Received 6 June 2018
Revised 6 June 2018
20 June 2018
Accepted 1 July 2018

Policy-induced price distortions along the small ruminant value chains in Ethiopia

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Abstract

Purpose – The purpose of this paper is to identify sources and quantifying distortions to agricultural incentives to produce along the small ruminant value chains in Ethiopia.
Design/methodology/approach – National and district level average nominal rate of protection (NRPs) were computed for a five-year period (2010–2015). The authors developed four scenarios based on combinations of the different data generation processes employed in relation to each of the key variables.
Findings – The NRPs at farm gate and retail market for both sheep and goats are negative indicating a strong deviation of producer and retailer prices from the comparable export prices over the five-year period. Policy induced distortions were separated from market inefficiencies through use of data on access costs throughout the value chain. These access costs are positive and significant in value. It is clear that market inefficiencies are also due to government policy to a certain extent.
Research limitations/implications – This study focuses only on sheep and goat value chains and covers only five-year period. This certainly limits the extrapolability of the results.
Originality/value – This study presents the extent to which smallholder livestock keepers are discouraged through disincentives in a unique context. This is the first study done on small ruminant value chains in the developing world.

Keywords Value chains, Disincentives, Nominal rate of protection, Price distortions, Price gaps
Paper type Research paper

1. Introduction

Farmers in developing countries face depression of incentives due to many factors including protection and subsidies in high-income countries, developing countries' agricultural price and trade policies, and non-agricultural policies (Anderson, 2013; Anderson *et al.*, 2010; Johnson, 1991; Josling *et al.*, 2010; Krueger *et al.*, 1988, 1991; Lutz and Scandizzo, 1980;

Journal of Agribusiness in Developing and Emerging Economies
Vol. 9 No. 3, 2019
pp. 220-236

2044-0839
DOI 10.1108/JADEE-02-2018-0024

Schiff and Valdes, 1992; Tyers and Anderson, 2011). The agricultural sector in general is heavily taxed in developing countries (Bautista, 1986; Anderson *et al.*, 2010; Lutz and Scandizzo, 1980). The discriminatory policies of the countries themselves reduce the domestic price of the agricultural products relative to the world price. This is devastating when farmers are export oriented or if their product is meant mainly for the export market (Anderson, 2013; Bautista, 1986; Lanfranco *et al.*, 2018).

Unfavorable agricultural and non-agricultural policies can have high social cost of domestic price distortions in terms of their resource allocation, national output and income distribution effects (Anderson *et al.*, 2010; Bautista, 1986; Josling *et al.*, 2010; Assefa *et al.*, 2016). A series of long term studies have shown that much progress has been made in reducing agricultural protection in high-income countries and agricultural disincentives in developing countries (Anderson, 2013; Josling *et al.*, 2010; Lloyd *et al.*, 2010). However, plenty of price distortions remain (Anderson, 2013). Given the importance of the agricultural sector in developing countries, the need to provide systematic analysis of the effects of price distortionary forces on the agricultural sector can hardly be overemphasized.

Ethiopia is a country of agrarian economy where agriculture accounts for more than 40 percent of national GDP, 90 percent of exports, and provides basic needs and income to more than 90 percent of the poor (Diao, 2010). Ethiopia has the largest livestock sector in East Africa. The livestock sector contributes about 11 percent of all formal export earnings. However, when informal cross-border trade is considered the contribution goes up to 24 percent (Behnke and Metaferia, 2011). Live animal exports are high, as an estimated 1.6m livestock are exported from the country annually – although the vast majority of these (approximately 1.4m) pass through informal channels (Farmer, 2010). The considerable size of the informal market is an indicator of the distrust livestock keepers have in the formal marketing system in the country. Another important aspect of this is that farmers are not earning as much as they should because of many reasons including market failures due to, among others, distortionary interventions.

This study focuses on the small ruminant value chains in Ethiopia and assesses the sources and magnitude of price distortions to agricultural incentives. This study contributes to the literature in at least two ways. First, this is the first study on small ruminant value chains in a developing country where there is a considerable level of price distortions due to both direct and indirect market interventions. Second, our analysis is based on primary data on farm gate prices and access costs which are usually proxied by other related measurements (MAFAP, 2014, 2015, 2016) reinforcing the policy relevance of the study.

The remainder of the paper is structured as follows. In the next section, we describe the small ruminant value chain in Ethiopia including the relevant policy environment. Then follows description of our methodology – tools and data – employed to measure distortions to agricultural incentives to keep small ruminants. Results and discussion will follow and the final section concludes focusing on the key results of the study.

2. The small ruminant value chain and the policy environment in Ethiopia

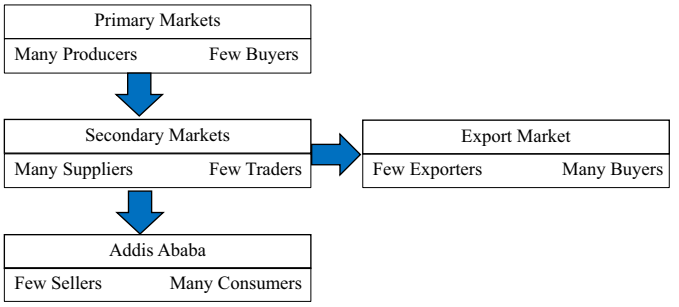
In many developing countries, small ruminants play a crucial role in the livelihood of farmers and in the overall economy (Kosgey and Okeyo, 2007; Timon and Hanrahan, 1986; Gizaw *et al.*, 2010). In Ethiopia, small ruminants account for the largest share of total livestock population, second only to cattle. For instance, in 2014–2015, excluding pastoralist holdings, there were 29.3m sheep and 29.1m goats in the country (CSA, 2015). Similarly, among livestock keepers surveyed in 2013–2014, 47.4 and 34.9 percent of them owned sheep and goats, respectively (CSA and WB, 2015). Small ruminants provide both economic and socio-cultural benefits to the smallholder and poor farmers in the country. They mainly serve as a source of income, meat, milk, manure, and as a store of capital. Moreover, they help mitigate risk from unforeseen environmental shocks, such as droughts and flood.

The contribution of small ruminants to smallholder farmers' livelihood is multidimensional and includes economic, social, nutritional and environmental benefits. They are the best options to improve food security and diversify household livelihood strategies, as they require lower initial capital investment and other production resources such as land and feed (Kassahun *et al.*, 2008). Rural farmers keep small ruminants essentially for cash income generation to sustain their meager-resource-based livelihoods. According to CSA (2013), the proportion of total sheep and goats sold in the year 2012 was 23.5 and 16.7 percent, while the proportion of slaughtered was 12 and 7.3 percent, respectively. However, problems related to market information, market infrastructure, propensity to market orientation and seasonal price fluctuations have been identified to be among the most important constraints that affect the production and marketing of small ruminants in developing countries like Ethiopia (Dereje *et al.*, 2014; Kocho *et al.*, 2011; Abebe *et al.*, 2013; Ayele *et al.*, 2006; Addis and Ginda, 2015; Eshetu and Abraham, 2016; Asegede *et al.*, 2015).

Small ruminants serve for smallholder farmers essentially as a store of value and as a readily available liquid asset. Although farmers hardly consume their own small ruminants, it is not at all meant for income or profit maximization, and hence marketing is a wealth conversion facility than otherwise. Figure 1 summarizes the characteristics of the market structure along the small ruminant value chain. In the primary market (including the farm gate), we observe few buyers and many producers, which means producers get paid relatively low prices due to lack of options. In secondary markets, the sellers that purchase the animal in the primary market are still higher in number compared to the traders. After the secondary market, either the animals are taken to the export market or to domestic consumers, where the buyers are always higher in number than the sellers. This market structure of the value chain translates into high mark-up between farm gate and retail markets, one of the key reasons behind the observed large gap between retail price and farmers' price.

Despite sufficient understanding of the basic characteristics of the small ruminant markets and the development efforts – mainly by the government, limited or mixed effects have been observed in rural Ethiopia (Aklilu, 2008; MOA, 2012). In general terms, the livestock markets in rural Ethiopia are considered to be dominated by a few, but powerful, buyers in rural areas undermining prices received by the numerous, but smallholder farmers (Kassie *et al.*, 2016). Market irregularities and distortions can occur at different points of the value chain for different reasons. The main sources of distortions are, however, erroneous policies/institutions and market inefficiencies.

Similarly, Ethiopian live animal exporting is entangled with inconsistent and rigid taxing system. Different regional governments have different taxing systems for live animals. Taxes on live animals are mainly levied in the Southern Nations, Nationalities and Peoples and



Source: Authors' characterization based on literature on Ethiopian small ruminant value chains

Figure 1.
Market structure of small ruminants' value chain in Ethiopia

Oromia Regions. This tends to discourage smallholder farmers from supplying their animals to the formal markets and drives them to illicit trading. Ultimately, the supply of animals will be limited. Taxes on live animals at the port are also critical for livestock exporters. The exporters are always complaining about unnecessary taxes imposed on their exports reducing their competitiveness and hence their profitability. Exporters have indicated that the high taxes are forcing them to close their businesses (Molla, 2004).

Ethiopia's top destination markets for its live animal exports, in order of sales volume, are Sudan, Somalia, Egypt, Djibouti, Saudi Arabia, Yemen and the United Arab Emirates. Ethiopia exports high volume of live sheep, goats and cattle. Ethiopia's live animal exports are estimated at 2,323,500 animals in 2011 (Legesse *et al.*, 2014; USAID, 2013). Reports show that 80–90 percent of the live animal export happens informally – predominantly across borders with Somalia, Kenya, Somaliland, Djibouti and Sudan (USAID, 2013). Exporting through informal channels is simpler and more cost-effective than exporting formally, and the exporter can avoid legal requirements for registration, licensing, foreign currency regulations and taxation.

This complex policy environment with multiple objectives affects both the producer and the consumer decisions across the entire value chain. In this context, it is crucial to identify whether and where these policies generate distortions to small ruminant producers. It is also important to separate policy induced distortions from market inefficiencies along the value chain.

3. Methodology

Methods to assess distortions to agricultural incentives are categorized into two main approaches; i.e., indirect measurement of incidence and direct measurement of policies (or a combination). The World Bank championed the indirect measurement of incidence approach using the nominal rate of protection (NRP) framework developed by Krueger *et al.* (1988). The Bank started by estimating the impact of direct sector specific and indirect economy-wide policies on agricultural incentives in various developing countries. Next, the methodology evolved into nominal rate of assistance (NRA) developed by Anderson *et al.* (2008). More recent efforts to measure NRA were initiated by FAO – Monitoring and Analyzing Food and Agricultural Policies (MAFAP) with sheer focus on the agricultural sector (MAFAP, 2016). On the direct measurement of policies approach, OECD has a long-standing effort in maintaining producer and consumer support estimates database for OECD and non-OECD countries (Anderson *et al.*, 2008; Josling *et al.*, 2010).

Different research questions entail different methodologies used in isolation or in combination. Studies that aim at measuring price distortions to agricultural incentives mainly employed NRP (e.g. MAFAP, 2014, 2015). According to Lutz and Scandizzo (1980) there are three reasons why NRP is quite appealing: the simplicity of the approach; the intuitive interpretation of the distortion measures as equivalent tariffs; and the relationship between these measures and the opportunity cost of foreign exchange. In addition, farm level agricultural prices of developing countries are often very close to value added levels and hence the impact of many agricultural price policies at farm level may be assessed by looking at NPRs only (Anderson *et al.*, 2008; Krueger *et al.*, 1988, 1991; Lutz and Scandizzo, 1980).

Our study, therefore, relies on NRP estimates that measure the effect of sector specific policies based on the proportional difference between the producer price received by farmers and a comparable border price that has been adjusted for distribution, storage, transport and other marketing costs (Anderson *et al.*, 2008; Krueger *et al.*, 1988; MAFAP, 2016). To the best of our knowledge, NRPs or NRAs for Ethiopian sheep and goat value chains have never been estimated. However, quite a number of scientific reports have been published in relation to distortions to incentives in the Ethiopian agricultural sector. Anderson *et al.* (2008) included Ethiopia in their analysis, but small ruminants were not part of it. MAFAP (2016) has done more recent work and has published NRAs for Ethiopian barley, beans,

cattle, coffee, lentils, maize, sesame seed, sorghum, teff and wheat, but not on sheep and goat value chains. So, this study expands upon what is available in the literature.

Our analysis is based on the comparison of domestic prices, both at farm gate and at point of competition, with a constructed reference price at these specific nodes of the value chain. Reference prices are derived from the border prices of the product and are free of the influence of domestic policies and domestic market structure. The border price also reflects the opportunity cost for domestic market participants (Anderson *et al.*, 2008, 2010; Krueger *et al.*, 1988). The type of border price is chosen based on the net trade status of the country for a specific commodity and a year. In the case of a net importing country, it represents cost, insurance and freight price. In the case of a net exporting country, it represents the free on board (FOB) price at which the country exports to the world. In deciding the border price, the type and quality of the product exported shall be similar to what farmers produce. If not, first a quality factor adjustment is necessary. Second, a quantity factor adjustment (for products that are different due to processing or other physical treatment) is necessary. For a detailed discussion of applying these principles to commodity markets in Africa, see MAFAP (2016).

In the domestic market, we observe the price of the commodity at the farm gate, P_{ofg}. We also compute reference price at the farm gate, based on the border price and the necessary adjustments for transport, storage, handling and distribution, so that non-policy driven distortions on prices are excluded. For these adjustments, we draw on information about observed or computed access costs, which are all costs that need to be incurred in order to move a commodity throughout the value chain between the farm gate and the border. These access costs need to be utilized and netted out when comparing border and domestic prices. Through this adjustment, government policy induced distortions can be computed by comparing border and domestic prices since they will be net of all other price wedges (Anderson *et al.*, 2008; MAFAP, 2016).

Since Ethiopia is a net exporter of live small ruminants, we use FOB price as border/international price, P_b. Thus, observed (and adjusted) reference prices at point of competition are obtained by subtracting the access costs between the border and point of competition (AC_{poc}). Between point of competition and farm gate, access costs (AC_{ofg}) are subtracted too to take into account all the costs incurred by farmers to bring the commodity from the farm to the point of competition. Equations for calculating the observed reference prices at point of competition (RP_{poc}) and at farm gate (RP_{ofg}) for an exported commodity are as follows[1]:

$$RP_{poc} = P_b \times ER - AC_{poc}, \tag{1}$$

$$RP_{ofg} = RP_{poc} - AC_{ofg}. \tag{2}$$

ER denotes exchange rate (Birr/US$), either observed (officially reported by the National Bank of Ethiopia (NBE)), or adjusted – which is the observed exchange rate corrected for overvaluation of the currency due to market or non-market reasons. We denote reference prices computed using observed and adjusted exchange rates as observed and adjusted reference prices, respectively.

After observed and adjusted reference prices are calculated for the commodity, they are subtracted from the domestic prices at each point in the value chain to obtain the observed and adjusted price gaps at point of competition and farm gate. Observed price gaps capture the effect of distortions from domestic policies directly influencing the price of the commodity in domestic markets. In many economies, official exchange rates may not always capture the real market exchange rate and hence many studies use adjusted exchange rates resulting in adjusted price gaps. Adjusted price gaps capture observed gaps plus the effect of any distortions from domestic exchange rate policies. The equations for

calculating the observed price gaps at point of competition (PG_{poc}) and farm gate (PG_{ofg}) are as follows:

$$PG_{poc} = P_{poc} - RP_{poc}, \tag{3}$$

$$PG_{ofg} = P_{ofg} - RP_{ofg}, \tag{4}$$

where, P_{ofg} is the domestic price at the farm gate, and P_{poc} the domestic price at point of competition. It is important to note that in this study we have three levels of measurement; namely, border, point of competition and farm gate.

A positive price gap indicates that the policy environment generates incentives (support) to producers or sellers at point of competition. On the other hand, a negative price gap means that the policy environment generates disincentives (taxes) to producers or sellers of small ruminants at point of competition.

We now add the NRP. The observed NRPs at the farm gate NRP_{ofg} and point of competition NRP_{poc} are:

$$NRP_{ofg} = \frac{P_{ofg}}{RP_{ofg}} - 1 = \frac{PG_{ofg}}{RP_{ofg}}, \tag{5}$$

$$NRP_{poc} = \frac{P_{poc}}{RP_{poc}} - 1 = \frac{PG_{poc}}{RP_{poc}}. \tag{6}$$

4. Data description

The analysis in this study covers the period that spans from 2010 to 2015. In order to calculate the indicators, data on prices at different points along the value chain and access costs between different nodes along the value chain were generated. The primary data were generated from randomly selected smallholder farm households. Geographic targeting was done using GIS and agricultural livelihood systems over nine districts were covered (Kassie *et al.*, 2016). Sheep and goat are the two most traded (exported) live animals in Ethiopia. Ethiopia exported over 450,000 sheep to eight countries in the Middle East and Africa in 2015; i.e., Saudi Arabia, Djibouti, Somalia, United Arab Emirates, Oman, Kuwait, Brazil and Egypt. The export in 2015 was valued over $34m. Ethiopia also exported over 87,000 goats to six countries in 2015 with an estimated value of $6m.

We used the FOB price at the port of Djibouti as reference price at the border since most of the formal small ruminant export from Ethiopia passes through the port of Djibouti. We checked the robustness of the results using Australian FOB price of live sheep as our border price to conduct sensitivity analysis of NRPs. Export prices for Ethiopia are calculated based on official exports data over the period as recorded by the Ethiopian Revenue and Customs Authority. The export price is generated through dividing export value by export quantity. The price was then converted to Ethiopian Birr using the average exchange rate for the study year as documented by the NBE in its exchange rate database:

$$\text{EXp}(\text{FOB price in US\$/head}) = \frac{\text{Export value(US\$)}}{\text{Export volume}}, \tag{7}$$

$$\text{EXp}(\text{in Birr/head}) = \text{EXp(FOB price in US\$)} \times \text{Exchange rate}, \tag{8}$$

where, EXp is export price. We employed two domestic prices at two nodes of the value chain: prices at the point of competition (Addis Ababa retail market) and prices at the farm gate.

Producer prices for small ruminants in the selected districts (Weredas) (Atsbi Wemberta, Menz Gera, Menz Mama, Ziquala, Abergele, Yabello, Horro, Shinile and Doyo Gena[2]) were collected from the Central Statistical Agency's (CSA) monthly producer price survey. For the price at the farm gate, we used average producer price in the above selected districts. CSA of Ethiopia collects producer prices from individual farmers and cooperatives in each of its Enumeration Areas. A maximum of three price quotations is collected from different producers and the average is reported. CSA publishes these prices in three categories: sheep/goat castrated; sheep/goat kid; and other sheep/goat 10–15 kg. Price data for the third category were used in the analysis as these are the types of sheep and goats exported. Figure 2 shows sheep and goat prices for each district. Here the gap among prices received by producers in different districts is clear. This could be the result of different legislative or regulatory frameworks discussed above, or the results of different market inefficiencies in each district. We also observe that although producers in all districts observe upward trend in prices they receive, the fluctuation of prices differs among districts, showing the different levels of insularity from export price or consumer price fluctuations.

Wholesale prices are not available for Addis Ababa or for other markets (from which wholesale prices for Addis Ababa could be calculated). Given the size and importance of Addis Ababa market, we decided to use the retail price in the city for the analysis in place of wholesale price since wholesaling of sheep and goat hardly exists in Ethiopia. Thus, our point of competition in the analysis is Addis Ababa retail market. The data come from CSA's price database for several markets over a 10-year (2005–2015) period. The trend in the retail prices of sheep and goat is upward, especially since 2011, a trend similar to that of average producer prices.

The choice of exchange rate is crucial since the analysis depends on comparison of what is prevailing in domestic market and what would have happened if international prices prevailed. In countries where there is a gap between official exchange rate and what the market forces imply, it is crucial to take this into consideration. Thus, we are replicating our

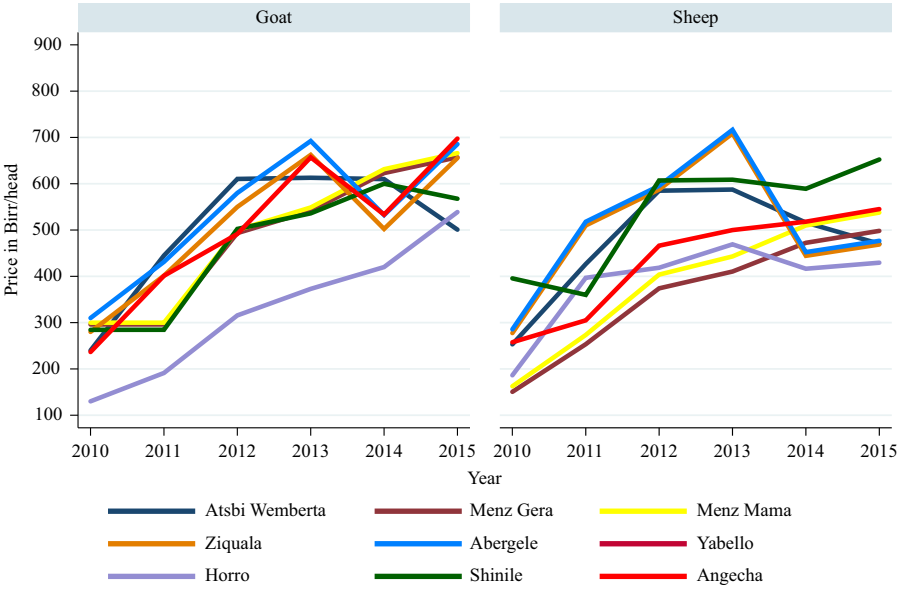


Figure 2.
Average sheep and goat producer price (Ethiopian Birr) for selected districts (2010–2015)

Sources: CSA, Ethiopia

analysis with an adjusted exchange rate. The reference price at the border is in US$ and hence we first employed the official exchange rate between US$ and Ethiopian Birr. Exchange rates for Ethiopia were derived from the NBE's database (see supplementary material). The exchange rate increased from 14.41 to 20.58 Birr per US$ between 2010 and 2015, showing some depreciation of the Ethiopian currency.

Following similar analyses done on Ethiopia, an adjusted exchange rate was also used[3] assuming that the local currency was, on average, overvalued by 20 percent during the period 2005–2010. Similarly, the exchange rate for 2011 was estimated to be overvalued at about 13.26 percent. For 2011 and 2012, the adjusted exchange rate was calculated on the basis of information obtained from IMF report on the status of Ethiopia's exchange rate: Ethiopian Birr was estimated to be overvalued by 10–14 percent in 2012. Thus, 12 percent overvaluation (average rate) was used to calculate the adjusted exchange rate for years 2012 and 2013. Using alternative methods and measurement, IMF reported that the real effective exchange rate was overvalued by 10–13 percent in 2014 (IMF, 2015). This 11.5 percent overvaluation (average rate) was considered to calculate the adjusted exchange rate for years 2014 and 2015.

Equally important in analyzing effects on incentives is the determination of access (marketing) costs since we separate policy induced distortions measured by NRPs from distortions due to market and value chain inefficiencies measured by access costs. The access costs reflect, among other things, the costs of transporting small ruminants from farm gate to point of competition and from point of competition to border, as well as other adjustments discussed above. The access cost between the retail market of Addis Ababa and the producing areas of selected districts was calculated as the sum of transport costs and marketing fees based on survey results. We used the average transport price of selected districts for 2015 which is obtained from the national household survey conducted in 2014–2015 (Kassie *et al.*, 2016). Since data on transport cost from 2010 to 2014 were not available, we imputed them using the annual average inflation rate from CSA (Table I):

$$C_{t-1} = C_t - (C_t \times I_t), \tag{9}$$

where, C_t denotes transport costs at time t, and I_t denotes inflation rate at time t.

Another option we considered is using derived access costs. We used the actual price gap between farm gate and point of competition. This price gap therefore reflects multiple factors[4], more comprehensive than the access costs above (transport, distribution, marketing and other mark ups that retailers impose). However, using this computed access cost and comparing the results to access costs based on survey data allows us to conduct a sensitivity analysis of the NRP results. Table II shows the derived access cost, which are much higher than the survey access costs as expected.

	2010	2011	2012	2013	2014	2015
Sheep						
Transport cost	14	15	22	30	32	35
Marketing fees	5	5	5	5	5	5
Observed access costs	19	20	27	35	37	40
Goat						
Transport cost	29	32	48	63	68	74
Marketing fees	5	5	5	5	5	5
Observed access costs	34	37	53	68	73	79

Source: Survey and authors' computations

Table I. Observed access costs from farm gate to retail market (2010–2015)

Another component of the access cost is the transportation cost between point of competition and the border; i.e., observed access costs between Addis Ababa (retail) and Djibouti Port (border) (Table III). Data for transport cost for the year 2011 were collected from livestock exporters. The same data imputation procedure was used to generate the access cost for the rest of the years.

In sum, our computation of NRPs encompasses different scenarios. The scenarios were developed based on factorial combination of the different data generation processes employed in relation to each of the key variables. The key variables considered are exchange rate (observed and adjusted), export price (Djibouti port and Australia) and access cost between retail and farm gate (observed and computed). The scenarios denoted the following combinations:

- Scenario 1: Observed and Adjusted Exchange Rate + Export Price + Survey Access Costs;
- Scenario 2: Observed and Adjusted Exchange Rate + Export Price + Computed Access Costs;
- Scenario 3: Observed and Adjusted Exchange Rate + International Price + Survey Access Costs (sheep only); and
- Scenario 4: Observed and Adjusted Exchange Rate + International Price + Computed Access Costs (sheep only).

The paper focuses on Scenarios 1 and 2. Results from Scenarios 3 and 4 (sensitivity analysis) are presented in the supplemental material.

5. Results and discussion

Understanding market price incentives and disincentives facing producers using robust methods of analysis has great value for future development of value chains. Following the methodology discussed above, domestic prices both at point of competition and at farm gate points of the value chain are compared with reference prices at similar nodes of the value chain. Reference prices reflect prices that producers could get in the absence of domestic policies since we netted out non-distortionary price wedges using access costs. Here, we are implying that the use of access costs in our analysis removes the distortions introduced by market inefficiencies or market structure. Thus, the price gaps provide an absolute measure of the deviation of domestic price from the comparable reference price, while NRP is the price gap in relative terms giving us an aggregate measure of all domestic policies reflected by a price ratio.

Table II. Derived access costs between farm gate and retail

		2010 Birr/Head	2011 Birr/Head	2012 Birr/Head	2013 Birr/Head	2014 Birr/Head	2015 Birr/Head
Sheep	Retail price–Producer price	194	179	348	404	528	593
Goat	Retail price–Producer price	212	259	477	507	622	639

Source: CSA

Table III. Observed access costs of sheep and goat from retail market to border (2010–2015)

Year	2010	2011	2012	2013	2014	2015
Transport cost	19	29	38	42	45	50
Observed access costs	19	29	38	42	45	50

Source: Survey and authors' computations

Two sets of analyses are being reported here – national level and district level. National average NRPs are computed to provide a general picture of small ruminant value chains. District-level NRPs provide detailed analysis for each region, showing us a more direct analysis of the impact of district-level implementation of policies and strategies on small ruminant keepers. Access costs between point of competition and farm gate from survey data also differ significantly among districts implying variation in infrastructures and market conditions across locations.

5.1 Price gaps at national level

For the discussion of price gaps, we limit ourselves to results from Scenario 1, which is a combination of observed and adjusted exchange rate, export price and access costs. The observed and adjusted price gaps at farm gate and point of competition for both sheep and goat are negative and indicate a strong deviation of producer and retailer prices from the reference price in all years under analysis. This means farmers and retailers received prices much lower than what the export markets are offering. Furthermore, the price gap increases in absolute terms over five years for farm gate node of the value chain, showing producer prices of sheep and goats in Ethiopia increased less in levels than the level increases of export prices of sheep and goat. This shows that the price increases in export markets were not fully transmitted to producers. Price gap in retail market has also been increasing in the study period, and yet does not have a definitive trend.

The observed price gap at the farm gate for sheep was negative, and ranged from −436 Birr per head in 2010 to −941 Birr per head in 2015. The observed price gap at point of competition for sheep ranged from −231 Birr per head in 2012 to −402 Birr per head in 2014, and −377 Birr per head in 2015.

The adjusted price gaps at point of competition and farm gate for sheep were greater in magnitude than the observed price gaps since we are using adjusted exchange rates. These gaps were very high in 2014 and 2015 compared to the other reporting periods although downward trend is clearer for the farm gate level. At the farm gate, adjusted price gaps for sheep were negative, ranging from −575 Birr per head in 2011 to −1,119 Birr per head in 2015. This shows the impact of macroeconomic conditions on the profit margins of producers and that they may be at a further disadvantage if devaluation of the overvalued currency happens[5].

For goat value chain, the observed price gaps at farm gate ranged from −315 Birr per head in 2010 to −693 Birr per head in 2014 with a significant downward trend. Observed price gaps at point of competition for goat were negative over the entire period, and ranged from −30 to −227 Birr per head with more volatility than farm gate. Similar to the case with sheep, the adjusted price gaps at point of competition and farm gate for goat were very high in 2014 and 2015 in absolute terms. The adjusted price gaps at farm gate for goat were negative, ranging from −441 Birr per head in 2010 to −849 Birr per head in 2014.

5.2 NRPs at national level

The observed and adjusted NRPs at farm gate and point of competition are negative over the entire period of analysis. This suggests that government of Ethiopia has not effectively protected sheep and goat keeping farmers and hence policies in place generated disincentives for farmers.

Scenario 1 (Observed and Adjusted Exchange Rate + Export Price + Access Costs). The producers have faced greater disincentives than retailers throughout the period of analysis as NRPs at farm gate are lower than at point of competition (20 percent points to 40 percent points). Observed NRPs at farm gate for sheep were negative, ranging from −53 percent in 2012 to −65 percent in 2014 and 2015 (Figure 3). NRPs at point of competition are higher for sheep and goats (or lower in absolute terms at farm gate) but still negative, showing policy

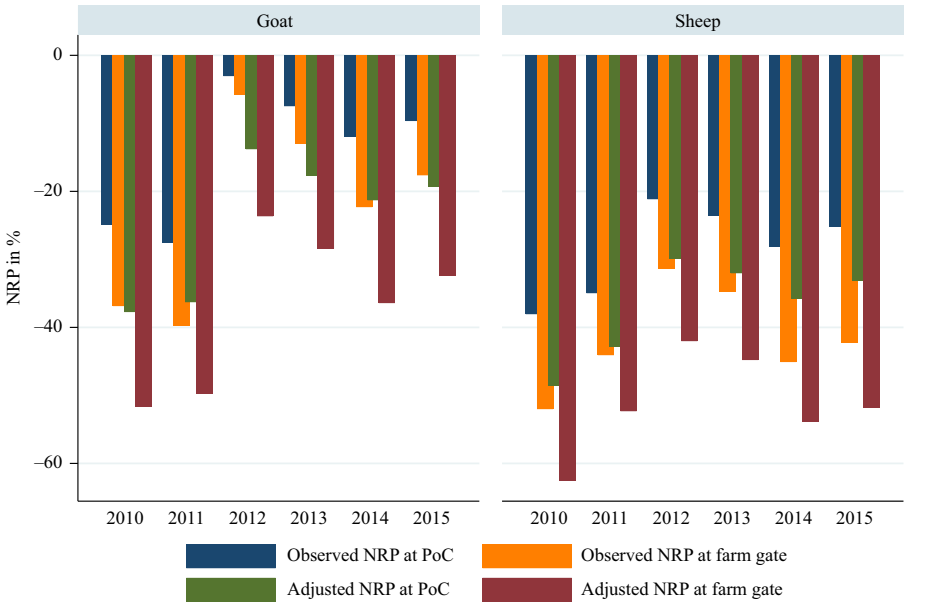


Figure 3.
Observed and adjusted NRP at point of competition and farm gate for sheep and goat at national level in 2010–2015 (Scenario 1)

Source: Authors' calculation

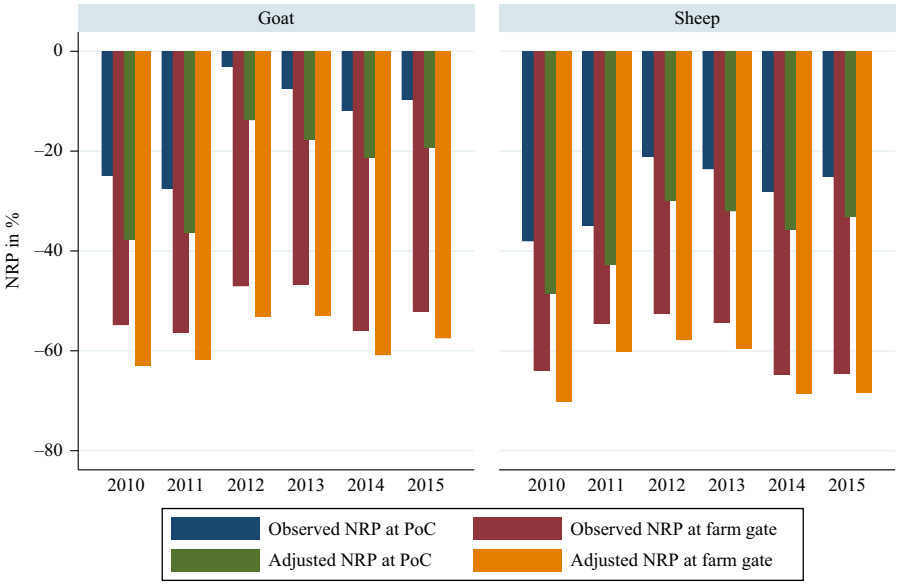
distortions between farm gate and point of competition. The average adjusted NRP at the farm gate for sheep for the five-year period was −64 percent (the disincentive varies from −58 to −70 percent of price). At point of competition, adjusted NRP for sheep was negative, ranging from −30 to −49 percent. NRPs with adjusted exchange rate are lower, showing farmers are taxed even more in real market, compared to official market with official exchange rates.

The NRPs for goats show that goat farmers and retailers also received disincentives during the whole period of analysis. The observed NRPs for goats at the farm gate were lower than those at point of competition over the entire period indicating that farmers incurred greater disincentives to produce due to policy distortions between farm gate and point of competition. In Scenario 1, goat producers received high disincentives of −56 percent (observed NRPs) in 2011 and 2014 (Figure 3). On the other hand, observed NRPs at point of competition for goat farmers ranged from −3 percent in 2012 to −28 percent in 2011.

The adjusted NRP at the farm gate for goat averaged at −58 percent from 2010 to 2015. However, yearly indicators show a mixed situation (and less of a trend) for producers with adjusted NRP at farm gate level varying from −53 percent in 2012 and 2013 to −63 percent in 2010 (Figure 3). At point of competition, adjusted NRP was negative, ranging from −14 percent in 2012 to −38 percent in 2010.

Scenario 2 (Observed and Adjusted Exchange Rate + Export Price + Computed Access Costs). Here we use computed access costs between farm gate and point of competition, which are much higher than access costs from the survey. This increases the final estimates of NRPs for farm gate since it generates lower reference price at the farm gate, and is intended as an effort at providing an insight into the potential variability in NRPs. The NRPs at retail do not change between Scenarios 1 and 2.

The results also show that the NRPs at farm gate for sheep are higher in value than those in Scenario 1, but still negative. In 2010, NRPs were −52 percent. Observing the NRP at farm gate and the adjusted NRP for sheep, the NRPs decreased further in recent years (Figure 4).



Source: Authors' calculation

Figure 4. Observed and Adjusted NRP at point of competition and farm gate for sheep at national level in 2010–2015 (Scenario 2)

The NRPs for goats at point of competition and farm gate level were higher relative to Scenario 1. NRPs in 2010 and 2011 were much lower than in 2012 and 2013, goat producers received low price disincentives of −6 and −13 percent in 2012 and 2013, respectively. In 2014, disincentives reached −22 percent. In 2015, producers continued to receive disincentives, although much less than in 2014 (−18 percent) (Figure 4).

5.3 Nominal rates of protection at district (Wereda) level

NRPs show wide variation across Districts. Same access costs are used between the border and the point of competition (retail) for all districts. However, access costs obtained from survey between point of competition and farm gate differ across districts due to market structure and market facilities (shed, roads, water and feed) in each district.

Scenario 1. The NRPs at farm gate level were negative in all districts (Table IV) and showed that producers have received disincentives over the entire period. The observed and adjusted NRPs at farm gate for sheep were lowest in Menz Gera and Menz Mama, while highest in Shinile and Ziquala. The observed NRPs at the farm gate for sheep in Menz Gera ranged from −65 percent in 2012 to −78 percent in 2010 while the adjusted NRPs ranged from −69 percent in 2012 to −82 percent in 2010. In Shinile, the observed NRP for sheep at the farm gate ranged from −37 to −54 percent, while the adjusted NRP ranged from −49 to −60 percent. In other words, farmers in Menz Gera and Menz Mama were at a higher disadvantage than farmers at Shinile and Ziquala.

Compared to sheep keepers, goat farmers experienced lower distortions during the whole period of the analysis in all Districts. Goat price at the farm gate level was below the reference prices in all years. In absolute terms, the observed and adjusted NRPs at farm gate for goat were highest in Horro and lowest in Abergele.

Scenario 2. Alike Scenario 1, the observed and adjusted NRPs at the farm gate were negative in all selected districts indicating a disincentive for farmers in all years between 2010 and 2015 (Table V). The observed and adjusted NRPs at farm gate level for sheep were

	Observed and Adjusted NRPs at farm gate level															
	Atsbi W.		Menz Gera		Menz Mama		Ziquala		Abergele		Horro		Shinile		Angecha	
Year	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)
Sheep																
2010	−64	−70	−78	−82	−76	−81	−56	−64	−59	−66	−73	−78	−37	−49	−63	−69
2011	−50	−56	−70	−74	−68	−72	−34	−43	−39	−46	−53	−59	−54	−60	−64	−68
2012	−46	−52	−65	−69	−62	−67	−39	−47	−45	−51	−61	−65	−38	−45	−57	−61
2013	−53	−58	−67	−71	−64	−68	−35	−43	−42	−48	−62	−66	−45	−51	−59	−64
2014	−64	−68	−67	−70	−64	−68	−65	−69	−68	−71	−70	−74	−53	−59	−63	−67
2015	−68	−72	−66	−70	−64	−68	−64	−69	−68	−71	−71	−74	−51	−56	−63	−67
Goats																
2010	−60	−67	−51	−59	−50	−59	−52	−60	−47	−56	−78	−82	−47	−57	−61	−68
2011	−46	−52	−64	−68	−63	−68	−49	−56	−46	−53	−77	−79	−62	−67	−51	−57
2012	−37	−44	−49	−55	−48	−54	−41	−48	−39	−46	−68	−71	−42	−49	−50	−55
2013	−46	−52	−53	−58	−52	−57	−39	−46	−37	−45	−67	−71	−46	−53	−43	−49
2014	−53	−58	−52	−57	−51	−57	−60	−64	−58	−63	−68	−71	−48	−54	−59	−64
2015	−63	−67	−51	−57	−51	−56	−49	−55	−48	−54	−60	−64	−52	−58	−49	−54

Table IV.
Observed and adjusted NRPs for sheep at district level (Scenario 1)

	Observed and Adjusted NRPs at farm gate level															
	Atsbi W.		Menz Gera		Menz Mama		Ziquala		Abergele		Horro		Shinile		Angecha	
Year	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)	Obs. NRP (%)	Adj. NRP (%)
Sheep																
2010	−51	−62	−64	−73	−62	−72	−49	−60	−48	−59	−59	−69	−40	−51	−51	−61
2011	−41	−49	−54	−62	−52	−60	−37	−45	−37	−45	−43	−51	−45	−−54	−50	−58
2012	−28	−38	−38	−49	−36	−48	−28	−38	−28	−38	−36	−47	−28	−38	−33	−44
2013	−33	−43	−42	−52	−40	−50	−29	−39	−29	−39	−39	−49	−33	−43	−37	−47
2014	−44	−53	−46	−55	−44	−53	−48	−56	−47	−56	−49	−58	−41	−49	−44	−52
2015	−44	−54	−43	−53	−41	−51	−45	−54	−44	−54	−47	−56	−37	−46	−41	−50
Goats																
2010	−39	−54	−34	−48	−34	−48	−35	−50	−33	−47	−54	−68	−35	−49	−39	−54
2011	−34	−43	−43	−53	−43	−53	−36	−46	−34	−44	−54	−64	−44	−54	−36	−46
2012	−5	−20	−6	−24	−6	−23	−5	−22	−5	−21	−9	−33	−6	−23	−6	−24
2013	−12	−27	−14	−30	−14	−29	−12	−26	−11	−25	−19	−38	−14	−30	−12	−26
2014	−20	−34	−20	−33	−20	−33	−24	−38	−23	−37	−27	−43	−21	−34	−23	−37
2015	−21	−37	−17	−31	−17	−31	−17	−31	−16	−30	−20	−35	−19	−34	−16	−30

Table V.
Observed and adjusted NRPs for sheep at district level (Scenario 2)

lower in magnitude in Shinile district over the period studied. In 2010, the observed NRP at the farm gate ranged from −40 percent in Shinile to −64 percent in Menz Gera. The improvement in relative prices decreased the disincentive to −37 percent in Shinile and −47 percent in Horro in 2015 from the higher disincentives in the previous years.

Under the same scenario, the observed and adjusted NRP at farm gate level for goat were higher than those for sheep in levels, but still negative. The observed and adjusted NRPs at farm gate level were lower in Abergele district compared to the other districts. The observed NRP at the farm gate ranged from −33 percent in Abergele to −54 percent in Horro in 2010.

In general terms, the findings of this study are in line with what has already been reported in the few studies done on livestock in Africa. Reports by FAO in Ethiopia and Kenya have presented comparable results. FAO studies on livestock reported price gaps, NRPs and market development gaps for live cattle in Ethiopia (FAO, 2015), beef in Uganda (FAO, 2012) and cattle in Kenya (FAO, 2013). FAO's live cattle study in Ethiopia considered seven-year period (2005–2012) and reported negative price gaps and NRPs at farm gate level for all years except 2012. The other study on cattle was conducted in Kenya and covered a period of six years (2005–2011). Heavy disincentives were reported both at farm gate and at wholesaler levels for the entire period except for year 2009 – where price gaps and NRP at farm gate level were positive. FAO's study on beef in Uganda focused on farm gate level and used price gaps, NRPs and access cost gaps as yardsticks to measure incentives/disincentives. The study covered three-year period (2008–2011) and reported positive observed price gaps and observed NRPs at farm gate level only for the years 2008 and 2009.

6. Conclusions

Rural communities in Ethiopia have limited access to basic resources – particularly capital and land – and social services, including financial services. Small ruminants play a crucial role as a store of value and readily available liquid asset. Smallholders depend heavily on the oligopsonic and poorly organized rural markets to transact their commodities – including their small ruminants. As these markets go, so goes the financial status of the farm households. Given this enormous importance of the rural markets for the smallholders, the importance of examining to what extent policy interventions in the livestock sector are distorting the market incentives of the farmers can hardly be overemphasized. This study therefore assessed the level of policy induced distortions using four scenarios based on the measurement of the key variables, as well as measurement of marketing and value chain inefficiencies using access costs.

Under all scenarios, the observed and adjusted price gaps at farm gate and point of competition relative to a comparable reference price for both sheep and goats are negative on the national level and indicate a strong deviation of producer and retailer prices from the comparable reference prices (Djibouti or Australia) over the studied five-year period (2010–2015). This means farmers and retailers received prices lower than what they would have received from export markets or international markets due to policy distortions. Furthermore, price gaps for farmers are getting higher over time, although retailers see some improvements in some years of the study.

The NRPs at farm gate level are negative in all districts under all scenarios. There is some variation of NRPs across districts, showing that some differences over location in policy effects. The access costs generated by a survey also varied across districts showing that market structure and performance are different from market to market.

The consistently negative NRP results clearly show that the restrictive policies of the government have negatively impacted the farm households, reducing the prices farmers would have received in a non-policy distorted market. Overall, producer NRPs were lower than retail point NRPs, implying that farmers are at a greater disadvantage, although both retailers and producers are receiving disincentives to their activities. If there is such a high gap between retail and farm gate prices, we need to ask to what extent this pie is shared along the value chain by traders, marketers and sellers, as this is definitely not going to producers. The analysis in a way shows that we need to analyze the impact of policy distortion using NRPs and then use access cost data to identify where value chains are efficient or not in Ethiopia.

It is difficult to separate policy impact from market and value chain inefficiencies, although effort has been done to do so by using access cost data. It can still be noted that market inefficiencies are due to government policy to a certain extent. The producers and retail traders received price penalization because of the low number of small ruminants

traded and the few market opportunities. The fact that farmers and retailers are operating within a market with heavy disincentive entails a serious revision of the grass roots level institutions and policies that increase the burden on farmers and traders.

Therefore, we find it important to emphasize that the sector needs less illicit and explicit taxing and more of a support. The physical and informational disconnection to the market of the smallholder small ruminant keepers in Ethiopia has destined farmers to take prices than being part of the price discovery process. We believe that there is a need for a deliberate effort to empower farmers through various means, for instance access to information and structured collective action. Market infrastructure development that includes access to financial services would certainly reduce the disincentive farmers are living with. We expect the livestock master plan and the second growth and transformation plan (GTP-II) of the country will give due emphasis to the improvement of the small ruminant production and marketing systems to reduce the disincentives and concomitantly improve the livelihoods of poor livestock keepers.

Notes

1. Since the study focuses on live animals only, and not by-products such as hides and skins, we do not have any quantity adjustment on prices. The study focuses only on live sheep and goats at a given weight range, and uses Ethiopian export prices as border prices. Thus, no quality adjustment has been done.
2. The data used were collected from Angecha market as CSA's price survey does not cover Doyo Gena district.
3. MAFAP (2016) also conducts NRP analysis for Africa using official and adjusted exchange rates, due to gap between official and market rates.
4. Farmers live far away from town markets where only very few sheep and goat buyers are available. In these markets, there is an oligopsonic type of market where few traders and brokers dictate the way the market functions.
5. Not surprisingly Ethiopia devalued its currency against the US$ by 15 percent in October 2017.

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