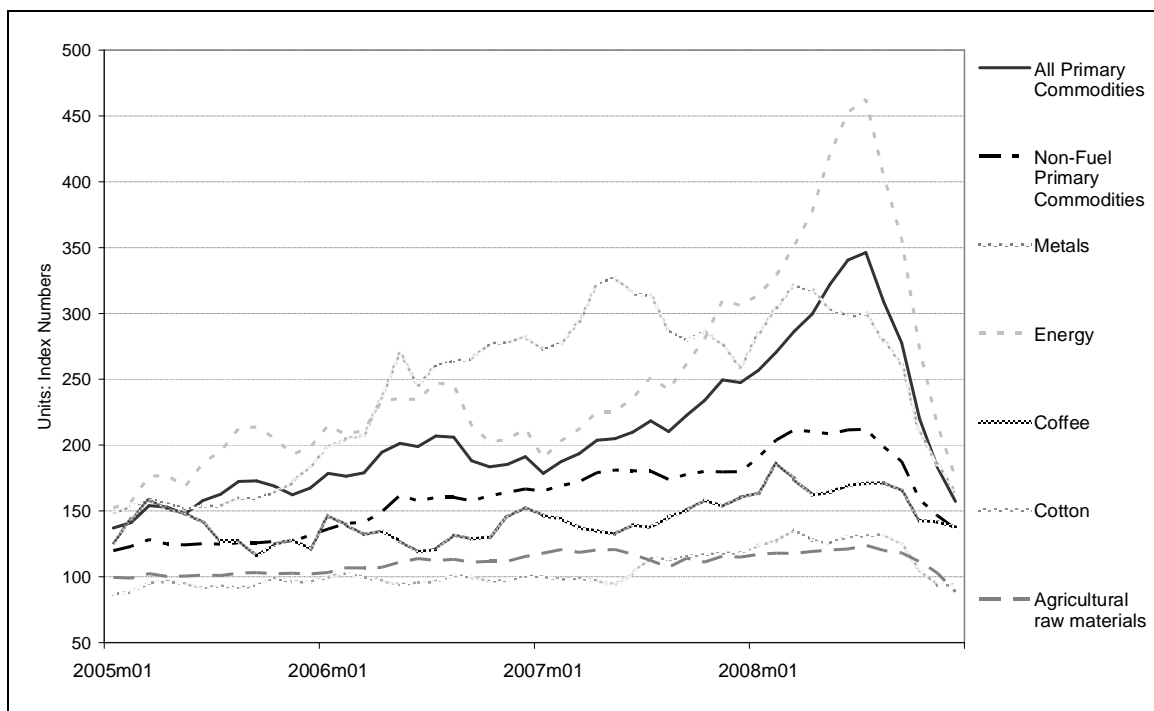


Figure 1: Monthly commodity price behaviour 2005-2009

Source: IMF IFS

3.2 The world price arrives in Tanzania

The world coffee price is brought to Tanzania by the international coffee trading companies that make up by far the largest share of coffee purchased from origin countries. The way in which international coffee prices are transmitted upstream along the chain depends crucially in the structure of the marketing system in the origin country.

There are two channels by which coffee is exported from Tanzania, via the auction and through direct export. The vast majority of coffee exports go through the coffee auction, where exporters purchase graded and bagged green coffee. Less than 20% of green coffee is exported directly by estates and farmers groups.¹⁰ For a number of commentators, “the auction appears to be an efficient pricing mechanism, in the sense that realized prices move in accordance with the New York Board of Trade futures prices” (Baffes 2005, p.35).

Direct export licenses are granted to the owners of coffee, estates or smallholder farmers organised into farmers groups, where coffee samples have been approved by the TCB to qualify as speciality grades. In addition, the seller of the coffee must have a buyer secured who is willing to pay a premium price for the coffee.

Licensed buyers at the coffee auction include private export companies (dominated by subsidiaries of MNC trading companies) and cooperative unions. For the bulk grades of coffee, the decision for exporters to purchase coffee at the auction will depend upon the sales that have been secured and their need to secure coffee in order fulfil forward contracts. Since these sales will be made at a differential on a price-to-be-fixed contract, the New York and London prices determine the price at which the exporter will purchase bulk grades at the auction. Two of the four MNC exporters interviewed operated as the buying arms of their group. Coffee sales to roasters are made through the European offices and the exporter based in Tanzania is issued with shipping instructions for these sales.

The process of purchasing at the auction and exporting speciality grades differs from that for the bulk grades. Firstly, exporters are less likely to sell speciality coffee on contracts which are far forward. Overseas buyers of speciality quality tend to procure coffee on the basis of a sample of the coffee that the exporter has already in stock. Speciality coffee exporters, including the Union exporters, have closer and more direct ties with their market. These exporters will have a good idea

¹⁰ In the 2007/8 season, direct exports accounted for 16.1% of total coffee exports by volume. (Data from Tanzania Coffee Association 2009)

of what their customers are looking for and purchase coffee on the auction accordingly. The pricing of speciality coffees differs from the bulk also. They tend to sell on a large positive differential to New York. This differential is realised on the basis of a sample through analysis and cupping by the exporter and his client. Coffee that is destined for the gourmet market may be priced with no consideration for the New York price.

In the 2006/7 crop year, 60% of mild Arabica coffee sold at auction was made up of the premium and speciality grades.¹¹ Since the pricing of these coffees can be less dependent on New York it might be expected that swings in prices on the New York market will not be as fully reflected in the auction prices. This would explain the findings by Krivonos that there was a slight reduction in the degree of price transmission between world and local coffee prices in Tanzania. In contrast to Krivonos' own interpretation of this finding as a result of the incomplete nature of the coffee market reforms in Tanzania, the weakening in the cointegration relationship between world and local coffee prices can be interpreted as the consequence of the TCM's strategy to differentiate green coffee at the auction and market speciality grades where prices are realised differently. In addition to a weak relationship between "world" prices and auction prices, we might expect increases in price on the New York exchange to be more fully reflected in the auction price than decreases.

The mixed system of export in Tanzania also affects the transmission of prices from the world level to the local level. The price of coffee that is exported directly acts as a guide to prices that appear on the auction (and vice versa). The two competing channels for export may act to drive the export/auction price up since the price of coffee for direct export is largely negotiated outside of the movements in the price of bulk grade coffee on the world market.

Based upon the way in which the world price enters the Tanzanian coffee system by way of international exporters, one would expect falling commodity prices at the international level to be reflected most fully in the auction price of bulk grades and to a less extent in the price of coffee that is directly exported.

¹¹ The figure of 60% was calculated based on the categorisation of AA, A and PB grades under premium and speciality coffee.

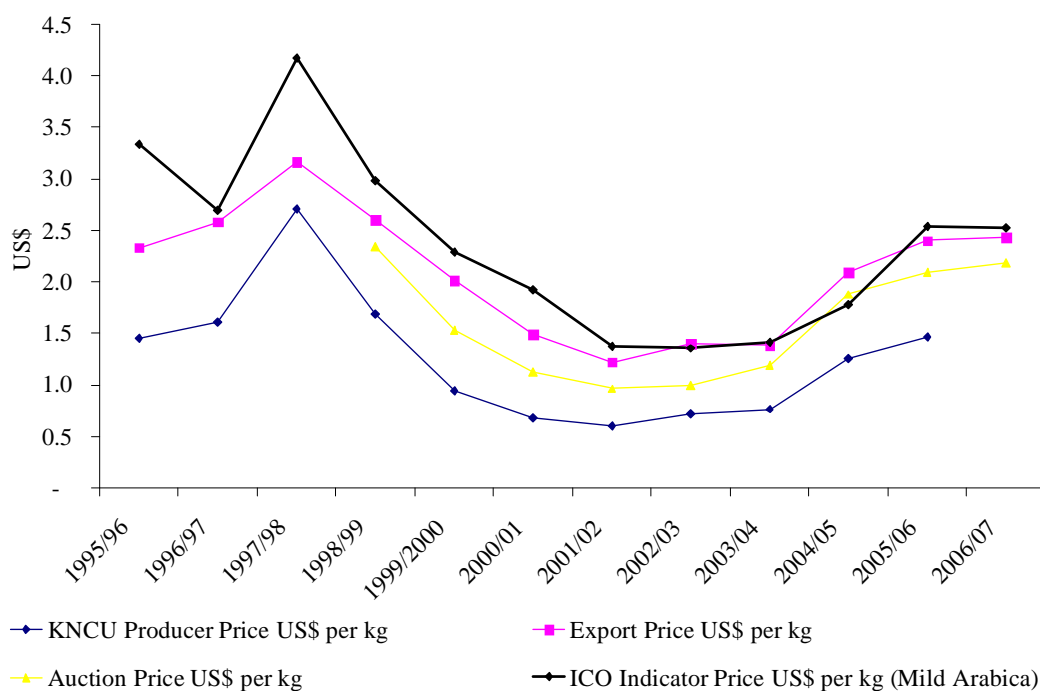


Figure 2: Nominal Arabica coffee prices in US\$ per kg

Sources: ICO Indicator Price for Mild Arabica are taken from www.ico.org (1990/91-2006/07); Export and Auction Prices were obtained from the Tanzania Coffee Board; KNCU Producer Prices are taken from the basic KNCU price offered to producers prior to receipt of final payment. Exchange rate: International Financial Statistics, Official rate at end of period – National currency per US\$.

Figure 2 shows the annual average prices received by different actors in the Tanzanian coffee chain, translated into US dollars. The graph shows the general co-movement of annual average prices for Arabica coffee within Tanzania and between world, export and producer markets. However, in order to really understand the transmission of prices to coffee producers in Tanzania, other factors need to be considered closely.

3.3 Domestic price transmission in Tanzania: Going beyond the basics

In order to assess the nature of the impact of the current commodity price crisis at the domestic level and on producers in particular, a short diversion into the factors that drive prices and incomes in the Tanzanian context and for coffee is required.

Current literature on price volatility has often failed to distinguish between annual price changes and movements in the price within one season. Within-season price changes have become a particularly important issue following liberalisation and the removal of centrally-set, pan-seasonal prices for coffee (Ponte 2002b; Ponte 2004). Considering auction data for coffee provides an indication of the variation of prices over each year since 1998/99.

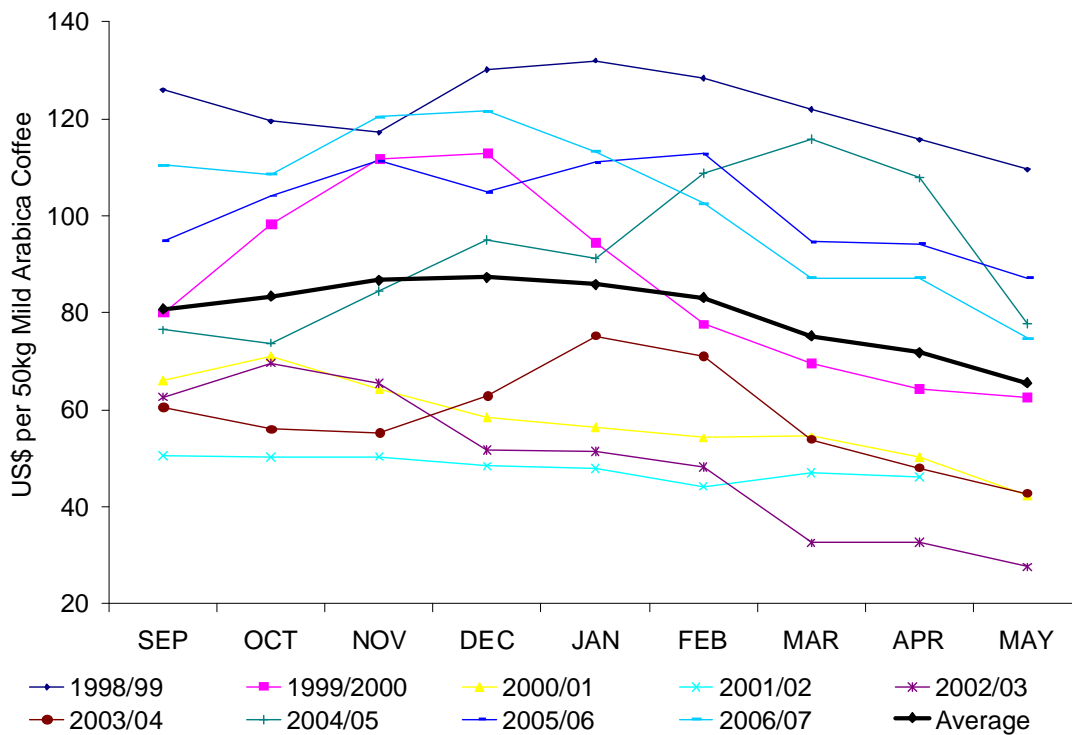


Figure 3: Tanzania's monthly, nominal coffee auction prices

Source: Tanzania Coffee Board.

Figure 2 revealed the dramatic decline in average annual coffee prices between 1998/99 and 2001/02. The downward movement in prices between years may help explain the dramatic fall in prices between December 1999 and May 2001, spanning both the 1999/2000 and 2000/01 season. Considering monthly prices in subsequent years, it is initially hard to determine a particular seasonal pattern for the development of these, although prices are clearly far from smooth across seasons.

2004/05 acts a good recent example of the magnitude of within-season price changes for coffee. Prices started at under 80US\$ per 50kg bag in September 2004, but gradually rose to reach a peak of 115US\$ in March, before declining sharply to US\$80 in May 2005. In general, one can note a shallow, inverted u-shaped pattern, with prices initially increasing gradually between September and January and subsequently declining from March to May. With the exception of 1999/2000 when prices declined significantly, the last four years appear particularly volatile, with prices following erratic movements over the season.

The coffee auction prices captured by figure 3 do not necessarily reflect the prices received by producers due to the intervening and stabilising function of the local cooperative union. In terms of domestic price transmission, the Tanzanian coffee marketing system, with its parallel cooperative

and private marketing channels, and the existence of a central auction, reveals some interesting complexities (see figure 4).

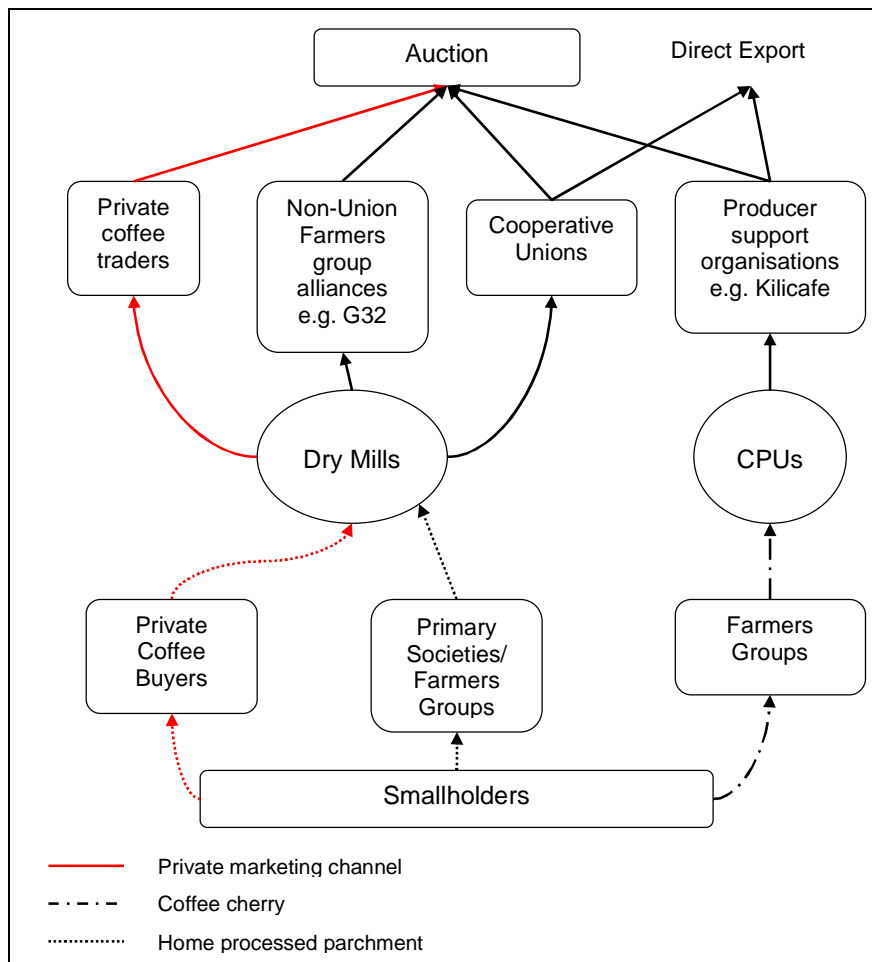


Figure 4: Local marketing system for smallholder coffee in Tanzania

There are four main channels by which smallholder coffee is marketed locally. The purely private marketing channel consists of private coffee buyers (PCBs) purchasing parchment at the farm-gate or at local buying posts. The PCBs deliver the parchment coffee to the dry mills for processing at a fee. The coffee is then stored and ready for auction. While the ownership of the coffee is transferred to the parchment buyer in the private marketing chains, ownership of the coffee remains with the farmers until the auction in the three remaining marketing channels. The traditional cooperative channel is still in operation in the Kilimanjaro region. Farmers deposit coffee at the primary society where it is inspected and weighed. The farmer is given a first payment for the coffee. The collected parchment is transported to the Union owned mill and processed. Once the coffee has been auctioned, the farmers receive a second payment for the difference between the auction price and the first payment, with costs deducted.

The remaining two marketing channels utilise elements of the cooperative marketing system. A number of primary societies have left the unions to which they once belonged and have formed alliances with other farmers groups to market their coffee. Here, cooperation between the groups is for marketing purposes only. The final, and most recently introduced, marketing channel is that which is coordinated by producer support organisations (PSOs). These are largely funded by external donors and the organisations deliver programmes and services aimed at developing the smallholder coffee sector in Tanzania. The projects aim to improve the quality of smallholder coffee and market it externally as speciality coffee. The main strategy for improving quality is through central processing. Rather than collect home processed parchment, farmers engaged in these marketing channels deliver dry cherry to central pulper units (CPUs)/washing stations where it is processed. PSOs follow a similar payment system as the Unions.

The continued economic viability and functioning of the cooperative unions in most regions has allowed these to provide producers with a more stable producer price. Producers in Kilimanjaro region who sell to KNCU should therefore face more stable prices than those selling to private companies. This is due to the KNCU's stable payment system, which offers producers the opportunity to sell their crop early but still benefit from potential increases in price once the crop has been sold to exporters through the auction. Most coffee producers in Kilimanjaro region have completed harvesting and selling their coffee by December and relative gains from price increases will evidently depend on year-to-year price developments. Furthermore, prices within the region in which KNCU operates are unified across geographical areas. Producers who chose to sell their coffee to private companies at village buying posts are not able to benefit from this additional payment system and instead receive a one-off price.

On top of the need to analyse seasonal prices, a consideration of nominal versus real prices is necessary for understanding the transmission of real prices to Tanzanian coffee producers. As figure 2 shows, in nominal terms, producer prices initially increased following liberalisation but subsequently gradually declined over time to reach a low in 2001/02. Since then nominal coffee prices have started to rise again. A consideration of real producer prices reveals an intensification of price movements. Deflating Arabica coffee prices by the Tanzanian consumer price index in figure 5 demonstrates this process. Producers have been particularly hit by the dramatic fall in coffee prices over the late 1990s and early 2000s, when compared with the cost of food.

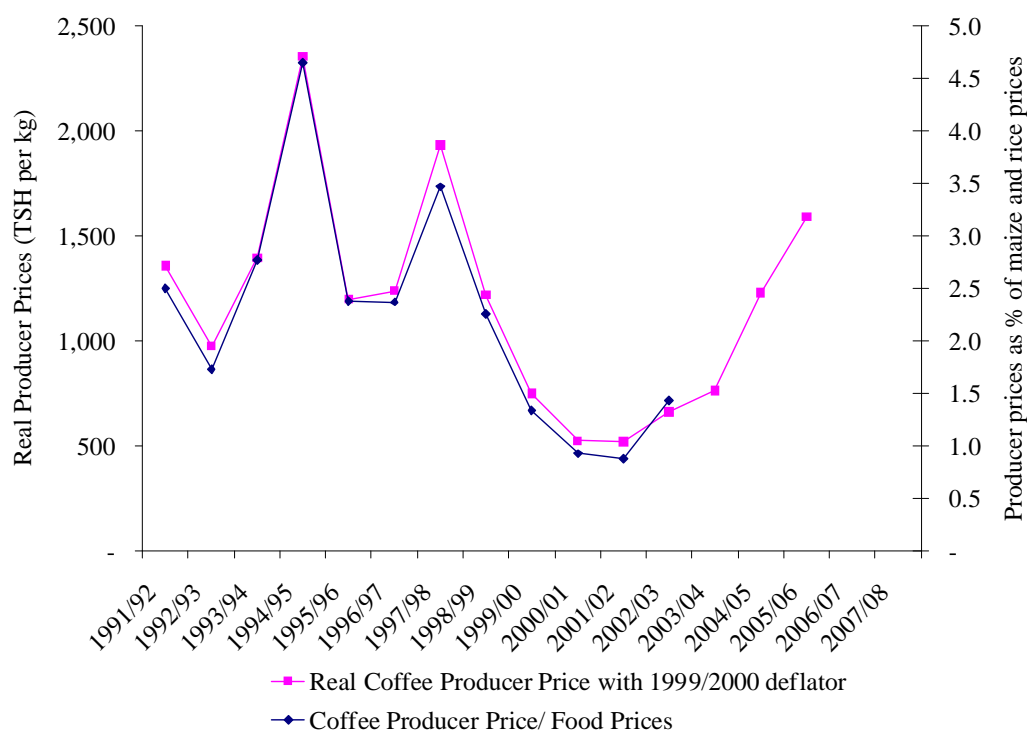


Figure 5: Real coffee producer prices (1990/91-2006/07)

Sources: The real coffee price is calculated using the producer price (KNCU in TSH/kg (1990/1-2005/06); and own survey (2006/07)) divided by the national consumer price index (World Development Indicators (1990/91-2006/07)) using 1999/2000 as a deflator. The relative prices are given by the nominal price in TSH/kg divided by the sum of the nominal retail prices of maize and rice (United Republic of Tanzania, 2003a (1991/92-2003/04)).

Data shortages prevent us from analysing the progression of nominal producer prices relative to both the cost of informal, seasonal labour and non-labour inputs, such as pesticides. In the context of Tanzanian coffee farming, some of the central input-related expenses are chemical pesticides, fungicides and insecticides. Full time-series datasets of insecticide and pesticide prices are not available and further complications are created by the proliferation of brand names and types of chemical inputs licensed for use on coffee since liberalisation of the input market.

However, we can determine from our own surveys as well as from secondary data, as provided in table 1, that the real cost of these inputs has increased noticeably since liberalisation, leaving producers with an even lower real price than depicted in figure 5. Comparing the cost of one commonly used chemical - Karate 5 EC - over time, a study of prices in the 1999/2000 season put this at TSH 9375 per litre equivalent in real terms (Itika and Makauki 2007). By 2005/2006, according to Agenda (2006), the cost of this had almost doubled in real terms. Nonetheless, a full consideration of changing input expenditure over time cannot be gleaned from table 1 alone, as studies evidently vary in the types of chemicals considered as well as the geographical regions and crops under investigation.

Table 1: Secondary information on pesticide and insecticide prices in Tanzania

Pesticide Name	Year	Price in TSH per 1lt equivalent	Real Price in TSH per 1lt equivalent (1999/2000 Prices) (1999/2000 base year)	SOURCE
Chemical*	1996/97	3000	3867	(ICRA 1997)
Insecticide	1997/98	4100	4686	(Gibbon 1998)
Karate 5 EC	1999/2000	9375	9375	(Itika and Makauki 2007)
Chemical*	2001/02	4500-7000	4262-6629	(Nylandsted Larsen 2003)
Various chemicals	2001/02	3500-6000	3315-5682	(Shao 2002)
Crop-protecting chemicals (various)	2001/02	7000-8400	6629-7955	(Maro and Poulton 2004)
Dursban	2002/03	9500	8959	(Itika 2005)
Dursban	2003/04	16000	15033	(Mhando and Itani 2007)
Pesticide*	2004/05	10000	9360	(Kabelwa and Kweka 2006)
Selecron	2005/06	21000	19553	(AGENDA 2006)
Dursban	2005/06	10500	9776	(AGENDA 2006)
Karate 5 EC	2005/06	19375	18040	(AGENDA 2006)
* Exact name of chemical/ pesticide not given in study				

The removal of subsidies and credit arrangements over the liberalisation period has increased the real cost of non-labour inputs dramatically. A World Bank study in 2000 found that the ratio of cotton producer prices to farm gate fertilizer prices had declined from 4.37 between 1985 and 1989 to 0.81 in 1998 (World Bank 2000). Similar direct comparisons for chemical pesticide and insecticide inputs are more difficult, although a glance at table 1 does demonstrate a general upward trend in prices over time.

The above considerations suggest that coffee producers in Kilimanjaro region are exposed to considerable real price variations and that the current commodity price crash will have impacted them significantly in real terms. The removal of pan-territorial and pan-seasonal prices; the opening up of the marketing system; and the removal of input subsidies will have exacerbated the real impact of price declines. Furthermore, these concurrent developments suggest that differences between those affected by the recent price decline may emerge. This is explored in the next section.

3.4 Price behaviour and coffee producers

Having considered the complexities concerning the transmission of prices to Tanzanian coffee producers and the intervening factors relating to a) within-season price instability; b) structural marketing features; and c) nominal versus real prices, there is need to consider how producers themselves have perceived price transmission and have been affected by price changes. The analysis and reporting of results in this section rely on data primarily originating from semi-structured producer interviews, as well as village-level focus groups and interviews with agricultural extension staff and school teachers in village primary schools in the 2006/07 production year. 35 coffee producers of different size and wealth, across three villages (Kiruweni, Wanri and Narumu villages) in Kilimanjaro region were interviewed to obtain information regarding price experiences and impacts. While the current commodity price crisis was not covered in these interviews, responses to previous price declines and a fuller understanding of the current institutional and marketing context allow us to extrapolate and consider the current crisis and its impacts.

Overall, interviews with coffee producers clearly reflected the negative trend in real producer prices over the last 10 years. The majority of coffee producers reported witnessing a decline in prices over recent years with increased instability between seasons. A minority of producers across the villages reported a slight increase in nominal prices in the last one or two seasons (2004/05 and 2005/06) while a similar minority were not aware of any particular trend in prices over time. The few producers who mentioned a positive movement in prices in recent years also stated that this tended to be accompanied by increased costs of inputs, particularly insecticide and fungicide. As a result, income from coffee for the majority of producers had declined over recent years. The minority of producers who had experienced real increases in income as a result of nominal increases in the coffee price, had put this income towards the renovation of their coffee farms as well as investment in livestock, especially dairy cows, house-building and their children's education.

The majority of those interviewed mentioned 1998/99-2001/02 as the period during which prices were particularly low, and during which they had been most detrimentally affected. The extent of the price drop during this period varied between producers, although most saw nominal prices fall

below TSH 400 per kg i.e. under one third of the 2006/07 price. The impact of this decline in prices and income was once again varied with only those producers reliant on other income sources stating that they had not been affected. In general, the impact was felt across households with most producers lowering their consumption and expenditure in response to the drop in prices. Furthermore, expenditure reductions affected the entire household through cuts in expenditure on housing, clothing, school fees and other essential school-related equipment. A further area mentioned by those most affected by the drop in prices was a search for employment and, to a limited extent, the sale of livestock assets. Finally, the fall in prices over the 1998/99-2001/02 period was also a deciding factor in shaping agricultural decision-making and changes to coffee production in the area.

Turning now to within-season instability, the experience here is similarly diverse as that of between-season price movements. While most producers noted an increase in within-season instability, its impact was masked by the cushioning effect of the staged payment procedure of the KNCU. As a result, roughly half of those interviewed were not aware of particular patterns or instability of prices over the season and had made no attempt at managing this or timing the sale of their crop. Nonetheless, over half of those interviewed did engage in seasonal storage. This was not always as a means of obtaining a better price, but instead producers tended to store their crop in order to sell it in bulk and obtain one lump sum payment for their crop. Producers selling to private buyers were more aware of increased within-season volatility over recent years and the general pattern of increased prices as the season progresses.

Evidently, a number of distinctions in the general picture can be observed. Here we can distinguish initially between-villages and then turn to some of the differences relating to producer wealth, highlighting the differential impact on, and strategies adopted by, poorer producers in comparison to their wealthier counterparts.

Between-village differences

A good starting point for discussing village-level differences is a closer look at the prices received by producers in the 2006/07 season across the three villages. As we can see from table 2, producer prices were diverse, depending on which statistics are considered. Furthermore, the prices received by producers varied between and within villages.

Table 2: Nominal average prices per kg of Mild Arabica Coffee in TSH in 2006/07

Village	Auction price: National	Producer price: KNCU price (pre final	Producer price: District level reported	Producer price: From	Spread (St. dev) of prices within villages: From

	level	payment)	price	interviews	interviews
Kiruweni	2750	1500	1500	1800	358
Narumu	2750	1500	1700	1200	105
Wanri	2750	1500	1700	1400	82

Differences in the average prices received by producers for their coffee are quite stark. On average, producers in Kiruweni village obtained a higher price for their coffee in 2006/07 when compared with the other two villages and especially when compared with Narumu village. However, the spread of prices was also greater in Kiruweni village when compared with the other two villages. The above picture regarding prices in 2006/07 is also reflected in the longer-term view of prices at the village level, where producers in Kiruweni reported a slightly more positive view of prices. They occasionally even mentioned price increases over recent seasons compared with previous years. Wanri and Narumu village on the other hand displayed a particularly negative view of price developments over recent years.

When it comes to coping strategies, no patterns at the village level are discernable. In all three villages a variety of strategies were relied on, although in Kiruweni it was evident that producers tended to rely on more than one strategy, reducing their consumption as well as attempting to raise their household income. When considering within-season price changes, village-level differences were also hard to detect. Across all three villages roughly half of those interviewed mentioned an increase in within-season price volatility. Similarly, strategies used to deal with the problem were mixed across villages with no clear differentiation emerging.

Within-village differences

Taking our analysis beyond that of the village, we can investigate how producers of different wealth experienced prices and dealt with price changes. The first thing to note here is the general sense of price developments over recent years. Producers in the highest wealth category tended to have a more positive experience of prices when compared to medium and poorer producers. That is not to say that the wealthiest producers across the three villages did not note the drop in prices in 1999-2002. It was in the relative impact and response strategies that differences between wealth categories were in greater evidence. Within the first category of producers, the wealthiest, the effect of the price drop was minimal whereas other producers were clearly more harshly affected.

To cope with a price fall, wealthier producers tended to rely on other sources of income, would temporarily halt investments in the building of their house, or would rely on the sale of other crops. Frequently these producers reported that they could manage by adopting a simple adjustment in their consumption or expenditure and were not affected in the medium to long-term.

Turning to the medium-wealth producers, the effect of price changes has been more detrimental. One major difference between these producers and their wealthier counterparts was the impact of price falls on the household as a whole, with children affected through the delay in payment of school fees. A frequent strategy among this group of producers involved the temporary borrowing of money or delaying of household spending (frequently the payment of children's school fees) until farm income from other sources (usually bananas) had been collected, allowing them to then repay their debts and pay school fees. For many producers in this category, the drop in prices also had a productive impact: they would decrease their spending on labour and non-labour inputs.

Finally we can turn to the poorest producers across the three villages, where between-season price drops have had the most severe effects. These producers and their families were affected in a number of ways, and response strategies were mixed and overlapping. Not only did producing households seek to lower their total food consumption and change their habits, by eating more staple foods and smaller portions, but they also reduced expenditure on clothes, school fees and equipment. Furthermore, within this category, producers frequently sought farm employment as a result of the price fall and sold livestock assets to raise their income. This category of producers tended to adopt more than one strategy and the price drop clearly had widespread and longer-term consequences on household coffee production and income sources.

The experience and responses to within-season price changes by our different wealth categories in coffee-producing villages are less easily observed. While there was no pattern in the experiences of within-season instability between producers, some differences emerge when considering storage strategies. It is mostly wealthier producers who engage in storage exclusively as a strategy for obtaining higher prices, while the medium and poorer producers tend to store their crop in order to sell it in one lump sum.

Implications for the current crisis

The above results from coffee-producing villages in Kilimanjaro region highlight some important aspects that need to be considered in the context of the mid-2000s coffee price boom and the recent bust. Evidently, coffee producers in Kilimanjaro region have not uniformly benefitted from

the rise in coffee prices since 2007. Instead, the concurrent rise in input prices and marketing costs has meant that many producers felt their incomes had remained unchanged or declined over time.

Furthermore, given the channels of impact of previous price falls in the early late 1990s and early 2000s, one can infer that producers will be impacted by the recent price crash to differing extents and in diverse ways. The variation of impact will be particularly felt across wealth categories, with wealthier producers more able to weather the impact by turning to alternative income sources. Poorer producers and their families will be particularly affected by the recent decline in coffee prices, with areas such as school fees, uniforms and equipment suffering from household expenditure cut-backs.

4. Conclusions

This paper has examined the nature of price transmission from futures markets along different segments of coffee chains and their implications for Tanzanian coffee farmers. Four main points can be drawn from our analysis of the processes of price transmission and implications of falling commodity prices in the wake of financial crises. Firstly, it has been argued that there has been a dislocation between movements in coffee futures prices and changes in physical supply and demand conditions owing to the rise of commodities as an asset class in portfolio investment. The increasing influence of financial markets in coffee price formation at the international level has meant that the current financial boom and bust have accentuated world coffee price movements in the shorter-term.

Secondly, the way in which prices are transmitted from the world level to coffee exporting countries depends crucially on the structure of the domestic marketing system. The auction system in Tanzania has improved the transmission of international price movements to domestic institutions, exporters and traders (albeit asymmetrically). However, the introduction in 2003 of a direct export channel has enabled those trading in speciality and top quality coffee to be, to some extent, cushioned from such international price movements.

Thirdly, at the producer level the combination of the removal of pan-seasonal, pan-territorial pricing systems; the opening up of the purchasing system for coffee; and the rising cost of inputs, have not allowed for a full downward transmission of positive price movements and have exacerbated the transmission of commodity price falls to the producer level.

Finally, the above changes in the domestic marketing, pricing and production structures for coffee have also led to a differentiation in price experience and impact. Within Kilimanjaro region, producers linked to the KNCU cooperative system are to some extent cushioned from within-season

price changes. Comparing across villages and wealth categories in the region demonstrated large differences in prices received by producers and differences in their ability to cope with sudden price falls.

The implications of these four observations are that falling commodity prices that result from the current economic crisis are likely to impact coffee producers in developing countries more severely than might be expected previously.

Current discussions on remedying the transmission and impact of unstable commodity prices have tended to focus *either* on the international and financial dimension at the international level *or* have considered aspects relevant to commodity producers. This paper, having considered the transmission of prices from international financial markets down to producers has demonstrated the importance of integrating these areas of research and policy. If the aim of policy is to protect those most vulnerable to the detrimental effects of commodity price instability, then both developments at the international and domestic level need to be taken in to account.

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