

ON THE ROLE OF COFFEE IN RURAL HOUSEHOLD
INCOME AND CIVIL CONFLICTS IN BURUNDI

By

PATRICK J NDUWIMANA

A Thesis Submitted to the Faculty of the
DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

In the Graduate College

The University of Arizona


2009

STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at the University of Arizona.

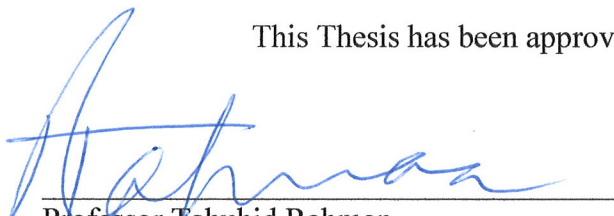
Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgement of source is made. Requests for permissions for extended quotation form or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgment the proposed use of the material is in the interest of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED:

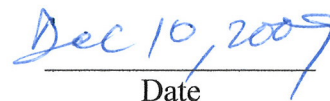


APPROVAL BY THESIS DIRECTOR

This Thesis has been approved on the dates shown below



Professor Tahuhid Rahman
Agricultural & Resource Economics



Date

ACKNOWLEDGEMENTS

I wish to express my gratitude to my advisor and mentor, Dr. Tauhidur Rahman for his constructive guidance throughout this study. I am especially thankful for his patience and for always being available to share his knowledge and thoughts with me.

I would also like to thank my committee members, Dr. Gary Thompson and Dr. Satheesh Aradyula for giving me constructive advices that were essential for the completion of this study.

I am certainly thankful to all my colleagues at African Energy for their selfless support and motivation throughout this study. I express special thanks to my friend Joseph Naraguma, for sharing his thoughts with me on the rigorous process of data cleaning. Completing this thesis would have been much more difficult without his timeless contributions.

Finally, I owe the greatest debt of gratitude to my family. To my mother, who thought me the first lessons of always having passion for what I do: *I think of you everyday and hope to be with you in heaven someday.* To my wife, Chrecentia, who has been remarkably supportive and accepting my isolation during the last few months of this thesis: *I love you more that you can imagine!!!!* To my brother Henry: *Thank you for being my shining star and a role model for our family.*

TABLE OF CONTENT

A THESIS SUBMITTED TO THE FACULTY OF THE.....	1
ACKNOWLEDGEMENTS	2
FIGURES	4
TABLES	4
ABSTRACT:.....	5
1 INTRODUCTION	6
2 HISTORICAL ACCOUNT OF PEACE AND CONFLICTS IN BURUNDI.....	10
2.1 BURUNDI: NEITHER A CLASS NOR A CASTE SOCIAL SYSTEM.....	11
2.2 BUILD-UP OF A SOCIALLY DIVIDED SOCIETY: A CENTURY OF TURMOIL IN BURUNDI.....	13
2.3 ETHNIC FRACTIONALIZATION: A POINT OF NO RETURN.....	16
2.4 BIRTH OF TWO ROYAL FRAGMENTATIONS	18
2.5 SERIES OF WARS IN THE POST-INDEPENDENCE ERA	20
2.6 POWER SHARING, BUT NO SYSTEMATIC RULING	23
3 LITERATURE REVIEW	26
4 HISTORY OF COFFEE IN BURUNDI.....	32
5 ROLE OF COFFEE IN THE RURAL HOUSEHOLD INCOME.....	35
5.1 CROSS REGIONAL OVERVIEW	43
5.2 DATA	47
5.2.1 <i>List of Variables to Used in the Income Estimation</i>	51
5.2.2 <i>Household Income Generation Function</i>	60
5.2.3 <i>Interpretation of the Results</i>	64
5.3 DECOMPOSITION OF INCOME INEQUALITY	65
5.3.1 <i>Decomposition Results and discussion</i>	69
6 DISCUSSION AND CONCLUDING REMARKS	73
REFERENCES	76
APPENDIX A: LIST OF VARIABLES	83
APPENDIX B: DECOMPOSITION PROCEDURE.....	84

FIGURES

Figure 1 Cumulative Value of Major Exports (1961-2005)	7
Figure 2 Population per School Areas in Selected Provinces in 2004.....	12
Figure 3 Frequent Distribution of Ruling Chiefs in Burundi (1929-1945).....	15
Figure 4: Percentage of Coffee Earning to Total Export value in Major Producing Countries	34
Figure 5 Area Harvested and Productivity Yield Between 1960 and 2007.....	37
Figure 6 Frequency Distribution of Household's Main Cash Crops	40
Figure 7 Percentage of Households producing Coffee and Households Earning Lower .	43
Figure 8 Mean Distribution of Rural Household Revenue for Coffee producers.....	44
Figure 9 Map of Burundi	46
Figure 10 Mean per Capita Annual Income by Province	58
Figure 11 proportional contribution to Household Total Inequality.....	72

TABLES

Table 1 Value of Coffee Exported as a Percentage of Total Export(1996-2005).....	39
Table 2 Contribution of Income Sources to the Household Total Income	42
Table 3 Frequently Listed Primary Source of Income per Province	50
Table 4 Basic Characteristics of Rural Household (N=3761)	58
Table 5 Estimated Household Income Generation Function for Rural Burundi	62
Table 6 Contributions to Rural Household Income Inequality (Coefficient of Variation method used).....	68
Table 7 List of variables Used for Income Estimation	83

Abstract:

Generating over 60 percent of the total exports revenues and much of the foreign exchange needed to secure, to service and to pay off external debts, coffee, the main cash crop for more than a third of rural households, is arguably the pillar of Burundi's political and economic stability. Knowing that coffee farming has been subject to government enforcement, the objective of this study is to examine whether the focus on compulsory coffee-farming follows the economic principle of revenue maximization for farmers. We examine whether coffee is the largest contributor to rural household income, analyze its contribution to rural income inequality, and the role it plays in shaping the public policies. While explaining why administrative enforcement of coffee farming has persisted since the colonial era, we provide a plausible explanation for why coffee is the root of the series of civil conflicts in Burundi.

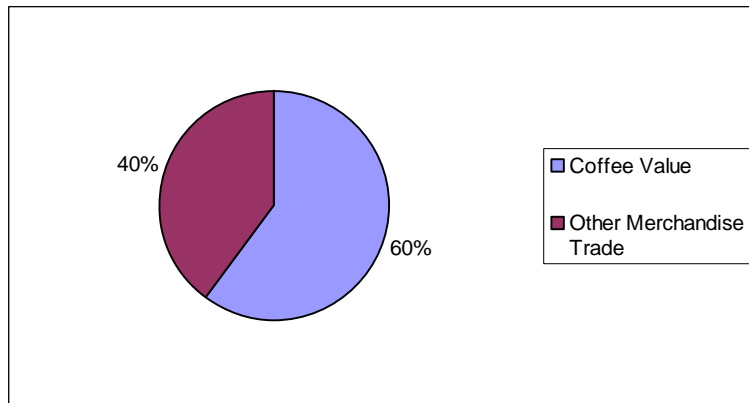
1 INTRODUCTION

Several studies have argued that the string of wars that engulfed Burundi has roots in three decades of discriminatory economic policies and political alienation along ethnic lines [Uvin, (1999), Ngaruko and Nkurunziza (2000), NKurunziza and Ngaruko (2002), Ndikumana (2005), Prunier (1994), Lemarchand (1994), Jackson (2000)]. These studies provide a better understanding of resource discrimination and the conflicts they may have generated; however, by focusing on institutions and extractive policies in general, they have taken an all-inclusive view of discrimination, thus overlooking the very important economic and socio-political role of coffee in Burundi.

In this thesis, it is argued that if agriculture is the backbone of Burundi's economy, then coffee trusses together this commodity export-based economy. Over 93 percent of the workforce is employed in agriculture, while only 2 percent is employed in industry, and 4.5 percent in service sector, according to recent reports (World Bank, 2004). The coffee sector alone supports nearly half of farming population according to the same reports. A coffee share of Burundi's total exports remained above 60 percent between 1960 and 2005 (98.1% in 1976, 70% between 1995 and 2001), figure 1. It is often assumed that proceeds from coffee are used for reinvestment elsewhere in the economy and ultimately providing citizens with public goods that could not be produced privately. It however remains to be seen whether they are used to build schools, hospitals, and roads, to train and pay teachers, doctors, and judges, all of which would help to improve producers living conditions.

Since Burundi is not endowed with huge reserves of natural resources such as minerals and oil that are often major revenue sources of other nations, it must rely on agricultural commodity exports for hard currency and balancing national budget. Precisely, commodity export revenues, 60 percent of which come from coffee (figure1), must be used as collateral by the government to secure loans from foreign lenders. When a government uses the present coffee production, to obtain a repayable loan, it effectively imposes a burden on future generation's earning. Albeit, coffee is produced by millions of rural farmers on small family patch of land, every post-independence political regime has enforced policies that promote personal loyalty over competences and ideology over experience.

Figure 1 Cumulative Value of Major Exports (1961-2005)



*Source: Author's calculations based on data from FAO.

This thesis builds on Kamola (2004), and Kimonyo and Ntiranyibagira (2007) by showing how coffee bears complex dynamic relationships between different regions of Burundi, between different ethnic groups and various clans, between rural and urban residents, between elite politicians and common followers, and between Burundi as a

borrower nation and its lenders and trading partners. This study underscores the role coffee has played in the initial national identity and the institutional policies that impact wealth distribution across the economic spectrum.

Even in perfect market conditions, we can not expect everyone to accumulate equal wealth, but ideally everyone should hope to have a shot at success. In order to better explain the issue of the income inequality in Burundi, this thesis will address a series of questions related to coffee as a primary source of government revenue: Does more coffee farming translate into higher revenue earning for farmers? Does it increase or decrease inequality in rural Burundi? In other words, do poor farmers devote their scarce resources to coffee farming because of higher income-earning opportunities? Alternatively, does a government regime enforce coffee farming because it expects to maximize revenues by exporting it, and in turn, redistribute or share it with supporters?

This thesis represents an early attempt to establish the fundamental determinants of income inequality and distributional issues in Burundi as discussed by Ndikumana (2005), Ngaruko and Nkurunziza (2000, 2004). We follow Shorroks (1999) framework of regression-based decomposition, and contribute to existing literature on income inequality and source of conflicts in Burundi. By using household-level data instead of aggregate data often used in previous studies, this thesis attempt to address the structural inequality embedded in all layers of Burundi's society. For rural households as price takers, the ultimate value attributed to coffee is the money generated when it is sold at government's pre-fixed prices. The goal of this study is to statistically estimate the percentage of a farmer's income that is generated from coffee, and hence evaluate its contribution to inequality along a larger spectrum of farmers.

In the next section, a historical account of conflicts in Burundi will be discussed. Section 3 explores the existing literature pertaining to conflicts and commodity exports. Section 4 provides background of coffee farming in Burundi. Section 5 analyzes the role of coffee in income generation and distribution between rural households. Finally, section 6 convenes concluding remarks.

2 HISTORICAL ACCOUNT OF PEACE AND CONFLICTS IN BURUNDI

Burundi conflicts are somewhat unique, albeit they represent an extreme example of problems that have afflicted many agricultural economies in recent years, and this analysis serve as a useful reference for examining the causes and effects of civil wars on subsistence economies. Burundi, like much of the world, has witnessed numerous deplorable human atrocities for the past century (Easterly et al, 2005). In the past fifty years, as many as a half million civilians have died for the only fault of belonging to or being associated with a group defined by the killers. These estimates may be misleading because Burundi has historically relied on oral tradition whereby one group relates to stories that others deny, leading to conspiracy theories formulated for a single event to suit the interests of a particular group. In fact, most of what is known by the academic community is what Lemarchand (1994, p.26) calls ‘regime truth’, a truth reflecting the versions available to outsiders based on official version or public transcripts, and hence suited to the dominant groups. The more menacing the dominant groups, the harder it is to access the hidden transcripts. In an attempt to better understand the fate and the misfortunes faced by Burundi’s society, we must first understand its social system and its stratification.

2.1 Burundi: Neither a Class¹ nor a Caste² Social System

The concept of ethnicity in Burundi is a matter of perception and the line dividing the two main groups³ Hutu and Tutsi, is as blurred as the traits that distinguish them. From what is known to historians, there are no traces of different religious practice, no traces of regional boundaries, no traces of linguistic differences, and no traces of remarkable physiological traits that separate the two ethnic groups. Apart from royal clans (abatara⁴ and abezi⁵), Burundi has never been a pure caste society where birth alone determines an individual's destiny. Instead, there has existed an upward mobility system such as "*Kwihutura*" which allows individuals formerly perceived as Hutu, to move upward and become Tutsis on the basis of socio-economic achievement. There also existed a downward mobility "*Gutahira*" where former royal members become commoners based on their lifetime failure. Hence the concept of ethnic identity could be viewed as occupational rather than physical, and the ethnic dynamics display nothing more than a patronage bond (Lemarchand, 1994).

Nonetheless, as a traditional agrarian society, Burundi social structure has not been a class system where individual achievements alone determine social status. During the post-independence era, many constraints were put in place to constrain substantial upward mobility. Examples include systematic limitations of public education (Fig2) and selective employment systems which constitute formal channels to social and economic

¹ A caste system amounts to social stratification based on ascribed traits

² A class system amounts to social stratification based on achievement.

³ The population of Burundi is composed of three ethnic groups. 85% Hutu, 14% Tutsi, and 1% Twa. However, these numbers are mere assumptions that have become references based on a similar composition of the neighboring Rwanda. No Census has been conducted in History of Burundi.

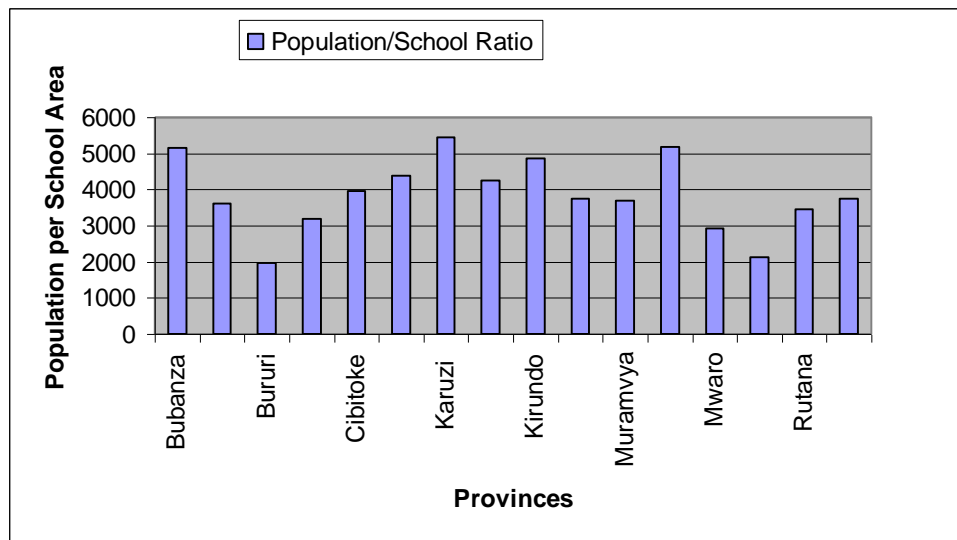
⁴ Abatara (Plu), Umutara (sing), Royal clan, descendent of King Ntare Rugamba, led the conquest of Eastern regions bordering Tanzania, died 1850.

⁵ Abazi (plu), Umwezi (sing), descendents of King Mwezi Gisabo, young son of late Ntare Rugamba, who succeeded him after his death in 1852. Abezi and Abatara were originally first cousins.

success [Ngaruko and Nkurunziza (2005), NKurunziza and Ngaruko (2002), Ndikumana (2005), Prunier (1994), Lemarchand (1994)].

As a result, Burundi descended into an ethnically stratified society where (i) common resources serve the interests of privileged groups while marginalizing others; (ii) meritocracy that matches talents and resources to productive positions is not promoted, leaving much talent untapped or wasted; (iii) values and beliefs quickly become ideological, often reflecting the interest of the more powerful sub-group members, and alienating many skilled members of other groups, hence fueling aggrieved resentment. This stratification along ethnic and geographical lines encouraged a status quo among the elite politicians most of whom were affiliated to the aforementioned privileged sub-groups , thus decreasing the opportunity cost for implementing extractive policies which in the end, created conflicts-prone communities.

Figure 2 Population per School Areas in Selected Provinces in 2004



*Source: ESTEEBE, 2004

2.2 Build-up of a Socially Divided Society: A Century of Turmoil in Burundi

Until 1850, Burundi had been ruled under a central and unchallenged royal authority based in Muramvya, a province geographically located in the center of the country (see the Map 1). After the 1852 death of Rugamba, a warrior king who had conquered new territories along the Tanzanian border, constant battles between princes started and continued throughout the colonial era. Gisabo, the youngest son of the late king was then crowned as a successor, a situation that created a bitter rivalry among his siblings (Batare⁶) and their descendents. The attempt of Gisabo to replace his brothers and nephews with his own sons (Abezi⁷) on the eve of colonialism, literally divided his territory into 4 regions: (i) The eastern region (newly conquered area bordering Tanzania) was inherited by Batare. (ii) The center which was the core of the kingdom was under his direct control, (iii) Adjacent regions which form a buffer zone between east and the west, were strategically ruled by his own sons (Bezi). (iv) The western region was given to different commoners encompassing both Hutu and Tutsi.

Batare felt alienated from the central power, and repeatedly tried to oppose it. Up to this point in time, the struggle was never seen as a Hutu-Tutsi conflict. Instead, the two prince factions relied on the support of Hutu and Tutsi to consolidate their authority. At the end of the 19th century, an anti-King sentiment and social discontent emerged due to a combination of abusive and divisive rule of the kingdom and new European masters.

⁶ Descendants of Mwezi Gisabo have been referred as Abezi (plural), Umwezi (singular); while

⁷ Descendants of Ntare Rugamba have been referred to as Abatare (plural), Umutare(singular). Since Mwezi gisabo was the youngest son of Mwezi Gisabo, Abezi and abatare are close cousins.

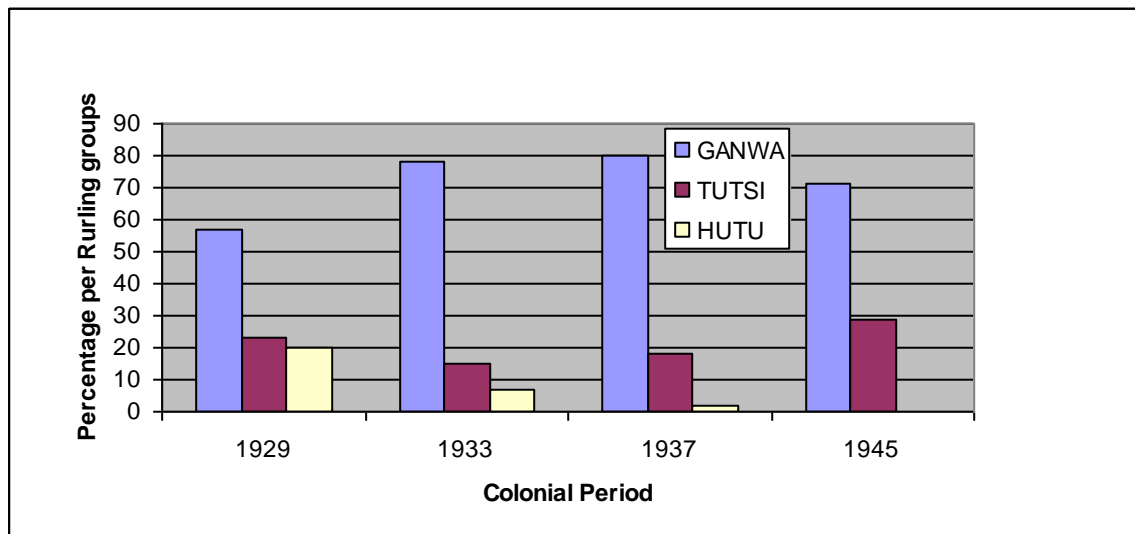
Prior to colonization, Burundi's king was a supreme ruler "father" of the nation (Prunier, 1994) whose mystique was shared by everyone. Political ruling was almost exclusively devoted to royal descendants with Tutsis and Hutus playing supporting roles. The Hutus or Tutsis who were privileged to govern did so in the name of the king. The king chose among his closest advisers for the court system regardless of ethnic background.

Things changed upon the arrival of the Belgian colonial administration after the First World War. The beginning of the 20th century was disastrous for as much of the world as it was for Burundi on social, economic, and political fronts. It was an era marked by famines, epidemics, epizootics, and colonial conquests. For Burundi, colonial conquest added insult to injury for a nation already suffering from royal oppressions and natural calamities. Colonial masters (German 1889-1918, Belgian 1918-1962) imposed forced labor, compulsory crop cultivation, taxes, and a coercive administrative system (Lemarchand, 1994). The ultimate result was sporadic conflicts between rich and poor, Hutu and Tutsi, southerner and northerners, and most radically between Batware and Bezi princes who held power at the time. Batware and Bezi fought to manipulate colonial authorities in a way that allowed them to legitimately gain and reinforce their supremacy respectively. Once the Belgian colonial authority established itself, shadowing the kingdom, it played a role of arbitrage between the two competing prince factions, and often did so with an unmistakable impartiality.

By 1929, the ruling classes (western entities along Tanganyika and Rusizi) were dissolved and were hence governed by the Batware who were more influential and colonial-friendly capable of carrying out coffee programs. Not only those administrative entities were put in the hands of outsiders, but also they were strategically consolidated

from 133 to 35 between 1929 and 1945 (Lemarchand, 1994, P43). This elimination of broad-based administration brought about ethnic polarizations. As a result of this political shuffle, only three out the twenty seven Hutu incumbents remained, while ten Tusti survived. Bezi emerged as the winners, holding seventeen versus Batare eight, Tutsi ten, and Hutu zero major positions (Gahama, 1983, P.104). Little about this territorial reform was known to indigenous authorities. The colonial administration had planned all along to launch a campaign to stimulate production of cash crops in all the occupied territories. As Hatungimana (2005) explains, the colonial administration undertook a series of recruitment and replacing old leaders by new ones who were willing and capable of enforcing coffee farming to the reluctant indigenous population. This situation would bear severe implications on Burundi society for many years to come.

Figure 3 Frequent Distribution of Ruling Chiefs in Burundi (1929-1945)



*Source: Gahama, 1983, P104. Lemarchand, 1994, and Ndikumana (2006)

Adding to a population already suffering from natural calamities, the newly appointed chiefs were mandated to obey colonial laws, to impose taxes, and to force labor especially for coffee production. Coincidentally, this political restructuring severely impacted the Hutu-populated fertile regions. Riots began as early as the 1940's in the northwestern region (Province Cibitoke) where revolts occurred under prince Baranyanka the iconic member of Batare princes. He brought with him a number of relatives and Tutsi followers into the region, and they were viewed as foreign elements in a traditionally cohesive society. The new rule was assigned to compulsorily implement colonial policies to collect taxes, force labor, cultivate of coffee, and oversee roads construction. The aftermath was a series of revolts and social unrest, and prices of primary goods declined while higher taxes were paradoxically imposed to support the stranded Belgian colonizers during the great depression of the 1930's. The image and respect for royal authority was irreversibly discredited and forever tainted.

2.3 Ethnic Fractionalization: A Point of No Return

The fight for power among princes spread to the mass population and, as one would expect, under the watchful eye of the Belgian masters. When Batare inherited the eastern regions, they felt alienated from the central authority and developed defiant sentiment toward the Bezi clan. That crack in the royal clique allowed the Belgians to apply their 'divide-and-rule' regime. Among pre-independence Burundi political figures, two personalities stood out in shaping 1960's politics: Jean Baranyanka and Louis

Rwagasore, a Umutare and Umwezi respectively . Both possessed Western education, and each represented a competing ideology.

Baranyanka claimed to be a protagonist of alienated Batare clans. He was the most qualified local person for any European settler to befriend (Lemarchand, 1994). He had attended a German school and acquired skills that gave him a competitive edge over other princes. He then served as personal secretary, confidant and informant to Richard Kandt, the German representative, and was later appointed to the ‘conseil de regence’ special adviser to the kingdom under the Belgian colonial rule. He became so important to the Belgian administration that he was always consulted for advice by the Belgians. From the Belgians’ point of view, he was the clear replacement of King. As (Lemarchand, 1994 Pge49) puts it, “No attempts was made to hide their ‘Belgians’ desire to dethrone the King.” Belgian administrators described him as the best leader who have understood the importance of coffee farming (Hatungimana, 2005).

The connection between Baranyanka to the much hated Europeans, provided Bezi a leverage to build a grass-root coalition. They used the anti-European sentiment to campaign against him and the trusteeship, and build a coalition among the mass population. The most influential of the Bezi coalition became Louis Rwagasore, the elder son of King Mwambutsa. He became the ultimate leader of UPRONA (National Union for Progress) and the number one enemy of descendents of Batare and their Belgian allies.

2.4 Birth of Two Royal Fragmentations

In the midst of all the havoc of the royal political wrestling, the end of WWII, and the de-colonization movements, the colonial administration embarked on a series of political reforms. The most remarkable policy became effective November 10, 1959. Reorganization of local administrative entities was undertaken by creating provinces and communes with the latter being led by a bourgomaster (later became provincial governors) assisted by elected councils. These councils were to serve as electoral colleges during the national council elections, and the king would be reduced to a constitutional monarch.

Although many political parties emerged during this period, UPRONA and PDC (Christian Democratic Party) led by the two opposing prince factions became so powerful that all small burgeoning factions dissolved into the two. Belgians showed their unmistakable support for PDC and unapologetically opposed UPRONA, often referred to by Belgians as pro-communist, and anti-European, and pro-Lumumba. During the decade of cold war, being labeled a pro-Lumumba was a proxy to pro-communist, hence an assault on western capitalism.

Despite the partiality from Belgians, UPRONA was victorious in the September 1961 legislative elections. The happy moment was short lived however. After the victory of UPRONA, Rwagasore, who would have legitimately governed free of all opposition was assassinated in a plot by PDC members in complicity with the colonial power on October 13, 1961 (Lemarchand ,1994, ed). It goes without saying that the death of such a beloved popular figure, supported by the majority of the population, most of whom were Hutu agriculturalists and traders, most of whom were opposed to the PDC, the symbol of colonialism and brutality, would become Burundi's fate for many years. From 1960

forward, political games were no longer based in Muramvya, but were played in Bujumbura where the central government had shifted, but their consequences echoed in the countryside. While the events leading to UPRONA's victory had fractionalized the population based on political affiliation, the assassination of Rwagasore turned the political fractionalization into the ethnic polarization.

Ethnicity itself is not necessarily a negative thing as ethnic societies elsewhere have flourished (Bates, 1999). However, division along blurry ethnic lines in Burundi has failed to promote forces of modernization as seen elsewhere. Due to lack of civil and open discussion of ethnicity as mentioned at the introduction of the paper, ethnic groups have missed the opportunity to advance the private fortunes of its members into social capital. In Burundi when political organizations began to foment at the wake of independence, the potential for violence was almost inevitable. Ethnicity had stimulated ethnic violence, and subsequently destroyed potentials for formation of cohesive social capital.

It is generally agreed that when resources are concentrated in the hands of a few who are not necessarily the ones with most the entrepreneurial capabilities, a country loses its development opportunities (Collier (1998), Collier and Hoeffler (2001), Bates 2006, Ngaruko 2002, 2005, Easterly, 2000, Nkurunziza, 2001). A small group of Tutsi, most of whom originated from the same sub-groups started to dominate the politics, transferring and rationing access to resources and opportunities to their supporters. The majority --Hutu or Tutsi non-members of elites-- lost hope for development and then lost their interests in long-term productive investments. For the past forty years, attribution

of public jobs and contracts was reserved for those who posed no threats to central authority. According to existing research, the distribution of income between public servants and average rural citizens of Burundi is one of the world's unevenly distributed (Ngaruko, 2002). Burundi has been a place where having strategic surname accounts more than entrepreneurial skills for economic success.

While PDC quickly dissolved as Batare lost support from the departing Belgians, UPRONA, the ruling party, became ethnically divided following the death of its founder, ethnic confrontations and lack of a unifying vision and leadership at the high echelon became synonymous with its organization. By 1965, the authority of the king was no longer respected. It was viewed by both Hutu and Tutsi political contestants as cause of more problems than it intended to solve. Additionally, the monarchy was then seen as a major hurdle to achieving political aspirations (Lemarchand, 1994, Prunier 1994).

2.5 Series of Wars in the Post-Independence Era

Since the eve of independence, Burundi has been trapped in a series of wars where the end of one is the reason to start the next. On October 10, 1965, a group of Hutu officers, then the army majority, unsuccessfully attempted to overthrow the monarch. The monarchy had no other recourse other than turning Tutsi and Hutu against one another, hence eliminating any potential for a unified multi-ethnic coalition. Following the coup attempt, a royal defense unit made up of Tutsi military men was deployed to defend the throne, and control was established. In the aftermath of this failed *coup d'état*, the residents of the capital became divided in the way that it could never be reversed.

Immediately following the failed coup d'état, insurrections followed in Muramvya, the home of the king. Within two weeks, the majority of Hutu army officers were purged and/or executed. Martial law was instituted and many Hutu government's functionaries were tried by the martial court and quickly executed by October 28, 1965 (Lemarchand, 1994, Page 71). As the first generation of Hutu leadership was decapitated, Tutsi elite politicians ruled unchallenged over the capital city of Bujumbura and other urban centers. In September 1969, another alleged coup attempt resulted in more Hutu executions and army purges. Many young male Hutu fled to neighboring countries, Rwanda, Tanzania, and subsequently formed rebellions which returned to fight the Tutsi authority in 1972, 1988, 1991, and 1993.

Literature shows ethnic groups are often organized by elite members of disadvantaged communities who find themselves discriminated against in the urban labor market (Bates, 1999). When fair access to equal political and economical opportunities became a distant dream for most educated members of the Hutu ethnic group, they started building grass-roots organizations for an eventual comeback. The western region, where the colonial restructuring had caused the greatest impact, was a suitable terrain for aggrieved members to gather. It was a place where (i) the 1930's political reshuffling took place by snatching power from traditional leaders and handing it to Batware princes and their allies. (ii) Batware abused their power under the patronage of the colonial authority (iii) the most fertile land, the home of palm production (one main cash crop), was the most heavily taxed and coincidentally the most populated by Hutu middle class peasants. The middle class, mostly educated Hutus residing in urban towns became community organizers. Filled with grief, they soon became icons and rebel leaders.

Primary school teachers, nurses, agro-monitors, and high school students found a reason and conviction for organizing the masses and preparing for a strike at the opportune moment

By the summer of 1972, those Hutu who had not died or fled, had no political and long-term economic hope. Their participation in education, military, and long-term economic opportunities were cut short. Clustering educational facilities in areas of the south and central provinces where most elites politicians originated discouraged many Hutus and Tutsis from pursuing higher education (Ngaruko and Nkurunziza, 2002). Accordingly, influential Tutsis and their allies populated urban towns, especially Bujumbura, and provincial centers. From then on, major decisions were made by a small team of elite politicians, while the majority of rural residents, the motor of this agricultural-base economy, became alienated and politically impotent.

The dictatorial regimes in place between 1976 and 2005, concentrated on extracting resources from the rural areas where the majority of farmers is confined. Rural resources especially coffee revenues became a major source of subsidy for urban centers, where those affiliated with power lived and enjoyed exorbitant life styles that coffee producers only dreamt of.

There is a combination of factors that help to explain root of the conflict in Burundi and why it was doomed to happen. First, although Burundi possessed broad-based and relatively inclusive pre-colonial institutions (Abashingantahe⁸), they placed little or no constraints on ruling elites in the same way the Kgotlas did in Botswana (Acemoglu, Johnson, and Robinson, 2001). Instead, Abanshingantahe were at the service

⁸ A broad-based traditional institution where every one can express his social concerns. It was made of both Hutu and Tutsi, socially influential. It has role of bringing and keeping social order. It had a very high judicial capacity, however lacks the power to contradict the royal authority.

of the executive branch--the kingdom. Second, the Belgian administration had no motivation for long-term government in such a densely populated country, with no tangible natural resources. Instead, they benefited from forcing people to produce so that taxes could be extracted (Johnson, Robinson, Acemoglu, 2001). This could not be achieved had they not flattened the traditional political structure as discussed above. Third, following independence, maintaining and strengthening the extractive system instituted under the colonial era, was in the economic interest of the post-independence local political elites. Fourth, Burundi was very small, just over sixteen thousand square miles, densely populated with more than four million in 1960's; and very poor in natural resources. The only source for hard currency was from export of coffee. Coffee export, nonetheless, did not generate enough rent to off-set the opportunity cost of challenging the status quo. And finally, the situation was made worse by the "grand-fathering" linkage of the first three presidents (Micombero→Bagaza→Buyoya), each being the student, comrade and/or childhood hero of his predecessor, whereby power was traded between the same hands, lacking leaders with "outside-the-box" critical decision-making abilities. The results have been a 15-years civil war that is still not fully solved today.

2.6 Power Sharing, but No Systematic Ruling

Fifteen years of civil war in Burundi have not only claimed over three hundred thousand lives and ruined its economy, but they have also forced different ethnic protagonists to negotiate in an effort to unearth the roots of their long-standing antagonism. The year 1998 marked the inception of the Arusha Peace Negotiations,

APN⁹ hereafter, between Burundi political protagonists, during which negotiating agents choose to bypass their differences in order to share power. Leaders of the two ethnic groups¹⁰ “agreed to disagree” (Ngaruko and Nkurunziza 2000). As result, power sharing government between negotiators was established, which eventually led to a ceasefire. The problem is that it painted an unrealistic picture far from a sustainable peace. The APN resulted in quota-based power sharing government, a first generation solution that failed to set up a sustainable system that would regulate power sharing when or if those quotas could no longer be applied. One must wonder whether by ‘agreeing to disagree’, those negotiating agents chose to treat the central question of inequality as a market issue rather than a structural issue.

Equality—inequality each means different things to different people. There are some who believe people in a given society should be equally prosperous, while others believe that everyone should have equal opportunity to be successful. Easterly (2005) differentiates these conditions into market inequality and structural inequality. Market inequalities are naturally inevitable. They simply occur in the form of market discrimination often through formal channels associated with uneven success in a free market across individuals, regions, and industries. Conversely, structural inequalities

⁹ In 1998, the government of Buyoya which took power by means of Coup, and undertook negotiations with various rebel groups in the Northern Tanzanian town of Arusha, under the arbitrage of the late Julius Nyerere, then president of Tanzania. After his death, rebel attacks were intensified, and the peace Noble Prize winner, Nelson Mandela revived the negotiations, which eventually reached a cease- fire deal and establishment of transitional government comprising representatives of most factions.

¹⁰ Lets assume here, as it is perceived by most Burundians, and is often presented to the rest of world, that there are 3 ethnic groups in Burundi. Hutu (85%), Tutsi (14%), Twa (1%). The Concept of ethnic identity often refers to groups that are distinguished by specific features such as language, culture, geographic boundary, or physiological aspects. In Burundi none these is traceable to any of the groups except for the Twa who still speaks kirundi with a different accent, and still live in localized and marginalized remote zones. Though there is a myth of ancestral incompatibility, the concept of tribe is inconsistent for communities that lived side by side, speak the same language, and share the same type of social organizations for centuries.

often reflect limitations to access resources in form of collective social by-products¹¹. Hence, structural inequality creates hierarchal classes through non-market mechanisms. While the effects of market inequalities can be bi-directional (positive and negative), the effects of structural inequality such as that prevailing in Burundi, are unambiguously negative.

From the above argument, the APN outcome should be regarded as a “first generation solution”; and, as such, fails to correctly address the resources distribution issues embedded in all layers of Burundi’s society since the introduction of coffee in the 1920’s. Furthermore, it leaves out a series of unanswered questions. First, would the power-sharing government rise above the rent-sharing attitude and set out to identify community-based resources and social by-products, and make them available to the common people, not just to a select few? Second, would the power-sharing government stand out or have the power and the willingness to create, maintain, and reinforce a sustainable private property system conducive to private business investments. Third, would the power-sharing government have the political will to re-establish an impartial judicial system that would be independent of executive powers, capable of enforcing contracts, and insuring the safety of individuals and their properties? The above basic duties are necessary, if not sufficient, such that any country failing to fulfill them is doomed to a state failure, generally renowned by wars, coups, revolutions, or anarchy (Sachs 2005, ed). By analyzing the household income generation structure and the social by-products that differentiate earning potentials for sub-groups with the same income factors, this thesis attempts to discern those structural inequalities.

¹¹ Social by-products in this context are created by and for a society. These could be public schools, health facilities, transportation, communications, sanitation, water, and law and order, etc.

3 LITERATURE REVIEW

The interconnection between income, human well-being, economic development and political brutality has compelled numerous economists to study social conflicts: a topic otherwise perfectly suited for the political science field. As a result, there has been a large pool of academic studies and policy prescriptions intended to identify causes and formulate models for the prevention of civil conflicts. Nonetheless, resource inequality-based wars continue to erupt despite much literature available today.

The Shared Fate of Small-Scale Coffee Production

Coffee and other exportable cash crop producers across the globe share a common fate. They must face the unexpected booms and the busts of the world markets and continue to make informed decisions based on factors beyond their controls [Sick (1997), Love (1999)]. Even though they are the pillar of their national economies, rural small-hold farmers often form a marginal class of politically impotent peasants confined in rural areas (Hecht, 1983). In Burundi especially, a combination of world market fluctuation and price setting systems from controlling government regimes have added insult to injury. In addition to facing a declining world market price since 1989, farmers in Burundi have been paid forty percent (40%) of the world prices, compared to eighty five percent (85%) and fifty percent (50%) paid to formers in Kenya and Cameroon respectively, according to the World Bank reports. The decline in the farm-gate price paid to growers has been greater than the world's market price. This raises an important question: Why would a sustainable governing system impose such high taxes on vital commodities only to benefit the urban supporters? According to Bates (1981) and

McMillan (2001), the answer for such a self-defeating mechanism is the “uncertainty of leadership duration”.

Greed, Low Income and Grievance

Whether related to the massively produced agricultural commodities or the localized precious gems and oil, the consequences of unfair distribution of wealth remains unaltered. Lessons drawn from the analyses of Collier (1998), Ndulu and O’Connell (2000), and Nkurunziza and Bates (2003), show that countries with economies that are dependent on exploitation of natural resources, often exhibit low per capita income and lack of the state capacity for appropriate governance. Additional studies such as Collier and Hoeffler (2001), Berdal and Malone(2000), Bellantini and Sherman (2003), Reno (1998), and Berdal and Nitzschke (2005) have stirred academic discussions and policy implications with regard to the relationship between natural resources and civil conflicts.

Export commodities and Civil Conflicts: “Resources are not, they become”

Ross (2003) argues against the robustness of hypotheses linking primary commodities and the onset of civil wars. While this study argues that conventional agricultural commodities are not major causes of civil conflicts eruption, the study suggests that commodities such as gemstones and drugs that are often a target of looting, do not initially increase the likelihood of a conflict, they only tend to lengthen it. This is in line with Collier and Hoeffler’s (2001) argument linking the possibility of rebellions

with resources that constitutes the funding source. Like Ross (2003), Fearon and Laitin (2003) call for caution in establishing the resource-civil war relationship.

The economic interpretation of resource-based intra-state wars gives useful insight, but violent conflicts continue to erupt because of the complexity surrounding the household income distribution. For example, an inconsistent revenue reporting system and the lack of complete information on all income sources that are required for variable and model specification, make it difficult to address the effects of what Wan and Zhou (2004), and Wan (2001) refer to as “fundamental determinants of income inequality”.

It appears that the majority of these studies have given a fair share of attention to what Ross (2003) labeled as “high-profile conflicts” Angola, Colombia, Liberia, DRC, Sierra Leone, Sudan, Iraq, and Afghanistan. They, therefore, reiterate what Sachs and Warner (1995), and others refer to as “natural resource curse” which can hardly be applied to Burundi.

Resource Curse Theory

Distinguished scholars have attempted to link the income distribution and its contribution to civil conflicts [Collier and Hoeffler (2000, 2002b), Collier (2000), Bates (2005), and Wantchekon (1999)]. These studies have mainly focused on valuable natural resources on which the national economies rely. They have concluded in most cases that a nation’s dependence on natural resources increases the probability of civil war eruption. Existing literature has focused on the abundance and scarcity of natural resources and internal conflicts.

1. When nations mismanage and unfairly distribute their abundant resources, they tend to cause a war because alienated groups use those resources as financial leverage for their sabotage activities. On the other hand, for the groups with access to the resources, they use them as an effective tool to humiliate and punish their enemies and reward their supporters. This theory is applicable and easily acceptable for high-profile wars--Angola, DRC, Iraq, Afghanistan, Sierra Leone, Columbia, and Nigeria -- it cannot however be the model for economies relying on massive participation of people to generate revenues.
2. Conversely, when resources are scarce, the “*winner takes all*” game takes place between groups fighting to benefit from the scarcity. Again this largely applies to lootable resources, but it is less direct and more complex for economies with commodities produced by the majority of impoverished peasants.

(Lebillon , 2003) summarizes that both resource abundance and resource scarcity theories respectively fail to consider the socially constructed nature of the resources; and in doing so, fail to explain why abundance or scarcity of a valuable resource is an insufficient condition for civil conflicts.

High Opportunity Cost to Challenge Status-Quo

Clearly that natural resources are related to conditions, means, and methods of production. Lebillon (2001a) concludes “Resources are not, they become.” In Burundi, the result of pre-independence policies on small-hold farming, especially pricing and marketing policies, have precluded larger scale estate (Hatungimana, 2005, ed). Furthermore, contrary to what is observed in British colonized regions of eastern and

southern Africa as noted by Barkan (1994) and Acemoglu et al (2000, 2001), no true rural bourgeoisie has emerged in rural Burundi. For example Burundi lacks the “Stake in Society” model that prevailed in post colonial Kenya, encouraging the country’s political elite to actively invest in rural land, [Barkan (1994, pge152)]. The basis for such a theory was that individuals with investments and properties to protect should be more likely to implement policies responsibly and respect private property rights. Furthermore, Johnson, Robinson, and Acemoglu (2001) observe that one of the reasons behind Botswana’s success was that most political elites at independence were also owners of major sources of revenue all across for the country. Unfortunately, the absence of economic involvement and lack of empowerment have created an atmosphere of grievance and a high opportunity cost for constraining extractive policies.

The existing literature has been unable to fully establish the proper economic ground for the outbreak of internal conflicts in Burundi. Burundi’s pittance of minerals, gems, and absence of oil does not properly fit the models of resource-related conflicts of Collier and Hoeffler’s (2001) school of thought. Burundi, unlike the Congo, Angola, and Sierra Leone, relies on coffee, a conventional agricultural commodity massively produced by more than half of the population.

The only common feature shared by coffee, drugs, gemstones, and oil produced in subsistence economies, is that a minuscule quantity is consumed by producers and nearly all are exported overseas. This thesis shows that dependence on the export of coffee is to some extent, linked to weak governance in the same way as other valuable commodities because it generates insufficient rent and, hence, results in scarcity-manipulating governments of the “winner-takes-all” type.

Resource Inequality-based Conflicts

While Uvin, (1999), Ngaruko and Nkurunziza (2000), NKurunziza and Ngaruko (2002), Ndikumana (2005), Prunier (1994), Lemarchand (1994), Kimola (2004), Kimonyo and Ntirandekura (2007), and Jackson (2000) have established the framework for this study, they lack crucial details contained in households data on which more concise conclusions can be made. This study examines why the most valuable commodity produced by the majority of Burundi's households –coffee--may not be the biggest contributor to their income. Under the known conditions of administratively-enforced coffee-farming and the regime's price controlling power, we follow McMillan's (2001) framework and explain that farmers do not receive fair value for they production. First they get paid a low price at harvest by OCIBU, a state-controlled marketing board. Second, the government seeks to maximize profit and redistribute proceeds to its supporters, hence creating a gap between groups regarded as government supporters on one hand, and those who feel alienated from the central power on the other hand, eventually resulting in civil conflicts. There are studies that have explored resource distribution issues, and established a framework for inequality decomposition [Fournier (2001), Fei et Al (1978), Loft and Loft (1998), Dutta and Mishra (2005)]. In the next two sections, we explore the history of coffee in Burundi and the role coffee plays in income generation and distribution among rural households in Burundi.

4 HISTORY OF COFFEE IN BURUNDI

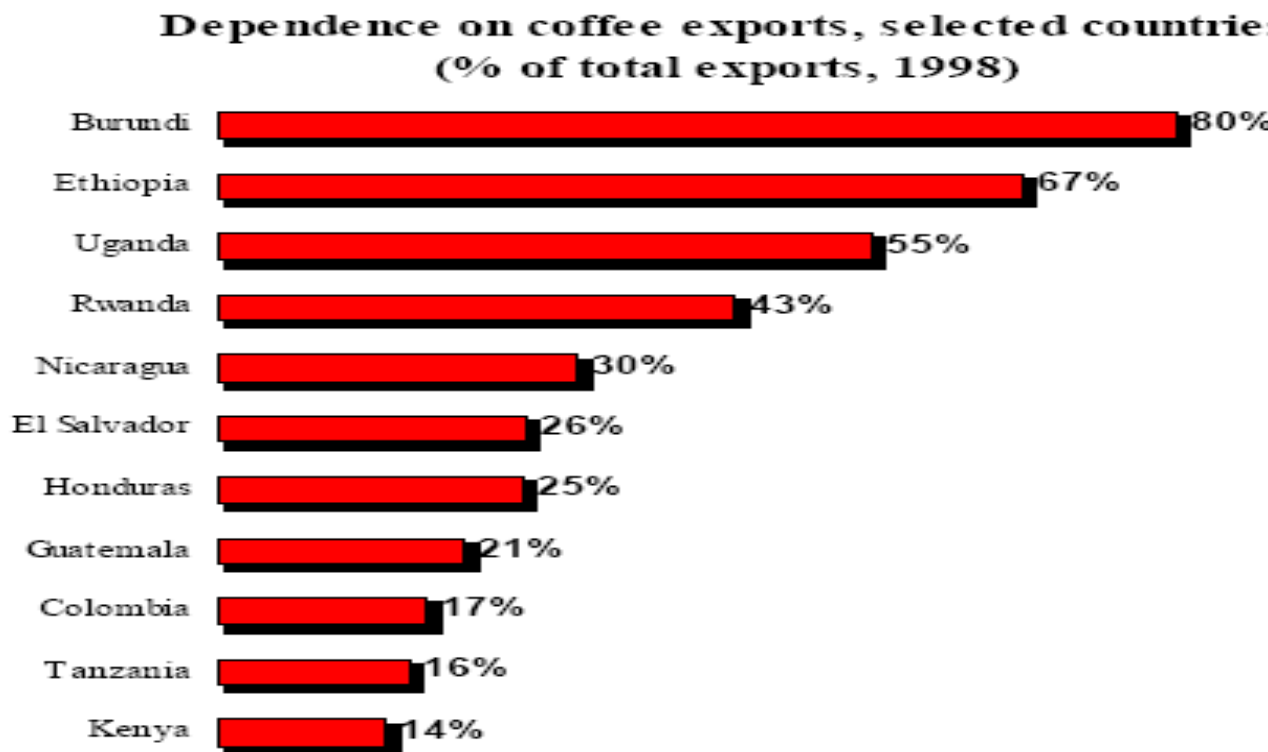
Coffee is a perennial plant, but has a biennial bearing cycle. There are two coffee species widely grown and traded: Arabica and Robusta. While Robusta can flourish in humid and hot temperature at low altitude requiring simpler and cheaper production and processing inputs, Arabica is mostly produced at higher altitude. Most coffee exported from Burundi, and referred to hereafter, is Arabica, a type of coffee suitable to grow in highlands of the subtropical regions. Clearly, the quality, quantity and prices of coffee are greatly affected by climatic conditions. Adequate rainfalls are required for proper blossoming of coffee flowers. Droughts often reduce the development of cherries; heavy rain during harvest season reduces cherries' quality, while frost inhibits growth of cherries. The biennial bearing cycle nature of coffee tree causes output fluctuations from year to year. A good fruition in a given year often exhausts the tree and is followed by a poorer yield.

In many producing countries, exchange rate, tariffs, export taxes, production subsidies, domestic investment programs are widely used by governments to influence coffee inputs and output prices. Prior to the 2000's privatization reforms that took place in many countries, all producing countries had established state marketing boards to oversee and perform duties related to marketing, processing, grading, and exporting coffee. OCIBU (Burundi Coffee National office) has the monopoly to oversee the above duties during the period in which coffee earning represented eighty percent (80%) of all export revenues (Fig4). Restrictive policies affect profitability of production activities, hence influence export performance. While export taxes provide an easy way to collect public revenue, excessive taxes reduce farm-gate prices far below international market,

discourage production, and in long-run affect output quality. While import restrictions such as tariffs, quotas, and import licensing are intended to protect local producers, they raise prices of imported agricultural input such as fertilizers and machinery. And while overvaluation of local currency increases the demand for locally produced commodities, it keeps domestic prices below their opportunity costs, hence discouraging export production and international competitiveness. A combination of these restrictive government policies, adversely prevent Burundian coffee farmers from competing at the world market.

In addition, the perennial nature of a coffee plant makes difficult to scale-down production. Producing and processing green coffee has low variable cost and price elasticity of supply, but it has high fixed cost. A coffee plant reaches its fruition maturity five years after planting. Even in times of price decline, it is difficult to destroy trees that have taken so many years to grow. As result of such production rigidity, price reductions continue for long time before supply is cut down.

Figure 4: Percentage of Coffee Earning to Total Export value in Major Producing Countries



5 ROLE OF COFFEE IN THE RURAL HOUSEHOLD INCOME

Coffee was coercively introduced under the Belgian colonial administration in 1920's as a cash crop intended to finance local administrative expenses. From the beginning, coffee was intended exclusively for export, and as its consumption became prevalently unrivaled in the western hemisphere, it has remained¹² solely an export commodity to this day. As stated above, colonial administration strategically established a tax-based economy founded on smallholding farming to generate much of the needed funds with little or no capital investment. The massive production has been achieved by zealously explaining to rural farmers the long-term economic importance of this newly introduced cash crop on the one hand, and harshly punishing those who refuse to plant or to care for the planted coffee-trees on the other hand. Punishments included fine, imprisonment, exclusion from community amenities, forced labor, and whipping. Rewards, included appointment to local leadership posts. With the help of local administrative authorities, this program was to be carried out by scrupulous agro-monitoring teams made of trained Belgian agents. The intention of the 1934 coffee campaign is summarized in the memos from Belgian administrators to the field agents: *"Our ultimate goal is to make coffee a popular crop [in Congo, Urundi-Ruanda],...if necessary, at the expense of food crops. The campaign should consist of making the indigenous population understand what is demanded of them, and be persuaded that authority will monitor the implementation. In other words, the intended supervision will*

¹² Coffee was introduced in Burundi first by German colonizers, and it was integrated as export commodity and main source of foreign exchange in late 1920's by Belgians who were mandated to take over Germans territories in the regions. Coffee is primarily intended for export, only less than 5% in consumed in Burundi.

be successful only if the indigenous understand that where there is lack of willingness, the legal obligation will serve". Hatungimana, 2005, pge 171, pge 2006)

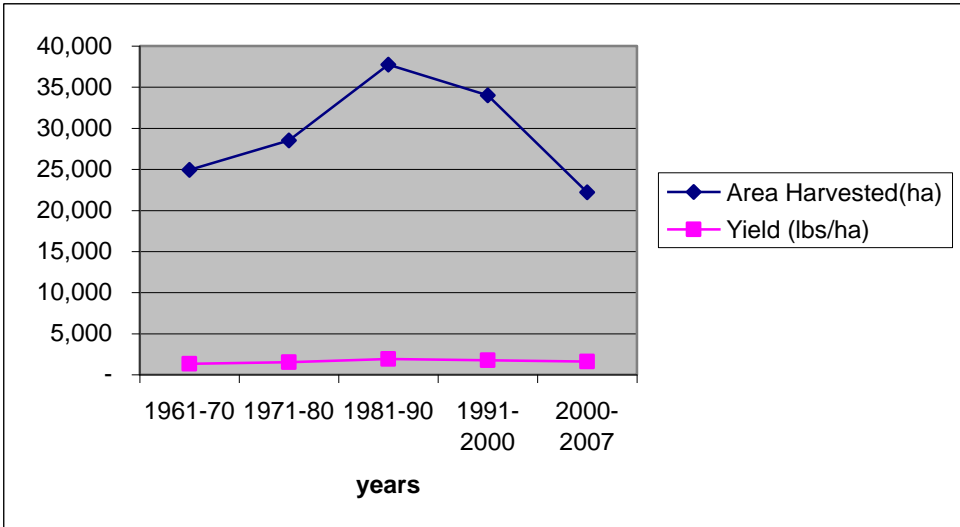
Over a period of twenty years 1940-1960, the number coffee trees planted was increased two hundred fifty percent from just 10.8 million trees to 25 million trees planted. These reforms remained or were even intensified throughout the colonial period in territories under the Belgian mandate (Congo, Burundi, and Rwanda). Note however, that due to land scarcity linked to demographic pressure, large coffee estate like those of the British East-African colonies, were discouraged (Hatungimana, 2005, pge 162, Kimonyo and Ntiranyibagira, 2007). Coffee-farming was done on small patches of land averaging 1200 square meter per family.

Subsequent regimes in the post-independence era continued on the same path with a renewed vision for sovereignty and economic self-reliance after the departure of colonial masters¹³. The first fifteen years following independence (1960-1976), coffee sector was privatized. Coincidentally, the quantity and quality of coffee, a crop introduced by means of coercion, quickly plummeted. Observers believe farmers lost interest because it was view as a symbol of colonialism. Since 1976, the coffee sector was placed under the management of OCIBU, the state-owned marketing board, and private operators were considered as subcontractors. Since then, coffee farming was intensified, but productivity has remained stagnant. Coffee production has grown tri-fold from fourteen thousand tons in 1961 to over forty one thousand tons in 1994. Its productivity however, has modestly increased 778kg/ha to 938 kg/ha in the same period (FAO, May 2008). Strictly speaking, the increase in national coffee

¹³ According the Economic Intelligence (1997) report, "Post-independence governments have perpetuated colonial wealth- extraction policies, enforcing coffee cultivation and paying little for the proceeds, and have used much of the revenue to sustain their power". Recently, it has been reported that the current presidential office allegedly attempted to exchange the presidential jet for a newer one, for the price of 1500 tones to coffee over a 10 year period. Where would the coffee come from?

output has been a result of a rise in the number of producers, rather than a proportional expansion of farm size or output per farmer. For the past four decades, average yield remained fairly constant even in the times of expansion in harvested area.

Figure 5 Area Harvested and Productivity Yield Between 1960 and 2007.



Source: FAO, 2008

Although coffee is a viable source of income for rural farmers who lack alternative means of revenue generation, a weak participation of smallholding farmers in the decision-making process, prevents them from fully reaping what they sow, and hence thwart the effort to devote their scarce resources to coffee farming and after-harvest preparations. Coffee is a perennial plant but requires much work beyond tree-planting (pruning, weeding, use of pesticides, and fertilizers) and harvesting (fermenting, de-pulping, washing, drying, de-husking, etc). Although the state’s law prevent farmers from destroying coffee trees, the quality and quantity suffers when a farmer is not keen.

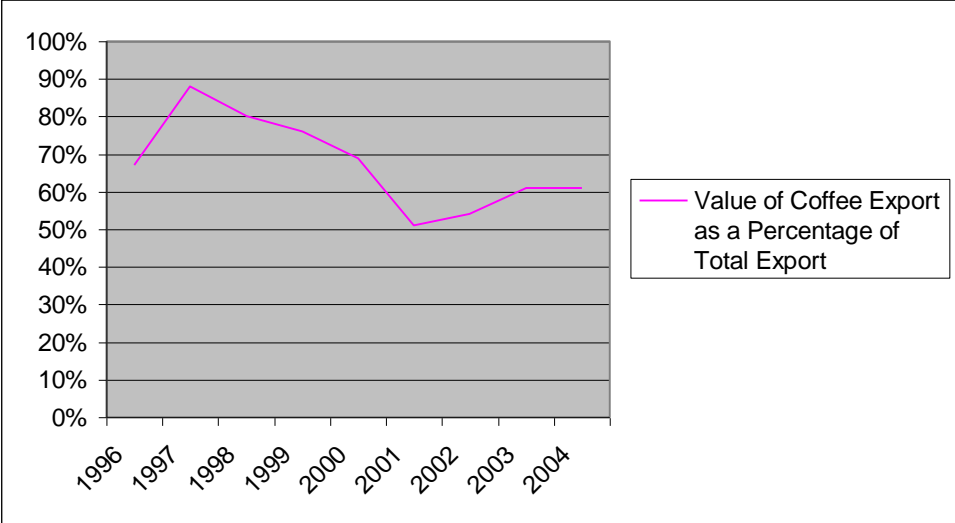
The issue of constant or declining productivity while the area planted is increased can be explained differently. The common view is such that as households increase the area covered by coffee orchard, the limited resources to care for it, proportionally decrease.

Existing studies have view the issue of coffee smallholding farming as suffering from sectors' discrepancies. Despite similar or better quality, coffee farmers in Burundi received much less than Ugandan farmers in 1990's (Kimonyo and Ntirandekura, 2007). According to the same source, coffee proceeds benefit the (government and supporters) state sector and unproductive industrial sector at the expense of rural farmers. For example, between the two devastating wars (1972) and 1993, more than seventy percent of investments went to industrial sector mainly based in Bujumbura and few other urban centers where only ten (10%) percent of the population live, whereas a meager 20 percent went to rural agricultural sector where 90 percent of the population live. By the same token, the agriculture sector provided sixty four percent (64%) of gross domestic product, while the industrial sector contributed just over sixteen percent (16.7%).

Ngaruko (1993), and Ngaruko and Nkurunziza (2000) expressed the same concern of the lack of rural-urban interdependence fundamental equilibrium. According the aforementioned studies, eleven percent (11%) of agricultural production was used as input in the industrial sector in 1988, representing as much as sixty three (63) of non-imported industrial production. Conversely, only less than half percent (0.4%) of industrial production was used as agricultural sector consumption, representing even a lower portion (.02%) of agriculture sector production and only five percent (5%) of non-imported intermediate agricultural consumption. This agricultural-industrial interdependence, whereby the industrial sector depends on agricultural sector as supplier of raw inputs, and agricultural sector depends on the industrial sector as supplier of the manufactured goods, features structural discrepancies. As results of the above

arguments, not only farmers would lack incentive to produce, also urban residents who find themselves outside of the political cycle and excluded from pursuing economic opportunities available to their counterparts become aggrieved and may find it easier to recruit followers among the would-be rich farmers.

Table 1 Value of Coffee Exported as a Percentage of Total Export(1996-2005)

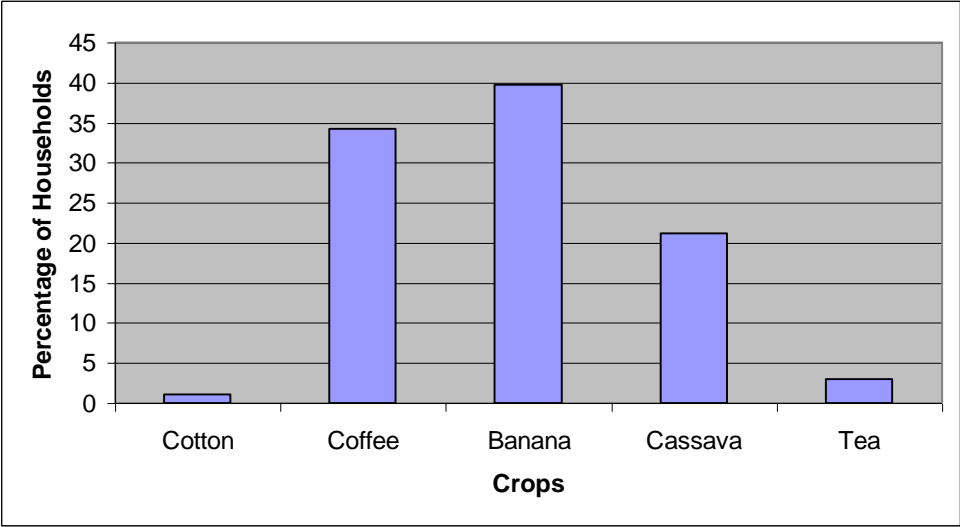


Source: Kimonyo and Ntirandekura (2007)

Nonetheless, Burundi economy still relies on the proceeds of coffee export (table1).Coffee, cotton, tea, banana, and cassava make up 99 percent of Burundi’s tradable commodities, of which coffee alone accounts for more than fifty percent (50%). Production of cotton and tea has been so low and so sporadic that the country could not produce a reasonable quantity for export. Tea and cotton are generally geographically-specific and capital intensive, so Burundi could not produce a quantity that could allow having a competitive advantage on the world market. They are not noteworthy to the cause of income generation for rural farmers in Burundi (fig 1). Although not traded at the world market, the most important crops to rural farmers are perhaps banana, cassava, and their by-products. Combined, they serve three

purposes: *Food security*—Banana, cassava, and their derivatives constitute an abundant food crop for much of rural areas where securing food is problematic. *Rural Income* – They are a major source of revenue for the poor rural residents as they are consistently traded between farmers. *Unity* – They are a crucial ingredient for social gathering and cohesion for a country that needs it so desperately. To value banana and cassava based solely on the income they generate is an understatement.

Figure 6 Frequency Distribution of Household’s Main Cash Crops



*The Chart is based on data from FAO.

Coffee is the only commodity for which Burundi has had a competitive advantage on the world market, thanks to the effort of some eight hundred thousand rural households. It goes without saying that Burundi often ranked among the bottom ten least developed economies, relied on external financing mostly in the form of repayable loans and assistance grants for the government to run its operations and provide basic services to the people. More government

revenues, by and large, come from income tax, taxes on goods and services, and taxes on trade¹⁴.

Accounting for taxes on services related to sales and transportation, coffee is estimated to generate more than seventy five percent of government revenue. This revenue is used to build basic infrastructures (school, hospitals, and roads), to pay for basic services (teachers, doctors, and judges), and to protect people's basic rights (security, law and order) for the entire nation.

Furthermore, coffee export revenues are used to repay of debts and to buy equipment and properties which affects both the present and future income generation. The above arguments highlight the central role of coffee in determining the type of institutions and policies on the one hand, and how it has been effectively used to reward political supporters and humble the opponents on the other hand.

Today, coffee export not only impacts household revenues through institutional and macroeconomic policies related to the above arguments, but it also has greater potentials to directly affect producers at the farm level. According to official reports from the government of Burundi, more than eight hundred thousand households are directly involved in the production of coffee. The data used for this thesis collected by the World Food Program in Burundi points in the same direction. Fifty seven percent of all households reported coffee as their main cash crop. More than forty nine percent (49%) of those who reported income of at least 1000Fbu (1USD) in the sample, deliver it from cash crops of which banana, coffee, cotton, cassava, and tea makes up to ninety nine percent (99%). Arguably, coffee continues to play key role in the institutions and speculative policy formulation in Burundi.

¹⁴ Income taxes, taxes on good and services, taxes on external trades consistently generated more than 20% of Government revenues while more than 10% comes from subsidies and transfers. (IMF, 2003),

Table 2 Contribution of Income Sources to the Household Total Income

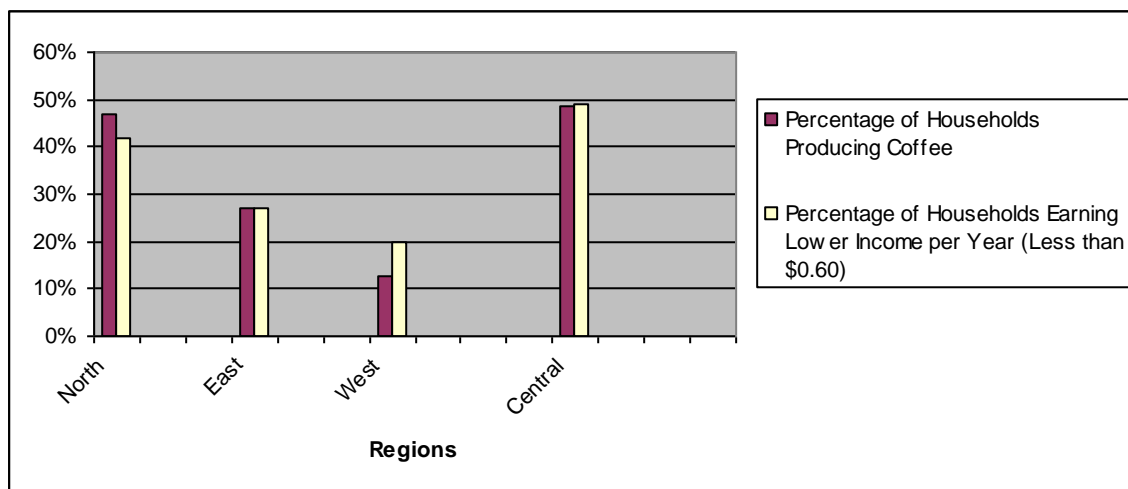
<i>Source</i>	<i>Primary Source Contribution (%)</i>	<i>Secondary Source Contribution (%)</i>	<i>Tertiary Source Contribution (%)</i>	<i>Total Contribution (%)</i>
Cash Crops	26.9	19.3	2.8	49.0
Manual labor	17.4	6.4	1.1	25.0
Small commerce	17.2	5.1	1.0	23.2
Sale of agricultural products	8.9	13.6	8.9	31.4
Off-road trades	8.7	4.4	1.3	14.4
Brewery	8.3	7.4	2.3	18.1
Off-Farm employment	4.7	1.0	0.3	6.0
Art-Crafts	1.5	0.7	0.3	2.5
Donation/Remittances	1.4	1.8	0.3	3.4
Animal	1.1	1.8	1.1	4.1
Forest products	0.5	0.3	0.1	1.0
Mining	0.3	0.1	0.0	0.4
Fishing	0.2	0.2	0.1	0.4
Fire woods and charcoal	0.2	0.3	0.2	0.7
Roadside sales	0.2	0.4	0.2	0.8
Land leasing	0.2	0.3	0.1	0.6
Sales of aid	0.1	0.1	0.0	0.3
Borrowing	0.1	0.2	0.1	0.4
Hunting	0.1	0.1	0.1	0.2
Retirement/Pension	0.1	0.1	0.1	0.2
Other	1.3	0.8	0.2	2.4
All	99.4	64.44	20.54	

Source: World Food Program (2004)

A preliminary analysis of this household data (Fig 7) fails to provide the justification of “*more coffee, more money*” for farmers. Instead, it appears as if coffee production and poverty go hand in hand. There are more households with annual revenues below sixty thousand FBU (0.60 US cents) in provinces known to be the powerhouse for coffee production, while more households earn more than a dollar per day (poverty line) in provinces where geography and climatic conditions do not favor coffee production. The more coffee farmers in a given region the

more prevalence of poverty observed. So, what is the source of this income disparity? Is it coffee or is it the policies shaped by political elites with a plan to extract the highest revenues from coffee exports?

Figure 7 Percentage of Households producing Coffee and Households Earning Lower Income per Year¹⁵



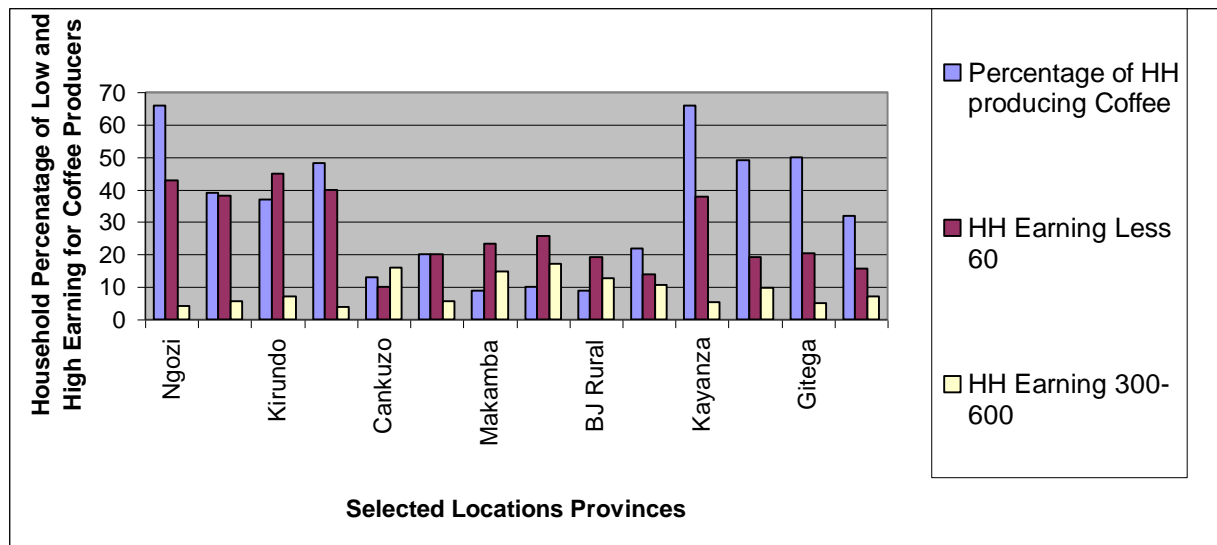
5.1 Cross regional overview

Previous studies have estimated Burundi’s income inequality with different levels of aggregation [Ngaruko and Nkurunziza (2003), Ndikumana (2005), Uvin (1999), Lemarchand (1994)]. On this basis however, income gaps tend to be miss-characterized as they are often based on regime version of the truth. Burundi’s inequality is deeply rooted in all layers of the society. For many reasons ranging from geography to policies, no poverty in any given province is identical to another, no commune is identical to another even within the same province, and household conditions are diversified within the same village. For example, in 2004 there were three times the number of people

¹⁵ These are regional-level statistics, not household level. Discrepancies within regions may account for some of the differences.

earning less than sixty dollars a year in Kirundo as there were in Cibitoke. As shown above, rural income is generally lower in northern provinces where coffee farming is predominant. Western provinces located in regions where coffee Arabica can not grow, earn higher income than the national average. Most of those earning at least one dollar per day are located in the west, with close proximity to Lake Tanganyika and the capital Bujumbura. There is a stunning wealth disparity between provinces particularly at the top and bottom percentiles. Our data shows that four times as many in Bururi earn four times as much in Ngozi, while three times as many in Ngozi earn five times less than their counterparts in Cibitoke.

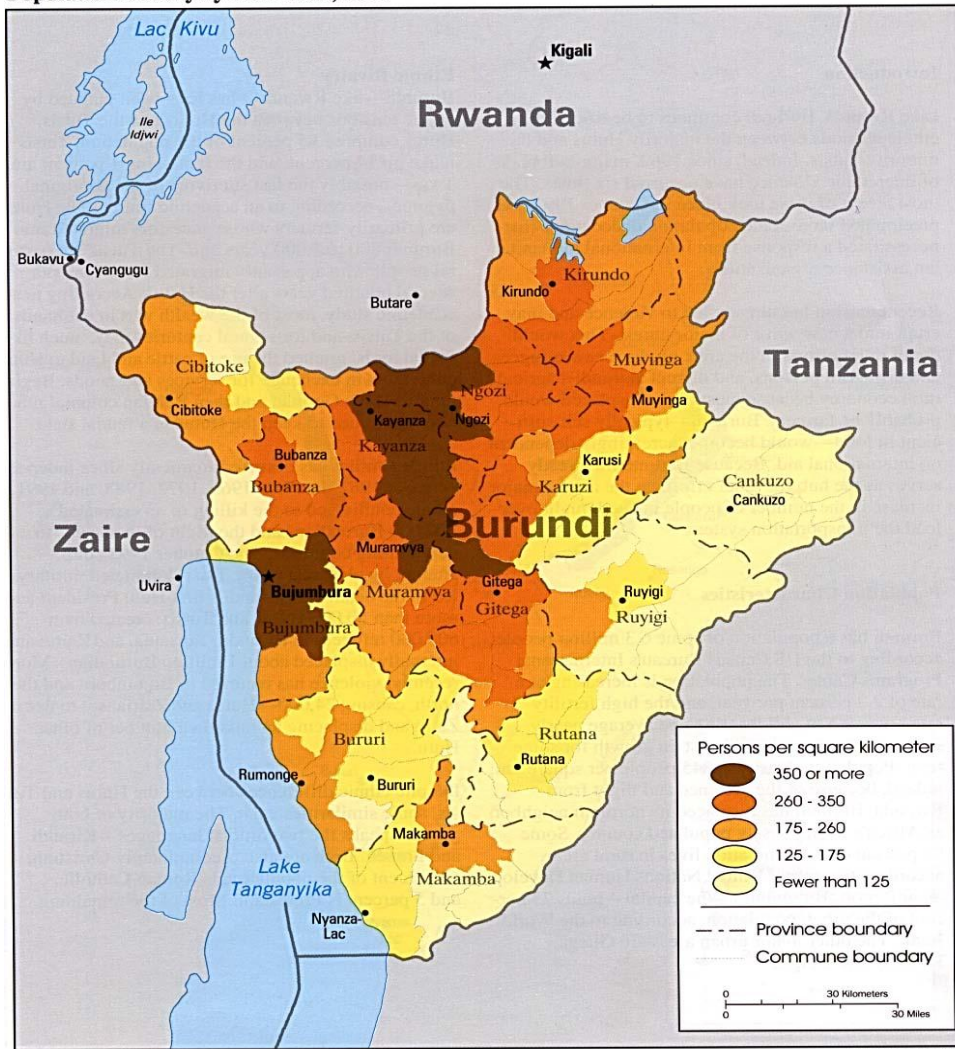
Figure 8 Mean Distribution of Rural Household Revenue for Coffee producers



**Source: Survey data*

The above observations imply that factors other than geography and coffee must have played a more and more important role. Given Burundi's economic deterioration for much of the 1990's, wealth inequality naturally becomes a barrier to progress in poverty eradication. Not only is there a wide income disparity between provinces, significant income inequality also exists among districts --Communes-- within a province and among households within a district. Figure 8 shows categories of bottom, median, and top percentiles. In Commune Marangara, no one made 300,000Fbu in 2004, and sixty-nine percent (69%) earned less than 100,000Fbu; however poverty is not as severe in commune Busiga of the same province since there is at least 14 percent (14%) who earn more than 300000Fbu, while only forty-five percent (45%) earn less than 100,000Fbu. The measure of wealth changes from one province to another. When we compare 2 communes --Rumonge and Butaganzwa-- of two different provinces, Bururi in the south and Ruyigi in the east respectively, we find that the rich in Ruyigi would be considered poor by their neighbors in Bururi. Earning at least 300,000Fbu in Rumonge (Bururi) can be seen as an economic struggle, while it may be viewed as wishful thinking for a resident of Butaganzwa (Ruyigi). Contrary to common expectation, Commune Rutovu, the home of all the presidents who led Burundi in the post-colonial era, has the highest number of residents earning less than 100,000Fbu and the least number earning above 300000Fbu within the province of Burundi.

Figure 9 Map of Burundi
Population Density by Commune, 1990



Source: www.lib.utexas.edu

5.2 Data

The data used for this thesis was collected by the office of the World Food Program in Burundi (WFP-Burundi), covering all of rural Burundi. Questionnaires for household and community were designed using similar surveys previously done in Uganda, and the Central African Republic. It was conducted over a period of four weeks and was completed in August 2004. The entire rural Burundi was initially covered except few locations in the province of Bujumbura (Kabezi, Mutambu, Muhuta) where the war was being waged, but they were completed later. According to (WFP-Burundi), a team of forty surveyors were contracted and conducted surveys throughout the country for a period of four weeks between July and August, 2004. Overall, 4300 households in 430 villages were surveyed with the help of village leaders who acted as informants. After thorough cleaning procedure, only 3761 households remain with complete information, and will be used in this analysis.

Sampling method: Communities and household data were chosen using the latest of number of households by districts –commonly referred to as collines-- provided by the Institute of Statistics and Economic Studies of Burundi (ISTEEBU). A systematic random sample of districts was chosen. Their probabilities of being chosen were proportional to the number of households in the district. Once this was done, one village was chosen at random within the district. Population data was not available at the village level however, villages within a district are generally similar in size, and therefore a simple random selection of one village in each selected district is not estimated to have a significant biasing effect on the sample. Within each selected village, one community questionnaire and 10 household questionnaires were performed. Households were

randomly selected from a list of all households in the village. Where the household members were not present, the household was revisited later in the day. If no one was available, a substitute household was chosen at random from the list of households in the community.

The data was collected taking into account inter- and intra-variable relationships within each household. In other words, households were clustered based on both household and community variables; including but not limited to, household demographics, migration and displacement, housing variability, transport, lighting, water, sanitation, education, community health care, asset ownership (material and livestock), land ownership, household income, and expenditure, to name just a few. The capital city (Bujumbura Mairie), which is considered as urban, is not included in this rural household analysis.

The country of Burundi is divided into sixteen provinces (Map1) --Bubanza, Bujumbura-Rural, Bururi, Cankuzo, Cibitoke, Karuzi, Kayanza, Kirundo, Gitega, Makamba, Muramvya, Muyinga, Mwaro, ngozi, Rutana, Ruyigi-- and each province is divided into communes. There are overall 116 communes subdivided into zones, zones are subdivided into districts and districts into villages. Most published studies have used proxy community variables such as regional agricultural outputs, community resources and services such schools and health care facilities, access to government employment, or private business opportunity available to citizens. Community variables however, often lack empirical evidences present in the household data. Since each household is different and may generate a different level of income despite having similar resources with others in the same district, these proxies can hardly be used as accurate measures of wealth

disparity between households. The data used here covers a wide range of geo-economic conditions and can be viewed as more representative than studies relying on aggregate data.

Table 3 Frequently Listed Primary Source of Income per Province

Province	Most common sources of income	Most common primary source of income	Percent of total income coming from primary source of income
Bubanza	<ul style="list-style-type: none"> • Sale of cash crops (43%) • Temporary work (40%) • Sale of agriculture (22%) 	Temporary work (29%)	80%
Buj. Rural	<ul style="list-style-type: none"> • Sale of agriculture (58%) • Sale of cash crops (35%) • Manual labor (33%) • Small commerce (26%) • Temporary work (26%) 	Manual Labor (27%)	81%
Bururi	<ul style="list-style-type: none"> • Sale of cash crops (43%) • Sale of agriculture (33%) 	Sale of cash crops (23%)	75%
Cankuzo	<ul style="list-style-type: none"> • Sale of cash crops (46%) • Alcohol brewing (31%) • Manual labor (25%) 	Sale of cash crops (22%)	65%
Cibitoke	<ul style="list-style-type: none"> • Sale of cash crops (48%) • Sale of agriculture (43%) • Manual labor (28%) 	Sale of cash crops (27%)	73%
Gitega	<ul style="list-style-type: none"> • Sale of cash crops (63%) • Manual labor (33%) • Alcohol brewing (27%) 	Sale of cash crops (28%)	73%
Karuzi	<ul style="list-style-type: none"> • Sale of agriculture (72%) • Manual labor (32%) • Sale of cash crops (32%) • Temporary work (30%) • Alcohol brewing (28%) 	Temporary work (26%)	82%
Kayanza	<ul style="list-style-type: none"> • Sale of cash crops (69%) • Sale of agriculture (30%) • Manual labor (26%) 	Sale of cash crops (39%)	74%
Kirundo	<ul style="list-style-type: none"> • Temporary work (37%) • Sale of cash crops (36%) 	Temporary work (27%)	87%
Makamba	<ul style="list-style-type: none"> • Sale of cash crops (50%) • Sale of agriculture (49%) 	Sale of cash crops (30%)	72%
Muramvya	<ul style="list-style-type: none"> • Sale of cash crops (58%) • Sale of agriculture (37%) • Temporary work (32%) 	Sale of cash crops (27%)	68%
Muyinga	<ul style="list-style-type: none"> • Sale of agriculture (39%) • Sale of cash crops (38%) • Temporary work (32%) 	Temporary work (25%)	88%
Mwaro	<ul style="list-style-type: none"> • Sale of cash crops (56%) • Sale of agriculture (40%) • Alcohol brewing (31%) 	Sale of cash crops (35%)	69%
Ngozi	<ul style="list-style-type: none"> • Sale of cash crops (68%) • Sale of agriculture (56%) 	Sale of cash crops (45%)	76%
Rutana	<ul style="list-style-type: none"> • Sale of cash crops (44%) • Manual labor (31%) • Sale of agriculture (30%) • Alcohol brewing (28%) 	Sale of cash crops (24%)	73%
Ruyigi	<ul style="list-style-type: none"> • Sale of cash crops (42%) • Manual labor (39%) • Sale of agriculture (33%) 	Manual labor (31%)	82%

* Source: WFP-Burundi

5.2.1 List of Variables to Used in the Income Estimation

DEPENDENT VARIABLE: Rural Household Income

Estimating the annual income for rural household is the first goal of this study; the second goal is to decompose income inequality. Total reported annual income for a household is a combination of all revenues generated from different sources by different household members. Each household was asked to list four sources of revenues and the level of revenue generated from those sources. All reported revenues were generated over the period of 12 months leading to July 2004. The revenues from the four sources were listed in ranking order starting with what generates the biggest percentage of combined income, then each revenue was matched with its source. The sum of all household revenues from the four sources is considered as the household income.

The entire sample encompasses twenty-one categories of income sources (sales of produce, sales of cash crops, sale of animals, salaries and pension, sale of arts, temporary employment, small businesses and road-side sales, manual labor, sale of fire woods, hunting, fishing, mining, land renting, gift of food and money, sale of food-aid, brewery, borrowing, and others (unknown). But each household income is made of maximum four revenues generated from any of the above twenty one. Generally speaking, over ninety-nine percent (99.4%) of household come is generated from 3 sources; over ninety-seven percent (97.2%) is generated from just 2 sources; seventy-eight percent (78.4) is generated from only one source of income. More than half of respondents (58%) reported that they generate more than ninety percent (90%) of their primary revenue from only one source. There is clearly a lack of income diversification in rural Burundi.

There are households who reported zero revenues from all combined sources. Other house households reported less than 1,000 BIF (equivalent of \$1) as their total annual earning. Many of those also lack other important household information, and were considered as outliers. The median annual household income is 100,000BIF, or \$10 at 2004 exchange rate.

INDEPENDENT VARIABLES:

The categories of income sources are grouped into six income source dummies: sale cash crops, sale of produces, manual labor, small businesses, salaries, all other categories are combined into one category called “other income sources”. The level of household income is expected to vary depending on the category from which the primary revenue generated. If the primary household revenue is generated from a given category, that category takes the value of 1, and zero otherwise.

Six categories of household primary revenues are described below:

Sale of Cash crops: Common cash crops in rural Burundi include tobacco, coffee, banana (Banane à Bière), potatoes, cassava, rice, wheat, corn, tea, fruits, vegetables, palm, and peanuts to name few; but banana, coffee, cassava, and tea account for more than 90 percent. While the data does not specify the quantity produced or sold by each household, it indicates whether the primary household income is generated from selling cash crops. Selling cash crops becomes a category of income sources and is treated as a dummies variable taking the value of 1 primary it is the primary source of household revenue, or

takes the value of zero otherwise. Table 2 shows that more 26 percent of rural farmers generated their primary revenue from selling cash crops.

Sale of produce: Produce is a term designating farm products collectively. It includes any food items produced by a household without the sole intention of selling. One household may decide to sell portion of the food produced in order to buy the type of food he does not produce. In some instances, produce and cash crops are not mutually exclusive. Some of the cash crops listed above may be considered as foods crop (produce) by one household while another takes as a crops solely designated for sales. Although sometimes the trade does not necessary require monetary transactions, agricultural products constitute major trading dynamics both within rural regions and between rural and urban cities. Households were asked whether or not part of the revenue was generated from selling produce (not cash crops). Generating revenue from sales produce takes the value of one, or zero other wise. Table 2 shows that more 8 percent of rural farmers generated their primary revenue from selling produce.

Salaries: Salaries is wages earned working off-farm. Although not indicated in the data, the largest employer has been the government and its affiliated agencies. According to Ndikumana and Ngaruko (2003), the government employs 80 percent of salaried people who, on average, earn 16 times more than the average per capita income. Although Ndikumana and Ngaruko's claim will not be fully tested in our model, we will exam the

percentage change in household income due to the fact that the primary revenue is generated from salaries.

Small Businesses: Small business, in this case, comprises trades taking place in rural area. There are usually farmers who trade food and other farm products on rural markets and community centers. They are also people who do not necessary describe themselves as farmers but live on farm, selling products brought in from urban centers or other rural regions. If a household generated primary revenue from this category, we assign the value of one, and zero otherwise.

Manual Labor: Manual labor designate those employed on farm seasonally or permanently. They are either paid in cash, in food, or rented patch of land. They can be employed by a neighbor or far from family residence. Whether paid in cash or in kind, their remuneration can translate into additional revenue for household. We found that more 17 percent of rural household have their primary revenue generated by a member doing manual labor. In some province such as Ruyigi and Rural Bujumbura nearly a third of households generated more than eighty percent of household income from manual labor. Earning primary revenue from manual labor takes the value of 1, or zero otherwise.

Others income Sources: There are many types of activities generating income in rural Burundi although not considered as primary sources of revenue by many household. The data would not be completed if those activities are not accounted for. They include sale of fire woods and arts, hunting, fishing, mining, land renting, temporary employment, road-side sales, sale of fire woods, hunting, fishing, mining, gift of food and money, sale of

food-aid, brewery, borrowing, and others (unknown). If household generated primary revenue from a source other than the five listed above, it takes the value of 1, but takes the value of zero otherwise.

Other independent variables: Household characteristics

Sex: If the head of household is male, the household is assigned the value of one, and it takes the value of zero if headed by female. More than 83 percent of households are headed by males and nearly 18 percent headed by female. We found some households headed by children as young as 7 years old. Although those are believed to be the orphans of the recent war, we consider them as outliers.

Age: The average age of household heads in rural Burundi is 42. In some cases heads of household did not know their age, and that's not surprising in rural area where written records are hardly kept. According to the reports, the 46.4 percent of the population is under the age of 14, and life expectancy is under 44years.

Literate: Literacy standard in rural Burundi was set at low level. If one can read, write in a simple sentence in either kirundi, he/she considered literate. Based on this criterion, 48 percent of household heads are considered literate. 54% of literate household head are males and only 21% are females.

Household Size: Mean household size is 5.6 persons. In some location peripheral to war zones, there were some houses hosting as many as 36 relatives who have recently lost their own.

Displaced: Displacement is defined as someone who has been forced out of his/her own home. 19 percent of households have had displaced member in the past 2 years. Thirty percent of the displaced members have been relocated from home due to the insecurity, and very few have relocated due to other reasons ranging from employment, studies, medical, and financial reasons.

Household asset: In rural area where farming is the main activity, farming tools are the most useful capital for households. 80percent of household own one or more commonly owned tools (machetes, hoes, pruning knives) regarded as rural household production capital beside land.

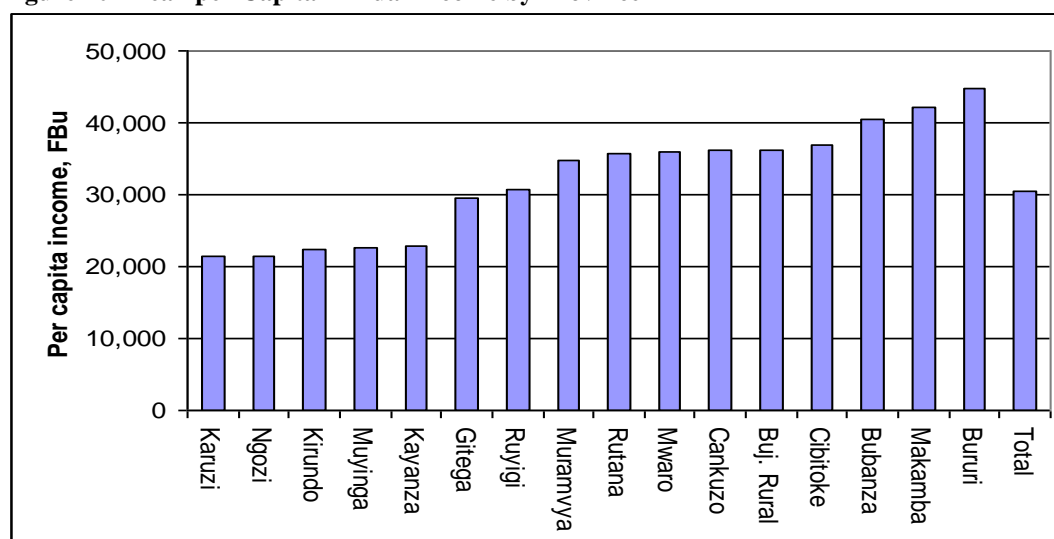
Water: Water is a vital necessity for any household regardless of economics status. Because of its importance in one's daily life, its availability or lack it thereof can impact a household well-being. The majority of Burundian household can not find potable water within a half hour from their residence. In some instance, water must be brought from distances greater than 3hours of walk from home. In other words, some member of a household must spend most time of day gathering necessary water, devoting time that could be spent on income generating activities. Only 38 percent of household can a source of potable water within half an hour. Surprisingly however, there are households with running water inside the houses. We will examine whether this is a normal characteristic of a rural household or simply are outlier.

Farm Land: Farm land is the total of land on which a household farm. It is a combination of land rented and land owned by a household. Land in rural community is fundamental important. Not only does it play inter-generation link between families descendent and collateral for social contracts, it also provide food, and employment opportunities. The mean size of farming land owned by household plots is 2.50 acres, while the average farm land rented is 0.50. Tenure is believed not to be an important factor.

Livestock: Households own farm animals among which there are large livestock, poultry and small animals. Large animals in Burundi are mostly to cows. Cows in Burundi are often linked to social status (Lemarchand, 1994) and even sometimes ethnic affiliation. They are sign of well-to-do conditions, and seen either as asset or capital. One out of four households owns at least a large animal. The small animal group include includes goat, sheep, pig, rabbit, cobaye, and poultry.

Provinces: Burundi is divided into 16 provinces (Bubanza, Bujumbura-Rural, Bururi, Cankuzo, Cibitoke, Karuzi, Kayanza, Kirundo, Gitega, Makamba, Muramvya, Muyinga, Mwaro, ngozi, Rutana, Ruyigi). Some rural regions appear to be better-off than others. Income difference by region is captured through provinces differentiation, and each of the 16 provinces has unique characteristics and different earning capacities. Regions and provinces are very informative and should not be overlooked in that they are associated with natural resources such as water, climates, rain, fertile soil, mineral, that can not be easily altered or removed.

Figure 10 Mean per Capita Annual Income by Province



*Source: WPF: Burundi Field Office, 2004

Table 4 Basic Characteristics of Rural Household (N=3761)

VARIABLES	MEAN	STANDARD DEVIATION	MIN	MAX
Total Income (Thousand BIF) (US\$1= 1095.10 BIF)	150.8	161.7	1	1,856
Gender ^b	0.8319	0.3739	0	1
Age	42.92	13.709	10	96
Literacy ^b	0.4852	0.4998	0	1
Household Size (Heads)	5.665	2.4094	1	30
Not Displaced from Home ^b	0.8029	0.3978	0	1
Displaced due to Insecurity ^b	0.1390	0.3460	0	1
Displaced for Employment ^b	0.02260	0.1486	0	1
Displaced to Other reasons ^b	0.00026	0.01062	0	1
In-house Running Water ^b	0.01754	0.1313	0	1
Large Livestock	0.2611	1.1478	0	40
Poultry	2.2347	20.7016	0	800
Other Animals	2.2831	5.2701	0	140
Total Farm Land(Acres)	3.0079	11.9941	0	222.33
<u>CASH CROPS^b</u>				
Coffee	0.3690	0.4826	0	1
Banana	0.4230	0.4941	0	1
Cassava	0.2252	0.4177	0	1
Potatoes	0.1752	0.3802	0	1
Other Cash-Crop	0.5663	0.8321	0	1

PRIMARY SOURCES^b OF HOUSEHOLD REVENUES

Sales of Coffee	0.28396	0.4509	0	1
Sales of Produce	0.0946	0.29277	0	1
Rural small Enterprises	0.08641	0.2810	0	1
Salaries	0.04520	0.20775	0	1
Brewery	0.08741	0.2825	0	1
Manual Labor	0.1683	0.383	0	1
Other Sources	0.2339	0.4234	0	1

PROVINCES^b

1. Bubanza	0.0414	0.1994	0	1
2. Bujumbura Rural	0.0627	0.2425	0	1
3. Bururi	0.0603	0.2381	0	1
4. Cankuzo	0.0311	0.1736	0	1
5. Cibitoke	0.0648	0.2463	0	1
6. Gitega	0.1028	0.3038	0	1
7. Karuzi	0.0576	0.2332	0	1
8. Kayanza	0.0967	0.2957	0	1
9. Kirundo	0.0842	0.2778	0	1
10. Makamba	0.0483	0.2146	0	1
11. Muramvya	0.0473	0.2123	0	1
12. Muyinga	0.0723	0.2590	0	1
13. Mwaro	0.0403	0.1969	0	1
14. Ngozi	0.1015	0.3021	0	1
15. Rutana	0.0422	0.2012	0	1
16. Ruyigi	0.0454	0.2083	0	1

*Source: Survey Data;

^bBinary or dummy variable

5.2.2 Household Income Generation Function

We estimate household income generation function before we embark on inequality decomposition. Using the data from the survey, we use semi-logarithmic functional form to estimate rural income. We use an income generation function of the form $\hat{Y} = f(X_1, X_2, \dots, X_k)$. \hat{Y} is the natural log of a household income ($\ln Y = \alpha + \beta X$), where β is the ordinary least square parameter (β^{OLS}) expressing a percentage change in Y , denoted $\% \Delta Y$, due to a change in X . If X is a dummy, $\% \Delta Y$ is given $e^\beta - 1$. Although the income generation function is not always linear, using of a semi-log functional form allows us to estimate income as a linear function.

If there are n individuals in the sample, the income of an individual i , and generated from k variables, is denoted $Y_i = f(X_{i1}, X_{i2}, \dots, X_{ik})$, $i = (1, \dots, 2, \dots, n)$, hence $[1/n \sum Y_i]$ is the arithmetic mean income. The list of determinants of rural household income in Burundi seems to be long, but not all factors significantly impact to rural income. That theory is tested by running 3 rounds of model specifications. The results are presented in columns (1), (2), (3) in table 5.

Restrictions are imposed, allowing running three separate regression models (1), (2), and (3). Both quantitative variables and dummies variables are maintained throughout, which in essence, can be interpreted as a linear income function of those quantitative variables, with a different intercept for each model (Kennedy, 2003, pge 252). Using dummy variables is inevitable in estimating rural income due to the lack of quantitative details on explanatory variables on hand. For example, the household data records household primary cash crops, but no information on the quantities produced by a household. The data also lists household that generate their primary income from cash crops without any indication on which cash crop generates more revenue. Although the

results may be spurious, dummy variables allow one to obtain efficient estimates of parameters while effectively imposing restrictions.

At the beginning (column 1) any variable thought to impact rural household income is included. Some are statistically significant but others are not. With information provided by the survey data, and common knowledge of household characteristics, it is possible to impose restrictions on the original function. The second round of restrictions resulted in the coefficients presented in column (2) of table 5. The second round of restrictions was imposed resulting in coefficients presented in column (3). At each round of restriction, F-test is performed using a chow test in the form of:

$$\frac{(SSE^{\text{restricted}} - SSE^{\text{unrestricted}})/J}{(SSE^{\text{unrestricted}})/(N-K)}$$

In this test, SSE stands for Sum of Square Errors, whereas J is the number of restrictions, N is the number of observations, and K is the number of parameters in the regression.

The values of these F-statistics are very small, leading to conclusion to fail to reject the null hypothesis with regard to the restrictions imposed.

Table 5 Estimated Household Income¹⁶ Generation Function for Rural Burundi

VARIABLES	ESTIMATED COEFFICIENTS (Standard Errors)		
	Model 1	Model 2	Model 3
Intercept	10.72188* (0.18504)	10.79081* (0.18517)	11.10785* (0.10792)
Gender	0.22210* (0.04171)	0.24397* (0.004188)	0.23851* (0.04155)
Age	-0.00293 (0.00596)	-0.00125 (0.00600)	-0.00645* (0.00117)
Age square	-0.0000446 (0.0000605)	0.0000557 (0.00006105)	
Literate	0.19066* (0.03157)	0.19718* (0.03178)	0.19497* (0.03177)
Household Size	0.07958* (0.00689)	0.07154* (0.00694)	0.07393* (0.00633)
Not-Displaced	0.34451* (0.08251)	0.35046* (0.08302)	
Displaced due to Insecurity	0.25067* (0.08801)	0.25504* (0.008855)	
Displaced due employment	0.02100 (0.111912)	0.04772 (0.11994)	
Displaced for other reasons	0.30570* (0.15536)	0.29149* (0.015638)	
In-house running water	0.09158 (0.11192)	0.07608 (0.11274)	
Large Farm-Animals	0.0309* (0.01330)	0.03090* (0.01337)	0.03322* (0.01338)
Other animals	0.00827* (0.00282)	0.00974* (0.00283)	0.00999* (0.00284)
Total Farm-land (Acres)	0.00250* (0.00123)	0.00259* (0.00124)	0.000255* (0.00124)
<i>Implied Income Generating Cash crops</i>			
Coffee	0.17118* (0.03557)	0.02648 (0.06019)	
Banana	0.14807* (0.33244)	0.010663* (0.05710)	
Potatoes	-0.11725* (0.04237)	-0.11183* (0.6752)	
Other cash crops	0.06672* (0.01899)	0.05233* (0.02840)	
<i>R-Square</i>	<i>0.2231</i>	<i>0.2125</i>	<i>0.2051</i>
<i>Adjusted R-Square</i>	<i>0.2150</i>	<i>0.2044</i>	<i>0.1991</i>

¹⁶ Percentage of rural income (Y) is the dependent variable. A change in a given explanatory variable (X) results in percent change %ΔY equal to the corresponding coefficient (β^{OLS}), unless a variable is a dummy in which case %ΔY is given by $e^{\beta} - 1$.

*10% Significant

• Sample size (N)= 3761

MORE VARIABLES : <i>Reported Primary Source of Income</i>	ESTIMATED COEFFICIENTS (Standard Errors)		
	Model 1	Model 2	Model 3
Sales of cash crops	-0.08197 (0.05764)	-0.015309* (0.07904)	-0.06797 (0.05731)
Sales of produce	-0.12386* (0.06926)	-0.16814* (0.06917)	-0.017619* (0.06924)
Salaries	0.59859* (0.08636)	0.50756* (0.08582)	0.48948* (0.08588)
Small Business	0.26943* (0.07111)	0.21453* (0.07085)	0.21344* (0.07089)
Labor	-0.03579 0.06269	-0.11628* (0.06190)	-0.12017* (0.06185)
Other Sources	-0.04469 (0.05952)	-0.11729 * (0.05871)	-0.13182* (0.05872)
Location Dummies (Provinces)			
Bubanza	0.14137 (0.10344)	0.15415* (0.10338)	0.27563* (0.09936)
Bujumbura Rural	0.18579* (0.09662)	0.16285* (0.09662)	0.22662* (0.09013)
Bururi	0.13458 0.09406	0.09614 (0.09439)	(0.19688* (0.09192)
Cankuzo	0.41113 (0.11093)	0.11010 (0.11089)	0.24406* (0.10754)
Cibitoke	0.13547 (0.09449)	0.14870 (0.09419)	0.28147* (0.08970)
Gitega	-0.13004 (0.08749)	-0.08839 (0.08753)	0.01821 (0.08230)
Karuzi	-0.55812* (0.09749)	-0.52237* (0.09697)	-0.38967* (0.09208)
Kayanza	-0.49718* (0.08851)	-0.44427* (0.08814)	-0.33185* (0.08332)
Kirundo	-0.61418* (0.09040)	-0.60146* (0.09052)	-0.47328* (0.08555)
Makamba	0.10520 (0.10046)	0.08628 (0.10056)	0.18264* (0.09563)
Muramvya	0.01569 (0.09892)	0.06774 (0.09923)	0.18641 * (0.09635)
Muyinga	-0.42260* (0.09268)	-0.39698* (0.09225)	-0.28140* (0.08756)
Mwaro			0.13004 (0.10131)
Ngozi	-0.55600* (0.08788)	-0.49501* (0.08763)	-0.37566* (0.08303)
Rutana	0.06456 (0.10251)	0.06978 (0.10261)	0.17437* (0.09860)
Ruyigi	-0.11732 (0.10101)	-0.12109 (0.10133)	

5.2.3 Interpretation of the Results

The dependent variable “household income” in the estimated function $\ln(Y) = \alpha + \beta X + \varepsilon$, is expressed as function of a set of both quantitative (example: age, household size, total farm-land, farm animal, etc) and qualitative (dummies) variables. Income is estimated as semi-logarithmic function where a one-unit change in a given explanatory quantitative variable (X) triggers a percentage change ($\% \Delta$) in income Y equal to the corresponding coefficient (β_{OLS}). In the case of a dummy variable, the percentage change ($\% \Delta$) in the dependent variable is equivalent to $e^{\beta} - 1$.

One important observation from the results presented in table 5, is an exceptionally large intercept as compared to other parameter, but that is expected since we are estimating a semi-log function with the majority of explanatory variables being dummies. Keep in mind the parameter values presented here do not indicate the level of household income, but rather a percent change in household income as a result of change of the variable.

As our original goal is to analyze the impact of coffee and other cash crops, it is noteworthy to pay attention to percentage change in income resulted from the fact a household farm coffee, banana or other cash crops. Although coffee and banana are cash crops widely found in rural Burundi, we can not say with a degree of certainty (within 10 degree of confidence) that farming those cash crops would indicate that the household is likely to generate higher income. In fact it appears in some case, household coffee farming tends to have declining income. This is however hard to determine the degree at which households are affected by cash crop farming since the data does not indicate any variation in farming in terms of acres dedicated to a specific crops, or quantity of crop

planted or harvested. With missing quantitative information, we decide (column 3) to examine the impact on income for household generating primary revenue from selling cash crop without regard of which cash crop farmed.

Personal attributes such as gender and literacy appear to play a big role in rural household income. In addition, the provincial coefficients indicate that location have an effect on the income. For instance, household located in northern part of the country (Ngozi, Muyinga, Kirundo, Karuzi, and Kayanza) are at greater disadvantage. Not surprisingly, the salaried work appears to be the major contributor to rural income. Ceteris paribas, if a household generates primary revenue from salary, the percentage change in income is over three times higher than that of a counterpart with similar attributes generating income other sources. This is in line with the finding of Ngaruko and Nkurunziza (2000).

5.3 Decomposition of Income Inequality

This study represents the first attempt to effectively dissect the extent of income inequality between and within households in Burundi, using a computational method which builds on Shorrocks framework of shapely value decomposition. Shapley value regression-based decomposition of inequality suggests that equally distributed income factors make no contribution to inequality. Shorrocks' framework has been used in the

past to study inequality in other countries [Adams (2002), Morduch and Sicular (2002), and Wan (2004)], but this is the first regression-based inequality study for Burundi.

Mathematical models have become common tools in explaining gaps between and within households, and subsequent exogenous forces that affect household income. Exogenous forces are natural forces such as geography and other external shocks, and government policies arbitrarily imposed upon households.

The method of regression-based decomposition was first introduced by Oaxaca (1973) and Blinder (1973), and further development has been done since then. Some of the most recent studies were done by Wan and Zhou (2004) in an attempt to decompose income inequality in rural China. Income decomposition framework has also been used by Shorrocks (1982, 1983, 1984, 1999), Bourguignon (1979), Kanbur and Zhang (1999),

Following Shorrocks (1999), regression-based decomposition can be used to decompose household inequality in Burundi using factors such as resource endowments and other determinants that often impact income.

Following Fournier (2001), Shorrocks (1999), Morduch and Sinclair (1998), this regression-based decomposition requires very extensive calculations involving the process of replacing variables by their sample means first and permutations at different stages. Lets take the general income generation function above $Y_i = f(X_{i1}, X_{i2}, \dots, X_{ik})$. Knowing that X_s are different for different households, replacing X_k by its sample mean would eliminate any differences caused from X_k among households. After this replacement, we re-compute and the resulting income, denoted by Y_k , differs from household to household due to X_s other than X_k . Conventionally, inequality in Y_k , denoted by $I(Y_k)$ is due to differences in X_s excluding X_k . According to methods

proposed by Shorrocks (1999), the contribution of X_k to total inequality, C_k , can be obtained as $I(Y) - I(Y_k)$ for $k = 1, \dots, K$. Shorrocks (1999) terms these contributions the first round effect.

The secondly, inequality caused by X 's other than X_k and X_j is obtained by replacing any combination of 2 variables X_k and X_j with their sample means and re-computing $Y_{kj} = f(X_1, X_2 \dots u_j, u_k)$. The second round contribution can be written as $C_k = I(Y_j) - I(Y_{jk})$ for $k, j = 1, \dots, K$ and $(k \neq j)$.

By the same token, the third round contribution can be obtained by replacing any combination of 3 variables by their sample means, and re-computing $C_k = I(Y_{ij}) - I(Y_{ijk})$ for $k, j, i = 1, \dots, K$ ($k \neq j \neq i$). In the third round, there are $K-2$ possible combinations of 3 sample means as long as 2 variables, x_i and x_j , remain invariably present. This sequences continues until all X s are replaced by their sample means and an unvarying income function $Y = f(u_1, u_2 \dots u_j, u_k)$ in round K .

At each round, it is possible to have multiple C_k , which are averaged first and then averaged across all rounds (Shorrocks, 1999). The above process is done for each variable of the function. (see Appendix 2 for details).

What about the residual term? For the function $Y = \alpha + \beta X + \varepsilon$ we may not be able to analyze the residual contribution. The pitfalls and proposed solution on how to treat the residual term ε have been discussed in (Wan, 2002). As discussed in Wan (2002), this thesis relies on conventional wisdom that the disturbance term neither affects the mean of the dependent variable, nor do they effect of the trend decomposition results.

Accordingly, we overlook the residual term because it is not explainable by the structural income generating function $Y = \hat{Y} = \alpha + \beta X$. While not ignoring that ε contains useful

information which, once determined, can be useful for policy-makers in treating inequality contributing factors, we think of it as representing factors other than those included in the decomposition.

This study seems to leave 13.5 percent of inequality to the residual term, indicating more research needs to be undertaken in order to include more explainable factors. Nonetheless, this model can shed some lights on how much the estimated model explains total inequality. If the model only explained 20 percent of total inequality, leaving the rest to the residual term, policy-makers may well be advised to look elsewhere for forces that cause inequality other than the decomposition results. In this study, the residual term is dealt with according to the procedure proposed in Wan (2002, 2004). With the semi-log income generation function, the contribution of the residual term will be computed as the difference between total inequality and the sum of contributions of all explanatory variables.

The inequality measure used here is coefficient of variation (CV). While this measure is useful and easy to compute, it has been criticized for its violation of the principle of income transfer. It does not show much, if any, distributional information along the curve. While it is a good indication of general inequality, it doesn't clearly indicate whether there is more disparity at lower level or higher level of income in the same way as Theil and Gini methods do. Nevertheless, it has been frequently used in literature as a sufficient measure of within-groups inequality.

Table 6 Contributions to Rural Household Income Inequality (Coefficient of Variation method used)

Variable	Inequality(CV)	Percentage Contribution to Total Inequality
Gender	0.002816886	7.15
Age	0.001984829	5.04
Literate	0.002909985	7.39
Household Size	0.005940254	15.08
Large Domestic Animals	0.000764423	1.94
Other Animals	0.0009297	2.36
Farm Land	0.000137993	0.35
<i>Source of Income Dummies</i>		
Sales Cash Crops	0.000212225	0.54
Sales of Produce	0.000568789	1.44
Salary	0.002922988	7.42
Small businesses	0.001532995	3.89
Manual Labor	0.000475168	1.21
Other Income Sources	0.000807053	2.05
<i>Province Dummies</i>	0.012042134	30.57
All Variables	0.034045424	86.43
TOTAL INEQUALITY	0.039392565	100.00

5.3.1 Decomposition Results and discussion

The total inequality is measured by method of coefficient of variation (CV), but Gini Coefficient and Theil-L can also be used. The total inequality that is explained by data is 0.03939 representing 86.43 percent of all inequality that can be explained using

this method as presented in table 6. The remaining 13.57% of inequality is unexplainable and should correspond to the residual term. Figure 11 shows proportional contribution of each variable to total inequality. These inequality values are obtained using household-level data, therefore are expected to be more indicative of the household income gap.

Income levels in rural Burundi are generally very low especially in the Northern provinces where coffee produced (table 5). Therefore, any factor that contributes positively to income for the majority of household may tend to close the gap between those with low income and the lucky few who have higher income. However, while earning more money is desirable, it may not be sufficient for closing the gap if everyone does not have equal access that source of income. Limited access to income opportunities helps to explain the higher coefficient of inequality attributed salaries. Since more than 80 percent of work force earning a salary is employed by the government know for favoring patronage linkage rather competence, not everyone would have equal opportunity according to (Nkurunzira, Ngaruko 2005, Lemarchand, 1994). Note that there are only 4.6 percent earning a salary.

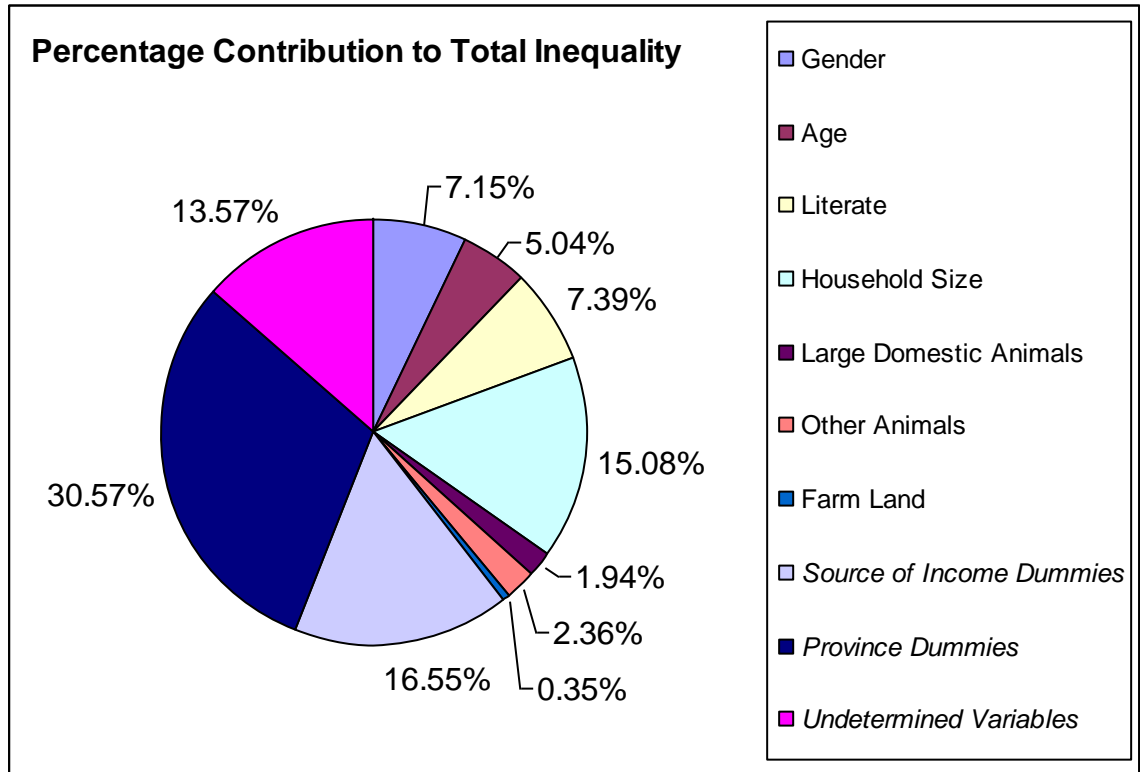
Provinces, used as proxy for location, also appear to contribute greatly to rural income inequality. This can be a result of many factors including natural conditions (climatic conditions, soil, etc), and discriminatory policies. Note that geographic factors cannot be easily added or taken away. Geographic conditions determine the type of infrastructures possible in a given regions. Transportation infrastructures have much to do with access or isolation to market, and development of other infrastructures such as health and education. As noted in Wan and Zhou (2004) geography is notably associated with natural resource endowments such as water, weather conditions, and soil quality all

of which are particularly crucial for farming lifestyle, but are neither tradable nor removable. Policy makers can reverse this trend by building good transportation infrastructures linking these regions to others in the country.

Land, domestic animals, sales of food product, and cash crops have lower contribution to inequality. Household headed by literate male increase the level of household inequality. Further research could analyze whether the higher inequality between households related to being literate is increased depending on locations. If that is proven, then public infrastructures clustered in one location favor that particular location. One should consider the impact of various variables taken together for better policy formulation. For instance, the inequality contribution of gender, literature, location taken individually seems to be small but when all these factors are taken together they become alarmingly high. This means for example that literacy for adult women may increase their earning capacity.

Also worth mentioning is the impact of the household size on income distribution in farming communities. We found that it is the second distributor to inequality. This can be argued differently. It is normal to think that a household with more members would have a higher combined income, hence causing a disproportion on income distribution across the village. The opposite argument is that more household members have to share scarce resources (food, land, school fees) leaving such households prone to extreme poverty.

Figure 11 proportional contribution to Household Total Inequality



6 DISCUSSION AND CONCLUDING REMARKS

Throughout this analysis, it was stipulated that coffee plays a crucial macroeconomic role, and we set out to examine its impact on smallholding household farming. Burundi has had fragile relations between the Hutus and Tutsi ethnic groups and structural imbalance between power holders, and coffee proceeds have been used as tool to reward supporters and humble the opposition at the expense of rural farmers. This analysis points out two interrelated aspects of drawback with regard to coffee farming.

First, Burundi is a landlocked nation with meager resources and its economy can not function without funding from external lenders. In economic sense, lenders would not be inclined to lend unless the borrower show the ability to pay back or service the loan (periodic interest). Accordingly, the only viable guarantee for the government of Burundi that can be used to secure external loans is the export of coffee produced by millions of farmers. Government, whether it is the current borrower or inherits the debt from its predecessors, have to pay back its lenders and at the same time satisfy its supporters in order to stay in power. For any government to accomplish such a delicate mission, it must acquire coffee at the lowest cost, and hope to sell it at higher price at the world market; leaving rural farmers economically blocked and politically impotent despite that they are the motor of this economy.

Second, because government regimes --past and present-- must keep their urban non-farm sector supporters from slipping into a rural-like economic hardship, they must be able to supply better social services (health, education, transportation, security, communication, and housing). In order to provide such services with they scarce resources, state-controlled firms are created. State-controlled firms however, operate poorly as their economic efficiency is wrinkled by state subsidies. Nonetheless, provision

of state-controlled services persists because that is how government cronies can remain cooperative.

The above arguments are supported by both our income estimation results and income inequality decomposition. Selling cash crops to generate the primary revenue is neither the biggest determinant of household income nor the biggest direct contributor to household income inequality. Some farmers continue to devote resource to cash crops because they do not have other income generating alternatives, or because they government enforces it.

We found that provinces and salaries are the biggest contributor to income inequality. And further speculation can be made to link contribution of coffee to the effect of salaries and provinces. We found that provinces are the second biggest contributor, and accounting for more than 30 percent of total inequality. Coincidentally, provinces in which most coffee is produced have higher concentration of households earning less income than their counterparts who live elsewhere in the country. It can then be speculated that coffee is as a proxy for state taxation which negatively affect those who devote their scarce resources to coffee farming.

Salaries are found to be the third biggest contributor with 7.4% of total income inequality. It can be linked to the government ability to generate funds through coffee exports. In order for government regimes to keep their cronies satisfied or at least better than rural farmers, they must maintain a large pool of employment. Ngaruko and Nkurunziza (2000) find that state-owned or partially controlled firms own 77% of GDP in 1996. The study also finds that public employment represent 80% of all full-time employment in modern sector. Other factors aside, we found (table6) that salaries

contribute over twice to income as much as any other household activities. All these facts point to many ways in which government regimes maintain themselves in power at the expense of coffee producers.

These income inequalities have created sufficient conditions in which, those who are discriminated from economic and political opportunities can easily recruit followers in farming communities, hence making Burundi a conflicts-prone country. To resolve these resources distributional issues, the government regimes, regardless of ethnic affiliation, should create equitable mechanisms to ensure not only a high and fair return on this valuable commodity produced by thousands of rural farmers, but also must grant farmers political power to constrain extractive policies.

REFERENCES

- Acemoglu, D., Johnson, S., and Robinson, A. J. (2000). *The Colonial Origins of Comparative Development: an empirical Investigation.* Forthcoming American Economic Review.
- Acemoglu, D., Johnson, S., and Robinson, A. J. (2001). *Reversal of Fortune: Geography and Institutions in the making of the Modern World Income Distribution.* Unpublished
- Acemoglu, D., Johnson, S., and Robinson, A.J., (2001). *An African Success Story: Botswana.* Department of political science and Department of Economics at MIT, and Department of political science University of California at Berkeley.
- Adams, R.H. (2002). *Nonfarm Income, Inequality, and Land in Rural Egypt,* Economic Development and Cultural Change 50:339-63.
- Alesina, A. and Dani, R. (1994). *Distributive Politics and Economic Growth* The quarterly Journal of Economics, Vol.109, no.2
- Atkinson, A. B (1987). *On the Measurement of Poverty.* The Econometric Society, Vol55, No 4
- Ballentine, H and Nitzschke, H (2003). *The Political economy of Civil War and Conflict transformation.* Research Center for Constructive Conflict Management.
- Bellantini, K and Sherman, J (2003). *The Political Economy of Armed Conflicts: Beyond Greed and Grievance.* Boulder: Lynner Rienner (ed)
- Bates, H. B (1981). *Markets and States in Tropical Africa: The Political Basis of Agricultural Policy.* Berkeley: University of California Press
- Bates, H. B. (1999). *Ethnicity, Capital formation, and Conflicts.* CID, working paper No.27.

- Bates, H. B. (2004). State Failure in Africa. Center for International Development, Harvard University, Cambridge, MA.
- Bates, H.B (2006). Institutions and Development. Oxford University press
- Barkan, D. J. (1994). Beyond Capitalism vs. Socialism in Kenya and Tanzania. Boulder: Lynne Rienner, Ed
- Berdal, A. M and Malone, M, D (2000). Greed and Grievance: Economic Agendas in Civil wars. Boulder: Lynne Rienner, Ed.
- Berdal, A. M and Nitzschke, H (2005). Economic Agendas in Civil Wars. What We Know, and What we Need to Know. Discussion paper, WIDER
- Blinder, A. S (1973). Wage Discrimination: Reduced Form and Structural Estimates. Journal of Human Resources 8, 436-455
- Bourguignon et al (2001). Fast Development with Stable Income Distribution: Taiwan 1979-1994. Review of Income and Wealth 47, 139-163
- Brachet, W and Wolpe, H (2005). Conflict-Sensitive Development Assistance: The Case of Burundi. World Bank
- Bundervoet, T. (2006). Estimating Poverty in Burundi. Working paper.
- Bundervoet, T., Verwimp, P., and Kresh, R. (2007) Health and Civil War in Rural Burundi. IZA Discussion Paper.
- Chantreuil F. and A. Trannoy, (1997), Inequality Decomposition Values, Mimeo, THEMA, Université de Cergy-Pontoise.
- Collier, P. (2007) Post-Conflict Recovery: How Should the Strategies of the African Development Bank be Distinctive? Working Paper.
- Collier, P(1998) The Political Economy of Ethnicity. World Bank
- Collier,P and Hoeffler, A (2000). Greed and Grievance in Civil War. World Bank, Working Paper

- Collier, P and Hoeffler, A (2002b). *On the Incidence of Civil war in Africa.* Journal of Conflict Resolution, 46, 15-28
- Deaton, A. (1999). *Commodity prices and development in Africa.* Journal of Economic Perspectives, Vol.13, No3.
- Dutta, I and Mishra, A. (2005) *Does Inequality leads to Conflicts?* WIDER, Working Paper.
- Easterly, et all (2005). Development, Democracy, and Mass Killings, Working paper
- Easterly (2000). Can Institutions Resolve Ethnic Conflicts? World Bank
- Fearon, J (2004). *Why Do Some Civil Wars Last So Much Longer Than Others?* Journal of Peace Research 41, 3 (May 2004), 275-301.
- Fearon, J, and Laitin,, D. (2000).*Violence and the Social Construction of Ethnic Identity.* International Organization 54, 4 (Autumn 2000), 845-877.
- Fearon, J, and Laitin,, D. (2003). *Ethnicity, Insurgency, and Civil War.* American political science Review, (97), 75-90.
- Fei et Al, 1978. *Growth and the Family Distribution of Income by Factor Components.* Quarterly journal of Economics, Vol 2, No1
- Fournier, M (2001). *Inequality decomposition by factor component : a “rank-correlation” approach illustrated on the Taiwanese case.* University d’Auvergne
- Hatungimana, A. (2005). *Le Café au Burundi au XXe Siecle.* Karthala, Ed
- Gahama, J (1983). *Le Burundi Sous L’Administration Belge.* Paris, Karthla, Ed
- Hecht, R. (1983). *The Ivory Coast Economic ‘Miracle’: What Benefit for Farmers?.* Journal of Modern African Studies, Vol.21, No1
- Kanbur, R., and Zhang, X (1999). *Which Regional Inequality? The Evolution of Rural–Urban and Inland-Coastal Inequality in China from 1983 to 1995’.* Journal of Comparative Economics 27:686-701.

- Kimola, I. (2004). *The International Coffee Market and the Rwandan Genocide*.
Minnesota University
- Kimonyo, J. P and Ntiranyibagira, D (2007). *Reform of the Coffee Sector in Burundi: Prospects for Participation, Prosperity and Peace*. International Alert
- *Diagnostic Trade Integration Study: Burundi*. World Bank, 2003
- Knight, J., and L. Song (1993). 'The Spatial Contribution to Income Inequality in Rural China', *Cambridge Journal of Economics* 17:195-213.
- Burundi's Institute of Economics Studies and Statistics (ISTEEBU)
- LeBillon, P. (2001a). *Political Ecology of War: Natural Resources and Armed Conflicts*. Political Geography.
- LeBillon, P. (2003). *Buying Peace or Fueling War: The Role of Corruption on Armed Conflicts*. Journal of International Development, Vol 15.
- Lemarchand, R. (1994). *Ethnocide as a Discourse and Practice*. Cambridge Univ. Press, Ed.
- Loft, F and Loft F, (1998). *Background to the Massacres in Burundi*. Review of African Political Economy, No. 43
- Love, R (1999). *Coffee Crunch*. Review of African Political Economy, Vol. 26, No. 82
- Jackson, T. (2000). *Equal Access to Education: A Peace Imperative for Burundi*. Int'l alert, London, England; and Swedish Int'l Development Authority (SIDA).
- Justino, P. (2007). *Carrot or stick? Redistributive transfers versus policing in contexts of civil unrest*. HiCN Working Paper.
- McMillan, M (2001). *Why Kill the Golden Goose? A Political-Economy Model of Export Taxation* The Review of Economics and Statistics, Vol. 83, No. 1 (Feb., 2001), pp. 170-184

- Morduch, J., and T. Sicular (2002). 'Rethinking Inequality Decomposition, with Evidence from Rural China', *The Economic Journal* 112:93-106
- Ndayikengurukiye, C. (2000). La gestion de risque de prix liée à la commercialisation du café au Burundi. Working paper.
- Ndulu, J. B and O'Connell, A .S. (2000). Explaining Africa Economic Growth project. Working paper
- Ndikumana, L. (2005). Distributional Conflict, The State, and Peace building in Burundi. Dept of Economics, University of Massachusetts, Amherst.
- Ngaruko, F. and Nkurunziza, J. (2000). An Economic Interpretation of Conflict in Burundi. Journal Of African Economies, Vol 9, No 3.
- Ngaruko, F. and Nkurunziza, J. (2004). Political Economy of Reform in Polarized and War-Prone Societies: The Case of Burundi. World Bank.
- Nkurunziza, J. and Ngaruko, F. (2002). Explaining Growth in Burundi: 1960-2000. Working Paper.
- Nkurunziza, J. (2002). Exchange rate policy and the parallel market for foreign currency in Burundi. The African Economic Research Consortium.
- Nugent, B. J and Robinson, A. J. (2005). Are Factors Endowment Fate? Dept of Econ, USC, Dept of Gov and institute of quantitative Social Science, Univ. Of Harvard.
- Oaxaca, R. L (1973). Female-male wage differences in Urban Labour Market. International Economic Review 14, 693-709
- Prunier, G (1994). Burundi: A Manageable Crisis? Writenet

- Reno, W. (1995). *Corruption and State Politics in Sierra Leone*. Cambridge University press.
- Reno, W (1998). *Warlord Politics and the African State*. Boulder: Lynne Reinner (Ed)
- Robinson, J. and Verdier, T. (2003). *The Political Economy of Clientelism*. Dept. of Political Science and dept. of Economics, UC Berkley.
- Ross, M (2003). *What Do We Know About Natural Resources and Civil War?* Department of Political Science, University of California, Los Angeles
- Sachs, D. J. (2005). *The End of Poverty: Economic Possibilities for Our Time*. The Penguin Press, Ed
- Sachs, D. J., and A Warner (1995). *Natural Resource Abundance and Economic Growth*. National Bureau of Economic Research. Working paper
- Shorrocks, A. (1999). *Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value* . University of Essex
- Shorrocks, A. (1984). *Inequality Decomposition by Population Subgroups*. Econometrica. Vol 56, No 6
- Shorrocks, A. (1982). *Inequality Decomposition by Factor Components*. Econometrica 50, 193-211
- Shorrocks, A (1983). *The Impact of Income Components on the Distribution of Family Incomes*. The Quarterly Journal of Economics, Vol. 98, No. 2, (May, 1983), pp. 311-326

- Sick, D. (1997). *Coping with Crisis: Costa Rican Households and the International Coffee Market.* *Ethnology*, Vol. 36, No. 3 (Summer, 1997), pp. 255-275
- Sokoloff, L. K. and Zolt, M. E. (2005). *Inequality and Evolution of Institutions of Taxation: Evidence from the Economic History of the Americas.* University of California, LA and NEB.
- Uvin, P (1999). *Ethnicity and Power in Burundi and Rwanda: Different Paths to Mass Violence.* *Comparative Politics*, Vol. 31, No. 3, (Apr., 1999), pp. 253-271
- Wan, G. and Zhou, Z. (2004). *Income Inequality in Rural China. Regression-Based Decomposition using Household Data.* WIDER
- Wan, G (2001). *Changes in Regional Inequality in Rural China: Decomposing the Gini Index By Income Sources.* *Australian Journal of Agricultural and Resources Economics* 43, 361-381
- Wan, G (2004). *Accounting for Income Inequality in Rural china: Regression-Based approach.* *Journal of Comparative Economics* 32, 348-363
- Wantchekon, L. (1999). *Why do Resource Dependent Countries Have Authoritarian Governments?* University of Yale
- World Bank, 2004. *Burundi: Etude Diagnostique sur L'intégration Commercial*
- World Food Program

Appendix A: List of Variables

Table 7 List of variables Used for Income Estimation

Label	Variable	Description
Income	Total Reported Household Income	Reported income generated from all sources. There are a total of 21 sources from which a household can choose 4 in a ranking order.
Gender	Household Head Gender	1=if the household's head is male; and 0=otherwise
Age	Household Head Age	The head of household age range from 1 to 95; 96 if he/she is older than 95 years; 99 if the age is not known
Literacy	Household Head literacy	The Head of household is literate if he can read or write at least a sentence in Kirundi or French
Household Size	Size of Household	Total number of people living in a household
Displaced	Member of Household Relocated	At least a member of household have been relocated due to security raisons in the past 2 years
Capital	Physical Capital	Physical asset owned by a household and can be used to generated farming income (hoe, pruning knife, ax, faucile, machete)
Cows	Cows per Household	Number of cows owned by household
Small Livestock	Small Livestock per Household	Number of small animals owned by a household. Most common are goat and Poultry
Land (.01 ha)	Land Used by Household	Total area land (rented or owned) cultivated by a household
Coffee	Main Cash Crop is Coffee	1= If the main cash crop is coffee; 0= otherwise
Banana	Main Cash Crop is Banana	1= If the main cash crop is banana; 0= otherwise
Cassava	Main Cash Crop is Cassava	1= If the main cash crop is cassava; 0= otherwise
Tea	Main Cash Crop is Tea	1= If the main cash crop is tea; 0= otherwise
Sales Cash crop	Primary Source of Income is sale of Cash Crop	1=If selling cashcrops is the primary source of income for the household; 0= otherwise
Sale of Food	Primary Source of Income is sale of food	1=If selling food is the primary source of income for the household; 0= otherwise
Entreprises	Primary Source of Income is off-farm activities	1=If primary household income is generated from temporary work, small commerces, or any activity not taking place on family's; 0= otherwise
Salaries	Primary Source of Income is Salaries	1= If a household earns its primary income from salaries, or pension); 0= otherwise
Brewery	Primary Source of Income is Brewery	1= If household earns its primary income from brewing beverage from banana, sorghum, wheat; 0= otherwise
Provinces	Provinces	There are 16 provinces. Percentage of total respondent is given for each province

Appendix B: Decomposition Procedure

For illustration, let's use a function of 6 variables,

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$$

We know that X s are different for different households. Replacing X_1 by its sample-mean would eliminate any differences caused by X_1 among different households. After this replacement, we can re-compute Y and the resulting income, denoted by Y_{x_1} , differs from household to household due to X s other than X_1 . Conventionally, inequality in Y_{x_1} , denoted by $I(Y_{x_1})$ is due to differences in X s excluding X_1 . According to methods proposed by Shorrocks (1999), the $C_1(X_1)$ contribution of X_1 to total inequality, can be obtained as $I(Y) - I(Y_{x_1})$. This contribution is known as the first round effect.

Similarly, replacing 2 variables by their sample-means eliminates income differences caused by those variables. After replacing the two variables, we can re-compute Y and the resulting income, denoted by $Y_{x_2x_1}$, will differ from household to household due to X s other than X_1 and X_2 . The second round contribution of X_1 denoted $C_2(X_1)$ is the arithmetic average of combination of 2 variables including X_1 such that $C_2 = (Y_{x_2 \dots x_6}) - I(Y_{x_j x_1})$. For $j = 2 \dots 6$.

Third round of inequality is obtained by replacing any combination of 3 variables by their sample means. Third round contribution of X_1 denoted $C_3(X_1)$ is the arithmetic average of $I(Y_{x_i x_j}) - I(Y_{x_i x_j x_1})$. For $i \neq j = 2 \dots 6$. The next round, 4 variables are replaced by their sample means, and their contribution is a result of arithmetic average computed in the same sequence as above. The sequence continues until all X 's are replaced by their samples mean in final round. At each round, the contributions are averaged and the sum of all rounds is then averaged.

Variable: X_1

Round 1 contribution: $\{C_1(x_1)\} = I(y) - I(Y_{x_1})$

Round 2 contribution: $\{C_2(x_1)\} = I(Y_{x_2}) - I(Y_{x_1x_2})$
 $I(Y_{x_3}) - I(Y_{x_1x_3})$
 $I(Y_{x_4}) - I(Y_{x_1x_4})$
 $I(Y_{x_5}) - I(Y_{x_1x_5})$
 $I(Y_{x_6}) - I(Y_{x_1x_6})$

Round 3 contribution: $\{C_3(x_1)\} = I(Y_{x_2x_3}) - I(Y_{x_1x_2x_3})$
 $I(Y_{x_2x_4}) - I(Y_{x_1x_2x_4})$
 $I(Y_{x_2x_5}) - I(Y_{x_1x_2x_5})$
 $I(Y_{x_2x_6}) - I(Y_{x_1x_2x_6})$
 $I(Y_{x_3x_4}) - I(Y_{x_1x_3x_4})$
 $I(Y_{x_3x_5}) - I(Y_{x_1x_3x_5})$
 $I(Y_{x_3x_6}) - I(Y_{x_1x_3x_6})$
 $I(Y_{x_4x_5}) - I(Y_{x_1x_4x_5})$
 $I(Y_{x_4x_6}) - I(Y_{x_1x_4x_6})$
 $I(Y_{x_5x_6}) - I(Y_{x_1x_5x_6})$

Round 4 contribution: $\{C_4(x_1)\} = I(Y_{x_2x_3x_4}) - I(Y_{x_1x_2x_3x_4})$
 $I(Y_{x_2x_3x_5}) - I(Y_{x_1x_2x_3x_5})$
 $I(Y_{x_2x_3x_6}) - I(Y_{x_1x_2x_3x_6})$
 $I(Y_{x_2x_4x_5}) - I(Y_{x_1x_2x_4x_5})$
 $I(Y_{x_2x_4x_6}) - I(Y_{x_1x_2x_4x_6})$
 $I(Y_{x_2x_5x_6}) - I(Y_{x_1x_2x_5x_6})$
 $I(Y_{x_3x_4x_5}) - I(Y_{x_1x_3x_4x_5})$
 $I(Y_{x_3x_4x_6}) - I(Y_{x_1x_3x_4x_6})$
 $I(Y_{x_3x_5x_6}) - I(Y_{x_1x_3x_5x_6})$
 $I(Y_{x_4x_5x_6}) - I(Y_{x_1x_4x_5x_6})$

Round 5 contribution: $\{C_5(x_1)\} = I(Y_{x_2x_3x_4x_5}) - I(Y_{x_1x_2x_3x_4x_5})$
 $I(Y_{x_2x_3x_4x_6}) - I(Y_{x_1x_2x_3x_4x_6})$
 $I(Y_{x_2x_3x_5x_6}) - I(Y_{x_1x_2x_3x_4x_6})$
 $I(Y_{x_2x_4x_5x_6}) - I(Y_{x_1x_2x_4x_5x_6})$
 $I(Y_{x_3x_4x_5x_6}) - I(Y_{x_1x_3x_4x_5x_6})$

Round 6 contribution: $\{C_6(x_1)\} = I(Y_{x_2x_3x_4x_5x_6}) - I(Y_{x_1x_2x_3x_4x_5x_6})$