Analysis of Coffee Production and Exports in Uganda

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<td>Mendel University in Brno</td>
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Analysis of Coffee Production and Exports in Uganda

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Abstract:
Uganda is one among the largest producing and exporting countries of coffee products in the world. Coffee production has heavily contributed to both domestic and foreign earnings in the country. Moreover, coffee also serves as a primary source of labour, especially for the rural smallholder farmers. Against this backdrop, this article attempts to investigate the effects of some factors on coffee production and exports in the country. Using ordinary least squares (OLS), the results show that coffee production and the world price index have a positive relationship with coffee exports in the country. On the contrary, the results show an inverse relationship between domestic coffee consumption and exports. Our results further indicate that coffee exports, domestic consumption and world price have a positive relationship with production in the country. The government of Uganda should as a matter of urgency implement the existing coffee policies and if necessary, make some reforms to improve production and promote the product on the international markets for competitiveness and maximum earnings.

Key words: production, world price, domestic consumption, Uganda

Introduction
The economic structure of Uganda, just as other East African economies, is dominated by the agricultural sector. Agriculture is the key determinant in the country's efforts to reduce poverty and hunger as well as foreign earning. Given that over 50% of Ugandans engaged in the sector and as a major source of government income, the growth and development of the country is closely linked to its production and exports. Chuhan-Pole and Angwafo (2011) stress that agrarian sector in the country still characterizes by low productivity, partly as a result of inadequate modern farm inputs, low public and private investment and undeveloped value chains.

Uganda is one of the world's major coffee producers. The commodity is grown in different highland areas of the country. Notably, on the slopes of Mount Elgon on the border with Kenya and the slopes of the Mount Rwenzori, also known as the 'mountains of the moon' on the border with the DR Congo. Some coffee is also cultivated in the West Nile region in the north western part of the country.

Uganda produces excellent wet-processed Arabica, mainly grown by smallholder farmers. Coffees marketed as 'Wugar' (Washed Uganda Arabica) or 'Drugar' (Dry Uganda Arabica) are grown on mountains which border the Democratic Republic of Congo, along the Uganda's western border. Coffee is mainly cultivated in the central and southern districts (57%), Eastern Uganda (23%) and Western Kassese (10%) and to a lesser extent, in non-traditional areas like Mpi, Wakiso, and Rakai (10%).

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Coffee if well developed, it may improve smallholders’ productivity and regional development in the producing countries (Bradford et al., 2011; Dicum and Luttinger, 1999). More so, the coffee production plays a crucial role in the socioeconomic development of Uganda. The Ugandan coffee sub-sector employs over 5 million people, both in the farms and post-harvesting processes. It remains a primary source of income for the poor rural inhabitants in over 30 Districts. The commodity plays a leading role in the economy, contributing a substantial foreign exchange earnings over the decades.

Following several decades of total state control of the coffee sector, the industry was fully liberalized during the period 1991-1992. Presently, the sector is entirely controlled by the private sector. Nonetheless, export quality control remains the responsibility of the Uganda Coffee Development Authority (UCDA) that grades, liquors and classifies all export shipments. The government of Uganda was successful in regulating the Coffee sector to produce and trade competitively through the successive policy measures in the early 1990’s. Business activity in the agricultural sector, in particular, increased enormously as the number of vigorous exporters increased significantly. The number of small traders entering the agricultural sector has considerably increased healthy competition in the markets. Most importantly, the poverty reduction of households in the coffee-growing regions are well documented (Baffes, 2006) since 1994 when the coffee boom hit the Ugandan market. The Ugandan economy has expanded and developed in recent years. Coffee remained an important product, earning an average of 60% of annual export revenues during the period 1993 to 2000 (Baffes, 2006). However, the share of coffee on total merchandise in the country exports has been shrinking over the years from about 30% to 26% in 2001 and 2008 respectively. It further shrank down to below 20% in recent years.

![Coffee production, exports and domestic consumption in Uganda (1975-2012)](image)

*Source: FAO, 2015*

Uganda is among top major coffee producers in the world. Coffee production in Africa increased by 16 % from 15.7 million bags during crop year 2011/12 to 16.7 million in 2012/13, accounting 11.5 % of the total world production. The major producing nations in the region showed increases in production. For instance, the largest producing country in Africa remains Ethiopia with 6.4 million bags in 2012/13, followed by Uganda (3.7 million) and Côte D’Ivoire with 2 million (International Coffee Organization, 2014). Uganda produced, on average, 2% of total world production in 2012.
Figure 1 shows the trend of coffee production, consumption and exports in Uganda. The shows a fluctuating quantity of coffee output and export in Uganda for the period between 1975 and 2012. The country recorded highest output with 252 thousand tonnes in 1999 and lowest with 121 thousand tonnes in 1978. Coffee output fluctuation is attributed to the dictatorial regime of 1972-1979 and partly due to climate change and prolonged droughts, shortage of labour force, low production due to inadequate farm inputs, domestic and world price shocks.

Similarly, Uganda also recorded the highest export with 231 thousand tonnes valued at $288 million in 1999 and lowest with 114 thousand tonnes valued at $313 million in 1978. The country recorded highest exports of coffee in value in 2011 with $460 million (191 thousand metric tonnes) and then decline to $371 million (186 thousand metric tonnes) in 2012. This to some extent, implies that the more the production, the more the exports and vice versa. The country also exports about 90% of its total output leaving a minimal quantity for domestic consumption. Arguably, the country has been benefiting from trade liberalization in the exportation of coffee products. The reason is likely that coffee is a tropical commodity that cannot be produced in the EU member countries and it is an important food to the continent as a whole. Hence, they have become the highest importer of Ugandan coffee (Figure 2).

The post-1997 coffee price decline has hurt production and exports (Baffes, 2006). The shocks in the prices of coffee in the global markets have raised concerns among local and global policy makers. Even though the price of coffee has relatively unstable and the dwindling foreign earnings compared to the mid-1990, the products remained the major foreign exchange earner Uganda. Hill (2010), small-scale dealers as aggregators for bigger independent traders and their agents, play a significant role in the success of coffee trading on the world market.

According to International Coffee Organization (2014) Uganda ranked the fourth position after Burundi, Ethiopia and Honduras in the share of total coffee export earnings with an average of 18% for the period between 2000 and 2012. As shown in Figure 2, the EU was the main destination for Uganda’s coffee exports (Robusta + Arabica coffee) recording for 71.4% of total coffee exports in 2011, followed by Sudan (10.8%), USA (3.05%) and Ecuador (3.03%) in the same period under review. This implies that the EU is an important partner of Ugandan agricultural exports that should be taken seriously for maximum sales and earnings.

Fig. 2: World Market share of the main destinations of Ugandan coffee exports
Source: Uganda Coffee Development Authority (2011)
**Empirically**, Were et al. (2002) determine factors that have impacted Kenya’s tea and coffee export products. Using error correction model (ECM), they find out that investment has a positive and significant impact on the export volumes of coffee products. Their results further reveal that other non-price factors such as the cost of inputs, labour costs, and access to credit play a vital role in coffee production and export supply response in the country. In the same vein, Gebreyesus (2015) uses ECM and Vector Autoregressive approaches to investigate the determinants of coffee exports in Ethiopia. The results indicate that real export price of coffee and domestic production had significant on coffee export. The study also finds out that coffee export also contributed heavily to the country’s GDP growth. Crentsil and Boansi (2013) investigate the drivers and performance of coffee exports, production and price in Ethiopia. Their findings indicate that Ethiopia has a comparative advantage in coffee exports. Nonetheless, the results do not reflect the same on its overall performance on the international market. Keeping other factors into considerations such as high transaction cost, price shocks, supply chain and the many actors and processes within, problems with quality control, the incidence of smuggling, and small scale production.

International trade in the products such as coffee is a product of both classical and neoclassical theories of trade (Sen, 2005; Meini, 2013). Absolute advantage theory of trade, which was coined by Adams Smith in 1776 offered an explanation as the best in producing a product than the rest should concentrate on it. The theory provides many frameworks and policies that facilitate a successful trade (Sen, 2005). Smith concluded by saying that for nations to do well in the international markets, they should regulate their systems. David Ricardo (1817) stresses that countries can mutually benefit from each other even in the presence of absolute advantage over the other in the production of all the goods and services. Ciuriak et al. (2015) stress that trade is greatly supported and influenced by trade policy and negotiations. This facilitates market access, multilateral agenda and services, standards, trade, procurement and innovation in the industries and firms. They emphasized the need for trade policy, and models that shape international trade. They also went ahead to warn of multifaceted impacts of trade policy.

This explains the struggles in the Ugandan Agriculture marketing of the produce in the international markets, which has constantly led to the loss of millions of US Dollars. Kee, Nicita and Olarreaga (2009) stress that poor countries face higher trade barriers for their exports because they also tag further restrictive trade policies. Hence explains why developing countries may or have continuously performed poorly in the world market. Verter and Bečvářová, 2014) even though there are higher trade barriers in raw agricultural products from poor countries, some tropical commodities such as cocoa and coffee have been partially liberalized. However, the prices of these products in the global markets are not stable and have been dwindling in recent years.

**Materials and Methods**

The aim of this contribution is to investigate the effects of some factors on coffee production and exports in Uganda. Time series data spanning the period 1995-2012 used for the statistical analysis were obtained from reliable sources. The sources are as follows: Food and Agriculture Organization of the United Nations (FAO), United Nations Conference on Trade and Development (UNCTAD), and Uganda Coffee Development Authority (UCDA). The econometric model employed for the analysis specified coffee exports (tonnes), coffee output (tonnes), domestic consumption (tonnes), and the world price (US$). The multiple regression models 1 and 2 are mathematically specified as follows:

\[
\ln QCX = \beta_1 + \beta_2 \ln QCP + \beta_3 \ln WP + \beta_4 DCC + \epsilon \quad (1)
\]

\[
\ln QCP = \beta_1 + \beta_2 \ln QCX + \beta_3 \ln WP + \beta_4 \ln DCC + \epsilon \quad (2)
\]

Where;
\[
\ln QCX \text{ is the natural log of the quantity of coffee exports (tonnes); }\ln QCP \text{ is the natural log of the amount of coffee production (tonnes); }\ln WP \text{ is the natural log of the world price of coffee.}
\]
Results and Discussion

Because time series data are subject to spurious regression findings; a stationary test was carried out prior to estimating the ordinary least squares (OLS) regression approach. Augmented Dickey-Fuller (ADF) unit root test was run, and the result is presented in Appendix A. Prior to the confirmation of the OLS regression results, some checklist tests were carried as presented in the appendices B, C, and D.

As shown in Table 1, the OLS estimation result indicates a robust positive relationship between coffee production (QCP) and coffee exports (QCX) in Uganda, statistically significant at the 1% level. This signifies that ceteris paribus, a 1% increase in the coffee output in Uganda, the coffee export may increase by 1.4%. This result has further confirmed the level of production and the exports as presented in Figure. Given that coffee product is liberalized, the more it is produced in the country, the more it will be exported and vice versa. Presently, the country exports about 90% of coffee output, leaving only about 10% for domestic consumption.

Similarly, the OLS estimation finding reveals an ample positive relationship between the lag world price of coffee (WP) and coffee exports in Uganda, statistically significant at the 1% level. This signifies that all things being equal, a 1% increase in the price of coffee products may stimulate its exports from Uganda by 1%. On the contrary, the results show an inverse relationship between domestic coffee consumption and exports in Uganda, statistically significant at 0.01 level. This implies that that more the domestic consumption the less the quantity coffee products available for exports (Table 1).

As presented in Table 2, the OLS estimation result indicates a robust positive relationship between coffee exports (QCX) and coffee production (QCP) in Uganda, statistically significant at the 1% level. This signifies that ceteris paribus, a 1% increase in the coffee export may spur producers to increase production by 0.18% in Uganda. Coffee plays a major role in foreign earnings in the country. It has contributed about 20% of the export earnings between 2000 and 2012. Similarly, Over 90% of the total annual coffee production is exported as green beans. Secondary processing, also known as grading and transforming it into the various coffee categories that meet the international standards.

Similarly, the result further show the lag of world price has a robust positive relationship with coffee production in Uganda, statistically significant at the 1% level. This signifies that all things being equal, a 1% increase in the price of coffee products may stimulate its production from Uganda by 0.39%. In the same vein, the results indicate a robust positive relationship between domestic coffee consumption and production in Uganda, statistically significant at 0.01 level (see Table 2). This implies that that more the domestic consumption the more farmers will be motivated to produce coffee in the country, holding other factors constant.

(US$); DCC is the domestic consumption of coffee products (tonnes); DDC\(_G\) is the growth rate of domestic coffee consumption (%) and \(\varepsilon\) is the error term.
Tab. 2: Model 2: OLS, determinants of coffee production in Uganda

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>-0.0753</td>
<td>-2.5549</td>
<td>0.0240**</td>
</tr>
<tr>
<td>d_lnQCX</td>
<td>0.1826</td>
<td>5.9076</td>
<td>0.0000***</td>
</tr>
<tr>
<td>d_lnWP(-2)</td>
<td>0.3859</td>
<td>3.8454</td>
<td>0.0020***</td>
</tr>
<tr>
<td>d_lnDCC</td>
<td>0.1923</td>
<td>2.3026</td>
<td>0.0385**</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.621995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R</td>
<td>0.53476</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F(3, 13)</td>
<td>63.2899</td>
<td></td>
<td>5.18E-08</td>
</tr>
</tbody>
</table>

Note: The asterisks ** and *** denote statistical significance at 0.05, and 0.01 levels respectively.

Finally, we conclude that variables such as the world price and domestic coffee consumption signify to have an influence on coffee production and export in Uganda. Due to lack of comprehensive time series data, other variables that may well to have an influence on coffee production and exports in Uganda were not incorporated in the models for the statistical analysis. We recommend future researchers to incorporate other determinants of coffee production such as cultivated area, labour force engaged in coffee farming, annual rainfall and domestic producer price. In the same vein, researchers should also incorporate variables such as trade openness and real Exchange rate to determine their effects on coffee exports in Uganda.

Conclusions

Uganda is one among the largest producing and exporting countries of coffee in the world. This article attempts to verify the some determinants of coffee production and exports in the country. Using the OLS regression, the results show that coffee production and the world price have a positive relationship with coffee exports in the country. On the contrary, the results suggest an inverse relationship between domestic coffee consumption and exports. Our results further indicate that coffee exports, domestic consumption and world price have a positive relationship with coffee production in the country. The paper concludes that, ceteris paribus, all variables in the models may well determine the level of coffee production and exports in Uganda. The government of Uganda should as a matter of necessity implement the already made coffee policies and if necessary, make some reforms to improve production and promote the product in the international markets for competitiveness and maximum earnings.

References


Appendix

Appendix A. ADF unit root test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levels</th>
<th>ADF test Statistics</th>
</tr>
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<tr>
<td>lnQCX</td>
<td>Level</td>
<td>-1.8522</td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-4.7579***</td>
</tr>
<tr>
<td>lnQCP</td>
<td>Level</td>
<td>-1.64875</td>
</tr>
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<td></td>
<td>First difference</td>
<td>-3.8880***</td>
</tr>
<tr>
<td>lnWP</td>
<td>Level</td>
<td>-1.6512</td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-4.4499***</td>
</tr>
<tr>
<td>lnDCC</td>
<td>Level</td>
<td>-1.5572</td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-4.0960***</td>
</tr>
<tr>
<td>DCCg</td>
<td>Level</td>
<td>-4.11763***</td>
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</tbody>
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Note: The asterisks *** denote stationary at the 0.01 level

Appendix B. Diagnostic test (model 1 and 2)

<table>
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<tr>
<th>Indicator</th>
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<th>Model 2</th>
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</thead>
<tbody>
<tr>
<td>Test</td>
<td>P. value</td>
<td>P. value</td>
</tr>
<tr>
<td>Non-linearity test (squares)</td>
<td>0.3813</td>
<td>0.1759</td>
</tr>
<tr>
<td>Ramsey's RESET (squares and cubes)</td>
<td>0.848</td>
<td>0.649</td>
</tr>
<tr>
<td>White's test for heteroskedasticity</td>
<td>0.9663</td>
<td>0.4263</td>
</tr>
<tr>
<td>Breusch-Pagan test for heteroskedasticity</td>
<td>0.9949</td>
<td>0.1849</td>
</tr>
<tr>
<td>Test for normality of residual</td>
<td>0.1031</td>
<td>0.6882</td>
</tr>
<tr>
<td>Breusch-Godfrey test for first-order autocorrelation</td>
<td>0.1259</td>
<td>0.9195</td>
</tr>
<tr>
<td>Test for ARCH of order 1</td>
<td>0.7098</td>
<td>0.5057</td>
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Appendix C: Plot of CUSUMSQ parameter stability test for model 1 (coffee exports)

Appendix D: Plot of CUSUMSQ parameter stability test for model 2 (coffee output)