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Competition in Kenyan Markets and Its Impact on Income and Poverty

A Case Study on Sugar and Maize

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Abstract

This paper investigates the link between competitive, well-functioning food markets and consumer welfare. The paper explores two key food markets in Kenya—sugar and maize—and argues that a variety of factors conspire to distort market prices upward. Distortionary factors include import tariff policy, nontariff barriers, potential anticompetitive conduct by firms, and direct state intervention in markets. Changes in sugar and maize prices are shown to have significant welfare effects on consumers. Equivalent income effects are estimated using the most recent available representative household survey data—the Kenya Integrated Household Budget Survey 2005/06. The paper shows that relaxing trade barriers to allow sugar prices to fall by 20 percent could reduce poverty by 1.5 percent. Similarly, adjusting government interventions in the maize market, which have been shown to inflate maize prices by 20 percent on average, could reduce poverty by 1.8 percent. The magnitude of the estimated income effects may vary based on updated household-level consumption data, assumptions regarding demand elasticities, and estimates of import parity prices for these staples. However, in all the scenarios, more competitive prices have a larger average effect on the poorest households in urban and rural areas, supporting the relevance of effective competition policies for poverty reduction strategies.

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Contents

1. Introduction

This paper shows that through appropriate policy action to support well-functioning markets, Kenya can improve the welfare of consumers and reduce poverty. Current wholesale sugar prices in Kenya are almost three times world prices. We show in this paper that relaxing trade barriers to allow sugar prices to fall by even 20 percent could reduce poverty by 1.5 percent. Similarly, adjusting government interventions in the maize market, that have been shown to inflate maize prices by around 20 percent on average, could reduce poverty by 1.8 percent. More competitive prices have a larger effect on the poorest households in both urban and rural areas. While the estimated effects for maize are larger than those for sugar, there is much larger scope for reduction in sugar prices, and as such potential welfare effects relating to sugar reform are likely larger.

This paper builds on a strand of literature that focuses on the welfare impacts on the poor associated with competition problems[1]. For example Urzua (2009) showed that the welfare cost from monopoly power in Mexico was borne disproportionately by the poor. Work by Creedy and Dixon (1998) analyzed 14 commodity groups using household survey data from Australia and concluded similarly that welfare losses from monopoly power were heavier among lower income than higher income groups.

There is a considerable literature that examines the effects of food prices on welfare, and this has expanded rapidly since the global financial crisis. Pioneering work by Deaton (1987, 1989) and Ravallion (1990), among others, developed the analytical and econometric tools for assessing the welfare impacts of changes food prices using survey data, at a time when these were already at the forefront of development debate. Even at that time, Ravallion (1990) observed "The welfare effects in a food producing economy of changes in the price of food have been central issues in numerous debates on development policy". While a substantial literature of welfare analysis of food prices already existed, recent global food crises have generated further expansion of this kind of work[2], although the policy recommendations have not always been consistent[3].

This paper investigates the link between competitive, well-functioning food markets and consumer welfare. The paper explores two key food markets in Kenya – sugar and maize – and argues that a variety of factors conspire to distort market prices upwards. Distortionary factors include import tariff policy, non-tariff barriers, potential anticompetitive conduct by firms and direct state intervention. We link the changes in prices to the associated welfare effects on consumers, using the most recent available representative household survey data - the Kenya Integrated Household Budget Survey (KIHBS) 2005/6[4]. In the case of maize, where there is significant production by smallholders captured by KIHBS, we are able to integrate the effects of price change both on the value of household production and

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[1] See the OECD (2012) background note on competition and poverty from the Global Forum on Competition.

[2] See for example Benson et al (2008), Ivanic and Martin (2008), Ivanic, Martin and Zaman (2012), Porto (2012)).

[3] See Swinnen (2011) for a review of how policy recommendations have not always been consistent in their approach to high or low food prices.

[4] While consumption patterns are doubtless changing in Kenya, annual data from FAOSTAT shows that *relative* consumption of food is changing very slowly, supporting the validity of using the 2005/6 data to draw inferences on household behavior that are applicable to Kenya today.

consumption, to estimate net welfare effects. This builds on more general work by the World Bank, proposing broader level reforms for driving growth for shared prosperity in Kenya[5].

2. The Sugar Sector

Sugar is one of the most widely consumed products in Kenya. It is, surprisingly perhaps, more frequently purchased than any other good reported in the last household survey (KIHBS of 2004/5). At least 89 percent of households regularly consume sugar (80 percent of Kenyan households purchased sugar in the week prior to interview and a further 9 percent consumed sugar from their own stocks). Average annual household consumption of sugar at the time of the survey is estimated 16.3kg per adult equivalent[6]. This corresponds to a average annual household expenditure on sugar of KSH 1,084 (USD15) per adult equivalent from the same source[7]. To put this into context, the annual per adult equivalent poverty lines for rural and urban areas at the time were KSH 18,746 (USD256) and KSH 34,954 (USD477), respectively. So the average household's sugar expenditure is roughly 3 percent of the urban poverty line and 6 percent of the rural poverty line. The same level of consumption at *current* retail prices would cost approximately KSH 2,147 (USD25)[8].

This paper is concerned only with white or brown sugar for human consumption – not industrial sugar, or sugar that still requires further processing for consumption. For clarity, our analysis covers all consumer sugar except for industrial refined sugar, as this is not a substitute for consumers – industrial sugar can only be imported for industrial purposes by firms listed in the East Africa Community (EAC) Gazette, with a remission of duty (to 10 percent). When we refer to "raw" sugar we are following the EAC Common External Tariff (CET) definition[9], which includes all refined or partially refined brown sugar. Raw imports into Kenya are brown sugar that is ready for human consumption, not "raw" sugar that must still be milled[10].

Consumers do not typically adjust their consumption of sugar much in response to price changes – together with the high expenditure on sugar this implies significant welfare costs from high prices. In other words, the elasticity of demand for sugar is quite low – people are reluctant to adjust their consumption of sugar much in response to prices. This means that sugar is sufficiently important to consumers that they are prepared to make sacrifices in the consumption of other goods to soften their reduction of sugar consumption in the face of high prices. As a consequence, sugar prices are important for household welfare in Kenya (and particularly that of the poor, who spent a larger fraction of their income on sugar). High sugar prices result in lower consumption of other goods, rather than just sugar.

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[5] See Fengler et al (2013)

[6] For all the estimations here we have trimmed outliers that are more than five standard deviations above the mean. This is the general rule followed for dealing with outliers in this paper.

[7] The expenditure is that reported in the survey. Converted to USD terms using the average exchange rate of 73.35KSH/USD from July 2005 – June 2006

[8] Change in cost calculated by dividing by average prices between July 2005 and June 2006 and multiplying by prices as of January 2013. Converted using the average exchange rate of 86.86KSH/USD as of January 2013.

[9] Chapter 17 specifies that raw suguar includes all "…sugar whose content of sucrose by weight, in the dry state, corresponds to a polarimeter reading of less than 99.5°".

[10] See Monroy et al (2013)

Given how important sugar prices are for household welfare, it is worth considering reforms in the sector to drive price decreases. As we will see in the next sections, policies that aim at shielding the domestic sugar industry from competition keep Kenyan sugar prices considerably above world prices, with substantial welfare effects as a consequence.. The sugar crisis of 2011 is a case in point. In light of these findings, it is worth reflecting on long-term policy action that will allow for a better balance between the profits of domestic sugar producers and the costs to Kenyan households. Restrictive trade policies are not only depriving families of welfare gains but also disrupting incentives for increased efficiency in the domestic sugar industry.

This section gives an overview of the sugar market in Kenya, analyzes the sugar crisis of 2011 in particular and examines the impact that price changes in sugar have on the welfare of Kenyan consumers. We show that even a modest price decrease of 20 percent (far smaller than the current difference between Kenyan and world sugar prices), would have a significant impact on real incomes, particularly among the poor.

2.1 Government intervention and market structure of the sugar industry

Kenya's sugar market is insulated from international competition by trade barriers. Kenya's sugar industry has long been highly protected and even liberalization within the Common Market for Eastern and Southern Africa (COMESA) has been restricted. Historical import tariffs have been at the higher of an *ad valorem* rate of 100 percent or a specific duty of $200/MT, where they remain today. It is indicative of the limited capacity of the domestic sugar industry that there were still significant imports through the 1990s despite such barriers to trade – imports averaged 26 percent of domestic production from 1993 to 2000[11]. Starting in January 2001, Kenya's market was opened to foreign competition within the COMESA Free Trade Area (FTA), dropping the tariff to zero for member states[12]. However, as cheaper imports from COMESA 'flooded' into the Kenyan market, the government responded quickly with the addition of a quota on COMESA imports in February 2002. This 'safeguard' measure was subsequently extended (multiple times) until 2008 (with varying quota size); after which the COMESA out-of-quota tariff was to fall progressively (70 percent, 30 percent, 10 percent) to 0 percent in 2012 while the quota simultaneously increased[13]. However, further extension was granted to keep the out-of-quota rate at 10 percent through 2014. Kenya has recently been granted another extension of the current quota of 350,000 metric tons through 2015[14].

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[11] Author calculations from ISO (2000) data as quoted in the Structural Aspects of the Sugar Industrial in East and Southern Africa available at http://www.iuf.org/sugarworkers/wp-content/uploads/2012/07/Africa-2002-Basic-Structure.pdf. Some of this import volume is likely accounted for by industrial refined sugar, which Kenya does not produce, and which have removed in all of our own calculations.

[12] See Structural Aspects of the Sugar Industrial in East and Southern Africa (2002)

[13] See KSB (2010)

[14] See FAS (2014)

The COMESA quota has generally been under-utilized[15], reportedly due to non-tariff barriers (NTBs) that allow discretionary blocking of sugar imports. The Kenyan Government has upon several occasions, including 2011, locked out COMESA imports due to various disputes[16]. Mandatory import permits for sugar are required by the regulations under the Sugar Act of 2001[17], through which the Kenya Sugar Board has complete control over imports. Although licenses are issued annually, every shipment of sugar requires pre-import approval. For this reason, it is unclear whether the duty free COMESA quota will be used in full. Other NTB's such as clearing fees and informal payments[18] may also play a role in increasing the price of COMESA imports, but these are likely superfluous in comparison to the discretionary control. More recently, high world prices of sugar making preferential access to other markets (such as the European Union (EU)) more attractive and occasional export bans from key COMESA exporters[19] have reduced the availability of imports from COMESA. It is doubtful whether this last factor has had significant impact, given the dominance of the discretionary controls mentioned above.

Barriers to competition from COMESA imports mean that these imports have a limited effect on Kenyan sugar prices. The barriers mentioned above have prevented imports in sufficient quantities to drive down the local price of sugar towards the levels in cost-leading COMESA countries. Kenya has a structural deficit in sugar production relative to consumption of roughly 200,000MT per annum at current prices. The amount of imports allowed is just such that the market clears at the current (high) prices, but there is no threat of sufficient imports to undercut prices due to the NTB's in place. Without these barriers, cheaper imported sugar should lead to decreases in the local price, all things held equal. With the insulation from competition provided by NTB's, local price variation is driven by local production, supplemented by limited imports from COMESA[20]. International landed prices form a loose upper bound to Kenyan prices. Section 2.2 below expands on this issue.

Government ownership in the sector remains large, despite higher relative efficiency in the private sector and long term plans for privatization. While some privatization has taken place over the past decade, government-controlled factories held a 37 percent production share[21], with additional non-controlling shares in other firms. Part of the argument in favor of privatization is the relative efficiency of production in private mills over those controlled by the government[22]. Plans to privatize the industry, with the hope of inspiring

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[15] See FAS (2009, 2011). Between 2002 and 2006 the quota of 200,000MT was never completely used according to KSB (2010) data. FAS (2011) noted that only about 40 percent of the quota was used in 2010.

16 A COMESA lockout occurred between October 2008 and July 2009 surrounding disagreements between Kenya and COMESA regarding the auctioning mechanism (FAS, 2010). FAS (2012) claims that the Government of Kenya allowed few imports in 2011 due to a pending lawsuit regarding imports from COMESA.

[17] The most recent iteration of the regulations is "The Sugar (Imports, Exports and By- Products) (Amendment) Regulations, 2013".

18 See FAS (2009)

19 For example Egypt in late 2009 (FAS, 2010).

20 Imports of non-COMESA raw (brown) sugar are negligible and may actually be zero – they are so low they may represent data errors. Trademap data, author calculations. Illegal imports, either undeclared or coming in falsely under the auspices of COMESA (see for example CGD Bills Digest (2005), http://www.trademarksa.org/news/mombasa-sh16bn-sugar-import-scam-unearthed) are likely not substantial enough to drive prices down either.

21 Kenya Sugar Board Data (KSB), 2011.

22 See Chisanga et al (2014).

more investment and efficiency[23], have been topics of discussion since joining COMESA, with little real action. The cabinet has approved the privatization of five state owned mills, but this has yet to occur. The latest information from the website of the privatization commission claims that the latest proposal is under consideration by parliament[24].

The local sugar milling market is quite concentrated, and combined with the barriers to trade this suggests that the largest players have significant power over prices. Mumias, the largest sugar company, had a market share of 38 percent of domestically produced sugar in 2011, lower than its typical market share due to cane shortages[25]. Combined with the government-controlled share of the industry, this implies that essentially two entities control at least 75 percent of local production[26]. The shares of local producers in domestic market *sales* vary quite widely depending on the period, as the volume of imports fluctuates a great deal. For example, Kenya Sugar Board data from the first two quarters of 2012 show imports were approximately 33% of local production. To some extent the high level of concentration in the market is probably driven by economies of scale – it is cheaper to produce and market sugar at large scale. There are many markets where the sugar sector is highly concentrated. Regional markets such as South Africa, Tanzania and Zambia have fewer players than Kenya (Zambia only has one), and yet ex-factory prices in Kenya have consistently been the highest for the past decade, as illustrated below in Figure 1. However, the combination of a concentrated market *and* a very high level of protection means that there is little real price competition in the market.

<p align="center">Figure 1: Ex-factory sugar prices</p>
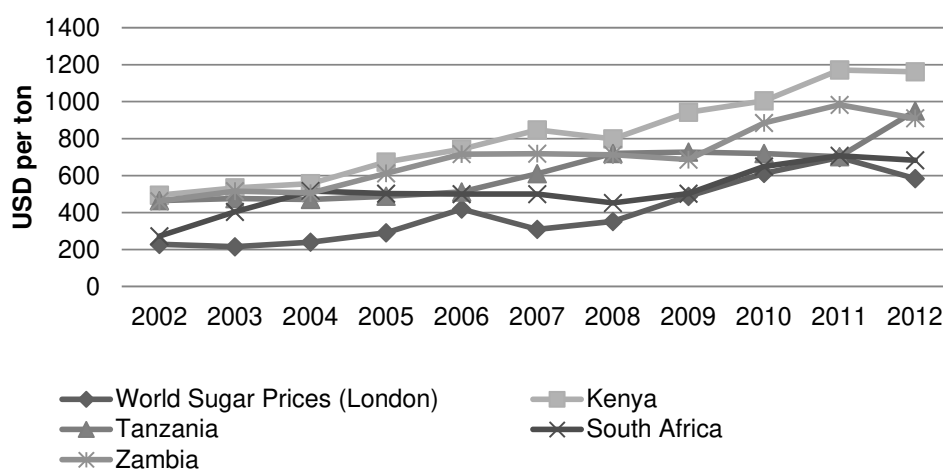
Source: Reproduced from Chisanga et al (2014)

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23 Media articles report that the cost of sugar production in Kenya is more than double that of other COMESA countries; $700 (Sh59,500) per ton compared to $323 (Sh27,455) per ton. It costs $300 to produce one ton of sugar in Zimbabwe, $310 in Malawi, $340 in Swaziland and $340 in Sudan.
http://www.the-star.co.ke/news/article-130060/kenya-spends-more-produce-sugar-mp;
http://www.businessdailyafrica.com/High-costs-sour-outlook-for-local-sugar-industry/-/539546/1929486/-/r11qf4/-/index.html
[24] See http://www.pc.go.ke/index.php?option=com_fsf&view=faq&catid=3&Itemid=535
[25] Kenya Sugar Board figures show Mumias had higher market share than this in 2009 and 2012. Mumias claims a 60 percent market share on its website – but this includes imports. This suggests that when we look at the wholesale market it may be even more concentrated that local production figures suggest. FAS (2008) reported a production share of 50 percent for Mumias in 2007.
[26] Kenya Sugar Board Data.

The sugar cane growing sector and its vertical relationship with sugar millers is a key driver of Kenyan sugar production that will need attention if the sector is to be become more competitive. Outgrowers produce 92 percent of cane in Kenya, similarly to South Africa (93 percent), but contrasting with Zambia (40 percent), where cane yields are the highest in the region[27]. As we will see in the following sections, sugar production follows cane deliveries very closely. In addition, a number of factories in Kenya have been complaining that they are unable to get sufficient cane to produce at full capacity[28]. Chisanga et al (2014) argued that the high production price of Kenyan sugar is due to a combination of low capacity utilization (too little cane, or overinvestment in capacity) and inefficient production (poor management, aging machinery). Mumias capacity utilization in 2012 had reportedly dropped to 55 percent[29]. The fact that sugar cane production has not increased to meet demand by millers suggests that there is some kind of competitive problem in between the sectors (cane production and milling).

The public discourse surrounding the sugar industry often focuses on the 'need' to protect the domestic industry against COMESA, rather than the problem in the domestic value chain[30] and how these might be addressed. Tariff and non-tariff barriers to competing imports are no panacea for the domestic challenges in the sugar industry. On the contrary, it is precisely this protection against competition from more efficient producers that allows the sugar sector in Kenya to remain so unproductive. A new policy to improve the competitiveness of the sector will require, beyond trade policy reform, a careful look at the production of cane smallholders, with particular focus on the vertical relationship with sugar factories.

Overall, due to the factors discussed above, Kenyan sugar prices remain very high relative to international prices. From 2009 to 2012, Kenyan wholesale prices were on average 149 percent above the international wholesale sugar price[31]. Compared to international wholesale prices, Kenyan wholesale prices have to account for additional costs incurred by sugar importers, including Value Added Tax (VAT), the Sugar Development Levy (SDL), international shipping, port clearing related charges and inland transport. Taking all of these into account, we could expect the removal of all trade barriers to bring down Kenyan prices by approximately 28 percent (full calculations and explanations are available in the appendix). This is probably a lower bound estimate, since further reductions in import parity would be possible via cutting other costs associated with importing. Perhaps a more realistic example is what could be achieved by moving to the EAC-CET finished products tariff of 25 percent on sugar, and cutting some of the costs of importing, including the clearing fees. We estimate that a scenario like this might lead to a decline in sugar prices of 19 percent[32].

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[27] Chisanga et al (2014).

[28] See for example http://www.businessdailyafrica.com/Cane-shortage-exposes-Kenya-to-Comesa-rivals/-/539552/1667464/-/ybdsy8z/-/index.html

[29] Chisanga et al (2014)

[30] Ibid.

[31] We use the No.11 Raw Sugar futures contract from the Coffee, Sugar and Cocoa Exchange for the world price for the duration of this paper. For this comparison, we convert into Kenyan shillings at the average mid-market exchange rate for the period. We use the Kenyan wholesale sugar price as reported by FAS.

[32] See appendix for full calculations and assumptions.

2.2 The sugar crisis of 2011: Potential explanations

In 2011 retail sugar prices increased sharply – at first glance this appears to be a much more pronounced increase than that of international prices over the same period. Retail sugar prices in Kenya started increasing rapidly in June 2011, rising from an average of KSH 95/kg in the first five months in the year, up to an average of over KSH 150 from June 2011 through to January 2012. The price spike reached its peak in November at KSH 173/kg (a more than 80 percent increase), but had declined to under KSH 120/kg by February 2012 after which it remained stable for the remainder of the year. The increase in prices coincided with a much more moderate increase in world sugar prices. The left panel of Figure 2 shows the price evolution of retail prices in Kenya alongside international prices[33]. The two vertical markers indicate the period of the price spike – we will keep these markers on all the graphs we use for our analysis, to keep our focus on the 2011 crisis.

After adjusting international prices for the costs that would be incurred to import for the domestic retail market, the spike in prices in 2011 does not seem so unusual. The right panel of Figure 2 once again compares Kenyan retail prices to international prices, but now adjusted for the additional costs that would be added to import sugar into Kenya, and deliver it to the retail market (VAT, SDL, international shipping, port clearing related charges, inland transport and retail margins).[34] From this adjusted curve one can see that the difference between Kenyan sugar and the international comparison price (as shown by the distance between the two curves) was actually relatively *low* compared to the long-term average[35]. Looking at the price series, it does not appear that there is a strong equilibrium relationship between them[36] – the considerable barriers to trade in Kenya keep local prices insulated from the international market (after these costs, international imports are more expensive than Kenyan prices). The international price adjusted for trade barriers forms something of a weak upper bound to Kenyan prices – when domestic prices rise above these, we can see that they typically drop back down fairly rapidly.

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[33] We use retail prices because wholesale prices are not available over a long period. See the analysis of wholesale/retail margins over a shorter period.

[34] Prices include ad valorem import tariffs of 100 percent or a specific duty of $200/MT (whichever is higher), VAT at 16 percent, Sugar development levy (currently 4 percent, 7 percent prior to November 2007), the estimated costs of shipping, port charges and inland transport). See appendix for details.

[35] Note how the calculated border price actually rose above the Kenyan retail price a few times in the period leading up to this. Potentially some combination of production and COMESA imports, or changes in other costs such as transport over time could be behind this.

[36] An Engel-Granger test of cointegration produces a test statistic of 3.012, which is rejected at the 5% level, but no the 1% level. Inspection of the graphed residuals suggests non-constant variance over time.
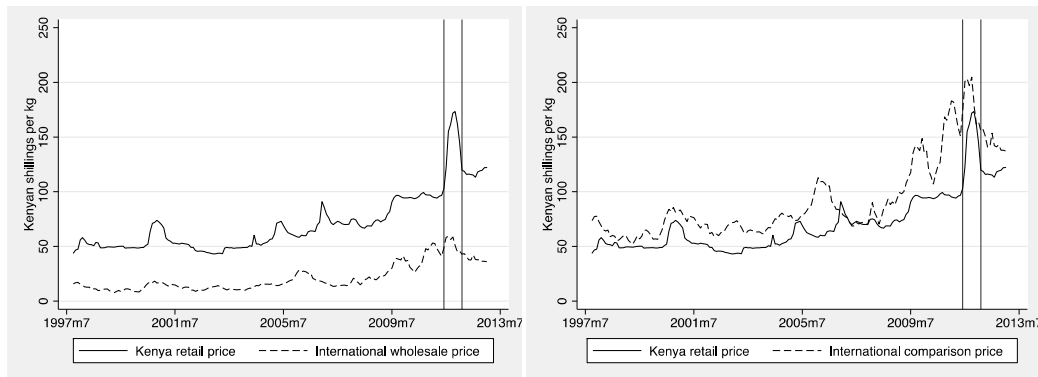
Source: No.11 Raw Sugar futures contract from the Coffee, Sugar and Cocoa Exchange, obtained from the International Monetary Fund (IMF). Kenyan retail prices from Kenyan CPI. Note: All prices in Kenyan Shillings per kg. Adjustments in the right panel include VAT, SDL, international shipping, port clearing, inland transport, and retails margins. See appendix for details.

With the Kenyan market at least somewhat decoupled from the international market by tariff and non-tariff barriers, we look to the domestic supply to understand the origins of the 2011 crisis. Sugar cane deliveries, sugar production, and sugar imports are all potential contributors to be assessed. We show below that the price spike in 2011 can be very substantially accounted for by a combination of a very large local production drop and lower than expected imports. High world (and COMESA) sugar prices likely played only a marginal role in the crisis.

The supply of sugar cane to factories dropped precipitously in mid-2011, with the production of sugar mirroring the change closely (see the left hand panel of Figure 3). A drop in the supply of cane to local sugar producers just after the middle of the year is a normal seasonal pattern but the drop in 2011 was very large even for the low season. Unfortunately data on cane deliveries are not available over a longer period. However, we do have data on sugar production reaching back to 2000 (see the right hand panel of Figure 3), and we can reasonably infer that production is substantially driven by the seasonality in cane deliveries as illustrated in the left hand panel. At its lowest point in 2011, sugar production fell to the lowest levels in a decade.

Figure 3: Deliveries of sugar cane and sugar production (left panel) ,
Sugar production only (right panel)
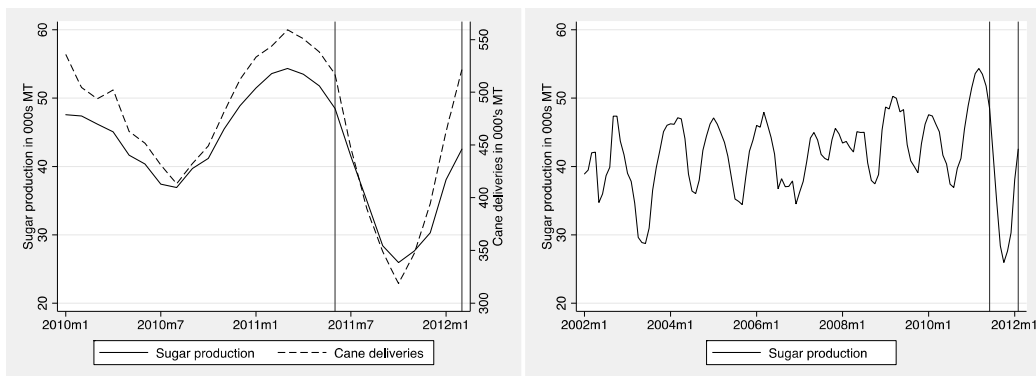
Source: KNBS, author calculations. All series have been smoothed using a four-month moving average (current month and three previous).

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Imported sugar is the natural channel through which a supply side shock would typically be cushioned, but government interventions that restricted imports from COMESA limited the role of imports. Kenya imports sugar every year to cover the structural deficit between domestic production and consumption. In 2011 imports collapsed due to government blocking imports of COMESA sugar[37] (see the left hand panel of Figure 4), although the COMESA regional shortage and high world prices would likely have led to some decline in any case. Note that the lockout of COMESA sugar began *before* the drop in local sugar production – so the source of supply side easing had been cut off before the crisis even began. Imports of sugar rocketed up in early 2012, in response to reversal by the government, even as local sugar production also recovered. The easing in supply brought retail sugar prices back down, although not quite to their previous levels (something to which we will return later).

Figure 4: Imports of sugar (left panel), and Comparison of total supply with a naive prediction (right panel)
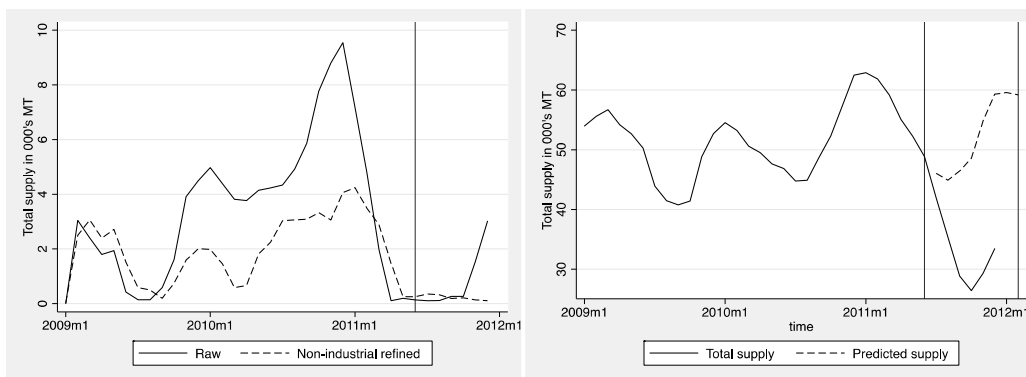
Source: Data is from Trademap and KNBS. Sugar marked as raw is brown and does not require further processing for human consumption. All series have been smoothed using a four-month moving average (current month and three previous).

When import response has not been inhibited, falls in domestic production have not had such large price effects. Contrast the situation in 2011 with the import response to the much smaller drop in production in 2010 (which from looking at Figure 3, still looks somewhat unusual for the season). The left hand panel of Figure 4[38] shows the very strong import response in 2010, primarily from COMESA countries, easing tightness in local supply over the period and resulting in stable domestic sugar prices. In 2009 there was only a slight price hike (see Figure 2) corresponding to the seasonal drop in production. The import response to tight supply in 2009 was smaller than in 2010, but still much quicker than that in 2011 (see left hand panel of Figure 4), which is why the price spike was much smaller. Note that the raw imports here are primarily of brown sugar, which is sold directly to consumers as opposed to truly raw sugar that has yet to be refined at all.

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[37] The Government of Kenya allowed few imports in 2011 due to a pending lawsuit regarding imports from COMESA (FAS, 2012).

[38] Including only HS codes 17011190 (raw cane sugar, not jaggery) and 17019990 (refined sugar, not for industrial use). As explained earlier, raw sugar under this HS code is actually refined or partially refined brown sugar. Amounts under beet sugar are negligible and can be ignored.

The 2011 decline in overall supply was very large relative to what we would have expected from previous years. The right hand panel of Figure 4 shows the overall supply picture (local production and imports), as well as a naïve prediction of what supply would have looked like had the average seasonal and overall trends since 2009 persisted[39]. At the peak of the price surge, total supply was at close to 50 percent of that which might have been expected under 'normal' seasonal conditions. Note that looking at the price series we do not typically observe seasonal differences in prices. It is only when seasonal fluctuations in production are exceptional and/or imported supply is sufficiently disrupted (as in 2011) that we would expect to see big price changes.

The evidence available does not suggest that *anti-competitive* conduct within the local industry was a major cause of the sugar crisis. There are clear indications that there were real production and import shocks to supply that merited a price increase. Anecdotal reports mention that there were *shortages* on the market, and both wholesalers and retailers undertook quantity rationing[40]. This suggests that retail prices could actually have increased further, to the point where the market cleared – not something that is consistent with the view that price increases were *caused* by collusion. In addition those reports assert that in August 2011 Mumias - Kenya's largest sugar company – announced a recommended retail price to curb price rises by retailers (such a move might be problematic in some contexts, as it may be a tool for anticompetitive practices, although that does not appear to be the case here). At the time there were even stories that some sugar mills might close due to the acute lack of cane[41] - again suggesting that the production shock was genuine. Nonetheless, longer-term anticompetitive practices in the industry cannot be ruled out.

Prices spiked throughout the value chain during the crisis, driven by ex-factory prices and wholesale margins, but this does not necessarily represent anticompetitive behavior. The left hand panel of Figure 5[42] shows ex-factory, wholesale and retail sugar prices. One can see that these prices are quite tightly linked together. A large portion of the price spike in 2011 came from the ex-factory price, but there was quite a dramatic change in wholesale and retail margins (right hand panel of Figure 5). Retail margins actually *fell* while wholesale margins increased sharply[43]. However, even though wholesale margins increased over the period, additional evidence would be needed to assess potential *anticompetitive* conduct at the wholesale level. The price change may simply reflect the need to recover fixed costs in the face of lower volumes due to the shock to cane supplies. As noted in the previous paragraph, the fact that shortages persisted suggests that these prices could have been increased even further to clear the market.

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[39] The predicted supply is estimated from regressing the total supply (production plus imports) between January 2009 and May 2011 on monthly dummies and a time trend. This is not intended as any reasonable forecast of the counterfactual, merely an illustration of what might have occurred had previous seasonal and overall patterns continued.

[40] See for example: http://agritrade.cta.int/Agriculture/Commodities/Sugar/Uncertain-future-for-Kenyan-sugar-sector-and-wider-EAC-developments and FAS (2013).

[41] See for example: http://allafrica.com/stories/201107290072.html

[42] Retail prices reported by FAS here are very slightly higher than the retail prices recorded under CPI. This is likely due to differences in sampling/weighting.

[43] Kenya Sugar Board quarterly data available online gives a confusing picture of this period, due to what is certainly a typo in the third quarter of 2011. In these data the mean value for the third quarter of 2011 is outside of the high-low range reported for the same period.

Source: Foreign Agriculture Service (FAS), reporting Kenya Sugar Board (KSB) data, author calculations. Implicit margins have been smoothed using a four-month moving average (current month and three previous).

Entry to the industry that occurred at the end of 2011 may have created some price pressure, but given the scale of the entrants, this is unlikely to explain a significant portion of the price reduction post-crisis. The entry of additional millers in December 2011, while timed almost perfectly with the decline in prices, is unlikely to have played a large role in bringing sugar prices down. The two collectively accounted for a tiny fraction of the market[44] and would have been unable to significantly undercut the big players. On the contrary, entry could have been a response to trade protection that allows an opportunity for supernormal profits in the sector. It is much more plausible that the recovery of domestic production (through the channel of recovering cane deliveries) coupled with an influx of imports eased supply sufficiently for prices to drop.

There have been a few other sharp spikes in Kenyan sugar prices over the past decade that may be linked with similar combinations of production and import shocks as described in 2011. Figure 6 shows prices and domestic sugar production together, with vertical lines indicating the price spikes. Clearly each price spike is associated with domestic production declining, but there are also many cases where production declines and there is no associated price spike. What we have seen in our analysis of the 2011 crisis (and the brief comparison of 2010 and 2009) suggests that the periods when the price increased are likely those where there is a reduction in imported sugar, paired with the observed drop in local production. Barriers to trade thus exacerbate local production shocks, creating high prices.

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[44] The two collectively accounted to 5 percent of production in June-July 2012 according to the KSB. It is likely that this was even lower as they started production in December 2011.

Figure 6: Domestic retail prices and production of sugar
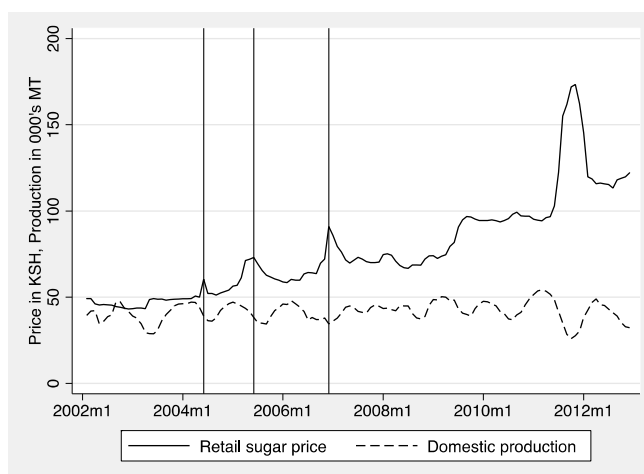
Source: Data is from KNBS, author calculations. Note: Domestic production of sugar has been smoothed using a four-month moving average as before.

Subsequent to the sugar crisis international prices continued to fall, but after an initial period of decline, Kenyan prices rose slightly again most likely due to further local production shocks. Looking back at Figure 2, Kenyan prices did not drop off as steeply as international prices after the crisis, and indeed even began to rise slightly shortly after the crisis. While we do not have a sufficiently long period of import or cane production data to examine this, we can see from Figure 6 above that domestic production took another historically large dip from mid-2012, suggesting that further local production shocks were likely the cause for sugar prices not continuing their post-crisis decline.

A combination of local production shocks and barriers to trade provide a plausible explanation for the sugar price surge of 2011. In general we could summarize the drivers of sugar prices in Kenya with the following points:

- Kenya is a high-cost producer of sugar, and does not produce enough sugar to meet domestic demand (there is a structural deficit), even at current (and historical) high prices. Problems between the cane sector and the sugar manufacturing sector, extensive government involvement and uncertainty about the future may play a role in maintaining this situation[45].
- Kenya has formidable trade barriers in place including exceptionally high tariffs (100 percent), COMESA import quotas and NTB's including a licensing regime that allows discretionary blocking of any sugar imports. These trade barriers prevent any real price competition from imports and restrict the process through which imports can ease tight supply in the context of a local production shock. This makes Kenya susceptible to price crises.

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[45] It is difficult to guess how exactly government has influenced prices. ODI (2010) reports that "government still intervenes in price setting intermittently (e.g. to hold prices down when there are sugar shortages due to a poor harvest during which the price would otherwise rise)", but given government role in production (broadly accepted to be expensive relative to the region) it is hard to guess what prices would be under a competitive market structure.

2.3 Welfare impact of high sugar prices: Effects on household income and poverty incidence

How much would a decline in Kenyan sugar prices, driven by a move towards a more competitive market, affect consumer welfare? To have a closer look at this question we will examine the effects on consumers of a sugar price decrease of 20 percent, rounding up the scenario discussed in section 2.1 – removal of licensing, a reduction in the import tariff to 25 percent together with cutting some of the costs of imports. The decreases that would be possible in sugar prices through policy reform exceed these, but this kind of decrease represents a realistic goal in the shorter term (where sugar would be treated in the same way as other finished goods in the EAC at a tariff of 25 percent). We will show that even a 20 percent decrease in sugar prices has surprisingly large effects on incomes and the incidence of poverty in Kenya.

Figure 7: Mean annual household expenditure on sugar *per adult equivalent* (left panel), Mean annual household expenditure *share* on sugar (right panel), both by income decile
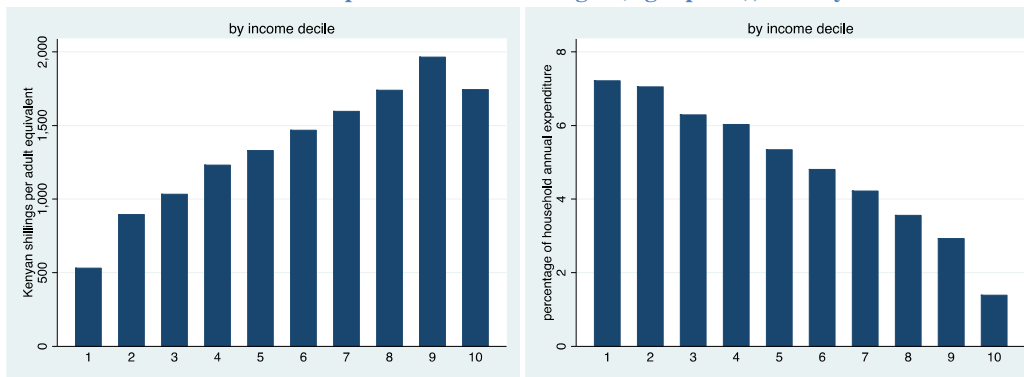
Source: KIHBS (2005/06), author calculations.

Sugar is an important good for Kenyan households, and particularly the poor. Households spend more on sugar as they become richer, but the *proportion* of their income spent on sugar falls progressively. The left hand panel of Figure 7 shows household annual per adult equivalent[46] expenditure on sugar by income decile. We can see quite clearly that higher income households consume more sugar per adult equivalent than lower income households, although this trend slows towards the richest end of the distribution. The right hand side of Figure 7 shows that the household expenditure *share* (the percentage of their total consumption expenditure) on sugar *declines* strongly with income. So as people become wealthier, they spend only a small portion of their additional income on sugar – something that makes intuitive sense.

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[46] An adult equivalent is a measure of household size that is adjusted for children. The idea is essentially that children do not require as much as adults and so a household of an adult and two children would have a lower per adult equivalent than three (which would be the adult equivalent of a household of three adults).
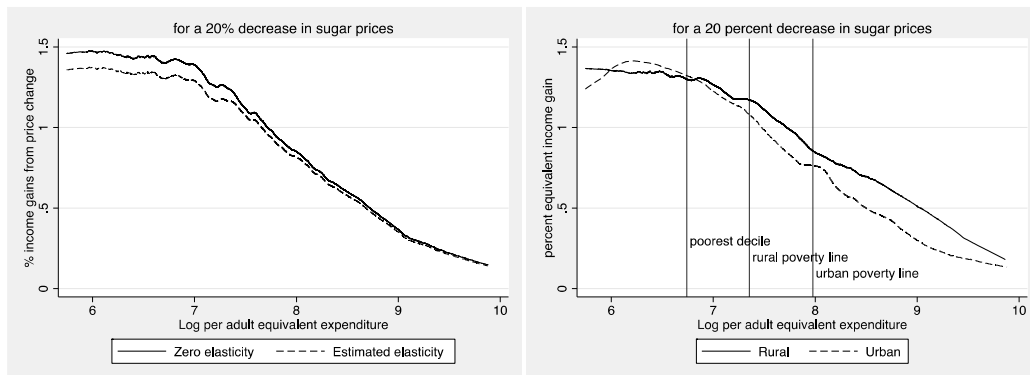
Source: KIHBS (2005/06), author calculations. Estimated elasticities used were estimated for each group of poor/non-poor and urban/rural. The estimates and description of the applied methodology is available in the appendix. Note: 'Equivalent income effect' reflects the estimated equivalent change in real income (compensating variation).

In the situation where households <u>do not change</u> the quantity of sugar they purchase in response to a price change, poor households will evidently benefit significantly more from lower prices. A 20 percent decrease in prices will correspond into a 20 percent decrease in expenditure on sugar for all households and of course a corresponding increase in remaining disposable income. However, households do not all spend the same portion of their budgets on sugar as we have already seen. As a consequence of their higher budget shares in sugar, poor households will be more affected by the change in sugar prices. The solid line in the left hand panel of Figure 8 plots the average gains against log income[47] – this shows very clearly that poor households gain much more in relative terms from a decrease in sugar prices (and conversely that they are much harder hit in relative terms by high sugar prices).

The poor still gain substantially more from price decreases in sugar, even when we account for changes in consumption patterns in response to a price change. We would typically expect households to increase the quantities of sugar they consume in response to a decrease in prices. However, in most cases we would also typically expect that total household *spending* on the good would *decline* – households use some of their 'saved' income from lower prices to purchase other goods. We can incorporate this kind of behavior into our estimates using *elasticity of demand*, a measure of sensitivity to price[48]. The dotted line in the left hand panel of Figure 8 incorporates estimates of the elasticity of demand for sugar in Kenya – here we can see that the positive impact of a price reduction on the poor is

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[47] This plot was estimated using a (non-parametric) lowess smoother implemented using the routine developed by Cleveland (1979) in Stata. Unlike regression techniques, this method does not require us to make any assumptions about the functional form of the average sugar expenditure share by log adult equivalent expenditure. Note that we have cut off the far left hand side of the distribution where almost all households consume zero as it is easier to understand visually, and there are very few households in this position. Those households that do not consumer sugar at all are at *worst* not affected at all by a decline in the price of sugar.

[48] The price elasticity of demand is the percentage change in quantity demanded (on average) associated with a percentage change in price. If the elasticity is between -1 and 0, then for a price decrease, *quantity* consumed would increase, but expenditure would still fall (since the change in price would outweigh the change in quantity.

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somewhat reduced by their price sensitivity[49]. However, the fact that poor households are still more affected (and substantially so) remains – the gain to poor households is equivalent to an increase in their overall expenditure of more than 1 percent. The right hand panel of Figure 8 plots the estimated gains (including substitution effects) separately for urban and rural households[50] - showing very similar results. We see very slightly lower impact on the urban population here – driven by both lower shares in sugar relative to income and (in the case of the urban poor) higher estimated elasticities. The vertical lines on the figure indicate the rural (left) and urban (right) poverty lines – giving a sense of how the poor and non-poor are differentially affected.

Lower prices that could be achieved by removal of trade barriers and more efficient domestic production would have a significant effect on poverty. We estimate that just over 40,000 families would cross the poverty line (out of poverty) as a consequence of a 20 percent price decrease in sugar – an approximate 1.5 percent decrease in poverty for Kenya overall. We use the estimated equivalent change in real income[51] added to current household expenditure to estimate 'post-reform income'. Comparison of the post reform income with the thresholds of the rural/urban poverty lines in Kenya produces the welfare estimate. Even though the equivalent income effects of the sugar price on households are relatively small compared to total expenditure (mean of 0.9 percent, median of 1 percent), the effects are higher on poorer households, many of which sit very close to the poverty line. This striking result is indicative of (a) the inelasticity of sugar demand (people do not easily change their consumption of sugar), (b) high average consumption of sugar, and (c) the vulnerability of poorer households to price changes[52].

Lower sugar prices *might* affect the welfare of sugar smallholders, but even if there is complete price pass-through, the net welfare impacts are still positive. We are focusing on consumers, rather than producers in this analysis. Producers are difficult to incorporate into the analysis as we lack information about the pass-through between sugar and sugar cane prices. Chisanga et al (2014) argue that the majority of rents in the value chain lie at the level of the miller, rather than the farmer. The fact that sugar factories in Kenya are generally operating below capacity due to cane shortage suggests that even if some sugar factories closed their doors, there would still be excess demand for cane, and as such cane prices would be unlikely to fall. Nevertheless, we can stress test our results by making two very simplistic assumptions: (a) cane prices move in lockstep with sugar prices, and (b) the elasticity of substitution of cane farmers is zero. Both of these are extreme (worst case) assumptions, but they provide us with an upper bound of the potential effects on smallholders. Under these

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[49] The welfare impact including household substitution effects is given by the compensating variation. This is estimated using a second order Taylor series expansion of the derivate of the expenditure function with respect to own-price, dropping the effect of curvature. See Porto (2010) and Mghenyi et al (2011) for derivation. Elasticities of demand are estimated using simple log-log regressions for four groups defined by the categories or poor/non-poor and rural/urban. Estimation using the method of Deaton (1989) found these elasticities to be high, suggesting that if anything we are understating the impact here (through overstating substitution). See appendix for the estimated elasticites from both methods.

[50] Again, we have truncated the plot on the left hand side to remove the bottom 1 percent of households.

[51] The technical term for this is the compensating variation.

[52] There are a very large number of Kenyan households that have consumption levels that are very close to the poverty line (KIHBS, 2005/06). Thus small changes income can generate large changes in poverty as measured by the national poverty line. The annual per adult equivalent poverty lines for rural and urban areas at the time of the survey were KSH 18,746 (USD256) and KSH 34,954 (USD477) respectively.

two assumptions, cane growing households would have median income losses of 0.7 percent of their incomes[53]. The net decrease in poverty taking this adjustment into account would be 1.05 percent. So even in the worst-case scenario for cane growers, the net effect on poverty is a substantial decline.

2.4 Concluding remarks on sugar

Sugar prices have a large impact on the welfare of Kenyan households and reforms in the sector could plausibly achieve substantial price decreases. We have demonstrated that sugar prices in Kenya are important in terms of real income and poverty. For a 20 percent decrease in sugar prices we have shown that poor households would experience gains equivalent to 1 percent of income, with a decline of poverty of 1.5 percent. It is the poor who have the most to gain here: the average gains as a percentage of income in the poorest decile are estimated to be 4.4 times those in the highest decile. While gains among wealthier households are lower, they remain significant. We estimate a reasonable import parity benchmark without trade barriers to be at least 28 percent below current Kenyan wholesale sugar prices, suggesting that a decrease of 20 percent via domestic and trade policy reform is very much achievable.

Current barriers to trade essentially isolate the Kenyan market from international competition, providing support to high prices. There is some legitimacy to complaints from sugar producers that the *international sugar price* is not 'fair'. Recent estimates suggest that the current world price is around 30 percent higher than what would occur under free international competition[54]. However, the natural protection created by the costs from arrival in the port in Mombassa to market in Nairobi easily exceeds this. Current import controls and tariffs of 100 percent are excessive, especially in addition to the natural protection due to transport costs. The Kenyan market could be opened to competition by removing import controls and phasing down tariffs. We estimate that phasing down to the EAC-CET finished product rate of 25 percent, paired with reforms to ease costs of importing, could result in price reductions in sugar of 19 percent[55]. In the short term, at least dismantling NTBs that block imports from COMESA (including the quota and import permits) is likely to have a significant downward impact on sugar prices, to the benefit of consumers.

There is a need for policy reform to create a better balance between support for domestic sugar producers and the welfare costs on Kenyan households. They key question is whether Kenya can become a low cost producer of sugar. If Kenya has the capabilities to become a competitive producer of sugar, then the question is how to help the industry make this transformation without compromising consumers (and the poor in particular) through high prices. If Kenya cannot become a low cost producer of sugar, then in the long run it would be better to lower trade barriers and allow other countries to subsidize Kenyan consumption of cheap sugar. The resources used for sugar production would be better used in an industry in which Kenya is able to become competitive. This would entail an

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[53] The mean is higher at 2.4 percent due to a few very large cane growers who take much larger losses.

[54] See the appendix for a full review, only an excerpt of which appears here.

[55] This is slightly lower than the estimated distortion in the world market, but other factors such as transport costs provide some level of natural protection.

adjustment period for local producers that, if not carefully managed, would result in the failure of Kenyan businesses and a loss of employment.

At the level of the domestic industry, some work needs to be done to establish why there has not been more investment to improve productivity in the sugar industry. It could be that the delay in privatizing the industry together with uncertainty surrounding the impact of open trade with COMESA is stalling investment in the sector, but there may be other reasons. Chisanga et al (2014) argue that a variety of factors including excessive government involvement, barriers to domestic investment, and problematic vertical relations with the cane sector, among others, are affecting sugar production in Kenya. Recent reports of sugar millers operating well below capacity support the idea that there may be some problems upstream in the cane-growing sector, or in the structure of the relationship between the two sectors[56]. Certainly completing the progress towards open trade with COMESA should help to resolve uncertainties in the investment climate, as well as discipline domestic sugar prices. However, further work will be needed to examine other obstructions to competitiveness.

3. The Maize Sector

Maize is the most important staple crop in Kenya, particularly for the poor. Average annual household consumption at the time of the last household survey (KIHBS of 2004/5) was approximately 105kg per adult equivalent[57], estimated at roughly 38 percent of gross caloric intake [58]. Average annual household expenditure on maize totaled KSH 1,863 (USD25) per adult equivalent[59], which is roughly 10 percent of the rural poverty line. The same level of consumption in current prices would cost approximately KSH 3,913 (USD46) per adult equivalent on average[60]. Per capita consumption of maize has declined very slightly over the past decade, reflecting the gradual rise of alternative staples in Kenyan diets, but there is still no other staple with a consumption share that approaches that of maize[61].

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[56] Given that sugar prices are so high, it seems strange that there can be a simultaneous long-term shortage of cane. Typically we would expect the prices for cane to rise, and further market entry by farmers to increase production of cane. The fact that cane shortages persist suggests there is a serious problem in the value chain between the cane growing and sugar milling sectors.

[57] Estimation accounts for population weighting and removing outliers in the same method as described for sugar. FAOSTAT figures for national supply are slightly lower than these estimates, coming in at 83kg per capita in 2005. However, other academic sources (for example. Jayne et al, 2005) cite figures circa 98kg, suggesting that the FAO estimate is on the low end.

[58] The average for 2005/2006 was 38 percent, very close to the average for the 2000's of 37 percent. Caloric contribution of maize has been on slow decline from the 1990's, when it averaged 41 percent. These statistics were estimated using FAOSTAT data.

[59] The expenditure is that reported in the survey, including both the amount purchased and the value of that consumed from own production or stores. Converted to USD terms using the average exchange rate of 73.35 KSH/USD from July 2005 – June 2006

[60] The change in prices is estimated as the price change in sifted flour between the year from July 2005 to June 2006 and the most recent price available at the time (October 2012). We use the change in sifted flour to be conservative, as it was slightly lower than that for dry maize. The exchange rate used is the average of October 2012, 85.16KSH/USD.

[61] FAO estimates have fallen since the time of the survey, as cited above, to 77kg in 2009. Estimates of percentage caloric intake have also fallen as noted above. Consumption of other staples, notably wheat, has risen over the same period.

Maize is consumed in a variety of forms in Kenya.[62] Green maize or dried grain is usually boiled with beans in a stew called *Githeri*. Milling the dry grain in local 'posho' hammer mills produces a whole meal flour (or posho flour). The *posho* millers sell unbranded ('loose') flour produced from their own supply, or provide a 'custom' milling service at a fixed rate per unit. This flour is commonly consumed in the form of a stiff (*ugali*) or soft (*uji*) porridge. Sifted flour is produced by the large industrial milling firms and sold in various retail outlets. The price of this kind of meal is generally higher – it has a lower extraction rate, higher packaging cost and longer shelf life.[63] Sifted flour is consumed in the same way as whole meal flour. An even more expensive variety of sifted flour, "fortified flour", is available at a premium price with the addition of vitamins and minerals.

Removal of subsidies during liberalization changed the relative importance of *posho* flour and sifted flour in the market. Sifted flour was heavily subsidized until 1993, and together with government restrictions, this resulted in large industrial millers dominating the urban market[64]. The removal of the subsidies and restrictions in 1993 resulted in a rapid transformation of the market, as *posho* flour quickly gained a strong foothold. Within two years, prices of both *posho* and sifted flour dropped substantially, to the benefit of consumers in general and the poor in particular[65]. Subsequent narrowing of the price premium of sifted flour over *posho* meal (reportedly due in part to a decline in the degree of refinement of sifted flour), has led to a relative fall in the consumption of *posho* meal, although its consumption still substantially exceeds that of sifted flour among poorer households.[66]

This section gives an overview of the maize market in Kenya, and discusses some of the factors that drive local prices. We then look at the impact that these price changes have on the welfare of Kenyan consumers[67]. We show that maize prices are important for household welfare in Kenya (and particularly that of the poor). Although household production of maize does substantially insulate many households from the effect of price changes[68], the poorest rural and urban families are generally large net buyers and will benefit the most from lower prices. We close with a brief review of some recent actions by the Competition Authority of Kenya (CAK) in the maize milling sector, and how these have affected prices.

3.1 Government interventions in the maize sector have led to higher prices

The Kenyan government continues to intervene extensively in the grain market, with the most reliable estimates suggesting that this has increased prices by an average of 20 percent. There was a period of 'liberalization' in the grain market during which sifted flour

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[62] See De Groote and Kimenju (2012).

[63] ILO & UNIDO (1984)

[64] Jayne and Argwings-Kodhek (1997) estimated that sifted flour had a market share exceeding 90 percent in urban areas prior to liberalization.

[65] Jayne (1997).

[66] Kirimi et al (2011), De Groote and Kimenju (2012), Hoffman (2013), Jayne (1997). See next section for analysis of current consumption.

[67] Mghenyi et al (2011) produced robust estimates of the impact of large maize prices change on rural households in Kenya. Unfortunately, the sample used was not nationally representative, and comparisons with KIHBS 2004/5 suggest that the sample does differ substantially from the population. We replicate some of these results for a representative sample, to assess how maize prices affect income and poverty for Kenya as a whole.

[68] See Mghenyi et al (2011)

subsidies were removed (1993) and NCPB interference declined (1995 – 2000) with a cut in central buying/selling and the removal of internal trade restrictions. However, NCPB activity rose steadily over the following decade[69]. The NCPB currently purchases around 10-20 percent of locally produced maize grain, at a fixed price, frequently above that which would exist under a competitive market[70]. Purchased grain is mostly sold on to millers, with some excess sold outside of the country. NCPB actions from 1995 to 2004 are estimated to have increased the price of maize grain by approximately 20 percent on average[71]. This benefits the small subset of farmers who are net-sellers of maize at the expense of the majority who are net-buyers[72].

The high tariffs on maize grain probably do not have a very large effect during times of plentiful regional supply, although at times the government has used barriers to trade to defend higher prices created by NCPB activity. Tariffs at 25-30 percent during 1995 – 2004 were estimated to increase maize prices by approximately 4 percent in Nairobi[73], but apparently informal (illegal) imports from within the region were rampant at the time. Currently the EAC-CET of 50 percent on maize generally means that no imports from outside the EAC/COMESA cross the border, except during exceptional circumstances when the tariff is typically waived[74]. However, free trade with lower cost producers in the EAC/COMESA typically covers Kenya's maize deficit and disciplines prices. Regional maize prices are quite closely integrated, with maize entering Kenya tariff free from within the EAC (Uganda and Tanzania – often informally[75]) and other COMESA trade partners in the region (Zambia and Malawi). Integration with Tanzania is considerably weaker than that with Uganda, in part due to the role of export bans that have been instituted by Tanzania upon occasion[76]. Kenyan prices remain somewhat above Ugandan prices generally – trade costs between Kampala and Nairobi prevent a single price from holding across the region and upon occasion Kenya has even impeded regional trade to keep domestic prices artificially high.[77] Various divergences between Kampala and Nairobi wholesale prices illustrated in Figure 9 may be due in part to this.

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[69] D'Hotel et al (2012). Previous share of marketed maize purchased by the NCPB estimated at 50-70 percent; with the NCPB also exercising other controls on the market for maize (Jayne et al, 2008).

[70] See Ariga et al (2010), FAS (2013), d'Hotel et al (2012).

[71] Estimated by Jayne et al (2008) using a reduced form vector autoregressive model. High maize grain prices may have benefitted some of the poor who grow maize, but most farmers are net maize buyers, with the majority produced by a very small portion of (mostly larger and wealthier) producers.

[72] Jayne et al (2008)

[73] Jayne et al (2005)

[74] Jayne et al (2005), Nyoro et al (2004), Jayne et al (2008), Jayne and Tschirley (2009).

[75] There are not tariffs applied between these nations, so informal imports are a not a problem in terms of compliance. However, it does mean that we must approach the import data with caution, since the formal doubtless underestimate total flows of trade.

[76] See World Bank (2009)

[77] See World Bank (2009)

Figure 9: Wholesale prices of maize in Nairobi, Kampala and International commodity markets
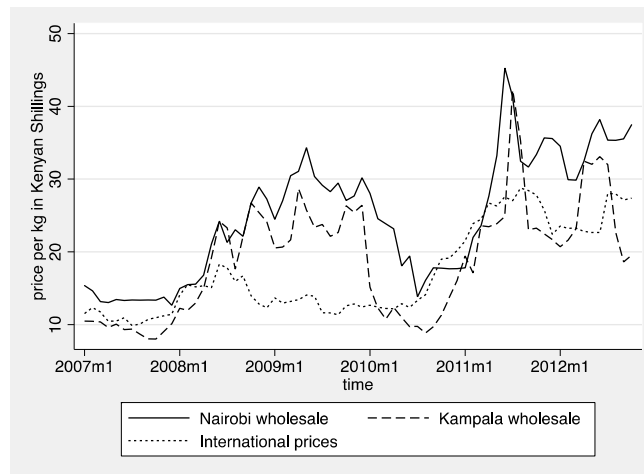
Source: Nairobi and Kampala wholesale from FAO, International price given by the U.S. No.2 Yellow, FOB Gulf of Mexico, U.S. price, as reported by the IMF. Note: All prices in Kenyan shillings per kg.

During times of tight regional supply, Kenyan prices have risen substantially relative to international prices. Figure 9 shows Kenyan and Ugandan wholesale prices, as well as international prices[78]. While, they mostly move together, there are some clear instances where they diverge – for example in 2009, and 2011/2012. During times of short regional supply (or when disruptions such as violence or export bans affect trade), when importers need to look beyond the region, the tariff (50 percent) has a large and significant effect, preventing imports from bringing prices down[79]. Maize grain imports have averaged about 10 percent of consumption over the last decade[80], but annual flows have shown considerable volatility – in 2009 for example, imports (mostly from South Africa) spiked to 38 percent of local supply[81].

The use of ad hoc changes in the import tariff policy during times of tight supply creates further problems. During times of tight supply, large millers lobby the government for a remission of the duty of grain[82], which sometimes results in a sudden removal or reduction of the duty (prior to joining the EAC this could be done unilaterally, but can still be done now via an agreed remission of duty). Due to the scale economies inherent in importing grain, it is typically the large millers (directly or via the NCPB) that are best positioned to access low-tariff or tariff-free grain during these periods of duty remission. This also has a side effect on competition from *posho* meal, as these small-scale millers are often unable to access sufficient maize grain in these times[83]. In addition, the associated reduction in flour costs tends to lag the change in tariff because of bottlenecks in transport infrastructure and trader withdrawal

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[78] International price given by the U.S. No.2 Yellow, FOB Gulf of Mexico, U.S. price, as reported by the IMF. We are not able to adjust the maize prices appropriately for costs incurred through importing, due to lack of data, most particularly on tariffs that have varied substantially over time.

[79] Ariga et al (2010)

[80] FAOSTAT data 2000 – 2009. Reports of unrecorded informal and illegal imports across borders with Uganda and Tanzania suggest that actual imports may have been much higher.

[81] FAOSTAT data 2000 - 2009.

[82] Kirimi et al (2011)

[83] Kirimi et al (2011)

from the market due to unpredictable government interference[84]. This means that consumers continue to pay higher prices for longer, before the imports bring prices back down.

The ban on GMO imports of maize, and the way in which it has been varied over time, is another source of uncertainty in maize prices. The Biosafety Act of 2009 created the National Biosafety Authority and granted it broad powers for the control of Genetically Modified Organisms (GMOs). This includes the control of imported GMOs such as GMO maize. Since this time, the control of imported GMO maize has been erratic, with periods during which a complete ban has been in place, while in others imports by millers (for the production of flour only) have been allowed. In addition, the National Biosafety Authority has not been the sole regulator, with direct intervention by the Ministry of Health, following a decree from the cabinet in 2012[85]. This ban has an important effect on imports, since there are only a very limited number of countries from which Kenya can source non-GMO maize. During 2009, and even through in 2010, Kenya imported significant volumes of GMO maize, mostly from South Africa[86]. After South African (GMO) maize was blocked, imports dropped off substantially. The GMO ban may in essence separate Kenya from other sources of maize outside the region, even if the tariff is reduced.

Further down the value chain, the Competition Authority of Kenya (CAK) has taken action against potential anticompetitive pricing practices in sifted flour. The Competition Authority of Kenya (CAK) (formerly the Monopolies and Price Commission) assessed the sector and provided pertinent recommendations based on their antitrust enforcement and advocacy powers. The removal of the clauses of the Cereal Millers Association (CMA) that allowed for price coordination was a good move, and the investigation itself may have triggered a response lowering prices of sifted maize flour. In addition, the recommendations on the actions of the National Cereals and Produce Board (NCPB) aimed at reducing the heavy burden on consumers of maize grain prices were timely. We will return to this in more detail in section 3.4.

We can summarize briefly what we know about the maize market in Kenya as follows:
- NCPB actions have increased the price of maize by 20 percent on average between 1995 and 2004, and given the continued high levels of purchasing, it is likely that they continue to inflate prices substantially.
- Inconsistent application of trade policy and bans on GMO maize imports has played a complementary role in inflating maize prices in Kenya. During times of plentiful regional supply of maize, these are less important as other producers in the region are able to produce at competitive prices (although trade costs do erode the competitiveness of the prices). During times of tight regional supply these factors have caused prices in Kenya to rise significantly above world prices, with the short term management efforts of government creating additional complications.
- CAK has played a positive role in improving the competitive environment in the sifted flour sector, with additional pertinent recommendations relating to the activities of the NCPB in the grain sector.

[84] Jayne and Tschirley (2009), Kirimi et al (2011)
[85] See FAS (2012a).
[86] Trademap mirror data. Another substantial source of GMO maize was the United States.

3.2 Households in the maize sector: Consumers and producers

Patterns of maize consumption in Kenya are complex, with differences across the income distribution both in quantity and form consumed. The left hand panel of Figure 10 illustrates the average annual expenditure on maize per adult equivalent across expenditure deciles. Maize consumption generally increases up until the 7th decile, after which it remains fairly constant. This is a common pattern for a staple – as income increases, households tend to consume more of the staple, but if income increases sufficiently then they begin to substitute superior alternatives. Households also make different choices between *types* of maize as they become wealthier. Consumption of dry grain and loose flour first increases and then decreases in total expenditure, while sifted flour increases across all deciles. This suggests that households view sifted flour as a superior substitute relative to maize grain and loose flour, and they substitute accordingly as they become richer. Green maize consumption increases across the distribution, suggesting that this might be a complement as opposed to a substitute to grain/flour (i.e. used for different dishes that are not necessarily viewed as superior or inferior).

Figure 10: Maize consumption:
Household expenditure per adult equivalent (left panel), Household expenditure *share* (right panel)
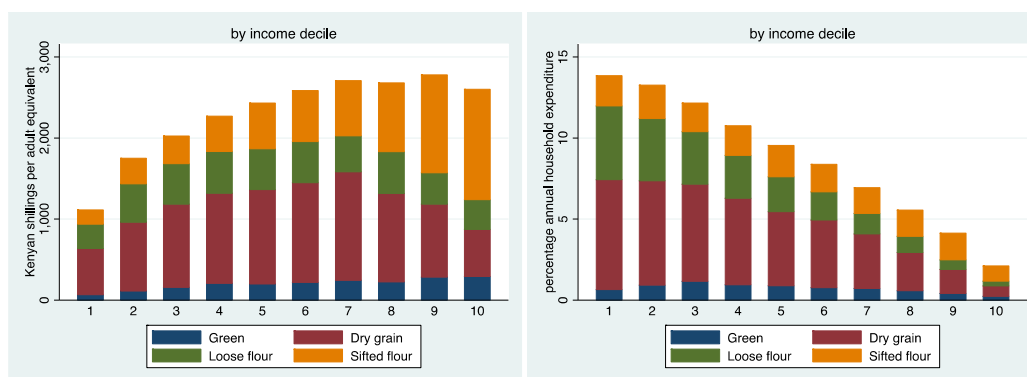
Source: KIHBS (2005/06), author calculations.

Maize consumption as a percentage of total expenditure decreases in total consumption expenditure. While households do consume more maize as their total expenditure increases, the rate of increase of the former is slower than the latter, as shown in the right hand panel of Figure 10 above. This graph illustrates that the budget share of maize declines monotonically across income deciles. This makes intuitive sense: as incomes increase households spend more on maize, but they do not spend *all* of the additional income on maize – clearly there are also other products they wish to consume. So wealthier households spend a much smaller portion of their total expenditure on maize. Households in the poorest decile have an expenditure share on maize that is almost seven times that of the wealthiest decile.

There are some differences between the makeup and level of urban/rural consumption of maize. The pattern of increasing overall expenditure, and decreasing expenditure shares, relative to income holds across both rural and urban households. However, on average rural households consume substantially more maize in general and maize *grain* in particular, while urban households consume more sifted flour. Some part of this pattern is likely explained by

differences in geographical availability of the different kinds of maize (as opposed to just prices and preferences). If we suppose that where a product is widely available we would typically observe at least *some* households consuming it, then we can infer that where we find no households consuming a product, it is probably not widely available. The first two columns of Table 1 show the percentage of survey clusters (small geographical areas) where each product was consumed in the week of the survey, broken down by urban/rural. Given that only 64 percent of rural (and 63 percent of urban) clusters consumed loose flour *at all*, it is highly likely that in at least some of these clusters, this product was not available. The last two columns of the table show the percentage of households overall that consume each kind of maize – this, in comparison with the clusters columns, gives a sense of how the household's consumption bundle of types of maize varies widely across the country. In addition to what is shown in the table, most households only consumed one (49 percent) or two (35 percent) of the four types of maize during the week of the survey.

Table 1: Geographical consumption of maize

	% clusters consuming		% household consuming	
	Rural	Urban	Rural	Urban
Green	43%	80%	14%	26%
Grain	95%	71%	66%	25%
Loose flour	64%	63%	29%	19%
Sifted flour	55%	96%	26%	63%

Source: KIHBS 2004/5, author calculations

The fact that many households grow maize for their own consumption and for sale must be taken into consideration for the analysis of the welfare effects. Roughly half of all Kenyan households grow maize, although only 14 percent sell *any* of their produce[87]. The left hand panel of Figure 11 shows mean annual sales and consumption of own-production of maize across income deciles. Notice that unlike demand, we have a strong inverse U-shape for supply – those in the middle of the distribution produce the most. Those that grow and sell are concentrated within rural areas, although there are a few urban households that grow maize.

Relative to their incomes, people across most of the lower and middle of the distribution produce a significant volume of maize. The right hand panel of Figure 11 shows the value of own-production maize consumed and sold, as a percentage of total expenditure, across expenditure deciles. Notice here how much higher the bars are in the poorer end of the distribution (as compared to the left hand panel of Figure 11) – even though these households do not produce that much maize, their production is significant relative to the size of their total consumption levels.

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[87] Estimated from the KIHBS 2005/6, as the percentage of household's with non-zero annual incomes from maize of maize, accounting for household weights.

Annual value of own-production (left panel), and Annual expenditure share of own-production
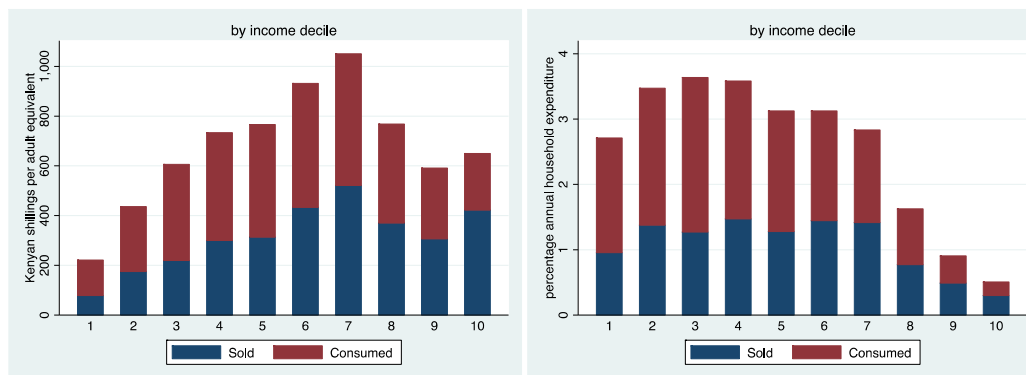
Source: KIHBS (2005/06), author calculations.

3.3 Welfare impact of high maize prices: Effects on household income and poverty incidence

In this section we estimate the welfare impact that could be achieved through a 20 percent average decline in maize prices. The most recent reliable estimates of NCPB purchases show that these activities inflated maize prices by 20 percent on average over a ten-year period[88]. Using the analysis of household demand and supply of maize, we now estimate the impact of a 20 percent decrease in prices on welfare in Kenya – i.e. what could feasibly be achieved by eliminating price increases due to recent NCPB actions. Similar analysis can easily be applied to other changes in maize prices, whether relating to the short-term management of crisis, or to longer-term structural policy. We know that trade policy (tariffs) and the policy towards GMO maize have also affected prices, although at this stage we lack credible estimates as to the size of those effects beyond their complementary role along with the NCPB as mentioned above. The results in this section underline the importance of maize prices and the fact that lower prices will yield significant benefits to Kenyan consumers, and most particularly the poor. Given that we have used only the estimate of the impact of NCPB, we can consider this a lower bound of what is achievable through adjusting current policies.

We will apply the hypothetical average 20 percent price decrease to all kinds of maize (green, dry grain, loose flour and sifted flour) across all parts of Kenya. World Bank (2009) showed that maize prices across Kenya are fairly well integrated, suggesting that it is reasonable to assume constant geographical effects on average. In addition, price history suggests that the margins between different steps in the value chain are fairly constant over time. Prices for green maize were not available, but these are the smallest segment, and there is no reason to believe that prices for green maize would not move in similar patterns to those of dry grain. In the next section we show that while margins between sifted flour, loose flour and dry grain do fluctuate over time, in the longer term they are generally very stable. The only point at which they have deviated substantially from this stability was during the aftermath of the of the 2009 price spike, when sifted flour prices fell more slowly than grain prices.

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[88] See background section.

Putting together household consumption and production from the previous section, it is clear that lower income households are on average much larger net buyers of maize relative to their incomes. To the extent that households grow their own maize, they are insulated from the effects of price increases, and may even benefit from them. So to understand total welfare impacts we work with net consumption (consumption less production). Figure 12 shows mean net purchases of maize as a percentage of expenditure, across income deciles. Only 8 percent of households are net sellers of maize, as compared to 17 percent with net purchases of zero and 75 percent with positive net purchases. From the figure we can see that those at the poorer end of the distribution are far more affected than the wealthy. The net budget share of those in the poorest decile households is estimated to be 6.5 times that of the wealthiest decile.

Figure 12: *Net* expenditure share on maize
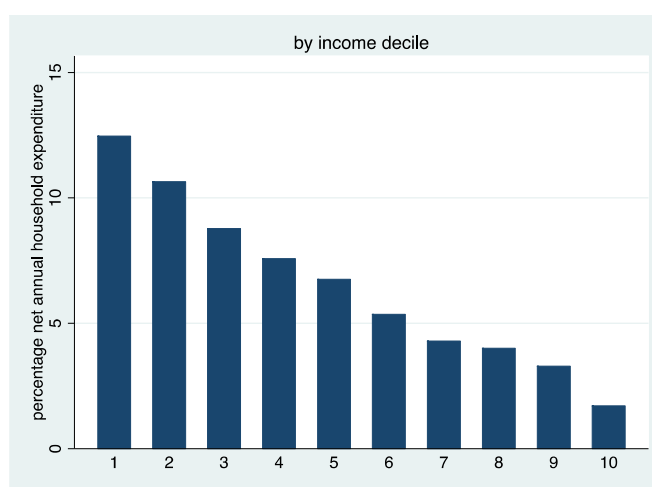
Source: KIHBS (2005/06), author calculations.

Without accounting for change in behavior, poorer households will benefit to a greater extent from the lower prices that can be gained from better-functioning markets. If we ignore behavior change for a moment, a change in the price of maize will affect households in direct proportion to their budget share on this item. The solid line in the left hand panel of Figure 13 illustrates the impact of a 20 percent decrease in maize prices across income levels – the y-axis measures the gain in income that would have equivalent effect on a household's welfare to this price cut. This figure illustrates precisely the same concept that we covered with respect to sugar.

Altering current policy to reduce maize prices by 20 percent would have approximately the same effect as a real income increase of 1.2 percent on average, with much greater gains falling on the poor. When prices fall, on average we would expect people to purchase more of that product (but probably not so much that their total expenditure on the item increases). At the same time we would usually expect an average decrease in the production of maize by some suppliers (since the profits to be earned are lower). As in the case of sugar,

we can incorporate this behavior into our estimates using demand and supply elasticities[89]. The dotted line in the left hand panel of Figure 13 does exactly this – showing very slightly reduced welfare gains[90] across the distribution of expenditure[91]. Notice that below a certain level of expenditure, households experience average welfare gains equivalent to more than 2 percent of total expenditure. Compare this to the wealthier end of the distribution, where equivalent income gains are below 0.5 percent. Clearly, a decline in maize prices will substantially benefit the poor.

Figure 13: Equivalent income effects of a 20 percent price decrease in maize:
With zero or estimated elasticity (left panel), Rural/Urban with estimated elasticity (right panel)
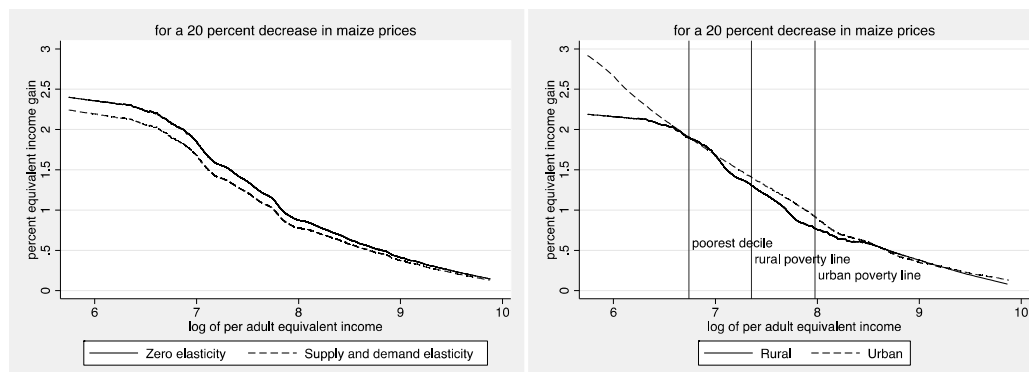
Source: KIHBS (2005/06), author calculations. Elasticities are taken from Mghenyi et al (2011). For supply this is an elasticity of 0.4. For demand the largest elasticity is used (for the sake of conservatism); -0.55 across the whole sample. Note: 'Equivalent income effect' reflects the estimated equivalent change in real income (compensating variation).

Separating the welfare effects of rural and urban groups suggests that impacts *by income level* are generally very similar. The right hand panel of Figure 13 shows the estimated welfare impact curves (including elasticities[92]) separated into rural (solid line) and urban (dotted line). The only point where the two lines diverge is just below the boundary of the bottom decile of expenditure (as indicated by the solid line on the left hand side). This divergence is explained by the fact that the poor in rural areas typically grow quite a lot of maize, reducing their net purchases, as opposed to the urban poor, few of whom grow maize. This suggests that the *poorest* of the urban population have the most to gain from lower maize prices. However, the portion of the population in this group is small (only 0.04 percent of urban households are in the bottom expenditure decile).

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[89] As with sugar we use a second order Taylor series expansion to estimate the effect. The only difference here is that we include supply effects, which we ignored in the case of sugar.

[90] Deaton (1989) argues that the first order impacts are good enough for the purposes of policy, since the difference made by elasticity's in most cases would be small and estimates of these difficult to produce in a defensible way. These results are consistent with this view.

[91] We use elasticities from Mghenyi et al (2011). For supply this is an elasticity of 0.4. For demand we follow their largest elasticity (for the sake of conservatism) of -0.55 across the whole sample. Inspection of the size of the effect in the graphs suggests that the magnitude of assumed elasticities will not substantially change the results.

[92] Extending these results with the use of elasticities for all of the different kinds of maize, that differ across rural/urban and poor/rich areas is not practical with the data available. In addition, based on the analysis of Figure 2.6, this would only marginally change our estimates. The fact that maize has been and continues to be by far the dominant staple in Kenya, despite the large price swings of recent years, there is no reason to suspect that elasticities would be particularly large, nor that differences

Table 2: Projected changes in household poverty from a 20% decrease in maize prices

	Rural	Urban	Total
percentage of poor out of poverty	2.00%	1.72%	1.95%
percentage non-poor into poverty	0.17%	0.01%	0.12%
Net change in poverty	-1.77%	-1.69%	-1.75%
Contribution to net change	82.37%	17.63%	

Source: KNBS, author calculations

A decrease in maize prices of 20 percent would result in a significant decline in poverty[93] in both rural and urban areas. We estimate that a maize price decrease of 20 percent (through the estimated average equivalent income gains of 1.2 percent) would result in a *net* decline in poverty of 1.8 percent. This result is consistent with other studies linking maize prices and poverty in Kenya[94]. Table 2 above shows the make-up in the net changes in poverty, including those moving from poor to non-poor and those moving from non-poor to poor across both rural and urban areas. The net poverty gains are concentrated in rural areas, with 82 percent of the net poverty gains living in rural areas. It is unfortunate that any households would be harmed by such reform, but those who gain very substantially outnumber those who lose. The number of households that move *into* poverty as result of the decline is roughly 10 percent of the number that move *out* of poverty.

3.4 Actions by the Competition Agency in the maize sector

The Monopolies and Price Commission of Kenya (now the Competition Authority of Kenya) conducted an investigation into potential collusion by large-scale millers of maize over the period 2009 – 2010. This followed spiking maize prices and recommendations of the maize sector survey report prepared by CAK in December 2008. The report highlighted anti-competitive concerns, particularly focusing on the Cereal Millers Association (CMA), which had clauses suggestive of price coordination in its constitution. The Monopolies and Price Commission did not determine whether a price fixing cartel was in fact being operated by the CMA, but the CMA was asked to amend its constitution to remove clauses that could facilitate price fixing. This process started in early 2010 and was concluded with a final edition forwarded by the CMA in February 2011.

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[93] When we talk of poverty here, we mean those that have household per adult equivalent expenditures below the national poverty lines.

[94] See Jayne et al (2008) for a review. These results most look at the welfare impact of a price *increase*.
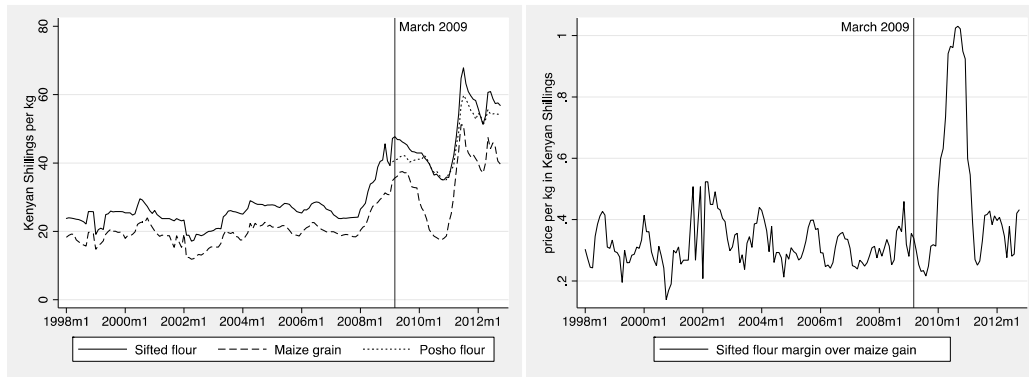
Source: KNBS, author calculations.

Although no evidence was found to conclude that the CMA was operating as a cartel, a small, unexplained drop in sifted flour prices following the investigation could be indicative of a response to pressures for setting more competitive prices. Immediately after investigation began in 2009, sifted flour prices started falling despite the fact that *grain prices were still rising*, as was the price of posho flour. This is illustrated in the left hand panel of Figure 14, where the vertical line indicates March 2009. Similarly the right hand panel of Figure 14 shows the margin of sifted flour over grain prices – to the right of the vertical line (March 2009), the margins of sifted flour dropped. Over the five months following March 2009 (April – October), the average margin of sifted flour over the price of grain was only 24.6 percent as compared to the average over the previous five years of 30.9 percent[95]. It is not the fact that this margin dropped that is unusual – as is clear from the margin history, drops of this size have happened in the past – but rather the fact that this occurred during a period while grain prices were still rising. This *might* be an indication of collusion, and investigation by the commission prompted a change from the millers. However, there could well be other reasons that account for this change, and available evidence is certainly not sufficient to conclude that there were in fact cartel activities being carried out.

The very large increase in margins starting in late 2009 should not necessarily be interpreted as anticompetitive. Sifted flour prices actually fell across the entire period of this margin spike. This increase in margins was caused by grain prices *falling* very rapidly back towards the historical average (see the left hand panel of Figure 14), while sifted flour prices fell more slowly. The slower fall of sifted flour prices may have been due to either (a) stocks of higher priced grain already purchased by millers, or (b) wariness about further grain price fluctuations given the unprecedented price shifts over the previous months. The higher margins were not maintained during the price spikes that started in early 2011, during which margins dropped once again. After the end of the unusual margin spike, margins have remained slightly higher than historical levels (the average from April 2011 through October 2012 was 36 percent as opposed to the average prior to March 2009 of 32 percent). Further data and analysis would be required to assess whether this reflects anything other than the costs of managing risks associated with much more volatile grain prices.

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[95] Margin calculated as the price per kg of sifted flour over the price per kg of maize grain.

Even if sifted flour prices have been inflated by a hypothetical cartel at some point, the impacts on consumers and poverty would be much lower than those associated with grain price hikes. A decrease in sifted maize prices (only) of 5 percent (the approximately amount that margins dropped post-investigation as outlined above) would increase real income by 0.1 percent[96]. This is only 5 percent of the size of the average impact we estimated would be caused by a grain price decline of 20 percent. The much more modest size is due to the fact that the average budget share of sifted maize is just under 2 percent, as opposed to the average total budget share of all kinds of maize at approximately 7 percent. In addition, the impacts of sifted flour changes are less concentrated on the poor, since as we showed above sifted flour is a smaller portion of poor consumer budgets than other kinds of maize. This is not to say that sifted flour prices are not important – clearly they still matter for consumers – but their importance is overshadowed by the importance of maize grain prices.

The Monopolies and Price Commission of Kenya 2011 report on the maize market focused on NCPB activities and included a set of recommendations regarding its future conduct – reflecting the accurate assessment that this is the more important concern in the value chain. This shift of focus towards maize grain prices is well advised, and the potential gains from removal of barriers to competition are much larger than those to be gained in the flour market. However, continued vigilance regarding potential cartel activities (as the CAK continues to show[97]) is important, particularly the trade barriers against imported flour (EAC-CET of 50 percent on maize flour).

3.5 Concluding remarks on maize

The analysis shows that eliminating the 20 percent average increase in maize prices caused by NCPB central buying would be equivalent to an increase in average incomes of 1.2 percent, and with an associated 1.8 percent reduction in the poverty rate. It is the poor who have the most to gain here: the average gains as a percentage of income in the poorest decile are estimated to be 7.4 times those in the highest decile. While certainly there would be some that losers from lower prices, the number of households moving into poverty would be only 10 percent of the number moving out of poverty. The gains on average significantly outweigh the losses. In addition, the 20 percent price decrease that we have focused on is a smaller price variation than that which has actually happened over recent years. From the beginning of the price spikes in January 2008 to their peak in June 2011, maize prices in Kenya increased by 64 percent in real terms[98] - far exceeding the increases in world prices. These spikes have often been due to the barriers in place that prevent maize imports from entering the country from outside the EAC/COMESA, to ease tight supply

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[96] This is estimated using the first order method (i.e. without accounting for substitution effects), as we do not have reliable estimates of own or cross price elasticities of demand for the different kinds of maize.

[97] See for example in the popular media:
http://www.businessdailyafrica.com/Cartels+put+on+notice+over+high+flour+oil+prices/-/539546/1643524/-/item/0/-/bb1kxmz/-/index.html

[98] Grain prices went from a national average of 20.3KES/kg to 51.21KES/kg in nominal terms over this period. However CPI rose more than 56 percent over the same period. Real prices have since fallen (both due to a reduction in nominal prices and further inflation), such that the net real increase since January 2008 is 20 percent - still a large impact on consumption baskets. *Data source: KNBS.*

during times of a poor regional harvest. These spikes could be significantly moderated through appropriate policy action.

Minimizing effects that the NCPB has in terms of increasing maize prices should be an important element of reform. The role of the NCPB in increasing prices needs to be addressed. This is something that has already been touched on by the Competition Authority of Kenya (former Monopolies and Price Commission). The Ernst and Young "Draft Final Report on Study of Restructuring of the National Cereals and Produce Board" released in April 2014, contains a strong emphasis on the role that the NCPB has played in increasing prices. The document notes *"in Kenya government directives on prices to be applied by NCPB have distorted the functionality of markets and the Board's profitability"*. An important consideration of any reform should be the way in which it is expected to affect the price-altering effects of NCPB actions.

A more consistent and open trade policy will support lower maize prices through increased competition, but perhaps more importantly, it will reduce the chances of price crises through better market response in times of supply side shocks. Trade policy needs to be reformed such that times of tight regional supply do not have such a large effect on prices. Reducing the tariff rate and committing to and communicating a consistent policy regarding how tariffs are managed will help the market to function better in these times. A consistent approach to GMO imports is a key complementary component. In the longer term, low, stable maize prices would also encourage farmers to diversify into cash crops with more growth potential (as opposed to staying in maize for subsistence).

4. Concluding Remarks

Policy reform that could reduce maize and sugar prices is an opportunity for Kenya to improve household welfare, and most particularly that of the poor. Lower prices of these foodstuffs will have the equivalent effect of increasing real incomes, with larger gains falling on the poor. Effects as a percentage of income in the poorest decile would be 4.4 times the gains for the highest income decile in the case of sugar; and, 7.4 times in the case of maize. Income poverty could decrease by 1.5 percent and 1.8 percent in face of price reductions of sugar and maize products, respectively. As with almost all policy reform, there will be some net losers from such reforms – but those who lose are much fewer in number and wealthier on average than those who gain. As such, the proposed reforms are both welfare enhancing for Kenya and pro poor. In addition, more competitive markets have benefits in terms of the strong incentives they create to drive productivity increases among producers.

More stable and pro-competition domestic and trade policies are recommended to increase consumer welfare. The action of the Competition Authority is key both to advocate for less distortive government policies and to detect anticompetitive behavior that can exacerbate the burden on the poor. Their investigations of the maize milling sector and their recommendations regarding the NCPB are both excellent examples of CAK playing precisely this role.

Extending this work through structural models that incorporate labor market and longer-term substitution effects would improve our understanding of food prices in Kenya. Ravallion (1990) showed that incorporating labor effects relating to high food prices in Bangaladesh could result in positive effects in the longer run. There are two reasons to believe that this kind of effect is unlikely to alter the general welfare conclusions of this paper. First, these effects typically take a long time to have an impact – in the case of Ravallion (1990), positive net effects were only observed after four years. None of the price spikes of Kenyan maize away from world prices has lasted even close to this long. Second, recent studies suggest that these labor market effects may be much smaller than previously believed[99]. Nevertheless, further structural work on these markets would enhance our understanding, and if the required data become available this would be an intriguing pursuit. General equilibrium models would also provide additional information on the transmission of effects deriving from removing constraints to competition.

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[99] See Wodon and Zaman (2008)

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Appendix

A1 Sugar price calculations

This appendix outlines the assumptions and calculations behind (a) the estimated import parity series for international sugar imports, and (b) the relevant benchmark to which to compare current Kenyan sugar prices.

### Estimating import parity prices

We use the international price series provided by the IMF, from the No.11 Raw Sugar futures contract from the Coffee, Sugar and Cocoa Exchange. This price is FOB the vessel of the importer at the port of origin. To adjust this price to import parity we need to make the following adjustments.

- **Shipping and insurance**. We use the estimated price for shipping a light 20ft container from the Pelotas Port in Brazil to Mombassa Kenya obtained from the seafreightcalculator.com ($2257). We divide this by an estimated container contents of 20MT. Monroy et al (2013) use 25MT in this calculations, but this is higher than the net capacity of a typical light 20ft container, so we take a slightly more conservative stance. We assume insurance costs of 1% of FOB value of the shipment. The shipping and insurance costs are added to the price of the sugar to calculate CIF.
- **Import tariffs.** Import tariffs are the higher of the ad valorem duty of 100% or the specific duty of $200/MT. For the period under study, the CIF price never dropped low enough for the specific duty to apply.
- **VAT.** VAT is applied at a rate of 16% to the value of CIF plus the import tariff.
- **Sugar development levy.** The sugar development levy is applied to the value of CIF. The SDL rate is currently 4%, and was 7% prior to November 2007
- **Costs associated with arrival at the port, clearing, inland transport and importer margins.** Monroy et al (2013) provide an excellent breakdown of all the costs incurred from arrival of a container at the port through to completion of inland transport to Nairobi from 2005 – 2011. We remove the portions of their calculations that are variable (i.e. percentage based) to calculate an average fixed portion. The variable portion is 5% of CIF (including letters of credit and clearing fees). The fixed portion averaged 7.6 across the period. We added this directly as a fixed portion. Variation is low enough that this should not make a significant difference to our estimates and since the data are not available for the whole period, we prefer this over attempting to use specific annual estimates.
- **Retail margins.** International sugar does not arrive at the port in saleable form. It arrives in bulk, and must be packaged and distributed on the local market. We apply the average margin between wholesale (50kg bags) and retail sugar in the domestic market to the import parity 'wholesale price' as calculated by taking into account all of the above bullet points. The average margin is 15%. This is calculated from FAS monthly data for the

period 2009 – 2012. In addition, the margin calculated using quarterly data from the KSB on the period 2003 (Q1) to 2013 (Q1) given the same average margin[100].

Figure 15 below illustrates how the components discussed above contribute to the import parity price estimated over the period 2005 – 2011, for which we have all the data that was then used to separate the fixed and variable components for the whole period. Note that over this entire period, with exception of 2007, the import parity price remained higher than the local Kenyan price (shown by the black line). This is why there have been no imports of (non-industrial) sugar into Kenya with exception of from COMESA (subject to quota and licensing), which is not subject to the tariff.

Figure 15: Components of import parity price
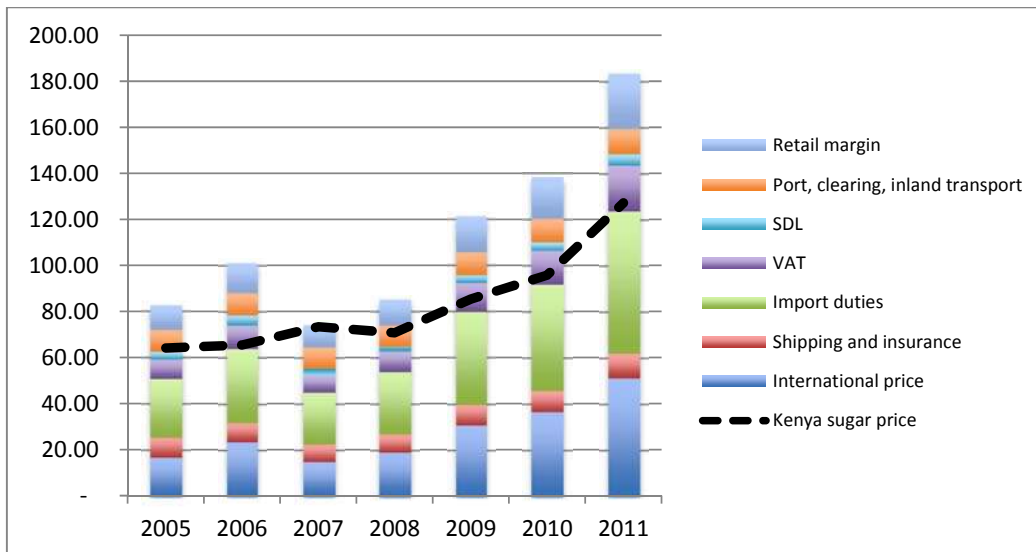
Source: KNBS, IMF, Monroy et al (2013), author calculations

Inspection of the graph shows that the import duties are easily the largest component of the import parity price – even larger than the actual international price itself. Import duties are currently so high that it completely excludes international imports. Over the period 2009 – 2012, it would have required a cut of over 50% to bring the import parity price down to the Kenyan price on average. The fact that import tariffs are so high as to insulate the local price from import parity prices except during exceptional times complicates the calculation of how much we might expect Kenyan prices to full under a more open trade regime. This is the calculation to which we now turn.

Estimating benchmarks to which Kenyan sugar prices can be compared

The relevant benchmark when considering reforming trade policy to open Kenya to international competition is that of import parity in a context of lowered trade barriers. This is the situation that is most likely to occur given removal of those barriers – a useful

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[100] We corrected one typo in the KSB data in Q3 2011, where the mean is shown to be outside the high/low range. This was the only point where the KSB data diverged from the FAS series.

counterfactual against which to weigh the current situation. Certainly it would be possible to lower prices further if some of the other costs associated with importing were lowered (e.g. costs at the port, costs of inland transport), but a large percentage of these require much longer-term effort to reform. One quick win in respect of reducing these costs would be the removal of the clearing fees (2 percent).

To estimate the benchmark we focus on a comparison between wholesale sugar prices and import parity without trade barriers. We remove import duties (which also impacts on other costs, such as VAT), and retail margins. Retail margins are removed because, at least for the period 2009 – 2012 we have reliable wholesale prices, and we are more concerned with the most recent prices in term of assessing a benchmark with which to compare Kenya's current situation. Retails margins may also be affected by other things that are not directly related to sugar policy (e.g. packaging costs, internal transport costs), and for this reason it is simpler to remove them. We also know that retail prices are responsive to wholesale, so all things held equal we can expect price reductions at the wholesale level to be passed on. Figure 16 below illustrates the results, showing that in general import parity (with zero trade barriers) has been below Kenyan wholesale sugar prices. However, the margin is not that large – Kenyan wholesale prices are estimated to have exceeded this (completely open) import parity price by 39 percent on average over the period 2009 – 2012 (illustrated by the difference between the two lines on the graph). This implies that a move to completely open trade would result in an average price decline of 28 percent[101].

Figure 16: Kenyan wholesale price compared to import parity with no trade barriers
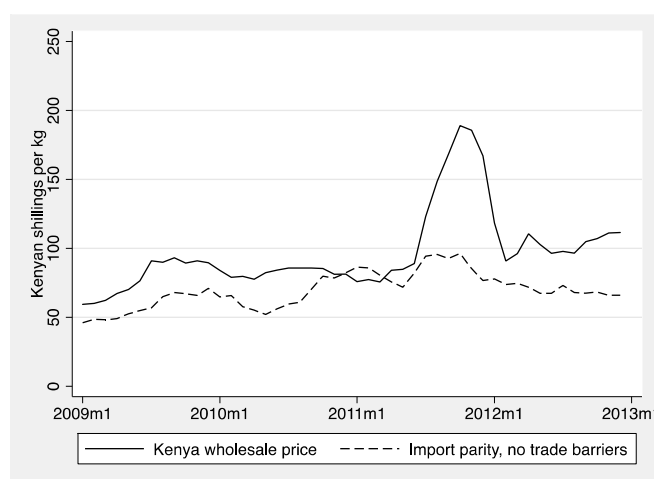
Source: KNBS, FAS, author calculations

A more realistic potential scenario for reform would be to consider reducing the EAC-CET rate on sugar to 25 percent from 100 percent (which would treat sugar on par with other finished goods[102]), remove the licensing regime and cut costs to import through removing clearing fees and simplifying procedures at the port. In this scenario, we assume that in the longer term Kenya could halve costs between arrival at the port and final destination. We estimate under these assumptions that Kenyan wholesale prices over the period 2009 – 2012

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[101] 0.39/1.39=0.28

[102] The Broad Economic Categories (BEC) nomenclature identifies some forms of sugar as *mainly* intermediate goods for industry, but non-industrial refined sugar (HS code 170199) is identified as a final consumption good.

would have exceeded the import parity price by 23% on average. This implies that a move to completely open trade would result in an average price decline of 19 percent.

An alternative scenario to consider would be one in which the world sugar market was fully liberalized (leading to international sugar prices rising by approximately 30 percent - see appendix A3), and the Kenyan sugar industry become competitive in this environment. If this scenario had occurred between 2009 – 2012 then - even ignoring the costs associated with delivering the sugar fob to a vessel in Mombasa - we would expect wholesale sugar prices to drop by 53%. In this situation, we would expect no international imports into Kenya, since local production would be cheaper than import parity.

A2 Estimation of elasticities

This appendix briefly presents the estimates of the elasticities of demand used for the welfare analysis. In general the methodology employed is described in sections 2.3 and 3.3. of the main text, and in footnotes such as 89-92. For more complete details of the estimations in this paper, the Stata do-files are available on request from the authors.

Table A1 below shows, in the first two columns, the average budget shares of sugar across the categories of rural/urban and poor/non-poor. The elasticities in the second two columns were estimated using a simple log-log regression. While simple to estimate, this suffers from numerous econometric problems. For an overview of these issues, see Deaton (1997). From the table we can see that elasticity of demand for sugar is higher (in absolute value) (a) for urban consumers relative to rural consumers, and (b) for poor consumers relative to non-poor consumers.

Table A1: Budget shares and price elasticities

	Average budget share		Log-log elasticity		Deaton method elasticity	
	poor	non-poor	poor	non-poor	Poor	Non-poor
Rural	6%	4%	-68%	-28%	-47%	5%
Urban	5%	2%	-89%	-48%	-74%	-4%

Source: Kenya Integrated Household Budget Survey (2004/05), author calculations. The equation estimated for the estimation of log-log elasticity is $ln(Q_i) \sim ln(P_i) + u_i$, where Q_i is quantity of sugar purchased by household i, P_i is the price of sugar faced by household P_i, and u_i is the error term. The estimation followed for the Deaton elasticities is considerably more complex and can be found in Deaton (1989).

We also estimate elasticities using the method proposed by Deaton (1989), which appropriately accounts for zero purchases, measurement error and quality shading – see the last two columns of Table A1. Note that this method has a far larger impact on the estimates of the non-poor – reducing them to very close to zero. We have not used these as our main estimates in the paper, which represents a more conservative stance, as these elasticities would result in larger welfare impacts in all cases. It would also increase the estimated effects on the poor relative to the non-poor.

A3 The International Sugar Market

The international market for sugar is considered as one of the most distorted of all agricultural commodities[103]. For example, the United States, EU and Japan use subsidies, import quotas and tariffs among other interventions to keep their domestic market prices high, while simultaneously depressing the world market price[104]. Only a handful of countries such as Brazil, Australia and Cuba have been able to produce at this depressed world price[105]. Beyond the substantial welfare costs this imposes on consumers in those countries where prices are kept artificially high, these distortions ensure that inefficient sugar producers, mostly in OECD countries, continue to produce, while much more cost efficient countries are unable to produce[106].

There is a consensus within the literature that full multilateral liberalization of the market would result in a significant rise in the world price of sugar, along with significant declines in the domestic price of highly protected markets. Studies from 2006/2007 estimate the increase in world prices at 40-50 percent; very similar figures to those produced by a whole set of previous studies[107]. Such an extreme price change might be eroded over time as supply from low cost nations (e.g. Brazil) responds to the change in world market[108], but is still likely to be significant. In addition to the price change, the adjustment to liberalization would involve a large shift in production from high-cost producers (particularly beet sugar producers in the EU and US) towards low cost producers most in less developed countries[109].

There have been some changes to the world market in the years since these studies. Over the last decade the EU has moved steadily from being a net exporter, to being a substantial net importer. This has been driven by both expansions in preferential access via EPA (Economic Partnership Agreements) and EBA (Everything But Arms) agreements as well as by a decline in protection through the 2006 sugar reforms[110]. The United States, while maintaining its long protection of its market, continued to open market access under NAFTA (most preferential agreements such as AGOA exclude sugar). However, a study in 2010 shows that NAFTA had a much smaller effect than expected, probably due in large part to domestic prices in Mexico that actually exceeded those of the United States[111].

Both the US and the EU were concerned that countries with which they had preferential agreements would take the opportunity to arbitrage the difference between domestic and international prices. For example, Mexico could import cheap world-price sugar and export more expensive domestically produced sugar to the United States. So far, this does not

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[103] Sandry and Vink (2008)

[104] See Mitchell (2004)

[105] Mitchell (2004)

[106] See OECD (2007) and Elobeid and Beghin (2006).

[107] Elobeid and Beghin (2006) estimate a change in the world price of 48 percent on full liberalization. OECD (2007) estimate a change of 40 percent and 42 percent in the world prices of refined and raw sugar respectively. Michell (2004) cites a list of studies including Sheales et al (1999) at 41 percent, Wohlgenant (1999) at 43 percent and Borrel and Pierce (1999) at 38 percent.

[108] Mitchell (2004) and Elobeid and Beghin (2006).

[109] Elobeid and Beghin (2006), OECD (2007).

[110] EU (2013)

[111] Knutson et al (2010)

seem to have materialized in the EU and the US[112]. Kenya faces a similar concern in COMESA where countries such as Egypt have much lower import tariffs and so can access world market sugar at very low prices.

So there is some legitimacy to complaints from producers that the world price is not 'fair' – most probably the current market price is 30-40 percent higher than what would occur under free international competition. The key question as to how Kenya can best respond to this is whether Kenya can become a low cost producer of sugar. If Kenya has the potential to become a competitive producer of sugar, then the question is how to help the industry to get there without compromising consumers (and the poor in particular) though exceptionally high prices. If Kenya cannot become a low cost producer of sugar, then in the long run it would be better to lower trade barriers and allow other countries to subsidize Kenyan consumption of cheap sugar. The resources used for sugar production would be better used in an industry in which Kenya is able to become competitive. This would entail an adjustment period for local producers that, if carefully managed, would mitigate the impact on Kenyan businesses and employment.

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[112] Knutson et al (2010), EU (2013).