From Futures Markets to the Farm Gate: A Study of Price Formation along Tanzania's Coffee Commodity Chain

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Abstract

This article examines the nature of price formation and transmission in the Tanzanian coffee price chain. To date, research on the real-world processes of price formation have been scant in economic geography and extant literatures. This article addresses this by focusing on price formation in geographically distant but connected markets, and the interaction between global and local price dynamics. The article employs a new framework that builds on chain and network approaches by integrating concepts from marketization and institutional approaches. The study finds that the *world* price of coffee has become increasingly volatile as a result of the behavior of international coffee traders and broader shifts in the character of global capital accumulation. It also demonstrates the varying role domestic marketing and local-level institutions play in shaping price formation and cushioning Tanzanian producers from sudden price changes. Finally, the study highlights the role prices, via these local-level

institutions, play in extenuating differentiation between producers, creating winners and losers.

> A one-pound bag of whole bean coffee from Starbucks under the name of Komodo Dragon Blend, a blend of Asia Pacific coffee beans with Papua New Guinea prominently mentioned on the label, costs $12.29. . . . Growers in Maimafu[2] received $0.33 for a pound of their coffee on 8 August…On the same day exporters in Goroka were paid between $1.00 and $1.41 per pound, depending upon the coffee's certification . . . of the $12.95 paid for a pound of fair-trade or organic beans, only $1.41 stays in Papua New Guinea. The rest of that price, $11.54, goes somewhere else. (West 2012, 16–17)

The above quote from West (2012) exemplifies a narrative of scholars and activists, for example in the fair trade movement of the 1990s and 2000s, interested in exposing the unequal trade relations and distribution of income along supply chains that connect producers in the Global South to consumers in the Global North. At the same time, global value chain and related variant approaches (hereafter referred to collectively as chain approaches/studies) rose in prominence in development studies and economic geography literatures as providing insights into the opportunities and challenges for developing country firms and actors integrated into global supply chains and production networks. Such approaches have subsequently been taken up by nongovernmental organizations and international development organizations, including the World Bank, World Trade Organization (WTO), and United Nations Conference on Trade and Development (UNCTAD), as blueprints for development

[2] Maimfu is the site of West's (2012) research, and Goroko is its nearest marketing center.

under contemporary global economic conditions and organization,[3] appearing as an unlikely confluence between more mainstream economic approaches, preoccupied with market integration as an end and in itself, and more critical chain studies grounded in world systems theory and the global production network approach in contemporary economic geography (Bair 2009; Neilson, Pritchard, and Yeung 2014; Coe and Yeung 2015).

Chain approaches in economic geography applied to issues of development and North–South economic relations have drawn from mainstream economic theory, institutional approaches, and new economic sociology. As such, they have provided great insights into new forms of industrial organization and the potential implications for development. However, detailed investigations on the real-world processes of price formation have been scant (Beckert 2011).

That detailed investigation of price formation in chain studies appears somewhat of a surprise given the significance and criticality of prices both in the coordination of economic activities and the distribution of wealth as well as prices as the outcome of the forces that structure market exchange. In this latter sense, prices "are anchored in institutional regulation, in the social structure of markets and in meaning" (ibid., 759) rather than the aggregate outcome of individual supply and demand interactions. This is not to say that the issues of prices have been entirely absent from chain studies; rather, they appear as crucial conditioning influences on the organization of production as opposed to an objects of study in their own right.

This article thus aims to contribute to extant debates and dialogues in economic geography more generally, and complements and develops existing chain approaches in

[3] Seven UN agencies joined together in 2010 to create the United Nations Value Chain Development Group in an initiative that highlights the broadening appeal of value chain approaches in development practice (Neilson, Pritchard, and Yeung 2014).

particular, by introducing the study of price formation. Using the example of coffee chains originating in Tanzania, this study seeks to advance our understanding of how prices are formed along supply chains that span multiple national boundaries and their implications for value distribution along chains and the extent to, and ways in which, unequal North–South economic relations are reproduced or challenged.

Tanzania is particularly fascinating case study for a number of reasons. Coffee is an important income source for the economy as a whole as well as for individual producers and their families. Despite accounting for less than 1% of gross domestic product in 2010 (International Coffee Organization [ICO] 2015a), the coffee sector averages US$ 100 million in export earnings per annum, and over 2.4 million individuals in Tanzania depend on coffee for their livelihoods in some way (Tanzania Coffee Board 2012). Coffee marketing and trade have undergone numerous changes, permitting an investigation of multiple marketing systems in parallel and allowing for an examination of the relational dynamics between and in new and old institutional structures. In Tanzania, coffee is produced in the north around the foothills of Mount Kilimanjaro (predominantly Arabica coffee) and in the south (predominantly Robusta coffee). This study focuses on the production of Arabica coffee in the Kilimanjaro region. The position of Kilimanjaro's coffee producers as price takers in the international coffee market allows us to investigate price relationships originating at the global level down to the local level in the field.

This study brings together in-depth research of how actual prices come into existence on the ground and how prices are formed and transmitted by different actors in Tanzania and at the level of domestic and international trade. The institutional aspects we consider as loci of such global–local links include the cooperative unions and appended institutions such as

village primary societies.[4] We will also consider the roles of the central coffee auction and the New York derivatives markets in forming and transmitting prices along the chain.

The article is organized as follows. The next section discusses approaches to the theory of price formation from mainstream economics, contemporary economic sociology, and economic geography before sketching out in the section that follows this study's approach to the study of price formation in spatially separated but connected markets along commodity supply chains. The third section presents the results from this investigation of price formation along the *price chain* from coffee futures markets to the farm-gate in the Kilimanjaro region of Tanzania. The penultimate section provides a discussion on the development implications of pricing mechanisms and modalities in coffee markets today and a calls for more detailed investigations of how real-world markets operate, and more detailed studies of processes of price formation for other commodities and in other countries. The final section provides conclusions on price formation and development.

Approaches to the Study of Markets and Price Formation along Commodity Chains

This section presents the various ways in which the state of the art has analyzed and dealt with *prices* in commodity markets. Three differing approaches are presented from very different scholarly and methodological origins. The three approaches can be classified as (1) the mainstream economics approach, (2) chain and network approaches, and (3) the institutional approach. By discussing these different approaches and their attempts at the study of prices in commodity markets, it will become clear where this particular study is able to fill gaps by crossing the currently distinct boundaries of theory and method.

[4] Primary societies are voluntary groupings of coffee farmers, based around their village or locality and are aimed at assisting producers with the production and marketing of their coffee. These societies were originally introduced as a central part of the cooperative marketing system. Today, however, the functions and membership numbers of primary societies in Tanzania are not uniform.

Mainstream Economic Approaches to Prices along Commodity Chains

At the core to mainstream economic approaches to the study of prices is the neoclassical theory of price determination where price results from the coming together of supply (as the aggregation of individual firms' output informed by the dictum of profit maximization) and demand (as the aggregation of individuals' demand determined by given and static preferences) through market competition. Given the critical coordinating function of prices as providing "crucial points of orientation for actors in market exchange that make heterogeneous objects and services commensurable" (Beckert 2011, 759) and the centrality of market exchange in mainstream economics, it follows that the translation of theory into both policy practice and empirical research on supply chains focus exclusively on market integration in order to unleash the forces of economic restructuring according to the comparative advantage of each country, and price transmission, respectively. If unabated by market imperfections, competitive markets are understood to guarantee an efficient allocation of resources and in turn implies that factor and product prices in spatially separated markets will differ only by transport and storage costs. Given that the definition of market integration implied by the standard spatial equilibrium model links directly to price outcomes, co-integration analysis—the times series econometrics method that allows the investigation of long-run *equilibrium* statistical relationships between variables—has become the most prominent analytical tool employed in empirical studies on market integration. In addition, co-integration analysis and its associated error correction models are presumed to allow the researcher to test certain features such as completeness, speed, and asymmetries in the relationship between prices. Here, focus has been on the extent and statistical nature of *price transmission* along supply chains (e.g., Abdulai 2000; Krivonos 2004; Rapsomanikis, Hallam, and Conforti 2006; Cudjoe, Breisinger, and Diao 2010).

While error correction models may provide forecasts for spot price developments in the near and medium term, they present a number of analytical, and technical, limitations that prevent their legitimate use as a model of price formation in commodity markets. First, this abstract view of markets *disembedded* from their institutional contexts and social, cultural, and political processes that make up real-world interactions constituting a market and shaping market outcomes can tell us little about the mechanisms by which prices are formed or the role that they play in processes of production and exchange. Second, the mainstream economic approach is unable to explain spatial variations in prices except in terms of market imperfections and lack of market integration that divorce localized supply and demand dynamics from regional or global market conditions. Third, greater price pass-through from world markets to prices received by primary producers in and of themselves cannot be taken as supportive of development processes. Fourth, supply and demand models conceive of markets as *horizontal* supply and demand relations and neglect the vertical structure of commodity supply chains. The above concerns with the mainstream economic approaches are highlighted by the theoretical approach discussed below and in Figure 1, where the standard economic approach takes into account column B only.

[INSERT FIGURE 1 ABOUT HERE]

Chain and Network Approaches to Price Formation and Transmission

Born out of a critique of *disembeddedness* of mainstream economics' market abstraction, network approaches to the study of markets (and price formation) emerged from economic sociology and focused on the social *embeddedness* of economic action, namely, as "embedded in ongoing networks of personal relationships rather than being carried out by atomized actors" (Granovetter and Swedberg 1992, 9) Network approaches to the study of price formation thus investigates power, trust, and status differentiation as mechanisms

through which networks, and network position, become relevant for market prices (Beckert 2011).

In network approaches, price is the outcome of how relationships are structured in the market field and how network position influences costs with power, trust, and status differences between actors as key factors in the formation of price (ibid.). Furthermore, price-based competition along supply chains and the ways in which differentiated chain actors are able to create spaces for price negotiation and organizational forms to shield them from price-based competition remain critical for development outcomes and therefore deserve greater attention than is currently afforded in chain studies (Ouma 2012).

While network or relational approaches to the study of markets have been prevalent in recent economic geography literatures, there has been very little attention on price formation in networked markets. In relation to agrofood chains, Ouma (ibid.) adopts a *relational–constructionist* approach that draws heavily from relational approaches while emphasizing certain insights from the marketization approach, namely, the necessity of studying materialities of market making (discussed below). A firm's survival is dependent on achieving relational stability: stable "socio-material relations vis-à-vis worker, suppliers, buyers, consumers, and the state" (Ouma 2012, 323). While not focussing on processes of price formation, Ouma (2012) showed how the maintenance of relational stability was key to shielding certain actors from price competition, on the one hand, and how price competition can destroy and undermine relational stability in the case of Tongo Fruits (a Ghanaian agrobusiness firm specialising in the cutting and packing of fruits fresh from harvest in the country of origin), on the other hand.

Rather than a clear break from network approaches of new economic sociology, marketization, as a subset, or *one modality*, of economization, retains much of the language and analytical devices of network theorists while orientating the focus of study on to

materialities: "the socio-technical assemblages and things that circulate from hand to hand" (Çalışkan and Callon 2009, 384). Rather than focus on networks and social relations, institutions, rules, conventions, norms, and power struggles in the social construction of markets, marketization theorists view the construction of markets as sociotechnical and regard technical devices of market making such as "techniques, sciences, standards, calculating instruments, metrology and, more generally, material infrastructure in market formation" (ibid).

Çalışkan and Callon (2010) lay out a research program for the study of markets and propose prices as one of five vantage points from which to examine marketization.[5] Here, price setting is a political process in which prices are the outcome of struggles between actors, each attempting to impose their mechanism for determining the value and quality of a good. What Çalışkan and Callon (ibid.) add to the notion of prices as the outcome of political struggle in classical sociology (Weber 1978) is that calculation tools are differentially mobilized by agents to estimate quantifications. Prices are therefore "at the heart of agents' struggles to produce asymmetries in the distribution of value" (Çalışkan and Callon 2010, 17). More powerful actors are able to impose their method of valuation on others and thus affect the distribution of value.

Çalışkan (2010) provides a rare example of the study of price formation, or what he refers to as price realization, along agrocommodity supply chains that applies a marketization approach. His analysis traces the agents along the chain and analyzes their interactions as they make use of technical devices according to differentiated positions of power in the negotiation of prices, how different narratives of the market are normalized into the everyday discourses and actions, and how conventions are maintained through performance and

[5] The other four vantage points consist of the things in the market, agencies, encounters, and market maintenance.

practice in the encounters between traders in what Çalışkan refers to as *rehearsals*. In the context of cotton price realization, these technical devices include influential market reports, price indices (the Cotlook A and B indices, the adjusted world price calculated by the US Department of Agriculture), and the price of derivatives contracts on the New York Board of Trade[6] (NYBOT). Moreover, Çalişkan shows that cotton prices, in some instances, depending on the structure of local marketing systems, can be shaped politically owing to the uncertainty of future supply and thus price. In this way, Çalişkan shows how cotton futures prices influence the price at which cotton is exchanged without necessarily reflecting supply and demand of physical cotton.

To date, the application of network and marketization approaches to the study of markets has left in the background, how networks and agencies, and therefore economic action, are specified by, and embedded in, their institutional context, and ignore the longevity, or resistance to change, of institutions themselves (Hess 2004; Sunley 2008). In the context of Figure 1, such approaches are dealing with segments B and C of the chain, and investigate the arrows between some of the price points. Most tackle the middle section of this figure, not necessarily concerned by the macroinstitutional factors (covered in segment A) in shaping price formation. Neither do such approaches tend to investigate price transmission or formation at the very top and bottom ends of the chain.

This is evident in Çalışkan's (2010) detailed study of cotton price formation that makes no mention of broader determinants of commodity prices and cycles, the financial crisis of 2007–2008, and its impact on commodity prices or the systemic origins of the rise in prominence of the New York futures price in price negotiations. In light of these deficiencies, Sunley calls for an analytical approach that set connections and relations "within an

[6] The NYBOT was renamed ICE Futures US in September 2007.

evolutional and historic institutionalism and understand how forms of economic relations are inseparable from other institutional practices and institutional positions" (2008, 19).

By employing an analytical approach discussed below and outlined in Figure 1, this study hopes to deepen existing network approaches by both discussing price formation and transmission at the very top and bottom of the price chain but also by bringing in the macroinstitutional factors that have a tendency to be left in the background of most chain and network approaches.

Institutions and Price Formation

In spite of its historic significance in economic sociology, for example, in the work of Durkheim (1947, 1992), Weber (1978), and Polanyi (1992), there has been little work on the influence of institutional regulation on economic outcomes, including prices, since the first half of the twentieth century (Beckert 2011). On the one hand, specific institutions matter in their impact on prices, and, on the other hand, mechanisms and processes of price formation are themselves underpinned by institutions that do not emerge spontaneously. This includes the flexible price mechanism. According to Polanyi (1992), "Acts of exchange on the personal level produce prices only if they occur under a system of price-making markets, an institutional setup which is nowhere created by mere random acts of exchange" (Polanyi 1992, 36). The regulation of markets is itself a part of the price struggle among actors who try to influence the market situation of commodities, "which in turn is determined either by tradition, convention, law or voluntary action arising from the interest of actors in the field" (Beckert 2011, 767).

Beckert (2011) identifies five mechanisms and instruments through which institutional rules impact on prices. First, regulation that directly alters the supply on markets or influence product costs, such as regulation on competition, quality standards, minimum wages, regulation of rights of unions to organize, and intellectual property rights, all alter the

nature of competition, the distribution of market power, and hence the distribution of value across different actors. In this way the "market price" "emerges not so much from market forces as from institutional structures." (ibid., 769) Second, regulations on the externalization of costs, such as environmental standards and labor safety laws, increase private production costs and hence prices. Third, regulatory institutions, such as warranties and other forms of consumer protection policies aimed at reducing uncertainties associated with informational asymmetries, will affect prices. Fourth, taxation and subsidies used by political actors to provide incentives or disincentives for the production or purchase of a specific good will affect prices. Finally, monetary policies that affect the availability and price of credit affect price levels.

Each of the approaches discussed above provides valuable insights into the constitution and operation of real-life markets and price formation. They show us that competition is regulated via institutional rules that affect distributional outcomes and are therefore contested between market participants. Market participants can exert their agency differentially depending on their position in networks and exercising of prominent technical devices and instruments of price calculation. Networks as relational configurations are created, stabilized, or dissolved in processes of contestation and are important explanatory factors. However, neither network relations, nor the *materialities* of market making and exchange should be privileged over institutions that differ in terms of their duration and path dependency. Nor should institutions be viewed as fixed, since they are themselves political and social entities shaped in part through networked relations. The next section details the analytical framework developed for this study, which integrates such an appreciation of institutions into the study of price formation and transmission.

An Analytical Framework for a Study of Price Formation and Transmission in Commodity Chains

The analytical framework adopted for this study of coffee prices is motivated by the discussion above. Different strands of social science research have analyzed and evaluated the formation of prices, the transmission of prices, and the impact of prices and price changes to differing degrees and on different actors. However, by dealing in isolation with a particular issue from a particular standpoint, factors impacting on prices, beyond the particular analytical framework adopted, have frequently been lost. For example, network and marketization approaches have been motivated by a desire to study markets and economic activities from the *ground up* in response to critiques of highly abstract supply and demand framework of economic orthodoxy and the tendency toward top-down theorizing in political economy. The result has been a preoccupation with the micro in empirical studies to the frequent neglect of the macro (Callon 1998; Granovetter 2002; Fine 2005; Sunley 2008; Berndt and Boeckler 2012; Ouma 2012).

Moving forward, we advocate a synthetic approach that adheres to the following points: (1) it is cognizant of an appropriate linking between micro and macro in their coconstitution; (2) it does not, a priori, prioritize market structure, networks and relational stability, institutions or technical devices, but rather analyzes how these different processes interact dynamically and differentially across commodities, spaces, and time, under different macroeconomic conditions, the changing character of global capital accumulation and capitalist restructuring; (3) it permits the analysis of points in the price chains as well as the extreme ends of the chain, without assuming that the actors or institutions that make up these points in the chain are in any way homogeneous or act in the same way in response to external influences.

Our analytical framework begins with a stylized price chain (see section B in Figure 1). Other chain and network approaches to the study of markets have historically proceeded by following the *thing*, the commodity as it is transformed from primary to consumer product with the identification of specific processes or *nodes* that serve as links in the chain. With greater recognition that the production and marketing of a good involves complex webs of interconnected intra- and extrachain networks, network approaches have advocated a method of following the actors beyond the physical commodity chain (Granovetter and Swedberg 1992; Callon, Méadel, and Rabeharisoa 2002; Henderson et al. 2002). Methodologically, this becomes problematic, since the researcher has to make an arbitrary choice in demarcating the network of study from the multitudes of network to which it is connected and embedded.

We therefore advocate an approach that follows the *price chain* that complements other chain and network approaches to the study of markets. The framing of a price chain, following the processes of price formation along commodity chains, allows the researcher to systematically select both intra- and extrachain sites and activities of study, connecting the macro and micro, the global and the local.

Using the case of Tanzanian coffee,[7] Figure 1 demonstrates what a stylized price chain looks like and how institutional and relational aspects influence the formation of prices and the mediation of prices between points in the chain. Following segment B of the figure shows, in simple terms, how *world* prices influence export prices and, in turn, auction and, finally, domestic trading and farm-gate prices downstream. A framework that follows segment B alone is associated with the mainstream economics approaches discussed in "Mainstream Economic Approaches to prices along Commodity Chains," above, in which price is ultimately the outcome of supply and demand conditions at the world level. This

[7] The analysis presented here is focused on bulk Arabica coffee, as opposed to speciality or niche coffee, or the usually lower-quality Robusta coffee.

approach is severely limited, since it is unable to analyze fully the importance of other factors (contained in segments A and C of Figure 1) in shaping pricing outcomes.

Clearly the configuration of the price chain and the factors shaping pricing outcomes depend critically on external institutional factors that determine the price at each point in the chain. This is what segment A of Figure 1 details. These aspects are brought into the discussion of prices in institutional approaches, discussed in " Institutions and Price Formation" above. However, the missing link from these institutional assessments is a broader chain approach. Instead, studies have focused on the role of a particular institutional arrangement in, for example, stabilizing or maintaining prices at a single price point. As such, this study sheds light on how and why these institutional aspects matter, not just for the formation of prices at one particular point, but also for the transmission of prices between points.

Segment C of Figure 1 helps illustrate the importance of recent network and marketization approaches to understanding prices, among other things. These relational factors highlight how social processes are at the root of understanding relationships, including those of price transmission. Despite this crucial addition, most studies are unable to complete the vertical price chain using such an approach. Instead they tend to focus on the relationship between two points in the chain, analyzing in depth the relations between actors and therefore prices as an outcome of such relationships.

In this study, the price chain acts as a starting point, allowing us to frame our empirical research of the real-life processes of price formation in a contemporary coffee marketing system: the ways in which they are anchored in institutional regulation and the social structure of markets, and the nature of contestation, including the technical and relational apparatus deployed.

Studying Price Transmission along Tanzanian Coffee Chains: Outlining Context, Methods, and Applying the Analytical Framework

Given the proposed approach, this study is necessarily grounded in reality and compels us to adopt a case study approach in order to uncover the aspects of price formation and transmission currently inadequately explained by the literature. This section provides a contextual and analytical framework for this study, by setting out the major themes that underpin it. First, the local context in Kilimanjaro will be described, tracing the evolution of institutional changes and the historic role of coffee in the local economy. This section will also briefly discuss coffee as an international commodity and the changes that have occurred at the global level. Finally, this section provides details and justification of our concrete case study methods.

Kilimanjaro Coffee

Coffee has been traded since the sixteenth century and is produced in over one hundred countries along the equatorial belt. Coffee production is, in many parts of the world, linked to the colonial history, from German and British colonial rule in East Africa to Spanish and Portuguese colonialism in Latin America. The importance of coffee production to numerous low income countries, especially in sub-Saharan Africa,() cannot be understated. In fact, over 90% of coffee production originates in the south, indicating the importance of understanding its role in growth and development (Ponte 2001, 2002). The wide geographic spread of coffee production, from Latin America to SSA and increasingly East Asia has resulted in intense competition among producers, leading to further price pressures (Maizels, Bacon, and Mavrotas 1997). Tanzania's coffee is exported to a number of countries, with Germany, Japan, and Italy making up the majority of this demand. The importance of Tanzania as an international coffee producer is negligible, at around 0.7% of world output

over the last twenty years (ICO 2015b). However, Tanzanian coffee is a particularly important substitute producer for other producers of mild Arabica and Robusta coffee. Tanzanian coffee is therefore often sought by importers and roasters for these substitute characteristics in the creation of blends (Daviron and Ponte 2006).

Arabica coffee is also a historic central income source for agricultural producers in the Kilimanjaro region. Coffee production was introduced by German Roman Catholic missionaries in the late 1890s and was initially restricted to settler plantations in favorable planting areas surrounding Mount Kilimanjaro. Despite opposition from the settlers and plantation owners, coffee cultivation among Chagga peasant cultivators grew (Iliffe 1979). In part, the growth of coffee production among peasant producers can be traced to the ease of interplanting, especially among existing banana groves but also due to the successful establishment of one of the first agricultural producer cooperatives, the Kilimanjaro Native Planters Association (KNPA). The KNPA allowed producers to act as one voice against the perceived exploitation by Asian and European middlemen as well as continued lobbying against peasant coffee production by European plantation owners (Kimario 1992). Through the KNPA and later the Kilimanjaro Native Cooperative Union (KNCU), producers could also begin to address crop disease problems and attempt to access necessary chemicals and spraying equipment (Iliffe 1979). Following independence in 1961, the newly formed Tanzanian government implemented drastic policies in the agricultural sector. These included frequent and varied changes to the role of agricultural cooperatives ending with liberalization of the domestic and international trade of coffee in the early 1990s (Ponte 2002, 2004). One central aspect that has been largely retained in the Tanzanian case (unlike its East African coffee-trading neighbors) is the central coffee auction, which was first introduced in 1952 to make the domestically processed coffee available to the international export market. Figure 2 provides a stylized picture of an Arabica coffee commodity chain that originates in

Tanzania's Kilimanjaro region.

[INSERT FIGURE 2 ABOUT HERE]

Method and Fieldwork Description

We adopt a case study approach, considering Tanzanian Arabica coffee and trace price dynamics from the coffee derivatives markets in New York to Kilimanjaro's producers as they are connected via international traders, Tanzanian traders, middlemen, and other local actors whose relations and actions are underpinned by institutional and market structures at the local and global level. Our research complements established work on coffee on Tanzanian coffee chains (Gibbon and Ponte 2005; Daviron and Ponte 2006). Our approach differs in a number of ways in that our focus in on the process of price formation. Consequently, our analysis both goes beyond the physical commodity chain to include derivatives markets and key institutions, and extends current thinking at the extreme ends of the commodity chain.

We conducted a series of semistructured interviews with commodity traders, key personnel in all of the largest international coffee trading houses in the United States, London, and Switzerland. In Tanzania, exporters, cooperative officials, extension workers and coffee research organizations, personnel from the Tanzanian Coffee Board, and Auction officials were interviewed using semistructured survey instruments. Semistructured interviews with primary producers and village-level focus groups were conducted across three villages in the Kilimanjaro region. Fieldwork was conducted in 2006–2007, which coincided with an important time in terms of price development for coffee and other commodities. This period represents an era of relative stability in relation to commodity prices in general, and predates the sharp rise and subsequent collapse in commodity prices that began in August 2008. The period under scrutiny also represents a period of calm following numerous institutional changes in the Tanzanian coffee trading system, which

allows us to study the longer-term impact of coffee market restructuring in Tanzania. Despite being almost ten years ago, institutional structures in the coffee chain have remained, by and large, the same so that the conclusions drawn from this research would not substantially change if fieldwork were to be repeated today. The case study approach and the use of numerous different types and sources of data, allow us to take into account different perspectives of actors and institutions. This allows for a more holistic and interpretive research process (Creswell 2003). Such fieldwork-based research is directly connected to the analytical framework presented in "An analytical framework for a study of price formation and transmission in commodity chains," above. The processes we are uncovering would not be revealed by alternative methods such as purely quantitative methods used in many economic studies on price transmission. Crucially, the adoption of a variety of qualitative techniques adds meat to the stylized bones of the price chain provided in segment B of Figure 1, by investigating how prices are formed in the context of global and local institutional changes and evolving relationships between actors in the price chain. In turn, such an approach then allows us to gain a richer understanding of the implications of price formation and transmission for the broader issue of economic development.

The Tanzanian Coffee Price Chain Reexamined: From World Prices to Farm-gates

The notion of a *world price* plays a core role in coffee price formation on the ground. As a commodity where supply and demand are largely located in different parts of the world, the world price is generally understood as reflecting the global supply and demand for coffee. As already discussed above, far from the mainstream economic abstract supply and demand depiction of markets, markets—including the notional world market—are regulated through varying institutional configurations. Changes in the regulation of the *world market* for coffee

have also changed the *index*, or *price prosthesis* in the lexicon employed by Çalişkan (2010) that actors consider as the world price.

The collapse of the system of target price (or price band) and adjustable export quotas under the International Coffee Agreement (ICA) in 1989 marked a watershed in the process of coffee price formation and signaled a shift in the balance of power in favor of international coffee trading houses vis-à-vis producing country actors[8] (Daviron and Ponte 2006). Under the ICAs, the ICO monitored prevailing member market prices through the calculation of daily indicator prices for each variety of coffee traded based on ex-dock quotations for prompt shipment on the physicals markets in Germany, France, and the United States. Should the indicator diverge too much from the target price, quotas were relaxed or tightened accordingly to bring the member market price back to the target range. The ICO system established the metric of price measurement as denominated in US dollars per 50kg bag of green coffee. From July 1, 1963, until the end of the ICA on July 4, 1989, the ICO indicator price served as the established world price to which all coffee trading parties referred in price negotiations. Given the relative stability of coffee prices and the relatively strong bargaining position of exporters in coffee-producing countries,[9] international coffee traders' main concern was to secure necessary volumes of green coffee, and, generally, fixed-price forward contracts were utilized.

The collapse of the ICA signaled the onset of an era of new risks associated with price volatility, and the diminishing relevance of the ICO indicator price and its replacement by the coffee futures prices evolving on the New York and London exchanges for Arabica and Robusta coffee, respectively, as international traders increasingly utilized exchange traded

[8] The ICA consisted of a series of agreements beginning in 1962 between a group of exporting and importing countries aimed at maintaining stable and relatively high prices.

[9] Throughout the ICA, exports tended to be channeled through a single state marketing institution in coffee-producing countries.

hedging instruments to mitigate these risks. The volume of coffee *C* futures contracts traded on the New York Coffee Exchange more than doubled between the signing of the last ICA in 1983 and its eventual expiry in 1989, and continued to accelerate without a comparable increase in global Arabica production.

Institutional and other financial investors account for much of the increase in coffee futures trading and trading on international commodity exchanges, in general, especially since 2004. Institutional holdings in commodity futures were estimated to have increased from $15 billion in 2003 to over $200 billion in 2008 (Commodity Futures Trading Commission 2008). The rise of institutional investors on commodity markets has been understood as part of a broader process of financialization as capitalist restructuring in the twenty-first century and related to neoliberal policy reforms such as the withdrawal of the welfare state in social provisioning, including for old age, with the consequent rise of private pension funds and their quest for new investment vehicles such as commodity indices (Froud, Johal, and Williams 2002; Lapavitsas 2011; UNCTAD 2011; Fine 2012). Rather than solely reflecting anticipated supply and demand dynamics on physical markets, the trading activities of institutional and other financial investors are informed by wider economic factors and conditions on equity markets owing to the role played by commodities in portfolio diversification (Domanski and Heath 2007; Mayer 2012; Adams and Glück 2015).

There is mounting evidence that the financialization of commodity markets has had a profound impact on price formation. Tang and Xiong (2012) reported greater comovement across futures prices since 2004 for commodities that formed part of commodity index instruments, such as the Goldman Sachs Commodity Index (GSCI), the Dow Jones UBS Commodity Index (DJ-UBS), S&P Commodity Index (SPCI), compared with those not included. More recently, Basak and Pavlova (forthcoming) estimated that between 11% and 17% of commodity futures prices is accounted for by financialization, with the rest

attributable to fundamentals. In the case of coffee, Newman (2009b) discovered a loosening of the relationship between coffee futures prices and physical supply and demand after index funds entered the market in the early 2000s. In this way the formation of the world price of coffee has been affected by the changing character of global capital accumulation and contemporary capitalist restructuring to which changes in the accumulation strategies and associated corporate restructuring of international coffee traders are attached.

Export Prices for Tanzanian Coffee

A major consequence of the shift toward routine hedging by international traders has been the promotion of futures prices as the key reference, or *technical device*, used in the process of price negotiation all along the commodity chain, leaving the ICO indicator price largely irrelevant in the trade. Far from benign, this shift has fundamentally changed the relationship between coffee price dynamics, and consequently the ways in which actors on the ground reconfigure and perform prices. International traders, with headquarters in consuming countries, particularly in Europe and the United States, sit between roasters and exporters in the vertical organization of the international coffee supply system. The coffee industry at the international trader level is highly concentrated, with the top five companies accounting for a market share of over 55% (International Trade Centre 2011). As well as the large international coffee trading companies, a number of small coffee trading companies exist, each accounting for a very small share of world market, often operating in speciality and niche markets such as fair trade.

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 differences 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 as follows: [10]

> 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 Colombia 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.

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 largest multinational coffee roasting companies and sourcing from around the world on a continuous basis.

International trading companies purchase coffee from local exporters, subsidiaries, or companies in their trading group located at origin. For coffee from a particular origin, the international trader decides on a differential to the international exchange at which it is willing to purchase coffee on that day. This differential reflects the difference in quality of the contracted coffee compared with minimum quality deliverable on either of the international exchanges. The trader then contacts its suppliers with this offer price, and the negotiation proceeds based on local market conditions. 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

[10] Quotes are taken from interviews with coffee traders in international trading companies conducted in 2007.

futures price at the point of fixing, plus or minus the agreed differential under the so-called price-to-be-fixed contract. Since the international trader hedges by offsetting its 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 critical. A seller may hold off fixing the price if it expects the futures price to rise further; losses are made if the futures price falls below the price at which coffee was purchased.

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 are needed 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 in international trade is inextricably linked to the price of coffee futures contracts on the New York and London exchanges.

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—where the price, volume, and delivery date are determined at the time of signing—means that the volatile prices on international exchanges are transmitted more rapidly and fully into the 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 toward 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.

Moreover, international traders have increasingly integrated futures trading into their accumulation strategies. There is evidence that commodity trading houses engage in *speculative hedging* in order to reap financial rewards in addition to the management of price risks in the context of increasingly volatile commodity prices (Newman 2009a). There is also greater alignment of multinational corporations'(MNC)trading strategies with those of financial investors. Physical traders look not only at fundamentals but also try to anticipate the factors that determine financial investors' trading decisions. As one trader interviewed by UNCTAD (2011, 44) put it, "the banks are trying to understand our markets and we try to understand their markets." This has had profound implications on the distribution of price risks along coffee chains and the ability of different chain actors to profit from financialized accumulation (Newman 2009a).

The Tanzania Coffee Auction and Domestic Trading Price(s) for Coffee

In terms of domestic price formation, 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 2).

Leaving, the direct export channels (on the right-hand side of Figure 2) to one side, there are four main channels through which smallholder coffee is marketed locally. First (marked 1 in Figure 2), 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, awaiting

the next 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.

Secondly (marked 3 in Figure 2), 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 (marked 2 and 4 in Figure 2) utilize 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 (marked 2 in Figure 2). The final, and most recently introduced, marketing channel is coordinated by producer support organizations for direct export, which we will not discuss in detail here (marked 4 in Figure 2).[11]

There are two channels by which coffee is exported from Tanzania, via auction and through direct export. The vast majority of coffee exports go through the coffee auction (between 60 and 90% over the past ten years, although this can vary dramatically from year to year according to Baregu, Barreiro-Hurle, and Maro (2013), where exporters purchase graded and bagged green coffee. Here we focus on the auction system as the mediator of price transmission for the majority of coffee exports from Tanzania. For a number of commentators, "the auction appears to be an efficient pricing mechanism, in the sense that

[11] These are largely funded by external donors, and the organizations deliver programs and services aimed at developing the smallholder coffee sector in Tanzania. The projects seek to improve the quality of smallholder coffee and market it externally as speciality coffee.

realized prices move in accordance with the New York Board of Trade futures prices" (Baffes 2005, 35).

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 on the sales that have been secured and their need to secure coffee to fulfill 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 for their groups. 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 and exporting speciality grades differs from that for bulk grades. Exporters are less likely to sell specialty coffee on contracts that are far forward. Overseas buyers of speciality quality tend to procure coffee on the basis of a sample of the coffee that the exporter already has in stock. Speciality coffee exporters, including the cooperative union exporters, have closer and more direct ties with their markets. These exporters will have a good idea of what their customers are looking for and purchase coffee on the auction accordingly. The pricing of speciality coffees also differs from the bulk. Speciality coffees tend to sell on a large positive differential to New York. This differential is realized 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 2010–2011 crop year, 60% of mild Arabica coffee sold at auction was made up of the premium and speciality (AA, A, and PB) grades. 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 (2004) that there was a slight reduction in the degree of price transmission between world and local coffee prices in Tanzania. In contrast to Krivonos's own interpretation of this finding as a result of the incomplete nature of the coffee market reforms in Tanzania, the weakening in the co-integration relationship between world and local coffee prices can be interpreted as the consequence of the Tanzania Coffee Board's strategy to differentiate green coffee at the auction and market speciality grades where prices are realized differently.

The auction system in Tanzania has certain other attributes and performs important functions in terms of price transmission and price stabilization that are often overlooked. Since 2001 those selling on the auction have to be legally separate from the buyers (international exporters) in order to prevent anticompetitive bidding behavior where international traders can bid up the price of coffee put up for auction by their local subsidiaries. The blind, electronic auction system facilitates this separation, forcing exporters to wait until the auction convenes (twice every month during the buying season) to purchase Tanzanian coffee at a price based on its grade. In this way the auction system helps to shield those (cooperatives and private domestic traders) further upstream of the supply chain from daily price fluctuations. It helps to reduce the amplitude and frequency of sudden price changes in international futures markets from being transmitted further up the price chain.

Farm-gate Prices for Coffee in Kilimanjaro Region

While the coffee auction discussed above performs an important role in terms of information provision and price stabilization, auction prices do not necessarily reflect the prices received by producers (see Figure 2). 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 the Kilimanjaro region who sell to KNCU, therefore, face more stable prices than those selling to private companies. This is due to the

KNCU's payment system, which offers producers the opportunity to sell their crops early but still retain the potential to benefit from increases in price once the crop has been sold to exporters through the auction. Most coffee producers in the Kilimanjaro region have completed harvesting and selling their coffee by December, and relative gains from price increases will evidently depend on seasonal price developments (however, the general tendency has been for prices to increase over the season). Furthermore, prices in the region in which KNCU operates are unified across geographic areas. Producers who choose to sell their coffee to private companies at village buying posts are unable to benefit from this additional payment system and instead receive a one-off, location-dependent price.

In general therefore, producers selling outside the cooperative system are more exposed to unexpected price shifts. However, other factors are also important in determining outcomes for producers, including the price of coffee relative to the price of other goods and services, including food. As Figure 3 shows, in nominal terms, producer prices initially increased following liberalization in the mid-1990s but subsequently gradually declined over time to reach a low in 2001–2002. Since then coffee prices have started to rise again in nominal terms.

[INSERT FIGURE 3 ABOUT HERE]

A consideration of real producer prices reveals an intensification and asymmetry in the way international prices have been passed down to producers. Deflating Arabica coffee prices by the Tanzanian consumer price index and comparing them to domestic food prices in Figure 4 demonstrates this process. Producers have been particularly hard hit by the dramatic real fall in coffee prices over the late 1990s and early 2000s, with prices in 2001–2002 representing a quarter of prices in 1997–98. At the same time, the stark increase in the

international coffee price since the early 2000s has not been transmitted in the same way in reverse to producers.

INSERT FIGURE 4 ABOUT HERE

Price instability in the season was predominantly a concern for those marketing their coffee outside the cooperative system. 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. Producers selling to private buyers were more aware of increased in-season volatility over recent years and the general pattern of rising prices as the season progresses. Table 1 reports prices received by producers in the 2006–2007 season across the three villages investigated. Reported producer prices were diverse, depending on which statistics are considered. Furthermore, the prices received by producers varied between and within villages.

[INSERT TABLE 1 ABOUT HERE]

Differences in the average prices received by producers for their coffee are stark. On average, producers in Kiruweni village obtained a higher price for their coffee in 2006–2007 when compared with the other two villages. However, the spread of prices was also greater in Kiruweni village when compared with the other two villages. The above picture regarding prices in 2006–2007 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 price developments. Wanri and Narumu villages, on the other hand, displayed a particularly negative view of price developments over recent years.

The above considerations suggest that coffee producers in the Kilimanjaro region have been exposed to considerable real price erosion since the mid-1990s, although the exact impacts have been diverse. When international and export prices have fallen, producers have borne the brunt of the impact in both real and nominal terms. When prices have risen,

producers in general have, however, not benefitted proportionally, largely due to the concurrent increases in the cost of inputs and food.[12] Given the earlier discussion regarding the role of the auction in Tanzania, one can speculate that a counterfactual situation in which no auction system exists would expose Tanzanian coffee producers even further to the above problems. The results also suggest that producers marketing their coffee via the local cooperative union are better protected from price falls than those selling to private traders.

Conclusion: Price Formation and Development

This article has examined the nature of price formation and transmission in the Tanzanian coffee price chain. It has investigated how prices are formed in different segments of the chain and how they are transmitted between different segments of the price chain, down to the level of Tanzanian coffee farmers. The article presented a new framework for the study of prices that has helped to demonstrate how prices, are in reality, formed and transmitted. By bringing together relational and institutional perspectives to bear on existing approaches, the article develops the field of chain studies. Economic geographers have only recently begun to expand their field of enquiry into prices, price formation, and pricing behavior. This has been a vast improvement on the historic and socially detached theories of price transmission conducted by mainstream economists. While the research among economic geographers on prices is to be commended, some gaps remain. This becomes evident when price is put at the center of the analysis, as in this study. Rather than focusing on particular relationships or specific institutions as a starting point, this study tackles prices and price transmission as a vehicle through which to understand how the global is transmitted

[12] Consumer prices for inputs and food have risen for a number of reasons in Tanzania. One can associate the price increases with changes in global prices from the mid-2000s to 2013, particularly the increase in the oil price, which has fed into the costs of production (Ghosh 2010). The rise in input prices is also a result of changes to the domestic sale and pricing, with liberalization resulting in fewer subsidized inputs available to producers (Bargawi 2015).

to the local. In particular, our focus on the processes of price formation, their institutional embeddedness, and their social–spatial dynamics sheds new light on both the nature of the networked relations in commodity systems as well as their implications for the geographic distribution value and (uneven) economic development. This framework is not unique to the study of coffee in Tanzania. Instead it is hoped that other researchers are able to borrow from this new analytical framework and apply it in other contexts and to other commodities to similarly gain greater insights into real price formation and transmission and, ultimately, development.

In the context of coffee and Tanzania, three main points can be drawn from our analysis. First, there has been a dislocation between movements in coffee futures prices and changes in physical supply and demand conditions, owing to increased financialization and the rise of commodities as an asset class in portfolio investment. Second, the way in which prices are transmitted from the world level to coffee producers depends crucially on the structure of the domestic marketing system. The auction system in Tanzania has cushioned the transmission of daily international price movements to domestic traders and cooperative unions. Finally, these domestic institutional changes have led to a differentiation in price transmission and impact. In the Kilimanjaro region, producers linked to the KNCU cooperative system are generally more protected from in-season price changes. While producers selling to private agents are more exposed to price shifts.

Given the findings of this research, it is important to assess the implications for economic development in Tanzania, particularly since prices have become the locus of a great deal of policy attention. Increasingly, this has come in the form of research on price instability and attempts to rectify such volatility via the use of risk-management mechanisms by commodity producers on the ground. This article has demonstrated the limits of such a policy focus. Instead, the allied forces of domestic institutional change and international price

formation need to be appreciated in order to understand how prices are transmitted to producers.

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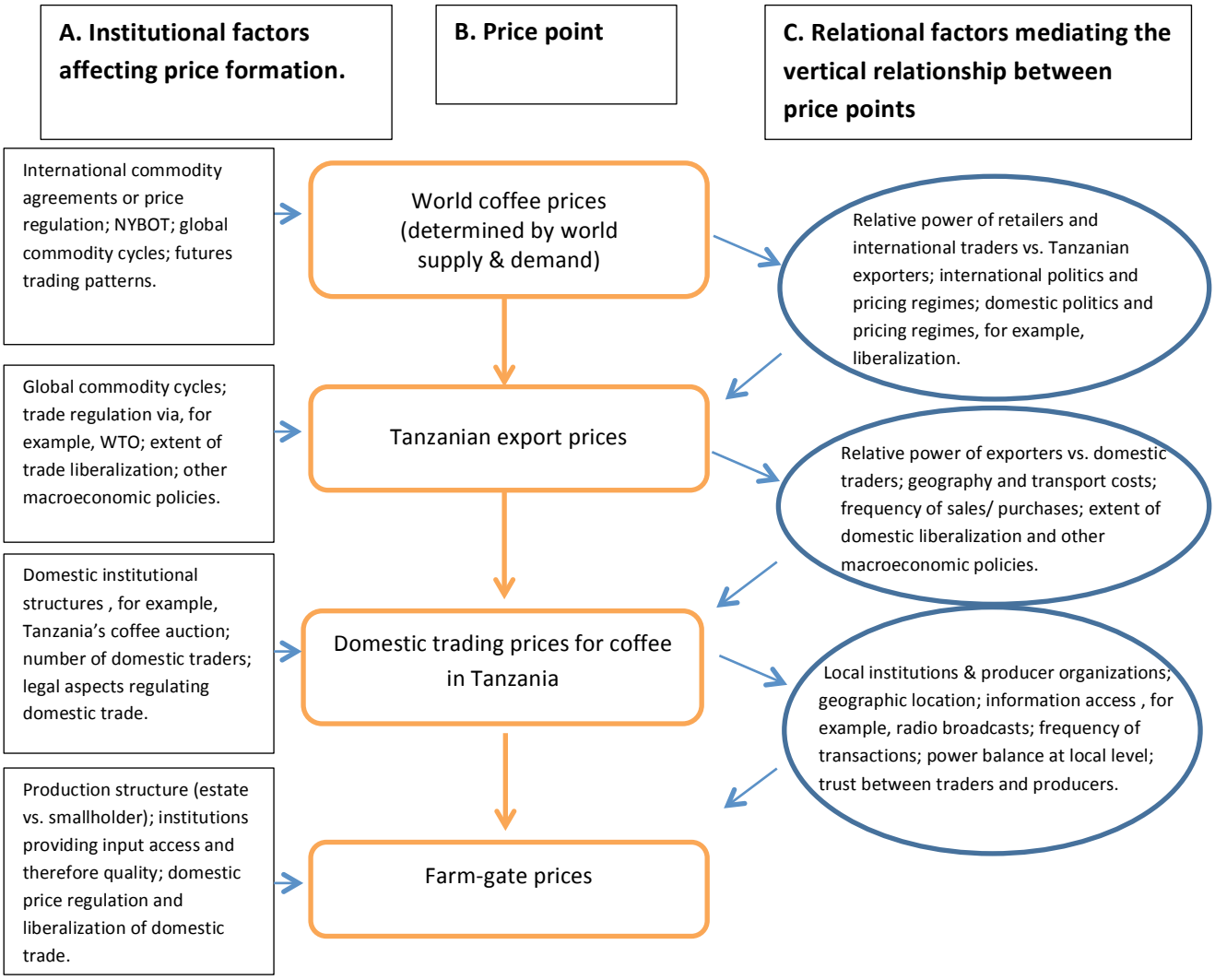

Figure 1. An institutional and relational framework for assessing commodity price.

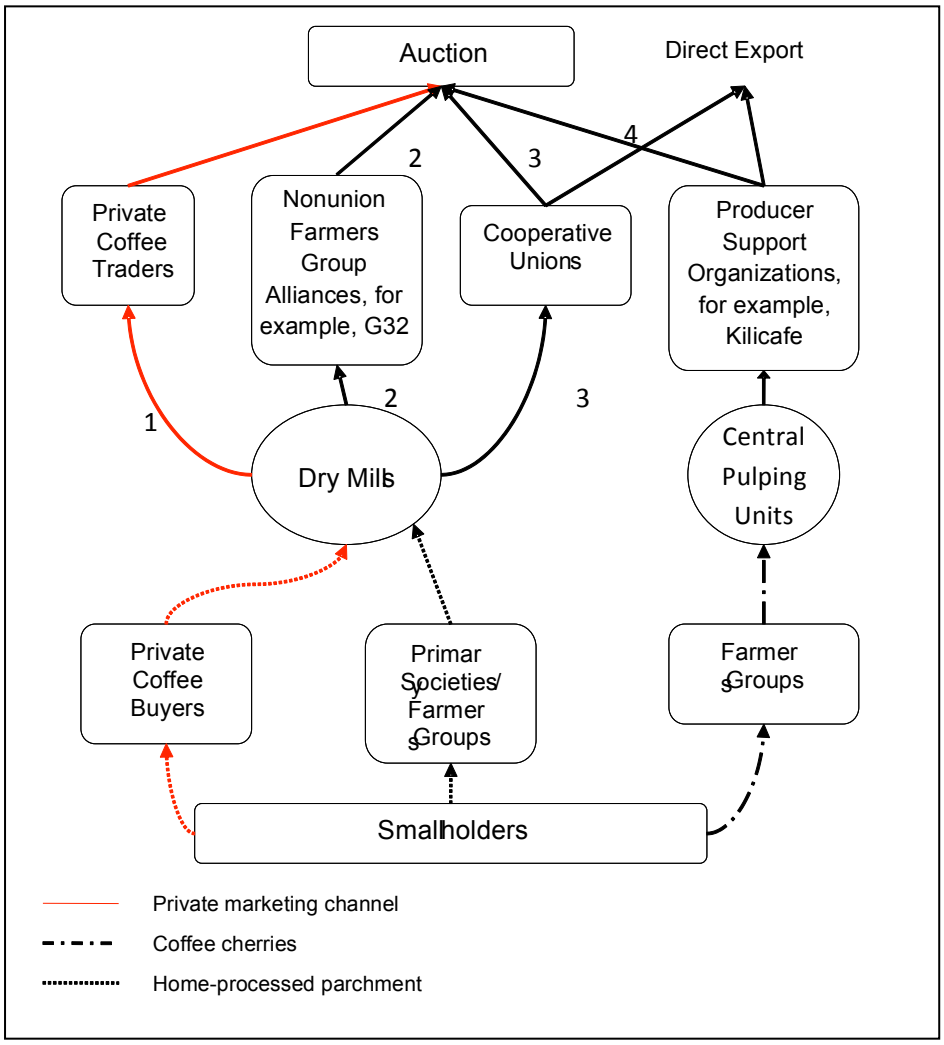

Figure 2. Local marketing system for smallholder coffee in Tanzania.

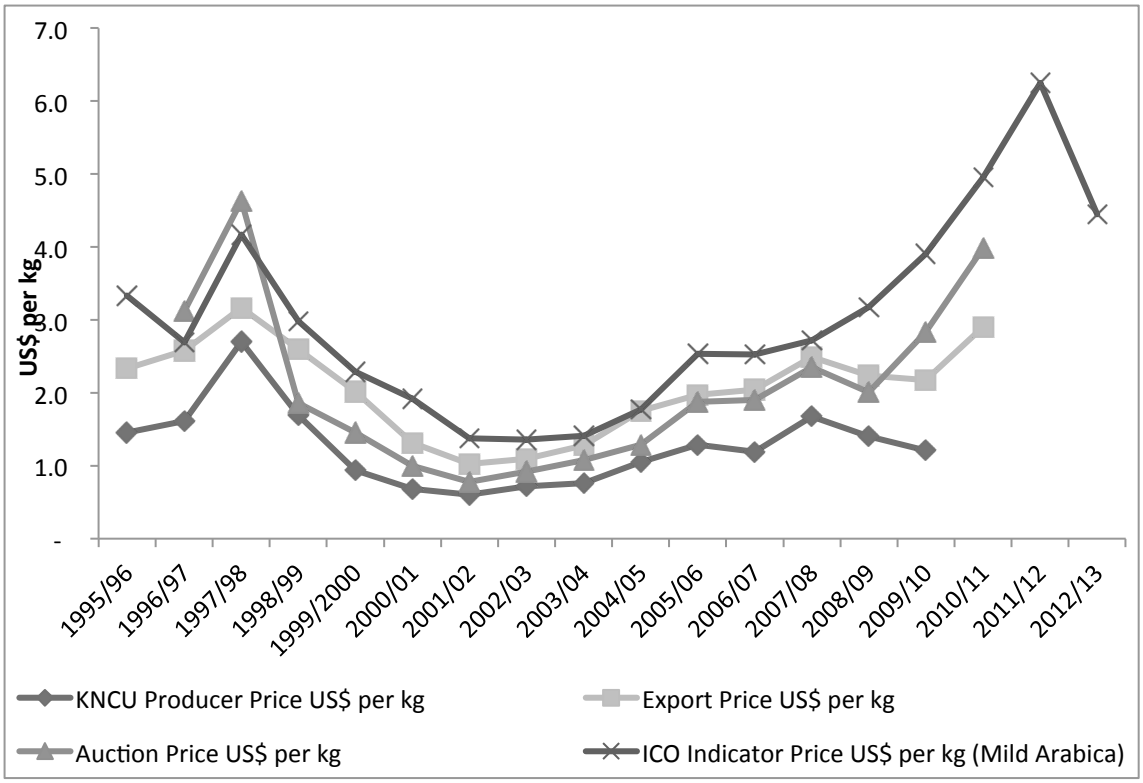

Figure 3: Nominal Arabica coffee prices in US$ per kg.

Sources: ICO Indicator Price for Mild Arabica are taken from http://www.ico.org (1995/96–2012/13); 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 Monetary Fund International Financial Statistics, official rate at end of period—national currency per US$.

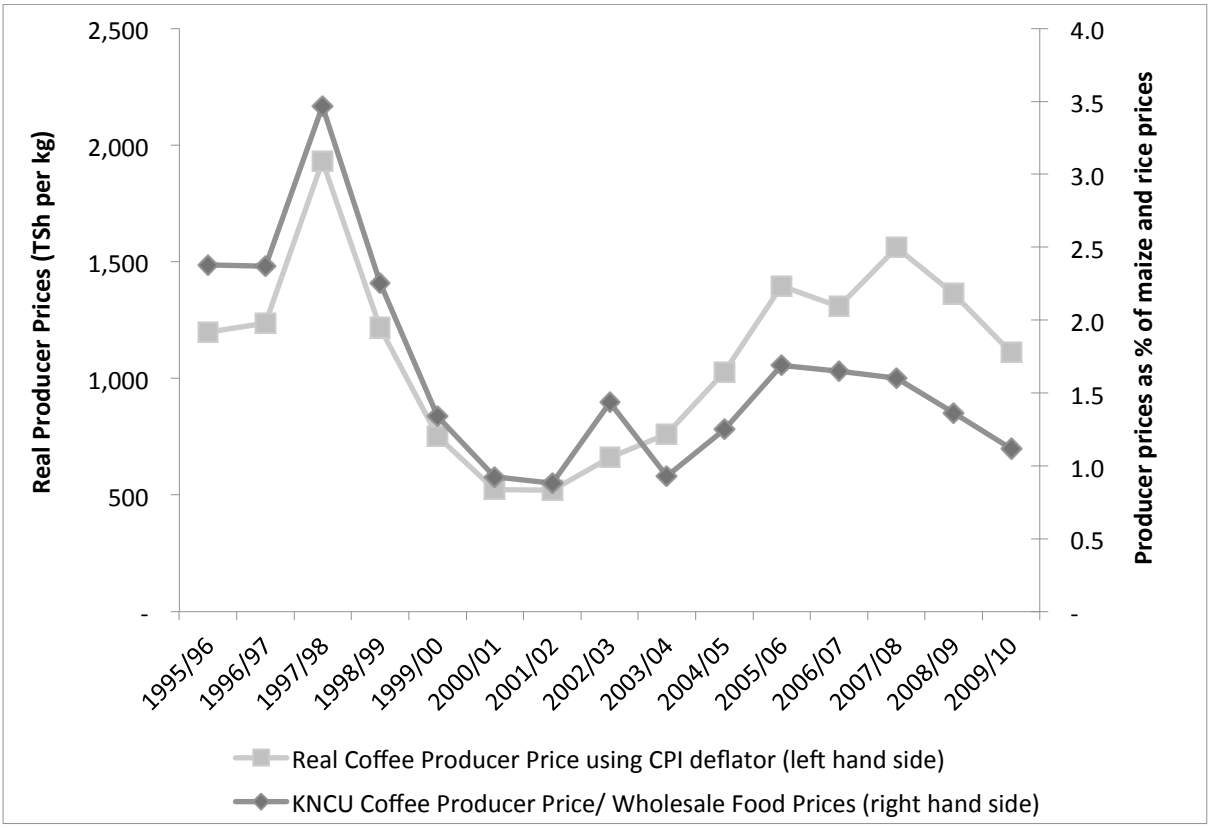

Figure 4. Real coffee producer prices (1995/96–2009/10).

Sources: The real coffee price is calculated using the producer price (KNCU in Tanzanian shillings/kilograms (Tsh/kg) 1995/96–2009/10) divided by the national consumer price index (World Development Indicators 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 average wholesale prices of maize and rice (FAO 2013).

Table 1

Nominal Average Prices per Kilogram of Mild Arabica Coffee in Tanzanian Shillings in 2006–2007

Village	Auction Price: National Level	Producer Price: KNCU Price (Including Second Payment)	Producer Price: District Level Reported Price	Average Producer Price: From Interviews	Spread (St. Dev.) of Prices in Villages: From Interviews
Kiruweni	2750	1500	1500	1800	358
Narumu	2750	1500	1700	1200	105
Wanri	2750	1500	1700	1400	82