

# Structure and performance of Ethiopia's coffee export sector

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## ABSTRACT

We study the structure and performance of the coffee export sector in Ethiopia, Africa's most important coffee producer, over the period 2003 to 2013. We find an evolving policy environment leading to structural changes in the export sector, including an elimination of vertical integration for most exporters. Ethiopia's coffee export earnings improved dramatically over this period, i.e. a four-fold real increase. This has mostly been due to increases in international market prices. Quality improved only slightly over time, but the quantity exported increased by 50 percent, seemingly explained by increased domestic supplies as well as reduced local consumption. To further improve export performance, investments to increase the quantities produced and to improve quality are needed, including an increase in washing, certification, and traceability, as these characteristics are shown to be associated with significant quality premiums in international markets.

## I. INTRODUCTION

Coffee is one of the most important traded commodities in the world. The sector's trade structure and performance have large development and poverty implications, given the high concentration of production by smallholders in poor developing countries. Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries (Ponte 2002; Daviron and Ponte 2005). There is a growing willingness-to-pay for premium, high quality coffee by rich consumers and the demand for specialty and certified coffee is on the rise.<sup>1</sup> Moreover, international coffee markets have experienced significant price variation over the last decade – prices were five times higher in 2011 than in 2002.

These changes have important implications for a number of the poorest developing countries, as most coffee production takes place in these countries, even though most coffee consumption is in developed countries (Pendergrast, 2010; Ponte, 2002). While there are a number of studies that have looked at price formation for different types of coffee at the retail consumption level in importing countries (e.g. Teuber and Herrmann, 2012), important questions remain on who benefits from this increasing willingness-to-pay for coffee and on how changes in global coffee markets are transmitted to producing countries. Moreover, few researchers have looked at how domestic policy change is affecting the performance of the coffee sector in these exporting countries.

In this paper, we look at the structure and performance of the coffee export sector in Ethiopia. In 2012, Ethiopia exported 3.2 million bags, making it the most important African coffee exporter and the tenth largest exporter in the world (ICO, 2013). Its share of the international coffee trade that year was about 3 percent. Coffee is the most important export product of the country, accounting for about a quarter of the value of all exports in 2012. Coffee is cultivated by over 4 million primarily smallholder farming households (CSA, 2013) and, with those employed in ancillary activities to coffee production, even more households are dependent on coffee for part of their livelihoods (LMC, 2003). Furthermore, coffee plays an important role in social gatherings and is important in local consumption, as more than half of Ethiopia's coffee production is consumed locally (CSA, 2013).

We study the structure and performance of Ethiopia's coffee export sector over the last decade. First, we document the characteristics of the sector, the policy shifts affecting the sector, and the important structural changes that have occurred in Ethiopia's coffee export market during the study period. We then study how price, quantity, and quality variation is associated with export performance. Local policy changes in Ethiopia, primarily those related to the start of the Ethiopian Commodity Exchange (ECX) at the end of 2008, as well as export license suspensions, have contributed to structural shifts in the sector. We find a lower concentration ratio in the export sector, an inflow of smaller firms, a slowly increasing importance of cooperatives and parastatals, and a slight diversification in the countries to which coffee is exported subsequent to these policy changes. Over the last decade, we also note a large increase in the value of coffee exports over time. This change has mostly been driven by increases in international prices and to a lesser degree by increased quantity and quality of exported

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<sup>1</sup> Specialty coffee and high-quality coffee are typically synonymous. However, certified coffee is not necessarily specialty coffee.

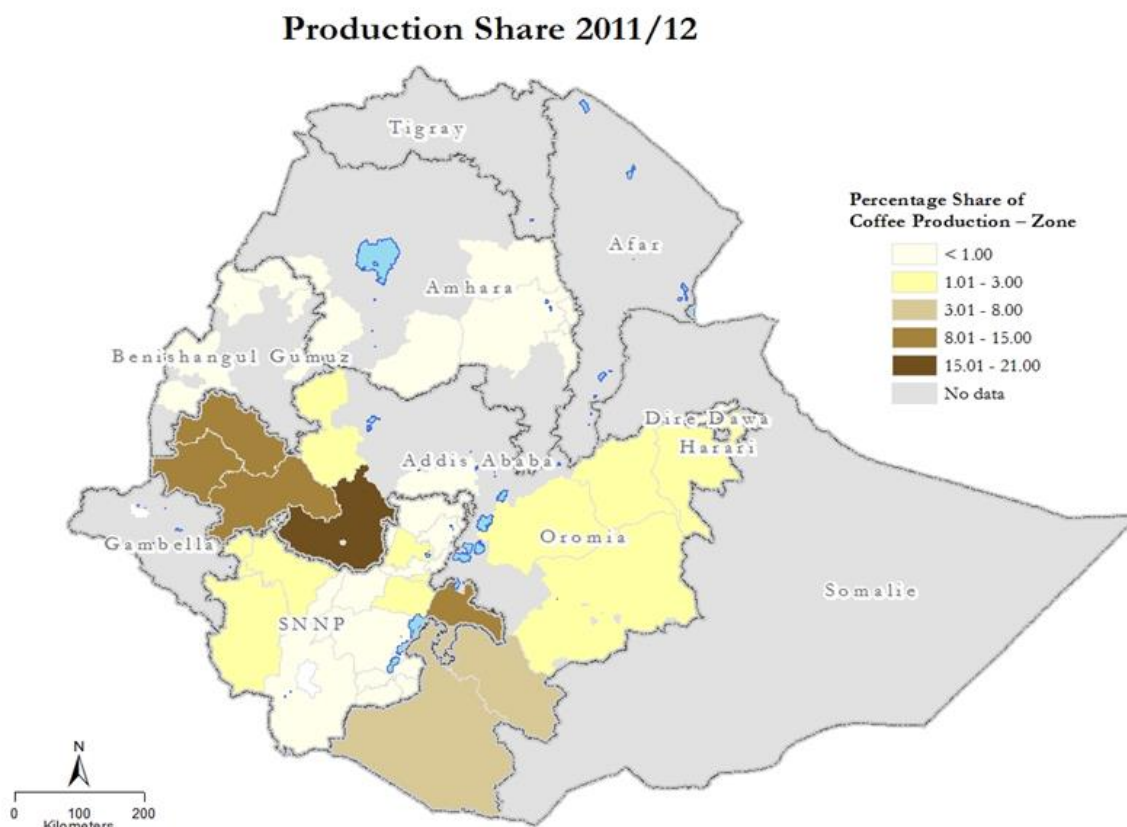
coffee from Ethiopia. While the exported quantity has increased, this has seemingly been driven by both increased production and reduced local consumption. We further note important premiums being paid in international markets for washing, certification, vertical integration, and for geographical indications of origin. The latter two are especially rewarded in emerging high-end markets.

The structure of the paper is as follows. First, we give some background information on the coffee sector in Ethiopia. Thereafter, in Section 3, we describe the data used for this study. Structural characteristics of the coffee sector are discussed in Section 4. We discuss quality issues in the Ethiopian coffee market and export destination markets in Sections 5 and 6, respectively. The performance of the sector over the last decade is considered in Section 7, particularly examining export prices and quality and their associations with different influencing factors. We finish with a discussion of the findings and conclusions.

## 2. COFFEE IN ETHIOPIA

Ethiopia is endowed with a good production environment for growing coffee with a combination of appropriate altitude, temperature, rainfall, soil type, and pH. Ethiopia is the center of origin for *Coffea arabica*. The country possesses a diverse genetic base for this Arabica coffee with considerable heterogeneity. Ethiopia produces a range of distinctive Arabica coffees and has considerable potential to sell a large number of specialty coffees (Nure, 2008).<sup>2</sup> Little of the lower-value Robusta coffee is produced in Ethiopia, being better suited for production in lower altitude equatorial climates. Coffee production in Ethiopia is almost exclusively situated in the two regions of Oromia and the Southern Nations, Nationalities, and People Regions (SNNPR) in the south and west of the country (Figure 1).

**Figure 1—Location of coffee production in Ethiopia**



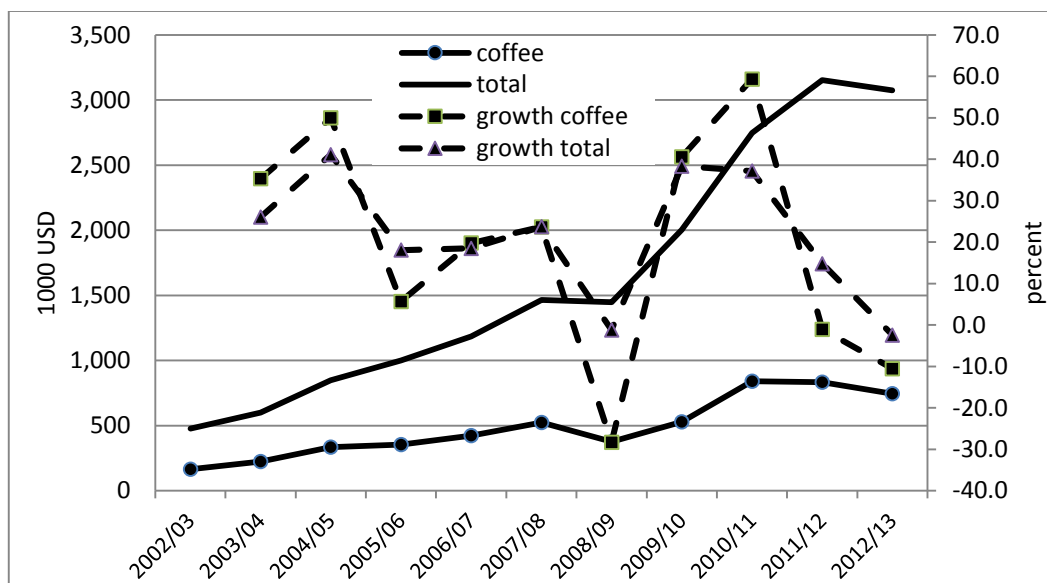
Source: Authors' calculations based on data from the Central Statistical Agency (CSA)

<sup>2</sup> The Specialty Coffee Association of America (SCAA) defines specialty coffee in its green stage as coffee that is free of primary defects, contains no unripened beans, is properly sized and dried, is free of faults and taints, and has distinctive attributes (Rhinehart, 2012).

Smallholder farmers produce 95 percent of Ethiopia's coffee (Tefera and Tefera, 2013). It is produced under several types of production systems, including forest, semi-forest, garden, and plantation coffee (Tulu, 2008). Forest coffee is grown in the wild under natural forest cover and is gathered by farmers from trees with minor tree maintenance. Semi-forest coffee is also grown in forest conditions, but there is some limited maintenance by farmers, mostly annual weeding. This type of coffee has clearly delineated boundaries of ownership, although the trees usually are located away from agricultural plots. Garden coffee is defined as coffee from trees planted by farmers in the vicinity of their residences. It is often intercropped with other crops or trees. Plantation coffee is grown on large commercial farms, private as well as state farms. Modern production practices – such as irrigation, modern input use, mulching, stumping, and pruning - are often applied in this case. While reliable recent statistics are lacking, it is estimated that these different production systems make up about 10, 35, 50, and 5 percent, respectively, of total coffee production in the country (Kufa, 2012).

Figure 2 shows the variation in the value (in nominal USD) of both overall exports and coffee exports from Ethiopia over the last decade. The figure illustrates two main patterns. First, coffee makes up an important part of overall exports. Second, we see strong growth rates in both over the last decade. The overall value of exports grew at an average compounded annual rate of 21 percent, while coffee exports grew at 16 percent. This slightly slower growth rate of coffee exports compared to overall exports implies that the share of coffee exports in total exports has decreased over time. While coffee made up almost 35 percent of the value of total export in 2002/03, this came down to 24 percent for the period 2012/13, which suggests that export commodities have diversified in recent years.

**Figure 2—Value of coffee exports from Ethiopia and year-on-year growth in coffee exports, compared to total exports, 2002/03 to 2012/13**



Source: Authors' calculations based on data from the National Bank of Ethiopia

There have been significant domestic policy reforms in the last decade that affected the structure and performance of the coffee export sector. First, from December 2008 onwards it became mandatory for private traders to sell their coffee through the Ethiopian Commodity Exchange (ECX), a new modern commodity exchange.<sup>3</sup> ECX trades standard coffee contracts, based on a warehouse receipt system, with standard parameters for coffee grades, transaction size, payment, and delivery. The first level quality control is decentralized and undertaken

<sup>3</sup> Producers who are exporters can bypass the ECX, as can farmer cooperatives.



in nine liquoring and inspection units in major production areas.<sup>4</sup> The establishment of the ECX has led to important changes in the structure of the coffee value chain (Gabre-Madhin, 2012).

Second, the government intervened in the coffee market on several occasions in an effort to reduce hoarding by exporters. In April 2009, six large traders were banned from exporting coffee because of their presumed excessive hoarding. The government revoked their licenses, closed down their warehouses, seized their coffee stocks, and sold them on their behalf (Alemu, 2009). A policy was further implemented in May 2011 that limited the amount of coffee an exporter can store. An exporter, for example, selling and buying coffee on the ECX will have his or her right to trade on the commodity exchange revoked if found to be storing more than 500 metric tons of coffee without a shipment contract with an importer (Tefera and Tefera, 2013).<sup>5</sup> Failing to adhere to these regulations has led to the banning of coffee exporters, as seen in 2011 and 2013 (Araya, 2011; Yewondwossen, 2014).

Third, there have been a number of changes regarding export taxes on coffee over time. Core changes include the removal of entry barriers (Proclamation No. 70/1993); the consolidation of all taxes and duties levied on coffee export into a single tax family (Proclamation No. 99/1998), which consolidated all taxes on coffee export to 6.5 percent; and, following the 2002 international coffee crisis, the waiving of all export taxes on coffee exports.

Finally, an Ethiopian Fine Coffee Trademark Licensing Institute was set up in February 2005 with the purpose of setting up a system to secure legal ownership in international markets of specialty coffee names (especially Sidamo, Harar, and Yirgacheffe) (Agrer, 2004). There was initial resistance against this initiative, but they were ultimately settled. The goal of this effort was to add brand value to Ethiopian coffee. Signatories entered into a brand management strategy with the government with the purpose of achieving better farm-gate and export prices for coffee (Arslan and Reicher, 2010).

### 3. DATA

To understand Ethiopia's coffee export sector, we relied on different sources of information and methods. First, a large number of key informants in the sector were contacted and interviewed. These included employees of private exporters, the Coffee Liquoring Unit (CLU), the Coffee Plantation and Development Enterprise, the Coffee Processing and Warehouse Enterprise, government entities, ECX, coffee producers and retailers, as well as coffee researchers.

In addition, we used a number of secondary data sources. First, data were obtained from the National Bank of Ethiopia (NBE) on monthly coffee exports for the period 2002 to 2013. These data were used to calculate trends, 12-month moving averages, as well as seasonal movements. Second, the International Coffee Organization (ICO) calculates an international composite price for coffee based on future contract prices recorded on the London and New York stock exchange. Historical monthly data were downloaded from their webpage.<sup>6</sup> Third, a database of coffee export transactions is maintained by the Ministry of Trade. This export transactions dataset for the period July 2006 to June 2013 was used.

An important aspect in coffee exports is quality. Coffee quality assessments for exports are conducted by the Coffee Liquoring Unit (CLU) to ensure that it meets export standards. After buying coffee on the ECX trading floor (or, before 2009, at the coffee auction), exporters pick up the coffee from regional ECX warehouses and it undergoes further processing to meet export standards.<sup>7</sup> On reaching this export standard, a quality certificate is

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<sup>4</sup> Before the establishment of ECX, all first and second level quality inspection was carried out in Addis Ababa.

<sup>5</sup> A directive requiring the shipment of coffee in bulk containers, instead of 60-kilogram jute-bags, was put in place in mid-November 2011. However, it was revoked soon after because of pressures from exporters. Such bags are widely used in international trade and help to better maintain the identity of the coffee (Tefera and Tefera, 2013).

<sup>6</sup> <http://www.ico.org/>

<sup>7</sup> It is estimated that there are about 80 of these processing units, mostly based in Addis. The most sophisticated processing machine is held by the Coffee Processing and Warehouse Enterprise. It is estimated that they process in their unit about one-quarter of all coffee exported from Ethiopia.

issued by the CLU. A quality inspection sheet is prepared and is attached to the lot to be exported.<sup>8</sup> These quality indicators, as well as others (such as washing, certification, and origin), are part of the coffee export transactions dataset, which was used for this study. We also obtained a list of private commercial coffee farms (with cultivated areas of 40 hectares and above) from its association. This information was integrated into the analysis as well.

## 4. STRUCTURE OF THE COFFEE EXPORT SECTOR IN ETHIOPIA

### 4.1. Characteristics of coffee transactions and coffee exporters

Table 1 gives an overview of some of the characteristics of coffee export transactions and of exporters over the period 2006 to 2013. The average coffee export transaction over this period involved 37 metric tons with a value of 133,000 USD. The average price was 173 US cents per pound (lb). The large standard deviations indicate significant variations in quantity, value, and price between transactions. 51 percent of the export transactions were destined for Europe, 14 percent for North America, 12 percent for Saudi Arabia, and 10 percent for Japan. Sudan accounted for 4 percent of all the export transactions over that period.

Transactions were aggregated by coffee exporter for every year to give an idea of the scale of operations of the exporters. An average exporter over that period exported 1,266 metric tons of coffee per year for a value of 4.5 million USD. Again, we see large variability in scale of operations across exporters.

**Table 1—Ethiopia’s coffee exports – descriptive statistics**

	Unit	Mean	Median	Standard deviation
<i>Transaction data (07/2006 - 06/2013)</i>				
Quantity	Metric tons	37.8	19.2	36.1
Price	US cents/lb	173.2	159.0	66.8
Value	1000 USD	132.7	91.5	131.4
Destination markets:				
Europe	% of transactions	51.2		
Japan	% of transactions	9.6		
North-America	% of transactions	13.9		
Saudi-Arabia	% of transactions	12.0		
Sudan	% of transactions	4.1		
Other	% of transactions	9.1		
<i>Exporters annually (01/2007 -12/2012)</i>				
Quantity exported by active exporters per year	Metric tons	1,265.7	340.5	2,610.1
Value of exports by active exporters per year	1000 USD	4,516.3	1,062.5	8,966.2

Source: Authors’ calculations based on data from the Ministry of Trade

### 4.2. Firm concentration and dynamics

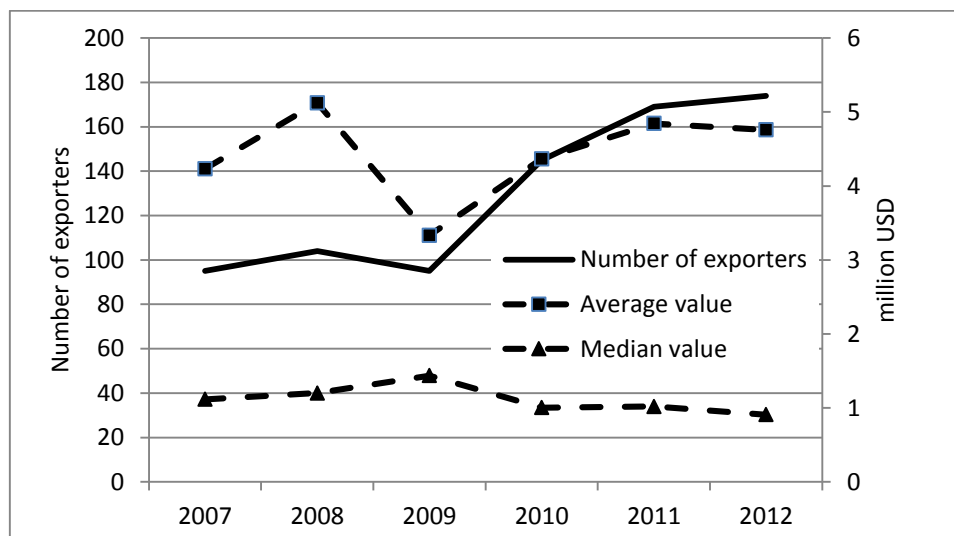
We note large changes over the study period in the number of exporters that are active in coffee export markets. In the beginning of the period (2007-2008), there were about 100 active coffee exporters (Figure 3). This increased to 175 exporters by 2012, an increase of 75 percent. The evolution of the median value of exports per exporter shows a slight decline over time, seemingly indicating an inflow of smaller exporters. While the average

<sup>8</sup> The analysis of coffee quality by the CLU is based on two measures, the raw and physical inspection and the cup inspection. The raw and physical inspection contributes for 40 percent to the final quality grade, while the cup inspection contributes for 60 percent. However, moisture and screen analysis are the two requisites before grading any coffee. The moisture content should be less than 11.5 percent, while the size of the bean should be above screen size 14 for 85 percent of the bean sample. In the case of unwashed coffee, raw quality is determined based on defect count of the beans and on odor. In the case of washed coffee, the raw quality is based on an assessment of shape and make, color, and odor. Cup quality is assessed along four criteria, including cup cleanliness, acidity, body, and flavor. Each characteristic counts for 15 percent of the 60 percent of the cup quality value. The washed coffee export standards vary between grade 1 and 2, as well as under-grade (UG) while unwashed coffee is graded 3, 4, 5, or under-grade. Within the under-grade category, a further distinction is made for under-grade type ‘inferior, but exportable’ coffee, while the worst under-grade coffee is not exportable and is destined for domestic consumption.



value of exports per exporter came down in 2009 (the first year of the ECX), it has rebounded since, although the median value has not.

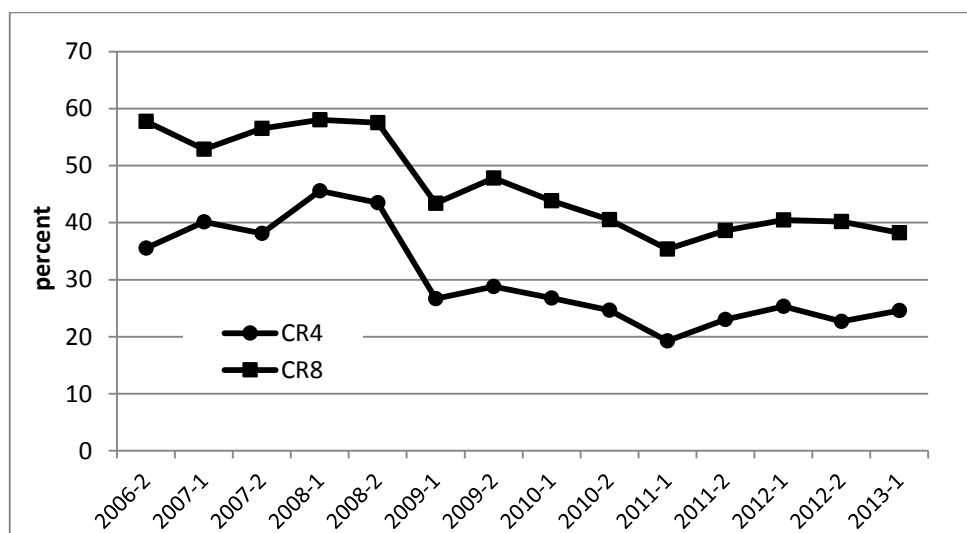
**Figure 3—Number of exporters and annual average/median value of coffee exports per exporter, 2007 to 2012**



Source: Authors' calculations based on data from the Ministry of Trade

We look at the concentration ratio of export firms in Ethiopia. Common measures used to measure the concentration of firms in economic sectors are the CR4 and CR8, the share of business in the sector handled by the four and by the eight largest firms in the sector, respectively. These concentration ratios have decreased significantly over time, especially after 2008 (Figure 4). Before 2008, the CR4 on average was about 40 percent, while the CR8 approached 60 percent. Since the ban of export licenses of six major exporters in early 2009 (Alemu, 2009), this share came down by 16 percent and 14 percent for the CR8 and CR4, respectively, compared to the end of 2008.<sup>9</sup> Over the period considered, the lowest concentration was at the beginning of 2011, but has been slowly increasing since. At the beginning of 2013, the CR8 was almost 40 percent, while the CR4 was 25 percent.

**Figure 4—Concentration ratios in Ethiopia's coffee export sector, 2006 to 2013 at six-month intervals**



Source: Authors' calculations based on data from the Ministry of Trade

<sup>9</sup> The license ban was triggered by the perception that these exports were involved in excessive hoarding, contributing to a general lack of foreign exchange in Ethiopia (Alemu, 2009).

The World Bank (2014) shows that the largest exporters, i.e. those selling more than 5 million USD per year, account for nearly 80 percent of coffee exports. They further argue that the coffee market is hard to enter – new firms have limited opportunities to enter into the coffee export business. This is illustrated in Figure 5, which plots the share of entrants (coffee export firms that were not in business the year before), exiters (firms that were not there the year after), and incumbents (firms that are there both the year before and after) for the period 2007 to 2012. On the left (Figure 5a), we see that a relatively large number of new entrants came into the market in 2010/11, possibly attracted by the high prices in that year. In 2007/08, we find that a large number of firms exited the market the year after, possibly related to the start of the ECX. However, in the graph on the right (Figure 5b), the share in total coffee exports of firms that moved in and out of the market is shown to be small, with entrants and exit firms typically making up less than 10 percent of the market. The graph also illustrates the disruptive effect of the ban on large exporters in the year 2008/09. The six banned firms made up a large proportion of the 35 percent of firms in that year who were exiters and would not export coffee anymore.

**Figure 5—Evolution of incumbent (present year before and after), exiter (not present year after), and entrant (not present the year before) firms in the coffee export sector, by number and by share in coffee exports**



Source: Authors' calculations based on data from the Ministry of Trade

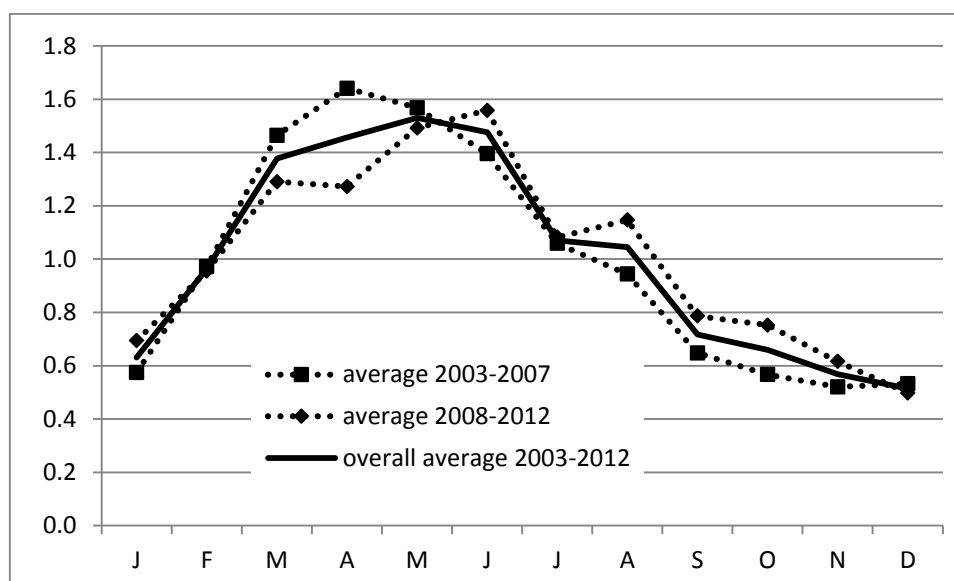
### 4.3. Seasonality

As for most agricultural crops, the production, processing, and marketing of coffee is characterized by important seasonal patterns. Coffee is mostly harvested during the period October to December. It can be sold immediately in the form of red cherries, or farmers might dry the cherries and sell them later in the year as whole dried cherries. Figure 6 shows how coffee exports vary over the year. The peak is achieved in the period from March until June when exports are on average more than twice as high as during the lean period, i.e. October to January.<sup>10</sup> The timing of the peak of exports indicate a significant lag between production and exports, linked to time consuming post-harvest and processing activities, but also due to storage. If the share of washed coffee in total exports had increased over time, one might have expected a shift forward in the timing of exports, since washed coffee is sold slightly earlier in the season. However, such a shift is not noted. In fact, the reverse is observed. Comparing exports for the period 2003 to 2007 to those of the period 2008 to 2012, a shift in the main export season to about 2 months later in the year is seen (Figure 6).<sup>11</sup> While the peak month of exports was April for the period 2003 to 2007, this had shifted to June for the period 2008 to 2012.

<sup>10</sup> During that period, left-over stocks of the previous year are mostly sold. It is not yet the new harvest.

<sup>11</sup> Part of the explanation is seemingly linked to late exports in 2009. As there were wide expectations of currency depreciation and as there was a decline in international coffee prices, exporters held on longer than usual to their coffee stocks. This led the government to take the drastic measure of banning licenses of major coffee exporters in April 2009.

**Figure 6—Monthly seasonality index for quantity of coffee exports for period 2003 to 2012**



Yearly average = 1.0

Source: Authors' calculations based on data from the National Bank of Ethiopia for the period January 2003 to December 2012

#### 4.4. Private versus public coffee exporting firms

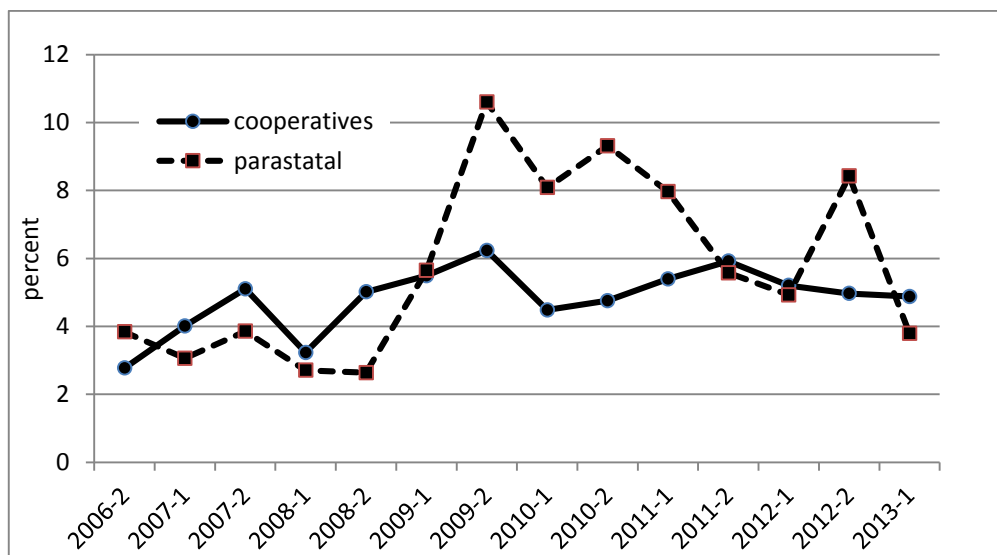
Figure 7 shows the extent to which cooperatives and parastatals, including the Ethiopian Grain Trade Enterprise (EGTE) and state farms, play a role in coffee exports from Ethiopia. Three main findings appear from the graph. First, the share of cooperatives and parastatals in export trade is relatively small. The large majority of coffee exports is in the hands of the private sector. The lowest share in total exports for the private sector was achieved at the end of 2009, when its share was 83 percent. However, in most years the private sector largely dominated, with a share close to 90 percent.

Second, we see significant variation in the share of exports for cooperatives and parastatals over time. In the case of cooperatives, we see a steadily increase from between 3 and 4 percent in 2006/07 to between 5 and 6 percent in 2012/13. The most important cooperative involved in coffee exports is the Oromia Coffee Cooperative Union, which over this period accounted for 57 percent of the export transactions made by cooperatives. Other important cooperatives include the Yirgacheffe, Sidama, and Kafa Forest Coffee Cooperatives.

Third, there also is large variation in the share of exports made by parastatal firms. They were the source of 3 to 4 percent of all coffee exports until the end of 2008. However, their share increased to more than 10 percent at the end of 2009. This was mostly driven by the seizure of coffee stocks of a number of large traders by the government.<sup>12</sup> These stocks were then consequently exported by EGTE on behalf of the government (Alemu, 2009). Since the end of 2009, the share of coffee exports coming from parastatals has been diminishing as many state farms were privatized over this period. These include the Bebekka and Teppi Coffee Plantations of the Coffee Plantation and Development Enterprise, which were privatized in 2011/12 and 2012/13, respectively. The Limu Coffee Plantation was the last to be privatized in 2014. Currently, there are no more state coffee plantations in Ethiopia.

<sup>12</sup> Alemu (2009) states that the government received 21 million dollars from exporting the seized stock owned by the six coffee exporters.

**Figure 7—Share of coffee exports by cooperatives and parastatal firms, 2006 to 2013 at six-month intervals**



Source: Authors' calculations based on data from the Ministry of Trade

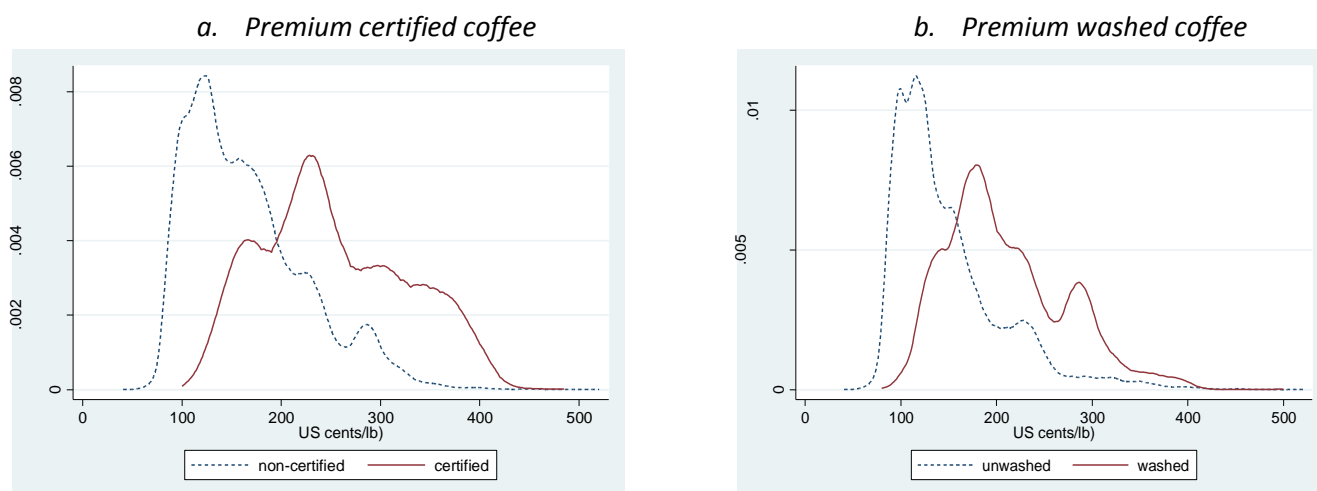
In short, we see a significant number of structural changes in the coffee sector over the last decade. First, we see a decline in concentration ratios in the export sector over time. Second, seasonality in coffee exports is pronounced with most exports being shipped between March and June. There also has been a recent shift in the major peak of exports to a later period in the year. Third, we find variation in the share of cooperatives (increasing over time) and parastatals (first an increase and then a decrease) in total exports over time. However, their share in total exports is relatively small. Overall, we note an increase in the number of exporters and increasing diversity of players (e.g. private sector, cooperatives, parastatals) in the export market. However, the shares of incumbent firms are large, possibly because of the expertise and reputation required to gain market share in the coffee export business, as well as problematic access to trade credit for new entrant firms, especially (World Bank, 2014).

## 5. COFFEE QUALITY

There are several measures of coffee quality in the Ethiopian market place. They include, most importantly, certification, which affects marketability and prices, but not necessarily the intrinsic quality of the coffee; geographical indications of origin; grades; and washing. Each is discussed in turn.

Certification and traceability have become major new requirements in the global food trade (Swinen, 2007), with such certification schemes often implemented to add value to a product (Jena et al., 2012). By guaranteeing the product origin, fair prices to producers, ethical standards of production and processing, environmental sustainability in production, and safety and quality safeguards for a product, international buyers and consumers are often willing to pay extra for a product. Conversely, adhering to those new requirements can be costly. In the global coffee sector, it is estimated that around 16 percent of current coffee production is certified. This share should reach over 25 percent by 2015 (Panhuysen and Van Reenen, 2012). There are currently a number of certification schemes in place, most importantly Fair Trade, Organic Coffee, Bird-Friendly, UTZ, and Global Forest Alliance. In the case of Ethiopia, the share of certified coffee is increasing, but is significantly lower than in other countries. For example, data from the Ministry of Trade show that only 2 percent of coffee transactions over the period 2006-2013 were done under the Fair Trade scheme. This suggests that Ethiopia likely foregoes the commercial rewards of the price premiums associated with these certification schemes. Figure 8a illustrates the size of the certification premium over the period 2006 to 2013. It is observed that the density function of prices of certified coffee is distinctively to the right of non-certified coffee.

**Figure 8—Quality premiums for coffee certification and washing, 2006 to 2013**

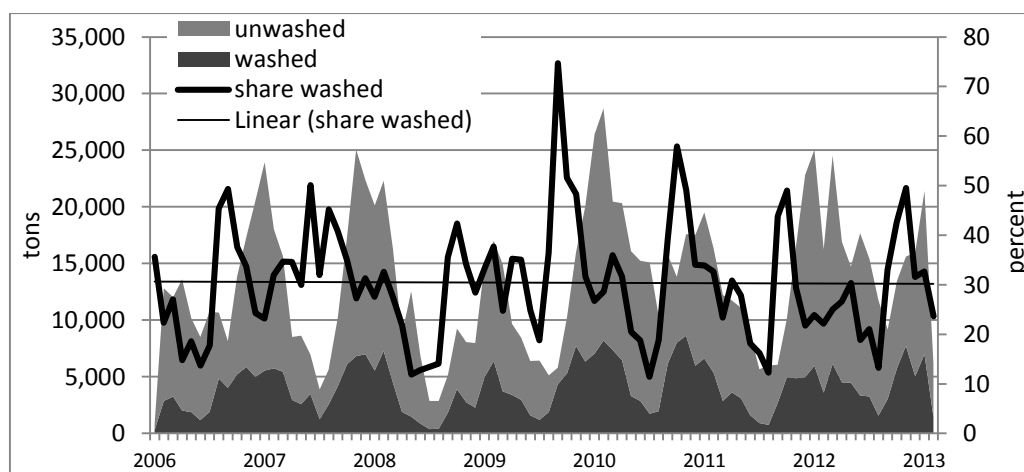


Source: Authors' calculations based on data from the Ministry of Trade

Second, the quality of coffee can be increased by washing, i.e. processing red cherries immediately after harvest in wet mills, instead of sun-drying the cherries (Nure, 2009). Washed coffee preserves the intrinsic quality of the bean better than unwashed beans, and the process leads to homogenous coffee with fewer defective beans. The washing process is carried out in washing stations where cherries are pulped immediately after harvesting, fermented in tanks, and washed in clean water to remove the mucilage. The wet parchment coffee is then dried in the sun. For unwashed coffee, cherries are dried on mats or concrete floors. After drying, the outer layer of the cherries is removed by hulling in coffee processing plants. Figure 8b (the right panel) is a graph of the price density functions for washed and unwashed coffee over the period 2006 to 2013. The graph reflects the significant rightward shift for the distribution of the export prices of washed coffee, illustrating the premium paid for washed coffee over unwashed coffee. However, this price difference might be linked to other explanatory variables as well. We explore this below through the use of multivariate regression analysis.

Given the sizable premiums for washed coffee in international markets, investments in a number of coffee producing countries have focused on setting up more wet mills. Figure 9 shows the share of coffee exports from Ethiopia that were washed. As shown in the linear trend line, the share of washed coffee in total exports has not changed significantly over time, remaining close to 30 percent. We see strong seasonality in the exports of washed coffee. The importance of washed coffee is higher at the beginning of the year, reflecting the fact that washed coffee is coming earlier to market than the unwashed coffee.

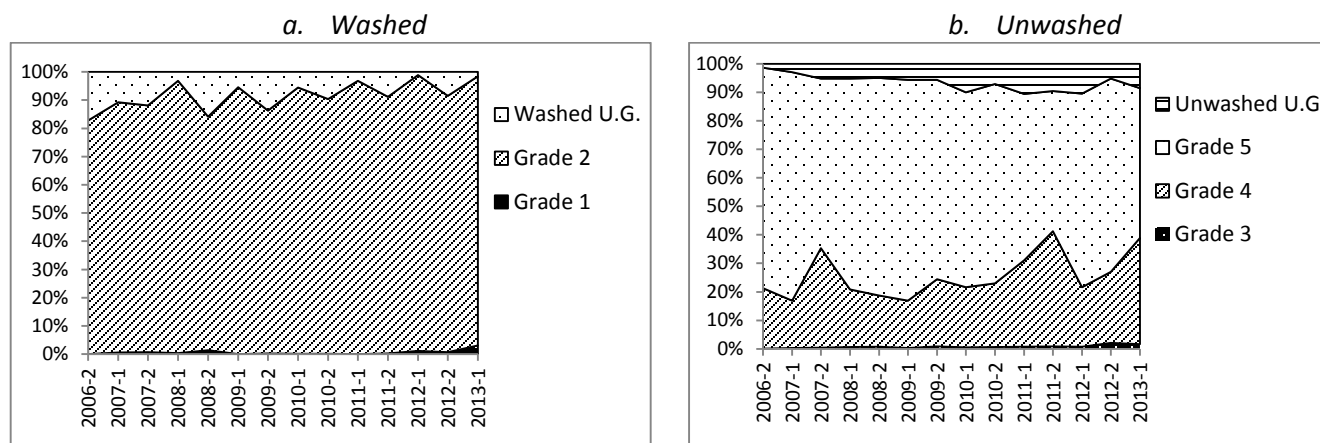
**Figure 9—Shares of washed coffee in total exported coffee quantities, monthly, 2006 to 2013**



Source: Authors' calculations based on data from the Ministry of Trade

The Coffee Liquoring Unit (CLU) grades the quality of each exported lot of coffee beans, for both washed and unwashed coffee, based on physical and cup inspection. Grades range from 1 to 5, where 1 is the best and highest grade and 5 is the lowest. Ungraded (U.G.) is the worst quality and this coffee is destined to those export markets where there is less demand for quality or alternatively, this type of coffee quality is not allowed to be exported and is sold on the local market. Grades 1 and 2 and grades 3, 4, and 5 are assigned to washed and unwashed coffee, respectively. Overall, we find a slight increase in quality over the study period for both washed and unwashed coffee. For the unwashed bean market segment, the share of the worse qualities (grade 5) has been decreasing slightly over time, while the share of grade 4 has been increasing slightly (Figure 10b). In 2006/07, 24 percent of unwashed coffee was grade 4, but this increased to 31 percent in 2012/13. We see little changes over time in the quality grades for washed coffee (Figure 10a). However, there is a small decline in the low quality washed U.G.

**Figure 10—Evolution of grades within washed and unwashed market segment, 2006 to 2013 at six-month intervals**



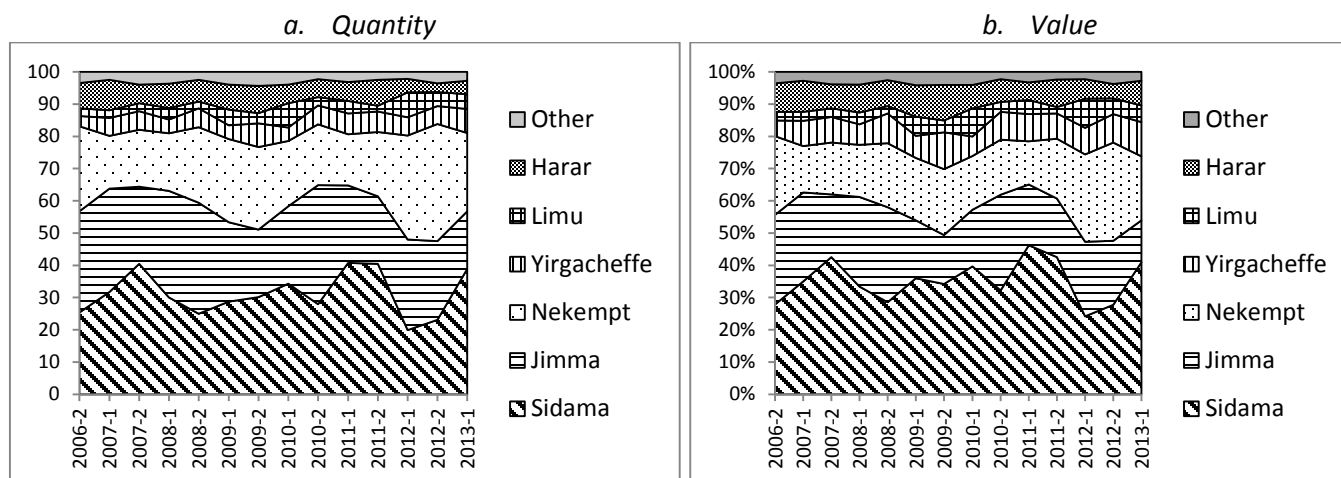
Source: Authors' calculations based on data from the Ministry of Trade

Third, the geographic origin of coffee is an important quality consideration, as it is strongly related to taste. In our analysis, we distinguish between Sidama, Jimma, Wollega (Nekempt), Yirgacheffe, Limu, Harar, and other coffees.<sup>13</sup> Kufa (2012) associates tastes and regions as follows: spicy for Sidama, fruity for Wollega (Nekempt), floral for Yirgacheffe, winy for Limu and Jimma, and mocha for Harar. Figure 11a shows the export share in quantity over time of the different origins of coffee. The three major coffee types that are exported are Sidama, Jimma, and Nekempt. While our data shows significant variation of the shares of different origins over the time period, there are no systematic trends. The combined share of these three major regions has stayed stable over the years at around 80 percent. Figure 11b further illustrates that, while the shares of the premium quality coffees of Harar and Yirgacheffe in total exports is relatively small in quantity, they are higher in value terms given their relatively high prices.

<sup>13</sup> It is to be noted that some coffees are put in these categories even though they might be produced in areas that are located outside these geographical delineations.



**Figure 11—Export share of the different producing regions by quantity and value, 2006 to 2013 at six-month intervals**



Source: Authors' calculations based on data from the Ministry of Trade

To understand the links of different associated variables with measures of coffee quality, we ran a regression on two main quality indicators, i.e. certification and washed coffee (Table 2). In the left columns, we present the results of a probit regression where we regress washed (1) versus unwashed (0) on a number of associates. As expected, we find that washed coffee is exported earlier in the year. The coefficients for the dummy variables for February, March, and April are positive and significant, while those for the rest of the year are negative. This indicates that washed coffee is significantly less likely to be exported in the latter period of the year compared to the default month January. We also find that there are strong linkages of washed coffee with regional dummies. Compared to the default region Sidama, Yirgacheffe has a significantly higher likelihood to export washed coffee. On the other hand, Jimma and Wollega (Nekempt) coffee exports are much less likely to be washed. No washed coffee is exported from the region of Harar and no coefficient estimates are therefore available. We also note that certification schemes as well as the type of exporters are strongly linked with washed coffee exports. Parastatals, cooperatives, state farms, and commercial private farms are significantly more likely to export washed coffee than are private sector traders. Fair Trade coffee is also much more likely to be washed.

**Table 2—Factors associated with the export of washed and certified coffee – probit model**

		Washed coffee		Certification	
	Unit	Coef.	z-value*	Coef.	z-value*
<i>Type of exporter (default=private)</i>					
Cooperative	yes=1	0.530	<b>8.06</b>	3.452	<b>61.39</b>
Parastatal	yes=1	1.042	<b>7.53</b>	0.000	-
State farm	yes=1	1.358	<b>9.54</b>	0.000	-
Private commercial farm	yes=1	0.389	<b>4.85</b>	1.924	<b>25.34</b>
<i>Region of origin (default=Sidama)</i>					
Jimma	yes=1	-5.098	<b>-22.23</b>	-0.832	<b>-12.41</b>
Wollega/Lekempte	yes=1	-3.126	<b>-26.51</b>	-0.958	<b>-8.35</b>
Yirgacheffe	yes=1	1.495	<b>33.15</b>	0.137	<b>2.51</b>
Limu	yes=1	0.936	<b>13.36</b>	-0.852	<b>-8.14</b>
Harar	yes=1	-	-	-1.016	<b>-8.44</b>
Other	yes=1	-0.572	<b>-8.48</b>	-0.339	<b>-2.43</b>
<i>Certificate</i>					
Fair Trade	yes=1	0.799	<b>8.06</b>	-	-
Organic	yes=1	-0.131	-1.91	-	-
<i>Year (default=2006)</i>					
2007	yes=1	0.210	<b>2.77</b>	0.057	0.38
2008	yes=1	0.188	<b>2.32</b>	0.015	0.09
2009	yes=1	0.174	<b>2.15</b>	-0.372	<b>-2.48</b>
2010	yes=1	0.153	<b>2.11</b>	0.126	0.91
2011	yes=1	-0.123	-1.62	0.060	0.42
2012	yes=1	0.039	0.49	0.243	1.74
2013	yes=1	-0.253	<b>-2.86</b>	-0.067	-0.42
<i>Month (default=January)</i>					
February	yes=1	0.472	<b>4.46</b>	0.067	0.47
March	yes=1	0.436	<b>4.28</b>	0.014	0.09
April	yes=1	0.084	0.89	-0.024	-0.18
May	yes=1	-0.290	<b>-3.11</b>	0.016	0.12
June	yes=1	-0.332	<b>-3.59</b>	0.012	0.09
July	yes=1	-0.351	<b>-3.72</b>	-0.190	-1.38
August	yes=1	-0.463	<b>-4.80</b>	-0.567	<b>-4.15</b>
September	yes=1	-0.435	<b>-4.38</b>	-0.284	<b>-2.01</b>
October	yes=1	-0.542	<b>-5.34</b>	-0.170	-1.11
November	yes=1	-0.549	<b>-5.07</b>	-0.007	-0.05
December	yes=1	-0.413	<b>-2.82</b>	-0.352	-1.75
Intercept		0.395	<b>3.71</b>	-2.513	<b>-14.07</b>
Number of observations		28220		28893	
Wald chi2(29)		3455		5716	
Prob>Chi2		0		0	
Pseudo R2		0.6147		0.7277	

\* robust standard errors; z-values in bold are significant at the 5 percent level

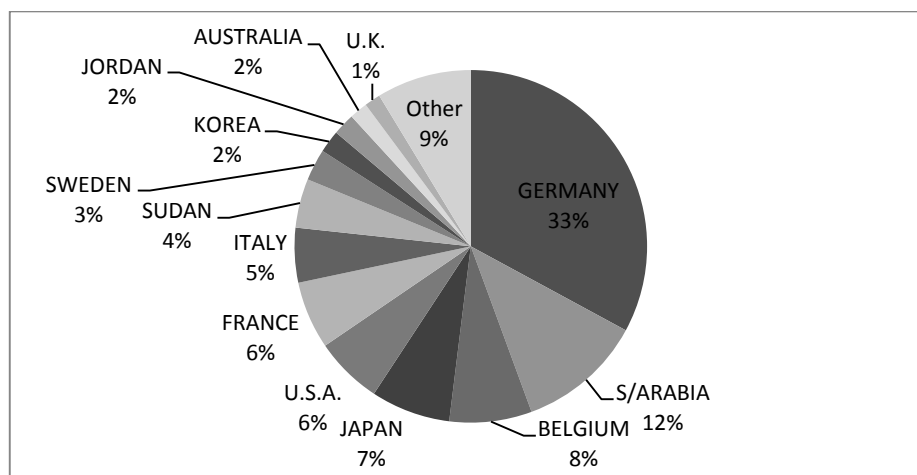
Source: Authors' calculations based on data from the Ministry of Trade

For the factors associated with certified coffee, Yirgacheffe coffee is more likely to be certified than is Sidama coffee, the default category of origin. Coffee from other zones of origin is less likely to be certified. We note higher shares of certified coffee are exported at the beginning of the year, which also suggests that most certified coffee is washed. Although there is high volatility, the prevalence of certification in general is increasing over time, as seen by the generally increasing positive coefficients linked with the year dummy variables. Cooperatives and private commercial farms are significantly more likely to export certified coffee. This is presumably because they are not required to transact on the ECX platform, and trading certified coffee on the ECX platform was not an option over the period considered.

## 6. COFFEE EXPORT DESTINATION MARKETS

In this section, we look more closely at the export destination markets. Ethiopian coffee was exported on average to about 50 countries annually over the period 2005 to 2012. Figure 12 shows the share of different destination markets for coffee exported from Ethiopia in 2012. The largest share of coffee exports went to Germany. It accounts for one-third of Ethiopia's coffee exports. The second most important importing country of Ethiopian coffee is Saudi Arabia, accounting for 12 percent of coffee exports.

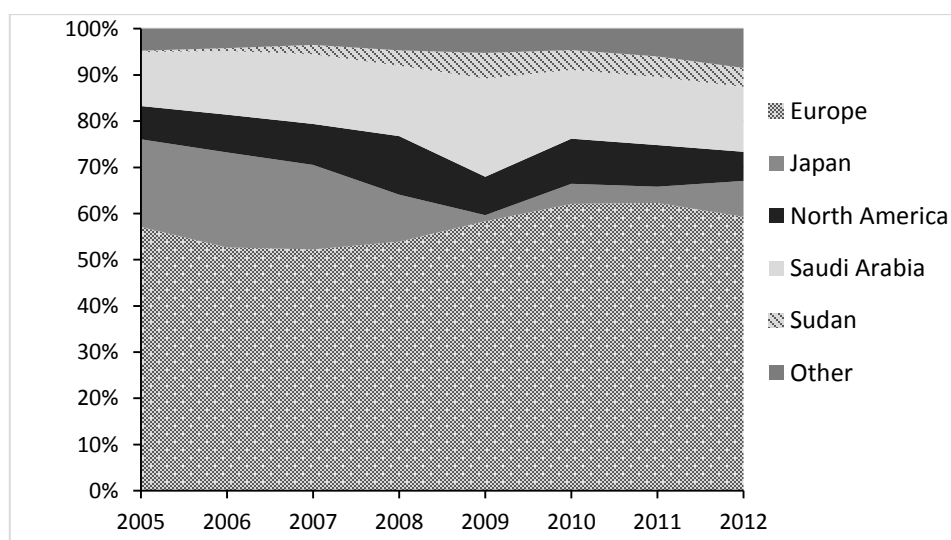
**Figure 12—Share of different destination markets for Ethiopia's coffee exports in 2012**



Source: Authors' calculations based on data from the Ministry of Trade

Figure 13 shows how the share of the different destination markets has evolved over the period 2005 to 2012. We note a number of changes. While the share of Japan was almost 20 percent in the year 2005, this declined to considerably lower levels in 2009, as Japan halted deliveries of coffee from Ethiopia in May 2008 after finding abnormally high pesticide residues in a shipment of coffee beans (Oakes and Thompson, 2009). This problem has since been addressed and the share of coffee exports to Japan is slowly increasing. We also see some increase in diversification of destinations. While exports to countries outside Europe, North America, Japan, and Saudi Arabia made up 5 percent of the export market in 2005, this share was more than 10 percent in 2012. Moreover, while no coffee was exported to Sudan in 2006, its share rose to 4 percent in 2012.

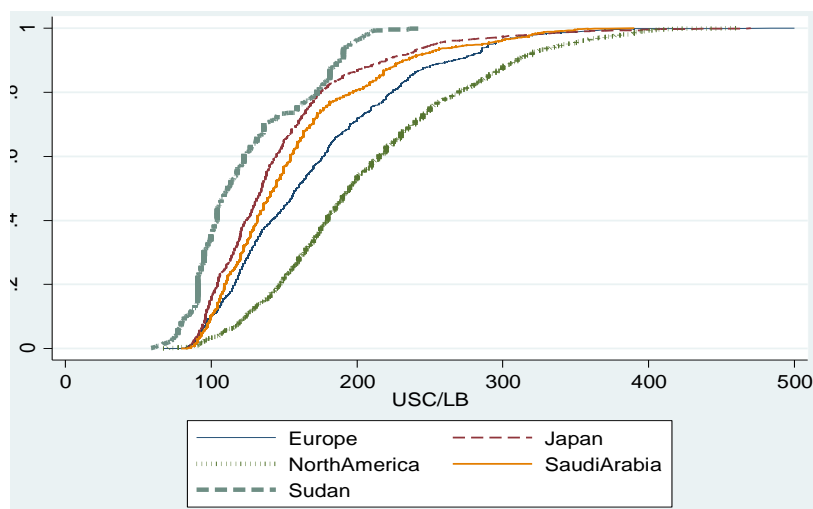
**Figure 13—Share of different destination markets in Ethiopia's coffee exports**



Source: Authors' calculations based on data from the Ministry of Trade

Figure 14 shows the cumulative price distributions over the period that data were collected for five major destination markets: North America, Europe, Saudi Arabia, Japan, and Sudan. It shows different price patterns for these markets. The lowest price is noted for exports to Sudan. These exports also show relatively little price variation, possibly because Sudan came later into the market and was therefore less exposed to international price changes. The variation in prices for exports to North America is much wider than for all other countries. The graph also indicates that North American prices are superior to the other countries as the cumulative price distribution curve for North America lies beneath all other distribution curves. European prices are second to North American ones, followed by Saudi Arabia and then Japan. This variation in prices between countries and continents reflects mainly different quality demands.

**Figure 14—Cumulative price distribution by destination market, 2005 to 2013**



Source: Authors' calculations based on data from the Ministry of Trade

To analyze to what extent different characteristics of coffee exports are associated with the different destination markets, we run a multinomial logistic regression with the destination markets as dependent variables (using Europe as the default market) and quality characteristics as explanatory variables, using a similar model to Boger (2001). The results are presented in Table 3. Overall, we find strong effects of different quality indicators on specific destination markets, indicating possible market segmentation.

**Table 3—Multinomial logistic regression model of destination markets for Ethiopian coffee**

(default = Europe)

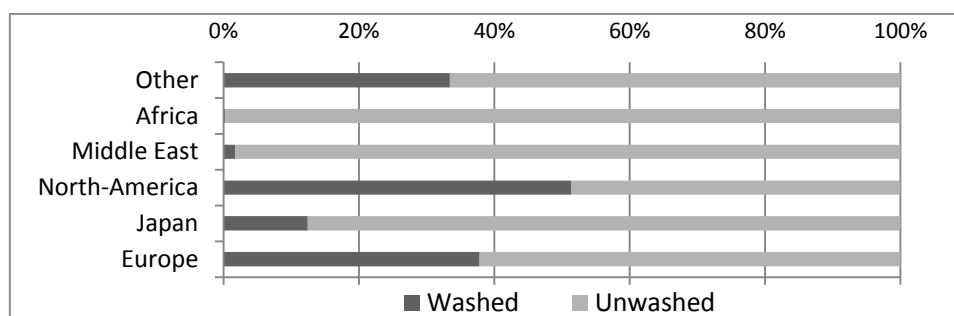
		Mean	Japan		North-America		Middle East		Africa		Other	
	Unit	share	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
<i>Washed coffee (grade 2 = default)</i>		0.37										
Grade 1	yes=1	0.01	2.43	<b>10.39</b>	1.57	<b>7.57</b>	-14.91	-0.01	-13.47	0.00	1.74	<b>7.71</b>
Un-graded	yes=1	0.02	-1.20	<b>-4.04</b>	-0.84	<b>-6.49</b>	-1.03	<b>-2.02</b>	2.16	<b>2.84</b>	-1.40	<b>-5.89</b>
<i>Unwashed coffee</i>												
Grade 3	yes=1	0.02	1.49	<b>7.96</b>	1.60	<b>12.54</b>	-1.07	-1.05	-14.50	-0.01	1.84	<b>12.84</b>
Grade 4	yes=1	0.18	2.66	<b>37.69</b>	0.81	<b>12.67</b>	1.36	<b>9.61</b>	-1.48	-1.07	1.73	<b>25.02</b>
Grade 5	yes=1	0.36	-0.23	<b>-2.13</b>	-1.46	<b>-12.20</b>	2.75	<b>16.26</b>	-1.75	-1.63	-0.58	<b>-4.66</b>
Un--graded	yes=1	0.05	1.18	<b>6.77</b>	-0.47	<b>-2.35</b>	2.99	<b>12.89</b>	5.18	<b>4.87</b>	-0.39	-1.50
<i>Region of origin (default=Sidama)</i>												
Jimma	yes=1	0.24	0.55	<b>5.57</b>	0.93	<b>7.92</b>	-1.94	<b>-12.55</b>	4.60	<b>4.90</b>	0.82	<b>6.96</b>
Wollega/Lekempte	yes=1	0.15	0.76	<b>9.22</b>	-0.32	<b>-2.58</b>	0.97	<b>6.92</b>	1.06	1.00	-0.31	<b>-2.66</b>
Yirgacheffe	yes=1	0.12	0.69	<b>7.21</b>	1.41	<b>25.70</b>	-1.04	<b>-3.12</b>	0.74	0.86	1.39	<b>19.75</b>
Limu	yes=1	0.05	-0.34	<b>-1.98</b>	0.76	<b>9.92</b>	-0.76	<b>-2.04</b>	0.66	0.58	0.89	<b>9.22</b>
Harar	yes=1	0.07	0.02	0.11	1.90	<b>15.96</b>	3.53	<b>24.76</b>	-15.10	-0.01	1.61	<b>13.46</b>
Other	yes=1	0.04	0.54	<b>4.75</b>	0.43	<b>4.19</b>	-0.62	<b>-3.16</b>	-15.87	-0.01	-0.32	<b>-2.10</b>
<i>Certificate</i>												
Fair Trade	yes=1	0.02	-2.19	<b>-3.69</b>	-0.14	-1.27	-0.65	-0.81	-14.04	-0.01	0.08	0.53
Organic	yes=1	0.09	0.15	0.97	0.72	<b>8.41</b>	-4.70	<b>-4.59</b>	-15.28	-0.01	0.57	<b>4.73</b>
<i>Type of exporter (default=private)</i>		0.81										
Cooperative	yes=1	0.10	-0.60	<b>-3.99</b>	0.58	<b>6.93</b>	-0.09	-0.46	1.12	1.48	-0.16	-1.34
Parastatal	yes=1	0.03	-1.50	<b>-6.27</b>	-0.76	<b>-5.33</b>	-1.41	<b>-6.88</b>	-19.58	-0.01	-0.36	<b>-2.68</b>
State farm	yes=1	0.03	0.06	0.38	-0.63	<b>-4.49</b>	-0.90	<b>-2.11</b>	-18.37	-0.01	-0.10	-0.69
Private commercial farm	yes=1	0.03	-0.09	-0.55	1.44	<b>16.80</b>	-0.20	-0.73	-18.36	-0.01	0.09	0.65
Intercept			-2.70	<b>-45.09</b>	-1.93	<b>-48.57</b>	-3.67	<b>-35.87</b>	-7.34	<b>-12.74</b>	-2.46	<b>-47.58</b>
Number of observations			30354									
LR chi2(106)			27945									
Prob > chi2			0									
Pseudo R2			0.32									

\* z-values in bold are significant at the 5 percent level

Source: Authors' calculations based on data from the Ministry of Trade

First, Japan and the Middle East are more likely to import unwashed coffee than are other countries. The impression of washed coffee being cleaner is strong in the US and Europe. Japan and the Middle East generally prefer unwashed coffee for a presumed better and richer natural taste (Tefera and Tefera, 2013). These different preferences for washed and unwashed coffee are illustrated in Figure 15. Second, we see significant differences in demand for different grades. For example, Sudan is more likely to import ungraded coffee, both washed and unwashed. Third, different destination markets import coffees from different specific regions. The Middle East is much more likely to import coffee that originates from Harar and from Wollega (Nekempt). Japan and North America import relatively more coffee from Yirgacheffe than do European importers. African importers focus mostly on the lower priced coffees from Wollega and Jimma. Fourth, coffee with Fair Trade certificates are more likely to be exported to Europe than to other destinations. Organic coffee on the other hand is in greatest demand by North American markets. These markets also import relatively more coffee from cooperatives than the other destination markets. Overall, these results suggest that quality differences explain an important part of the significant differences in prices between destination markets. This will be further discussed below.

**Figure 15—Share of exports of washed and unwashed coffee by export destination, 2005 to 2013**



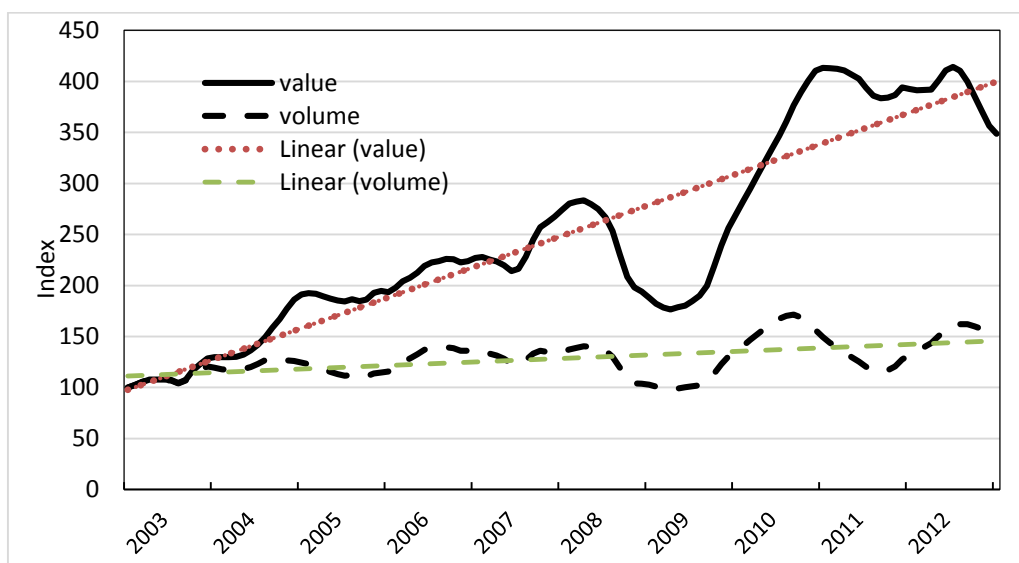
Source: Authors' calculations based on data from the Ministry of Trade

## 7. PERFORMANCE OF ETHIOPIA'S COFFEE EXPORT SECTOR

### 7.1. Values and quantities

We start with a discussion of the performance of the coffee sector through an analysis of the changes in quantities and values of coffee exports. Figure 16 shows how the values, in real USD<sup>14</sup>, and quantities of coffee exports have evolved over the last 10 years. To illustrate trends over time, we plot 12-month moving averages for value and quantity that we equate to 100 percent for January 2003 and then add linear trend lines to these plots. There are two main findings. First, we see large growth rates in the values and quantities of coffee exported. Figure 16 illustrates that the real value of Ethiopia's coffee exports at the end of 2012 was four times higher than it was at the beginning of 2003. The value of exports in nominal terms was five times as high. Quantities exported also increased by 50 percent over the same period. Even though the growth rate in quantity terms is much smaller than for real values, this is still an impressive performance. Second, we see a significant drop in the real value and the quantity of exports from the trend line in 2009, indicating a bad production year as well as disruption to coffee exports with the revocation of export licenses. However, exports have increased and remained on an upward trend since then.

**Figure 16—Trends in real value and quantities of coffee exports from Ethiopia, 2003 to 2012 (Jan. 2003=100; 12-month moving average)**



Source: Authors' calculations based on data from the Ministry of Trade

<sup>14</sup> Deflated by the US CPI downloaded from <http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/>

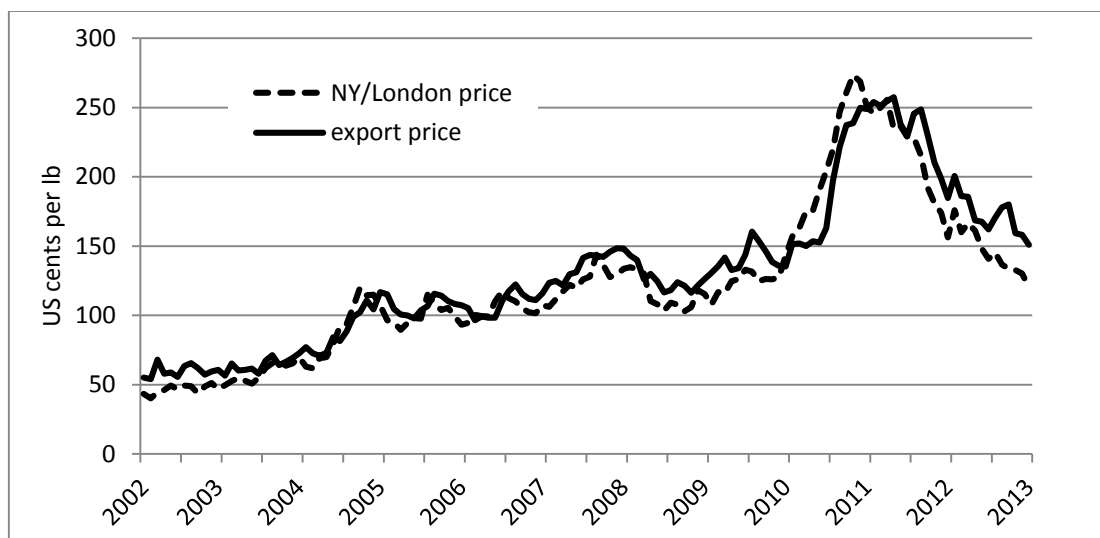


The change in the real value of exports is largely driven by the increasing international prices offered for Ethiopian coffee. In the next two sections, we explore to what extent international price changes and quality changes (rewarded in quality premiums) in exported coffee from Ethiopia, have contributed to this change.

## 7.2. Changes in international coffee prices

Figure 17 compares the export prices, as reported by the Ministry of Trade, and the composite price of Brazilian natural Arabica coffee, as constructed by the International Coffee Organization (ICO), based on coffee futures contracts in commodity exchanges in London and New York. The graph illustrates the large variations found in coffee prices over time. Coffee prices in 2011 were five times higher than prices in 2002, with the price in 2011 at around 2.5 USD per lb, compared to 0.5 USD per lb in 2002. While the price has come down significantly since its peak in 2011, prices in mid-2013 had not yet declined to the low level of 2002. This large price variability in recent years has led both to increasingly unpredictable windfalls and losses in Ethiopia's export sector. Several key informants reported that a lack of hedging instruments in local coffee markets, such as futures contracts, was a source of weakness in the coffee sector in the face of this price variability in Ethiopia. The graph further shows a strong correlation and synchrony between export and international prices. The reported export prices are mostly higher than the ICO composite price, reflecting the relatively good quality Arabica coffee produced in Ethiopia. However, a drop below the ICO price is seen in 2010 and 2011. The reasons for this are unclear, although this pattern in the relationship of the two prices has since been reversed.

**Figure 17—Trends in Ethiopian export coffee price versus reference international coffee price, 2002 to 2013**



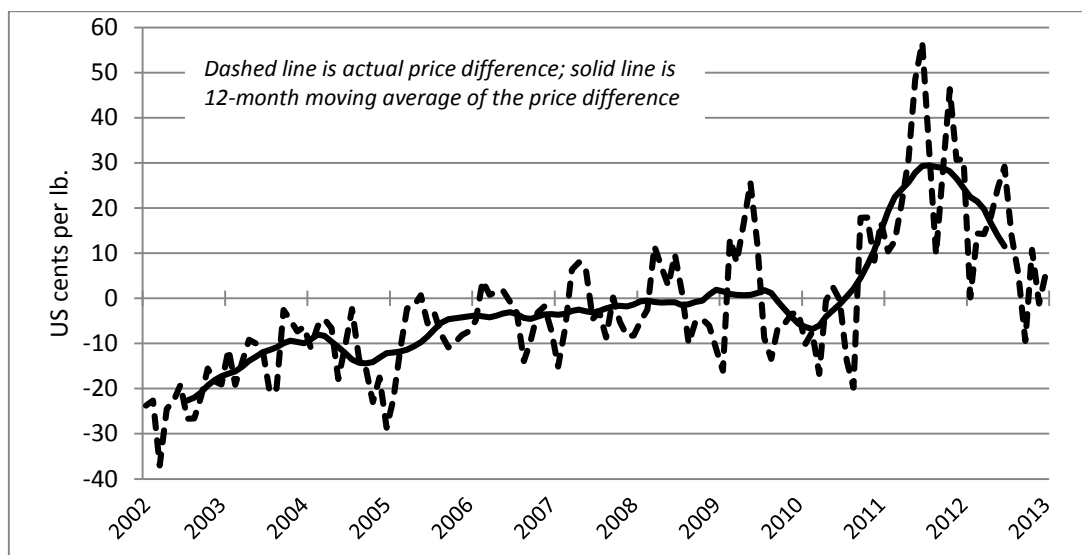
Source: Authors' calculations based on data from the Ministry of Trade and International Coffee Organization (ICO)

In principle, all marketed coffee in Ethiopia has to go through the ECX to determine the quality standard of the coffee. If the quality of coffee is judged to be of export quality, then it must be exported and cannot be sold locally. This makes the local market a residual market, where prices are in theory detached from international prices. Given the government's need of foreign currency to finance its ambitious development agenda, it may be the case that this export requirement has become increasingly stringent over time and there has been less coffee supplied to local markets. This pattern is possibly confirmed in Figure 18 where we compare the retail prices for coffee in Addis Ababa markets, as collected by the Central Statistical Agency, with export prices for coffee. We plot monthly differences as well as 12-month moving averages of that difference to more accurately discern the trend.<sup>15</sup> While the retail prices for coffee beans in Addis Ababa was 20 cents lower per pound than export prices in the years 2002 and 2003, this difference was reversed in 2011 and 2012 when local prices in Addis Ababa

<sup>15</sup> Unfortunately, we cannot control for changes in coffee quality over time, but it seems safe to assume that these do not explain these trends.

were 20 cents or higher per pound than export prices. More recently, the price difference has readjusted so that the prices are now considerably closer, possibly because of the development of a black market (Fikade, 2014). Such informal markets are encouraged to flourish, given the possible rewards obtained from channeling export quality coffee to domestic markets.

**Figure 18—Difference between Addis Ababa retail coffee price and the Ethiopia coffee export price, 2002 to 2013 by month**



Source: Authors' calculations based on data from the Ministry of Trade and CSA

In contrast with most coffee exporting countries, Ethiopia is itself a major consumer of coffee. The improved export performance over the last decade raises the important question about the extent to which this change is linked to high international prices and a subsequent shift from domestic consumption to export markets. A negative price elasticity, as is commonly seen for most agricultural products, would suggest that part of the total increase of coffee exports is explained by reduced consumption. This is especially the case in a situation where prices have changed dramatically, as in the last decade.

The analysis of the data from the National Household and Income Surveys (HICES) of 2000 and of 2011, indicate that coffee expenditures were 40 Birr per adult equivalent in 2000 and 206 Birr in 2011. When these expenditures are divided by the average annual retail prices for whole dried coffee beans, this implies a consumption per adult equivalent of 8.7 kg in 2000 and 5.9 kg in 2011, or a decline by one-third in coffee consumption by Ethiopian households. However, given that different methodologies were followed for the implementation of these surveys over time, the interpretation should be treated with caution (Stifel and Woldehanna, 2013). However, the Ethiopian Rural Household Survey (ERHS), a comprehensive panel survey in fifteen Ethiopian villages, shows that weekly household coffee consumption declined from 1.0 kg in 1997 to 0.7 kg in 2009, again a decline by 30 percent. Evidence from these consumption surveys therefore seem to suggest that the higher exported quantities in the last decade are at least partly driven by reduced local consumption of coffee.

### 7.3. Quality premiums offered for Ethiopian coffee

To arrive at the implicit price of product attributes, the hedonic pricing method is widely used. If the marginal yield of most characteristics and the implicit price for each attribute is assumed constant, a hedonic price regression can be estimated where the price of a product is a function of the characteristics of the product, for example, through variety choices or post-harvest technologies. A simple model of the following form can then be run:

$$p_h = \sum_{k=0}^N \beta_{kh} X_h^k + v$$

where  $p_h$  is the price of the product  $h$ ,  $X_h^k$  is the quantity of the attribute  $k$  of the product  $h$ ,  $\beta_{kh}$  the implicit price, and  $v$  a stochastic error term. Similar approaches have been used in coffee pricing studies by, for example, Teuber (2010), Teuber and Herrmann (2012), and Donnet et al. (2007, 2008). We discuss the results of similar exercises below. In all the regressions that were run, robust standard errors were estimated.

In a first specification of the hedonic price model presented in Table 4, we regress the logarithm of prices in US cents per lb on quantity exported, the origin of the coffee, certification, type of exporters, and yearly dummy variables. We find a strong effect of origin on export prices. Compared to the Sidama default value, Jimma coffee is exported at a 32 percent lower price. It is the least valuable export coffee in Ethiopia. Wollega (Nekempt) also has a negative coefficient – its price is 23 percent lower than the Sidama price. In terms of place of origin, the most valued coffees are from Yirgacheffe and Harar, with premiums of 19 percent and 7 percent, respectively, over Sidama. We also find that certification raises prices significantly. Fair Trade and Organic certification generate premiums of about 9 percent, other things being equal. Finally, coffee exported by cooperatives and private commercial farms obtains higher export prices compared to that exported by private exporters. The premium for cooperatives and private commercial farms is 16 percent and 5 percent, respectively. As we control in the regression for the quality of the coffee and certification, this premium might partly reflect the willingness of buyers to pay for vertical integration in sourcing their coffee from Ethiopia. We further note significant changes in the year dummies, reflecting large international price variability over the period considered.

In a second specification, we add a dummy variable to reflect the washing of coffee. We find that washed coffee raises the export price by a premium of 20 percent on average over the period considered. We also note that the coefficients on the region of origins change significantly with the inclusion of the washed coffee dummy in the hedonic price model. There is now significantly less variability between the regions. While the price range between the highest (Yirgacheffe) and the lowest (Jimma) priced regions was almost 51 percent in the first model specification, this was reduced to 38 percent in the second specification (Harar versus Jimma), indicating that a significant part in regional price variation is explained by the processing method followed. By controlling for washing, coffee originating from Harar is shown to be the most expensive in the country, with an average price premium of 20 percent over Sidama.

In a third specification, we add within the washed and unwashed categories the different quality grades as measured by the CLU. We find that the grades within each segment lead to significantly different premiums, and that the premiums attached to the grades are consistent with what would have been expected, i.e. better prices offered for better quality grades. In the washed segment, grade 1 coffee is sold at a premium of 20 percent while un-graded washed coffee is sold at a price that is 23 percent lower than grade 2 washed coffee. In the unwashed segment, grade 5 is sold at a price 8 percent lower than grade 4, while grade 3 has a price that is 32 percent higher than grade 4. Note that ungraded washed coffee is more valuable than ungraded unwashed coffee.

Fourth, we interact the washing dummy with the year dummy, reflecting the returns to washing for each year separately. We find that washing in all years adds a premium relative to the price of unwashed coffee. In all cases, this interacted coefficient is significant and positive. However, the premium is highly volatile between years, seemingly linked with the high volatility of international prices. The premium was lowest during 2006 and 2007 at between 15 and 18 percent. The premium then increased to 34 percent and 24 percent in 2009 and 2010, respectively. In 2012, when prices decreased during the period of sales of the unwashed coffee, the premium of washed coffee came down but still resulted in a premium of 21 percent over unwashed coffee. This volatility in the price premium associated with washing coffee leads to uncertain pay-offs to investments in coffee washing mills.

**Table 4—Determinants of coffee prices (log(US cents per lb)); hedonic price model**

		Specification 1		Specification 2		Specification 3		Specification 4	
	Unit	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*
Quantity exported	log()	-0.038	<b>-26.82</b>	-0.037	<b>-26.53</b>	-0.023	<b>-18.30</b>	-0.036	<b>-26.55</b>
Washed coffee	yes=1			0.202	<b>55.41</b>				
<i>Washed coffee (grade 2 = default)</i>									
Grade 1	yes=1					0.196	<b>13.29</b>		
Un-graded	yes=1					-0.230	<b>-39.77</b>		
<i>Unwashed coffee</i>									
Grade 3	yes=1					0.057	<b>4.86</b>		
Grade 4	yes=1					-0.259	<b>-88.13</b>		
Grade 5	yes=1					-0.344	<b>-67.38</b>		
Un--graded	yes=1					-0.497	<b>-64.17</b>		
<i>Region of origin (default=Sidama)</i>									
Jimma	yes=1	-0.320	<b>-116.37</b>	-0.188	<b>-52.02</b>	-0.051	<b>-10.00</b>	-0.186	<b>-52.13</b>
Wollega/Lekempte	yes=1	-0.234	<b>-76.94</b>	-0.106	<b>-28.39</b>	-0.015	<b>-3.19</b>	-0.103	<b>-27.98</b>
Yirgacheffe	yes=1	0.192	<b>55.25</b>	0.136	<b>37.34</b>	0.104	<b>35.63</b>	0.135	<b>37.73</b>
Limu	yes=1	0.006	1.34	-0.041	<b>-9.26</b>	-0.055	<b>-13.65</b>	-0.043	<b>-9.83</b>
Harar	yes=1	0.068	<b>14.04</b>	0.200	<b>37.10</b>	0.290	<b>51.52</b>	0.202	<b>36.65</b>
Other	yes=1	-0.071	<b>-9.90</b>	-0.030	<b>-4.50</b>	-0.011	-1.69	-0.029	<b>-4.41</b>
<i>Certificate</i>									
Fair Trade	yes=1	0.089	<b>13.43</b>	0.053	<b>8.21</b>	0.057	<b>8.97</b>	0.043	<b>6.53</b>
Organic	yes=1	0.095	<b>13.46</b>	0.096	<b>13.94</b>	0.076	<b>12.07</b>	0.098	<b>14.22</b>
<i>Type of exporter</i>									
Cooperative	yes=1	0.157	<b>23.21</b>	0.146	<b>22.01</b>	0.154	<b>25.38</b>	0.146	<b>21.79</b>
Parastatal	yes=1	-0.008	-1.44	-0.029	<b>-6.04</b>	-0.042	<b>-9.24</b>	-0.024	<b>-5.17</b>
State farm	yes=1	-0.018	<b>-3.04</b>	-0.063	<b>-11.04</b>	-0.082	<b>-14.02</b>	-0.065	<b>-11.55</b>
Private commercial farm	yes=1	0.048	<b>6.33</b>	0.041	<b>5.38</b>	0.030	<b>5.08</b>	0.041	<b>5.51</b>
<i>Year (default=2006)</i>									
2007	yes=1	0.112	<b>26.57</b>	0.101	<b>27.47</b>	0.093	<b>27.43</b>	0.115	<b>27.13</b>
2008	yes=1	0.343	<b>83.49</b>	0.332	<b>92.90</b>	0.319	<b>98.31</b>	0.335	<b>83.60</b>
2009	yes=1	0.222	<b>43.77</b>	0.208	<b>47.40</b>	0.204	<b>51.22</b>	0.140	<b>26.64</b>
2010	yes=1	0.335	<b>79.37</b>	0.324	<b>89.45</b>	0.319	<b>97.00</b>	0.305	<b>71.68</b>
2011	yes=1	0.753	<b>157.44</b>	0.745	<b>171.10</b>	0.744	<b>181.94</b>	0.756	<b>134.65</b>
2012	yes=1	0.671	<b>150.9</b>	0.664	<b>167.81</b>	0.651	<b>177.18</b>	0.655	<b>138.13</b>
2013	yes=1	0.445	<b>83.35</b>	0.436	<b>89.10</b>	0.415	<b>93.68</b>	0.444	<b>64.34</b>
<i>Year interacted with washing</i>									
2006	yes=1							0.183	<b>23.21</b>
2007	yes=1							0.155	<b>30.43</b>
2008	yes=1							0.180	<b>34.29</b>
2009	yes=1							0.345	<b>51.42</b>
2010	yes=1							0.237	<b>49.16</b>
2011	yes=1							0.160	<b>26.09</b>
2012	yes=1							0.212	<b>34.68</b>
2013	yes=1							0.174	<b>21.33</b>
Intercept		5.131	<b>343.94</b>	5.001	<b>331.51</b>	5.096	<b>393.46</b>	5.002	<b>333.27</b>
Number of observations		30333		30333		30207		30333	
F()		6830.0		7870.6		8035.9		6239.5	
Prob>F		0.00		0.00		0.00		0.00	
R-squared		0.78		0.81		0.85		0.81	

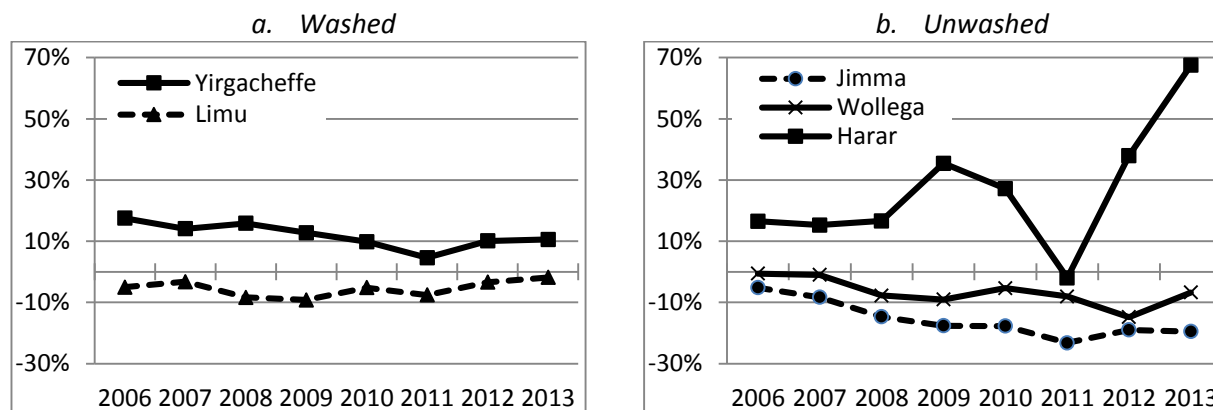
\* robust standard errors; t-values in bold are significant at the 5 percent level

Source: Authors' calculations based on data from the Ministry of Trade

In a fifth model specification, we use the second model specification, but interacted yearly dummies with geographical indicators and split up the regression between washed and unwashed coffee. In Figure 19, we plot the quality premiums compared to coffee of Sidama origin. We see increasing divergence of quality premiums for

unwashed coffee over time. While the range in quality premiums between 2006 and 2008 was about 20 percent, this had increased to 90 percent in 2012 and 2013. This increase in variation has been driven largely by the substantial upswing in the Harar coffee premium. However, even if we discard Harar coffee from our analysis, we still see slightly increasing divergence over time, with the premiums offered for unwashed coffee from Wollega (Nekempt) and Jimma not keeping up with premiums offered for unwashed Sidama coffee. This divergence might possibly be explained by the rise of specialty coffee which fetches very high prices in international markets (Teuber and Herrmann, 2012). In the case of washed coffee, changes in premiums over time are less pronounced.

**Figure 19—Regional coffee premiums over time, compared to Sidama coffee**



Source: Authors' calculations based on data from the Ministry of Trade

Sixth, we run a test on the rewards for vertical integration and traceability. Commercial private farms, state farms, and cooperatives produce coffee themselves or buy it directly from producers, and are permitted to sell directly to international buyers. This gives them the benefits of assuring traceability, which is increasingly demanded in international markets (Meijerink et al., 2010; Swinnen, 2007). Since the introduction of the ECX, other buyers and exporters can no longer sell directly to international buyers, but must sell their coffee through the ECX. To test to what extent management structures that allow vertical integration have increased quality premiums after the introduction of the ECX compared to the situation before, we interact in the regression the management structures with a dummy variable for before and after the ECX and compare differences through an F-test.<sup>16</sup> The results are presented in Table 5. While cooperatives obtained a price premium compared to other traders before the introduction the ECX, this premium gap has widened significantly subsequently. The price premium of cooperatives compared to private traders widened by 9 percent, from 9 percent before ECX to 18 percent in the period afterwards. Significant but smaller changes are also found for other vertically integrated structures – 3 percent for state farms and 5 percent for commercial private farms. However, they both started from significantly lower levels of sales.

<sup>16</sup> However, caution in interpretation is required as it is not directly possible to separate ECX, time, and cohort effects. Untangling this is left for future analysis.

**Table 5—Testing the benefits of vertical integration and traceability in the Ethiopian coffee export sector**

		Before ECX		After ECX	
	Unit	Coef.	t-value*	Coef.	t-value*
<b>Regression coefficients</b>					
<i>Type of exporter</i>					
Cooperative	yes=1	0.091	<b>13.72</b>	0.181	<b>23.38</b>
Private commercial farm	yes=1	-0.007	-0.49	0.055	<b>6.30</b>
State farms	yes=1	-0.082	<b>-11.93</b>	-0.047	<b>-6.22</b>
Control variables similar as in specification 2					
<b>F-test of differences between period before ECX and after ECX</b>					
		F()	Prob>F		
Cooperative		200.62	0.00		
State farms		15.28	0.00		
Private commercial farm		15.26	0.00		

\* robust standard errors; t-values in bold are significant at the 5 percent level

Source: Source: Authors' calculations based on data from the Ministry of Trade

Seventh, to understand international market segmentation, different hedonic regression models for different destination markets are required (Teuber and Herrman, 2012). The results of these regression models are presented in Table 6. A number of interesting findings are obtained. First, similar patterns to those detected in Table 4 emerge over different countries – better grades are associated with higher prices; there are significant differences in prices for coffee from different regions; and certification raises the price of coffee. However, the size of these coefficients differs over destination markets. Second, ungraded coffee has the lowest negative premium in the case of exports to other African countries. The ungraded coffee that is exported to Japan gets the best price of all ungraded exported coffee. Third, organic certificates are rewarded the highest prices in the Middle Eastern and North American markets, while Fair Trade coffee gets the best prices in Europe. Fourth, compared to Europe, price rises over time have been higher in Japan. Prices for coffee exported to North America, on the other hand follows, the prices for coffee exported to European markets more closely, while Middle Eastern and African markets follow them less closely, other things being equal. Fifth, while vertical integration is rewarded in the European, Japanese, and North American markets, this is seemingly not the case in the Middle East.



**Table 6—Determinants of coffee prices (log(US cents per lb)) by destination market; hedonic price model**

		Europe		Japan		North-America		Middle East		Africa	
	Unit	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*
Quantity exported	log()	-0.02	<b>-13.43</b>	-0.02	<b>-6.24</b>	-0.02	<b>-7.08</b>	0.00	-0.20	-0.01	-1.45
<i>Washed coffee (grade 2 = default)</i>											
Grade 1	yes=1	0.23	<b>6.55</b>	0.12	<b>3.79</b>	0.19	<b>9.63</b>				
Un-graded	yes=1	-0.24	<b>-41.60</b>	-0.16	<b>-2.73</b>	-0.23	<b>-9.25</b>	-0.27	<b>-2.58</b>	-0.61	<b>-6.66</b>
<i>Unwashed coffee</i>											
Grade 3	yes=1	0.06	<b>2.23</b>	-0.03	-0.62	0.06	<b>3.93</b>	-0.32	<b>-20.05</b>		
Grade 4	yes=1	-0.29	<b>-65.52</b>	-0.25	<b>-33.87</b>	-0.19	<b>-22.61</b>	-0.18	<b>-8.57</b>	-0.58	<b>-46.67</b>
Grade 5	yes=1	-0.32	<b>-37.59</b>	-0.32	<b>-19.69</b>	-0.28	<b>-11.42</b>	-0.34	<b>-13.59</b>	-0.63	<b>-12.92</b>
Un--graded	yes=1	-0.40	<b>-28.30</b>	-0.21	<b>-8.93</b>	-0.44	<b>-7.11</b>	-0.43	<b>-13.76</b>	-0.68	<b>-14.21</b>
<i>Region of origin (default=Sidama)</i>											
Jimma	yes=1	-0.08	<b>-9.46</b>	-0.01	-0.87	-0.13	<b>-5.42</b>	-0.08	<b>-3.81</b>	-0.09	<b>-2.56</b>
Wollega/Lekempte	yes=1	-0.05	<b>-5.50</b>	0.02	<b>3.18</b>	-0.12	<b>-6.18</b>	-0.05	<b>-2.61</b>		
Yirgacheffe	yes=1	0.15	<b>34.60</b>	0.09	<b>6.19</b>	0.06	<b>10.10</b>	0.10	<b>2.37</b>	0.06	<b>3.54</b>
Limu	yes=1	-0.06	<b>-12.71</b>	-0.05	-1.94	-0.07	<b>-8.28</b>	0.01	0.29	-0.69	<b>-17.24</b>
Harar	yes=1	0.33	<b>18.38</b>	0.30	<b>11.68</b>	0.22	<b>19.49</b>	0.25	<b>12.72</b>		
Other	yes=1	-0.06	<b>-7.01</b>	0.10	<b>5.80</b>	-0.06	<b>-3.62</b>	0.01	0.43		
<i>Certificate</i>											
Fair Trade	yes=1	0.08	<b>9.21</b>	-0.12	<b>-2.15</b>	0.03	<b>2.20</b>	0.00	-0.02		
Organic	yes=1	0.05	<b>5.49</b>	0.06	<b>2.78</b>	0.08	<b>7.17</b>	0.13	<b>2.62</b>		
<i>Type of exporter</i>											
Cooperative	yes=1	0.16	<b>18.28</b>	0.12	<b>6.02</b>	0.15	<b>14.01</b>	0.02	0.53	0.25	<b>15.37</b>
Parastatal	yes=1	-0.04	<b>-7.36</b>	-0.06	<b>-3.50</b>	-0.07	<b>-3.84</b>	-0.10	<b>-4.18</b>		
State farm	yes=1	-0.07	<b>-11.42</b>	-0.20	<b>-9.49</b>	-0.06	<b>-2.90</b>	-0.06	-0.77		
Private commercial farm	yes=1	0.00	0.03	0.07	<b>2.34</b>	0.05	<b>4.22</b>	-0.04	-1.23		
<i>Year (default=2006)</i>											
2007	yes=1	0.08	<b>19.49</b>	0.13	<b>27.54</b>	0.03	1.84	0.13	<b>12.19</b>	0.09	<b>4.54</b>
2008	yes=1	0.31	<b>79.35</b>	0.35	<b>63.99</b>	0.30	<b>16.34</b>	0.34	<b>39.33</b>	0.20	<b>9.54</b>
2009	yes=1	0.19	<b>40.08</b>	0.38	<b>28.49</b>	0.23	<b>11.72</b>	0.22	<b>21.61</b>	-0.07	<b>-2.08</b>
2010	yes=1	0.31	<b>80.24</b>	0.43	<b>47.79</b>	0.32	<b>17.07</b>	0.36	<b>40.91</b>	0.06	<b>2.65</b>
2011	yes=1	0.75	<b>157.49</b>	0.83	<b>61.03</b>	0.69	<b>35.64</b>	0.74	<b>56.82</b>	0.56	<b>20.48</b>
2012	yes=1	0.62	<b>144.74</b>	0.60	<b>61.85</b>	0.68	<b>35.06</b>	0.72	<b>64.85</b>	0.58	<b>25.06</b>
2013	yes=1	0.37	<b>72.32</b>	0.43	<b>41.52</b>	0.44	<b>21.58</b>	0.56	<b>37.82</b>	0.24	<b>10.51</b>
Intercept		5.10	<b>306.68</b>	5.03	<b>156.20</b>	5.14	<b>127.53</b>	4.85	<b>91.39</b>	5.34	<b>63.84</b>
Number of observations		15540		2885		4167		3643		1229	
F()		4834		872		966		.		.	
Prob>F		0		0		0		.		.	
R-squared		0.87		0.87		0.84		0.76		0.60	
* robust standard errors; t-values in bold are significant at the 5 percent level											

Source: Source: Authors' calculations based on data from the Ministry of Trade

Eighth, we run a simultaneous quantile regression in order to understand the relative importance of different price determinants at lower and higher ends of the markets (e.g. Costanigro et al., 2010). The results for 5 quantile - at 0.10, 0.25, 0.50, 0.75 and 0.90 quantiles - regressions are presented in Table 7. We find that quality premiums for indications of origins are increasing from lower to higher quantiles, indicating the greater importance of origin effects in high-end markets. While the difference between the lowest (Limu) and the highest (Harar) coefficients for the 0.10 quantile regression shows a difference of 27 percent, this gap increases to 44 percent for the 0.90 quantile regression. We also note increasing willingness to pay for vertical integration at the higher end of the market as shown by higher positive coefficients for cooperatives (17 percent and 11 percent for the 0.90 and 0.10 quantile regression respectively) and for commercial private farms (7 percent and 2 percent for the 0.90 and 0.10 quantile regressions, respectively). Parastatals are less able to compete at the high end of the market as shown

by its larger negative coefficient in that market segment when compared to other exporters as well as to lower market segment. Rewards to grades and certificates decline from low to high quantiles, possibly indicating absolute (a fixed amount) instead of relative rewards.

**Table 7—Determinants of coffee prices (log(US cents per lb)); quantile hedonic price models**

	Unit	quantile 0.10		quantile 0.25		quantile 0.50		quantile 0.75		quantile 0.90	
		Coef.	t-value*	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*	Coef.	t-value*
Quantity exported	log()	-0.013	<b>-12.05</b>	-0.018	<b>-15.53</b>	-0.018	<b>-17.39</b>	-0.021	<b>-18.49</b>	-0.031	<b>-14.88</b>
<i>Washed coffee (grade 2 = default)</i>											
Grade 1	yes=1	0.125	<b>5.87</b>	0.181	<b>10.51</b>	0.205	<b>13.19</b>	0.227	<b>8.16</b>	0.245	<b>6.42</b>
Un-graded	yes=1	-0.232	<b>-39.49</b>	-0.244	<b>-48.99</b>	-0.243	<b>-34.07</b>	-0.211	<b>-29.54</b>	-0.187	<b>-22.17</b>
<i>Unwashed coffee</i>											
Grade 3	yes=1	-0.144	<b>-12.95</b>	-0.012	-0.54	0.087	<b>4.82</b>	0.151	<b>19.24</b>	0.179	<b>12.41</b>
Grade 4	yes=1	-0.296	<b>-103.60</b>	-0.289	<b>-90.16</b>	-0.267	<b>-67.19</b>	-0.229	<b>-59.69</b>	-0.226	<b>-34.63</b>
Grade 5	yes=1	-0.363	<b>-48.59</b>	-0.379	<b>-66.64</b>	-0.350	<b>-56.46</b>	-0.314	<b>-48.32</b>	-0.319	<b>-28.49</b>
Un-graded	yes=1	-0.624	<b>-37.02</b>	-0.570	<b>-60.64</b>	-0.495	<b>-51.87</b>	-0.415	<b>-43.74</b>	-0.406	<b>-29.55</b>
<i>Region of origin (default=Sidama)</i>											
Jimma	yes=1	-0.015	<b>-2.04</b>	-0.024	<b>-4.41</b>	-0.048	<b>-8.07</b>	-0.053	<b>-8.21</b>	-0.040	<b>-3.99</b>
Wollega/Lekempte	yes=1	0.012	1.63	0.008	1.81	-0.012	-1.89	-0.011	-1.77	0.002	0.17
Yirgacheffe	yes=1	0.101	<b>20.25</b>	0.114	<b>28.65</b>	0.102	<b>32.47</b>	0.116	<b>28.36</b>	0.177	<b>16.30</b>
Limu	yes=1	-0.067	<b>-9.17</b>	-0.046	<b>-10.74</b>	-0.048	<b>-13.40</b>	-0.061	<b>-13.75</b>	-0.065	<b>-11.11</b>
Harar	yes=1	0.202	<b>21.95</b>	0.266	<b>46.92</b>	0.271	<b>46.20</b>	0.290	<b>38.80</b>	0.380	<b>29.15</b>
Other	yes=1	-0.060	<b>-7.35</b>	-0.035	<b>-3.83</b>	-0.041	<b>-5.51</b>	-0.003	-0.28	0.048	<b>3.44</b>
<i>Certificate</i>											
Fair Trade	yes=1	0.106	<b>15.42</b>	0.051	<b>4.79</b>	0.052	<b>5.44</b>	0.037	<b>7.17</b>	0.034	<b>3.45</b>
Organic	yes=1	0.067	<b>6.52</b>	0.059	<b>7.74</b>	0.073	<b>10.49</b>	0.065	<b>11.35</b>	0.038	<b>4.58</b>
<i>Type of exporter</i>											
Cooperative	yes=1	0.115	<b>10.42</b>	0.161	<b>21.79</b>	0.170	<b>27.44</b>	0.177	<b>33.22</b>	0.175	<b>23.99</b>
Parastatal	yes=1	-0.010	-1.34	-0.020	<b>-4.71</b>	-0.043	<b>-6.76</b>	-0.041	<b>-6.82</b>	-0.071	<b>-14.01</b>
State farm	yes=1	-0.069	<b>-8.32</b>	-0.089	<b>-10.94</b>	-0.077	<b>-13.94</b>	-0.052	<b>-8.57</b>	-0.077	<b>-8.21</b>
Private commercial farm	yes=1	0.019	<b>2.62</b>	0.008	1.52	0.016	<b>2.75</b>	0.066	<b>7.55</b>	0.069	<b>6.72</b>
<i>Year (default=2006)</i>											
2007	yes=1	0.070	<b>14.33</b>	0.070	<b>27.72</b>	0.089	<b>29.31</b>	0.112	<b>34.14</b>	0.136	<b>16.94</b>
2008	yes=1	0.286	<b>53.22</b>	0.315	<b>119.94</b>	0.318	<b>106.88</b>	0.327	<b>109.20</b>	0.341	<b>42.27</b>
2009	yes=1	0.085	<b>14.64</b>	0.138	<b>21.83</b>	0.227	<b>46.38</b>	0.264	<b>64.55</b>	0.296	<b>28.34</b>
2010	yes=1	0.268	<b>54.24</b>	0.292	<b>88.15</b>	0.313	<b>125.15</b>	0.349	<b>97.27</b>	0.370	<b>45.14</b>
2011	yes=1	0.621	<b>102.36</b>	0.690	<b>160.71</b>	0.775	<b>182.57</b>	0.833	<b>198.02</b>	0.852	<b>114.84</b>
2012	yes=1	0.552	<b>111.04</b>	0.584	<b>177.93</b>	0.631	<b>106.36</b>	0.732	<b>175.36</b>	0.747	<b>97.58</b>
2013	yes=1	0.339	<b>67.26</b>	0.352	<b>117.12</b>	0.383	<b>84.56</b>	0.449	<b>89.70</b>	0.513	<b>52.33</b>
Intercept		4.918	<b>416.91</b>	5.004	<b>412.17</b>	5.044	<b>465.55</b>	5.098	<b>385.94</b>	5.253	<b>231.49</b>
Number of observations		30207									
Pseudo R2		0.60		0.63		0.64		0.64		0.62	
* simultaneous quantile regressions; standard errors with 100 bootstrap replications;											
t-values in bold are significant at the 5 percent level											

Source: Source: Authors' calculations based on data from the Ministry of Trade

## 8. DISCUSSION AND CONCLUSIONS

We study the structure and performance of the coffee export sector over the period from 2003 to 2013 in Ethiopia. Important structural changes are happening in coffee markets internationally and locally within Ethiopia with significant implications on performance and, ultimately, on the livelihoods of local smallholder coffee producers, given their high dependence on coffee as a major source of income. However, few studies have looked at the impact of these changes on the organization of export markets for coffee exporting countries.

Major changes have been seen in international coffee markets in recent years. First, the specialty coffee market has quickly grown in global markets. Coffee differentiation, often based on product origin, is becoming increasingly important (Reuber, 2010). Second, there has been high price variability in global coffee markets with prices on international markets increasing five-fold between 2000 and 2012. Third, the demand for certified coffee is on the rise (Jena et al., 2012; Meijerink et al., 2010). Domestically, there have also been important policy changes related to the start of the Ethiopian Commodity Exchange (ECX), a modern marketing system based on warehouse receipts, interventions by the government in the issuing of export licenses, and changes in the export tax structure.

We note important structural changes in the export sector in Ethiopia. We see a larger number of exporters and an increasing diversification in the types of exporters – such as cooperatives and commercial farms - in the export sector, with lower concentration ratios in the export sector overall. On the other hand, the share of the incumbents in the local coffee market is large. This is possibly driven by reputation effects in these international markets (Macchiavello, 2010), the complications of understanding coffee markets, as well as lack of access to credit for emerging exporters (World Bank, 2014). There is over time relatively little change in the countries that Ethiopia exports to, except for a small increase of exports to Sudan. We also note the small but increasing share of parastatals and cooperatives in the coffee export sector as well as more emphasis on certification of coffee, although the share of coffee exports from Ethiopia that is certified is still small compared to other producing countries.

We have seen an impressive performance of Ethiopia's coffee export sector over the last decade with the real value of coffee exports rising four-fold between 2003 and 2012. The increases in export values have largely been driven by increases in international coffee prices between 2003 and 2012. However, it should be noted that increases in quantity also have played a role, as the quantity exported has gone up as well – exported quantities from Ethiopia were 50 percent higher in 2012 than 10 years earlier. The increasing quantity exported may have partly come at the expense of local consumption, with coffee in local markets becoming increasingly rationed over time, as shown in relatively important domestic price increases. We also note a small increase in the quality of the coffee exported, reflected in the share of certified coffee as well as in the better quality of unwashed coffee. The share of the premium washed coffee in total exports, however, has not changed over time.

We show that the coffee export market is highly differentiated in Ethiopia, with quality premiums being offered for washing, grades, certification, and specific geographical indications. About 30 percent of the coffee is washed, leading to high but variable (due to international price variation) premiums compared to unwashed coffee. There are strong effects of geographic indications of origin with Yirgacheffe and Harar coffee commanding large premiums over coffees originating from elsewhere in Ethiopia. Certified coffee and coffee marketed by cooperatives are being sold at higher prices than coffee sold by the private sector. We also find that all exporters that are vertically integrated are able to obtain significantly higher prices over time than those that do not. This is especially valued in the differentiated high-end market.

The findings from this research point to a number of important implications for efforts to stimulate Ethiopia's coffee export sector. First, emphasis on stimulating washing of coffee by creating the right investment incentives is important, as it leads to significantly higher export prices and, thus, higher foreign exchange earnings for the country. As only part of the exported coffee is sold as washed coffee, there is still room for growth in this area. However, profitability for the setting up of wet mills needs to be carefully assessed, as does the environmental implications of more widespread washing (Beyene et al., 2012; Endris et al., 2008). Improved processing methods, relying on ecological pulpers which reduce water demand significantly, should be more widely adopted. The growth of washing coffee in Ethiopia may have been constrained because of regulations and the difficulty of access to foreign exchange to import wet milling machines. However, due to climatic constraints, coffee cherries produced in some areas of Ethiopia are not suitable for washing, thus limiting spatial growth in wet milling services to coffee producers.

Second, it has been estimated that between 20 and 30 percent of Ethiopian coffee could qualify as specialty coffee<sup>17</sup>, opening up important export opportunities (Chemonics, 2010). Greater efforts to gain increased access for Ethiopian coffee to global specialty coffee markets could be made. Ethiopia could also benefit from increasing the profile of the Ethiopian coffee brand, increased participation in certification schemes, and emphasizing trade in traceable coffee products. This is especially important given the growing emphasis of international markets on certification of sustainable coffee production practices.<sup>18</sup> However, as certification is often a costly process that might also limit benefits for producers (Jena et al., 2012; Cramer et al., 2014), setting up cheaper local certification schemes that would be credible in international markets and that would benefit local producers directly should be considered. Furthermore, as many of these international certification schemes require collaboration with cooperative institutions, further capacity building of these institutions will be required.

Finally, coffee yields are very low in Ethiopia compared to other countries. There seemingly are significant opportunities for productivity growth (Adugna et al., 2008; Kufa, 2012). Increasing support at the farm level and training towards higher adoption of improved technologies, such as mulching, pruning, rejuvenation of trees, planting of improved varieties, and modern input use, have been shown to be associated with higher productivity (Adugna et al., 2008) and could lead to higher local supply and, therefore, quantities of coffee exported. Moreover, more efforts should be done with the research and agricultural extension services to address widespread concerns related to coffee diseases and adaptation and mitigation of climate change that are likely to have major impacts on the coffee sector in Ethiopia (Davis et al., 2012).

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<sup>17</sup> Carl Cervone, Technoserve, personal communication

<sup>18</sup> For example, the Sustainable Trade Initiative has an agreement with major roasters towards increasing global sustainable coffee sales to 25 percent in 2016. See <http://www.idhsustainabletrade.com/koffie-news>

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