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Agriculture and poverty reduction:
A critical assessment of the
economic impact of the avocado
industry on smallholder farmers in
Giheta - Burundi

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Introduction

Agriculture is argued to be an important strategy for economic growth and poverty reduction, especially, during the early stages of development. The OECD (2006) report entitled “Promoting Pro-Poor Growth Agriculture”, for instance, indicates that very few economies around the world have achieved sustainable economic growth without agricultural and rural growth preceding or accompanying it.

Agriculture is regarded by many analysts as an engine of growth in that it can generate the resources needed in other sectors of the economy to feed and sustain the whole process of the economic growth (Irz 2006). Additionally, both theory and empirics have also shown that agriculture can play a crucial role in poverty reduction, especially, in poor countries (Christiansen and Kuhl 2006). In this vein, the OECD (2006) report argues that growth in agriculture tends to be pro-poor as it harnesses poor people’s key assets such as the land and labour, and creates a viable economy in rural areas where the majority of poor people live. However, the literature suggests that only small-scale agriculture can achieve a sustainable rural economic growth and its associated poverty reduction.

Identifying the characteristics and context of those agricultural activities that can contribute towards poverty reduction is then a critical issue and is the focus of this paper. The avocado industry in Giheta, Burundi is used in this study to illustrate the role that agriculture could play in poverty reduction especially in the context of high levels of poverty. Burundi experienced four decades of political instability and violent social conflict, two factors which have greatly deteriorated its economy and agricultural system. The country has been classified by the Multidimensional Poverty Index (MPI) among the ten poorest countries in the world and Giheta is one of the eleven communal districts of Gitega province, the second poorest province in Burundi (Bundervoet 2006). Employment in small-scale production is one of the most important livelihood activities in this district and the cultivation and sale of avocados is widespread in this district and has included commercial production and beneficiation in the form of oil extraction.

The few available studies have confirmed the avocado crop’s economic and market potentiality to stimulate rural development in developing countries (Van Wijk 2006; FAO 2000). Avocado production also represents an opportunity to diversify the rural agricultural sector which is, very often, dominated by one or two crops such as coffee, cocoa or tea in most developing countries. These traditional cash crops are subject to declining prices and when not exported, are of little use to either the producers or consumers in the countries in which they are produced (Van Wijk 2006). Further, unlike most other cash crops, studies have demonstrated the avocado crop’s high

nutritional value which makes the avocado “an important nutritional food source and one of the most nutritious and healthiest fruit in the world” (Van Wijk 2006:9); a quality that positions this crop to also contribute towards the reduction of malnutrition in poor countries.

Van Wijk (2006), for instance, has argued that avocado is the only fruit known so far that contains all the main nutrient elements in significant proportions such as proteins, lipids, vitamins, minerals, salt, sugars, carbohydrates and water. Bergh (1992) shows that there is substantial evidence to suggest that eating avocados may contribute significantly to resolving many major health problems such as overweight, heart disease, cancer, and stroke. For instance, Bergh (1992:5) indicates that avocado “provides about twice as high a proportion of our daily needs for three potent antioxidants vitamins C, E, and beta carotene” and it is also “rich in copper and iron, two mineral constituents of antioxidant enzymes” that the human body needs to defend itself against cancer, heart disease, arthritis, and eye cataracts. Further, Bergh (1992:6) mentions the results of a study jointly conducted by the School of Medicine of the University of California and Cambridge University in England which shows that “a 40 percent reduction in stroke risk was associated with an average daily increase in potassium consumption of about 400mg, the amount supplied by less than half an avocado”.

Likewise, an Italian epidemiological survey of 4903 people, quoted in Bergh (1992:6), shows that the monounsaturated fat found in avocado is also associated with lower blood pressure. In addition, Van Heerden (2008:1) indicates that the results of the study conducted at the Potchefstroom Institute of Nutrition at Potchefstroom University also show that avocados can be used successfully in weight-management programs. This excellent nutritional value of avocado has led the Australian Heart Foundation to certify this fruit as a “heart-healthy” food (Perez-Jimenez 2008). Avocado was hailed by the Heart and stroke foundation of South Africa as “heart mark” and was classified by the American Dietetic Association as a “functional food” that has many health benefits (Van Heerden 2008:1). Moreover, writing about the contribution of avocados in commercial baby food, Sears (1988), quoted in Bergh (1992:8), notes that “avocados contain more potassium than 45 other fruits, juices or vegetables ... and they are one of the only fruits or vegetables which contain monounsaturated fats, essential for baby’s development”. Sears (1988), quoted in Bergh (1992:8), further indicates that avocados contains more other important nutrients needed for infant development such as vitamin B1B2, niacin, folacin, potassium and magnesium per 15 gram intake than “any of the other frequently recommended fruits and vegetables and are second to the highest in many other vitamins and minerals”. In similar vein, the results of the study by Slater et al. (1973), quoted in Bergh (1992:4), shows that for instance one half of a “Hass” avocado contains a substantial percentage of the daily nutritional needs of a child aged seven to ten. Additionally, Knight (2002), quoted

in Perez-Jimenez (2008), contends that avocado oils are a highly valued cash crop for the cosmetic industry. They are used as a skin moisturizer, cleansing cream, makeup base, sun screen, lipstick, bath oil, and hair conditioner (Bergh 1992:1).

These attributes partly explain the reason why the avocado market and production have been rapidly increasing for the past four decades. The majority of researchers working on this crop propose that this rapid expansion of avocado production and consumption is likely to continue with new avocado markets being developed in the fastest emerging economies in the world such as China and Brazil.

This paper investigates the contribution of avocado production on the quality of life and livelihoods of small-scale farming households in the Giheta district of Burundi. It explores the extent to which the production of avocados benefit the income and well-being of small-scale farming households in Giheta and the role that both private and public sectors should play to support this. The paper comprises four sections in total. An attempt is made in the first section to review the relevant literature on the subject under investigation in this study. The second section presents the methodology used for conducting this study. The results from the quantitative and qualitative methods will, then, be presented separately in the third section. In section four, as Sandelowski (2000) recommends, both qualitative and quantitative results will be linked in the discussion of the main conclusions for this study. The policy implications will be also discussed in this section.

2.1 The role of agriculture in the process of economic growth

There is a significant body of literature on the role of agriculture in the process of economic growth. The key question in this literature is whether agriculture could rightly be regarded as an engine of the overall economic growth. There is no consensus in this debate as the literature provides conflicting evidence in answering the question. While some argue that the agricultural sector can drive the economic growth especially at the early stage of economic development, others contend that it is rather the economic growth which causes the agricultural growth and not other way around (Tiffin and Irz 2006:79). For instance a study on the US agricultural development by Gardner (2000) finds that income growth in the non-agricultural sector had played a crucial role in increasing the income in agricultural sector. Similarly, in their study on the Philippines' economy, Estudillo and Otsuka (1999) establish that the growth in the non-agricultural economy has been the main driving force of growth in agricultural wage rates in this country.

According to the advocates of agriculture as an engine of growth, food and labour are arguably two crucial resources which are exported from the agricultural sector to the rest of the economy. A study by Wichman (1995) investigating the relationship between agricultural growth, nutrition, and labor productivity finds that the agricultural growth increases food consumption, improves nutrition, and ultimately raises labor productivity in other sectors of the economy. Further, the proponents of this view also argue that the increase of the agricultural output results in low price of food which, in turn, spurs the economic growth in at least two main ways. First, it allows the owners of the means of production to pay lower wages and this is likely to increase the profitability and competitiveness of the industrial sector, savings and investments, as well as the creation of non-agricultural jobs. Second, the low price of food increases the savings of the net-purchasers of food and this raises incomes of these households which, subsequently, provide a market for domestically produced goods and services (Tiffin and Irz 2006; Byerlee et al. 2005).

The advocates of this view also argue that agriculture can supply the capital through direct and indirect taxes collected from the agricultural sector which can enable the state to finance industrial development, provides public goods, and develops effective infrastructures that the industrial sector needs to grow sustainably and competitively. Additionally, they also make a strong case that the scarcity of foreign exchange that poor countries experience and which restricts them to purchase capital goods and other imports needed for investment could be overcome by the agricultural surplus which can either substitute food imports or increases the exports (Tiffin and Irz 2006; Rangarajan 1982). These ties between agricultural performance and the overall economic growth are also explicitly acknowledged by the policymakers (cf. Plan National Agricole 1986:1508, quoted in Dorosh and Haggblade 1992).

2.2 The role of agriculture in poverty reduction

There is also debate on the role of agriculture in poverty reduction. As with the debate over growth, there is a school of thought which questions the role of agriculture in poverty reduction. Byerlee et al. (2005) provide a summary of five key points which constitute the agro-pessimist argument. First, the agro-pessimists argue that agricultural development can be bypassed through rapid industrialization due to the availability of cheap and plentiful food imports that can allow developing countries to leapfrog agricultural development and proceed directly to industrialization. Second, agro-pessimists shift the focus away from agriculture as the “engine of growth” in rural areas and,

instead, put strong emphasis on migration and diversification into non-farm activities as the main drivers for growth in rural areas. Third, based on the ever declining share of agriculture in developing economies, the agro-pessimists argue that the agriculture's contribution to pro-poor growth is increasingly becoming insignificant. Fourth, the agro-pessimists argue that the past agricultural successes such as the Green Revolution might not occur today due to current technological stagnation in agricultural sector. The final argument that the agro-pessimist theorists put forward in challenging the relevance of agriculture in ensuring growth and poverty reduction is the high costs of overcoming the sunk costs of urban bias.

The agro-optimists' key argument is that, given the fact that the majority of poor people in the developing world depend directly or indirectly on agriculture for their livelihood, agricultural growth potentially has a higher return in terms of poverty reduction than an equal amount of growth in a non-agricultural sector (Christiansen and Kuhl 2006; Thirtle et al. 2003; Gallup et al. 1997; Mellor 1999; Ravallion and Datt 1996; Fan et al. 2005; Bresciani and Valdes 2007; Bourguignon and Morrison 1998). The OECD (2006) report indicates, for instance, that a 10 percent increases in crop yields leads to a reduction of between 6 percent and 10 percent of people living on less than \$1 a day. Additionally, the report also finds that a 1 percent increase in labour productivity in agriculture reduced the number of people living on less than \$1 a day by between 0.6 percent and 1.2 percent, and 1 percent increase in agricultural gross domestic product per capita led to a 1.61 percent gain in the per capita incomes of the lowest fifth of the population in 35 countries (OECD 2006:19). This leads Wolz (2005:4) to conclude that "to a large degree, poverty is a product of unproductive agriculture".

The focus in the literature on the agro-optimism is on the critical impact of both consumption and production linkages on rural economic growth and poverty reduction. There is a view among scholars that a substantial share of the income of the rural households is derived from agriculture and spent on food (Machethe et al. 2004; May et al. 2000; Hazell and Hojjati 1995). Dorosh and Diao (2007) go even to the extent to argue that the best prospects for agriculture-led growth remain in the food sector as it is in this sector that domestic demand for food products still represents a large and growing market.

Available evidence also seems to suggest that the part of the income of the rural households which is spent on non-agricultural items targets more the locally-made goods and services than the imported ones (Hazell and Hojjati 1995). Evidence on the employment gains generated by agricultural growth shows strong employment increases in a wide variety of rural industries, especially those supplying consumption goods and services to agricultural households (Haggblade and Hazell 2007). A study by the International Labour

Organization in the Philippines, quoted in Anderson and Leiserson (1980), shows that the households residing in the regions which had had improved yields of rice within a period of five to six years have improved their houses, built new ones, and purchased household furnishings and other equipment. Accordingly, Hazell and Roell (1983:12) argue that these consumption linkages are more appealing because “the rounds of growth they induce are predominantly concentrated within rural areas and because the kinds of goods and services demanded are typically produced by small, labor-intensive enterprises”.

Concerning the production linkages and their effects on poverty reduction, Christiaensen and Kuhl (2006) contend that agriculture does have strong direct forward linkages to agricultural processing and backward linkages to input-supply industries. According to Tiffin and Irz (2006), these production rural growth linkages are important for poverty reduction as the agriculturally based industries require little technology and financial capital but are relatively labour intensive with enormous potentiality for enhancing employment generation in rural areas. Bresciani and Valdes (2007) note, however, that the relationship between these linkages and the rural labour market could only be enhanced by agricultural growth based on crops which require processing and transformation before consumption or export.

This literature suggests that agriculture through its consumption and production linkages discussed above could be rightly qualified as a contributor in alleviating rural underemployment and reducing rural poverty. However, some available evidence seems to suggest that it is not any kind of agriculture which can achieve that end. Only the “agricultural growth based on small-farm efficiency” could do this (Ellis and Biggs 2001:441; see also Lipton 2006). In similar vein, the World Development Report (2008:1) indicates that “using agriculture as the basis for economic growth in the agriculture-based countries requires a productivity revolution in smallholder farming”.

The idea that small-scale farming in developing countries could form the basis of agriculture-led process of economic development is widely discussed in the literature. The supporters of this view suggest at least four main arguments to justify their position. First, they argue that small-scale farmers’ rationality enables them to make appropriate and efficient decisions for their farming activities (Schultz 1964). The point which is being made here is that small-scale farmers are as capable as big farmers to decide on making use of inputs and agricultural strategies necessary to increase their agricultural output (Ellis 2001). The results of a study by Ngqungweni et al. (2006) conducted among small-scale farmers in the Eastern Cape, KwaZulu-Natal, and Northern Province, South Africa, indicate, for instance, that black small-scale farmers can produce both profitably and efficiently as their white commercial counterparts. Similarly, small-scale farmers

in Kenya have increased their share of national agricultural production from 4 percent in 1965 to 49 percent in 1985 (Machethe 2004). Likewise, in what was termed “African Green Revolution”, small-scale farmers in Zimbabwe tripled maize production between 1980 and 1987 thereby increasing their share of the national marketable maize surplus from ten percent in 1980 to 40 percent in 1987 (Eicher 1994).

Second, the proponents of this view argue that there exist a positive relationship between farm size and economic efficiency in that small-scale farmers seem to be more efficient than big farmers. This is justified by the combination of factors such as the intensive use of abundant labour, small land holdings and low requirements for capital that small-scale farming entails (Berry and Cline 1979). Third, they argue that the increase of agricultural output in the small-scale agriculture has positive effects on rural growth linkages which, in turn, can stimulate the growth of labour-intensive non-agricultural activities in rural areas (Johnstone and Kilby 1975; Mellor 1976). Byerlee et al. (2005) argue that the rural growth linkages discussed previously have proven to be strong when agricultural growth is driven by small-scale agriculture. Finally, the advocates of this view make a strong case that “both growth and equity goals appear to be satisfied simultaneously via the emphasis on small-farm agriculture” (Ellis and Biggs 2001:441). In this vein, Bresciani and Valdes (2007) argue that, given the fact that poverty is highly prevalent in small-scale farming households, an increase in farm income of these households could be rightly regarded as key to rural poverty reduction.

One of the ways in which agriculture offers a route out of poverty already noted is the increase of employment rates in rural areas. According to Lipton (2006), this supports the argument for small-scale agriculture emphasis in poverty reduction not only because small-scale farmers have great potentiality to generate income per hectare for self-employed family farmers, but also because growth in small-scale agriculture offers incentives for small-scale farming families to withdraw labour supply from hiring out, into the family farm, thereby creating enough opportunities of work in the hired-labour market available to the landless and this, in turn, raises their employment and wage rate.

To conclude this section, despite opposing voices with regard to the role of agriculture in the process of economic growth, it does seem that, in an appropriate context, agriculture can be the driving force in triggering, nurturing, sustaining, and influencing the long-term rate of economic growth, particularly in the context of the developing countries. It is precisely this which qualifies agriculture to be “an engine of growth”. As a result differing views on the role of agriculture should rather be seen as continuums of potential outcome that will differ from country to country, and perhaps even within a country depending on context. It is not any kind of agriculture which can

achieve poverty reduction, and instead focusing on small-farm efficiency appears to offer the greatest potential. As the OECD (2006) agriculture cannot achieve these alone or function in isolation from the wider economy. It requires a viable and supportive environment. The creation of this environment necessitates that a certain number of conditions should be met certainly through what has been referred to in the World Development Report (2008:2) as the “visible hand of the state” consisting of, among other things, the increase of the assets of rural poor households, especially a more equitable land distribution; making small farmers more productive through providing them with farming skills and other inputs they need for farming, and creating opportunities in the rural non-agricultural economy through making available credits to supports non-agricultural livelihoods and effective and viable rural infrastructural development.

The crop, its mode of production and the context in which it is being produced will all play a role in determining the extent to which agricultural production can bring about a reduction in poverty. It is with this in mind that the remaining sections of this paper examine avocado production in Burundi.

2.3 Avocado industry in the world

FAO’s (2008) estimates show a significant increased production of avocados in the world which has attained an annual average of 3 million tons in the recent past and a value of over \$500 million in 2003. Global exports of avocados reached 541, 000 tons in 2004 and were valued at US \$ 605.74 million and the world imports of avocados increased from 284,000 tons in 1996 to 539,000 tons in 2004. World avocado utilization has also increased by over 30 percent and the main drivers for this have been mainly human consumption of fresh and processed products, consumers’ enhanced awareness of the fruit’s nutritional properties, and the use of avocados in the cosmetic industry that has been spurred by the growing demand for natural based product components. This shows the has dramatic expansion global market for this fruit over the last few decades and these trends are likely to continue in the future as the avocado production is also expanding rapidly in the most dynamic and viable emerging economies such as China and Brazil.

Avocado production in poor countries is also rapidly growing. Van Wijk’s (2006) study on avocado industry in Dak Lak province, Vietnam, shows that, even without plantation style production, and with minimal cultivation, avocados can be an important source of income for small-scale farmers. About 80,000 farmers are involved in avocado production in this province and the harvested area of avocados is estimated to be around 2,650 hectares. The total revenue

from the avocado sector in the province in the main season is estimated to be around \$7 million.

However, the study finds that, in general, avocados are not popular among the farmers in Dak Lak province partly because they are not seen as profitable as other crops such as pepper. Accordingly, farmers do not grow avocados on big scale, and use the trees as windbreaks for their coffee or as fences around their fields and homes. They take no management of their avocado trees and do not apply fertilizer on them unless when avocado trees are intercropped. On average, a farmer own only five avocado trees without knowing their varieties as “almost every tree can be considered as a different variety” (Van Wijk 2006: 27). The study shows that the situation is changing because the increased consumer demand which has caused higher prices of avocados has led to some farmers to start developing small orchards of avocados in which they even use agro-chemicals and take proper management of their avocado trees. The improvement of infrastructure which facilitates the transport services is also believed to have played a crucial role in the development of the new markets in other Vietnamese cities such as Hanoi and others. To some degree, the Vietnamese government seems also to play a major role in the avocado chain as it has identified avocado as one of the seven priority fruits which can offer enormous income generation opportunities to the farmers and has, accordingly, decided to support the avocado sector through investing in avocado research.

3 Methodology

This study combines both qualitative and quantitative methods. According to Kaplan and Duchon (1988), combining these methods in the same study is more desirable in that it makes a study to be better balanced, strengthened, reliable, and valid. The combination brings about both testability and context in the research.

For the qualitative component of the study, ten households of small-scale farmers were selected for the Participatory Learning Assessment (PLA) exercises. These households were selected purposefully in all three zones which constitute Giheta district. Two main criteria which were used for selecting these households were the distance separating them from the avocado oil firm of Murayi (that is, closer, far, and very far to the firm) and whether the household is involved in the farming of the avocados (that is, whether there are avocado trees in the household’ farm). In addition to PLA exercises, two focus group studies were also conducted; one with members of a local small women farmers’ association which is involved in avocado seedling production and distribution in Giheta, and another one with the collectors of avocados in Giheta. Further, thirteen in-depth interviews were also conducted with various actors in avocado chain within and

outside Giheta district. These include political leaders involved in agricultural sector, agricultural technicians at various levels, sellers of avocados, the owner of the avocado oil firm, directors of private institutions involved in avocado production, and a medical doctor who is in charge of the health sector in this region.

For the quantitative component of the study, a questionnaire was administered to a hundred households which were selected randomly in Giheta. The selection was done in the geographical part of Giheta which is delimited on the one side by RN2 and on the other side by the river which separate Giheta and other district on the northern part of the Giheta district. The questionnaire was administered to each tenth household with a randomly selected starting and the counting started from the place where the river crossed with RN2 and progressed in the direction towards the capital city of Gitega province. The respondents were the heads of the households.

4.1 Analysis of the quantitative data

The results of the survey concerning avocado production are shown in Table 1 which indicates that avocados are not produced at the commercial scale as the avocado trees are mainly intercropped with other food crops. Avocados are intercropped with other food crops in about 96 percent of the sampled households' land. The traditional varieties dominate the avocado farming in the sample. Almost all the households (96 percent) are involved in farming of traditional avocados and the number of the households who are engaged in farming the grafted avocados is still negligible (7 percent). The reasons for this may be the fact that the grafting business is not yet well developed in the area of the study. It is also likely that many small-scale farmers find it difficult to afford the costs of the grafted avocados seedlings because of their poverty status.

Interestingly, the quantitative results show that more households are involved in avocado farming than coffee which is the main cash crop in Burundi. The results also show that the burden for producing avocados seems to be equally shared among members of the households in that various categories of the households' members are more involved in some aspects of the avocado production than others. The planting of avocados seems to be more dominated by adult males (70 percent of the households), followed by adult females and children (45 percent and 31 percent of the households respectively).

Table 1: Nature and structure of avocado production in the sampled households

	Number of households
How land is used for growing avocados	
Inter-cropping	96
Varieties of avocados grown	
Traditional varieties	96
Grafted varieties	7
Is the total amount of avocados the household sold on the market higher, lower, or more or less the same if compared with that consumed	
Much higher	39
Higher	9
More or less the same	3
Lower	33
Role of adult males in household's avocado production	
Planting	
Harvesting	70
Selling	15
Transporting	23
	26
Role of adult females in household's avocado production	
Planting	
Harvesting	45
Selling	6
Transporting	33
	53
Role of children in household's avocado production	
Planting	
Harvesting	31
Selling	6
Transporting	22
	36
Main buyers of households' avocados	
Neighbours	
Shoppers at the local market	38
Travelers (RN2)	25
Collectors	46
Avocado oil firm	10
	6
Main recent changes in the household's avocado production	
Whether the selling price of avocado increased for the past three years	76
Whether the selling price of avocado is likely to increase for the next three years	80

Selling and transporting avocados are more dominated by adult females as 53 percent of the respondents report that women in their households transport avocados from the farm to the houses during the harvest as compared to 26 percent and 36 percent for adult males and children respectively; and 33 percent of the respondents indicate that the selling of avocados is done by adult females as compared to 23 percent and 22 percent for adult males and children respectively. The head-carrier seems to be the most used mode of transporting avocados from the farms to the houses and from the houses to the various local markets for the majority of the sampled households (81 percent). None of the respondents interviewed make the baskets that they use for this mode of transport and 94 percent of the respondents mention that they outsource the basket from the local markets. The cost of a basket depends on the size (mean of 835.48). This seems to present a quite substantial downstream multiplier in the avocado value chain. Access to the RN2 seems to play a vital role in the trade of avocado in the sample as almost half of the respondents (46 percent) indicate that they sell the avocados to the travelers on RN2. Surprisingly, a small number of respondents (6 percent) report that they sell their avocados to the avocado oil firm.

The total amount of avocados sold is reported to be higher than that consumed in about 48 percent of the households, and lower in about 33 percent of the households. This may suggest that, in addition to the households' consumption, avocados are also regarded as a potential source of income among the sampled households. Noteworthy though is the fact that about 69 percent of the respondents report that their households consume their own avocados now compared to five years ago which implies that the avocado production and consumption is rapidly and significantly expanding among the sampled households. This is further supported by the fact that the upward production volume is identified by 33 percent of the respondents as the main change which recently take place in the avocado production in their households and the majority of the respondents indicate that the selling price of avocado has increased for the past three years and is likely to increase for the next three years (76 percent and 80 percent respectively). This is in line with the global avocado outlook discussed in section two.

The results also suggest that the consumption of avocados among all categories of the sampled households' members is substantial. About 95 percent of the respondents indicate that children in their households eat avocados and 96 percent of the respondents report that adult females in their households eat avocados. The percentage for adult males (in 85 percent of the households) is slightly lower than that for adult females and children reported above. Interestingly, the results seem to suggest that the driving force behind this wide consumption of avocados is the fact that all categories of the sampled households' members have preference for the fruit (adult males in 78 percent of the households, adult females and children in 92 percent of

the households respectively). This is further evidenced even by the number of days avocados are consumed per a week (adult men – Mean = 3.45; children – Mean = 3.81; and adult women – Mean = 3.21) and the number of avocados consumed per day in these households (Mean = 6.51). With regard to the sources where most of the avocados consumed in the sampled households are sourced from, the results show that 83 percent of the households consume the avocados that they have produced and 79 percent consume the avocados bought in the market. Noteworthy is the fact that these results seem to suggest that even the households which produce the avocados may still buy avocados from the local markets in order to meet the need of the households' avocado consumption, presumably because of the ripening that prevents storage in times of glut. These results seem to diverge from Van Wijk's (2006) study which found that avocados are not well known among the Vietnamese people who are still in the process of discovering this fruit for local consumption.

This wide consumption of avocados among the sampled households seem to suggest that the contribution of avocados to their diet is quite significant and important and based on the findings from other studies discussed in the introductory section which show the high nutritional value of avocado, one can safely say that this wide consumption of avocados can play a vital role for the improvement of health of the sampled households' members.

The results further show that the living conditions are more favorable for the producers of avocados in the sample than those that do not produce. A statistically significant association was found between selling avocados and having food, new clothes, owning a radio, and self reported economic status as table 2 below shows. A very weak association was also found between selling avocados and saving for the emergencies.

The households' expenditure priority may account for this. Given the lower levels of per capita incomes from avocados (Mean of 8362.91) which may not enable the small-scale farming households to cover everything they need, they may prioritize things that they deem important in the households and on which they can spend the little income they obtain from the avocados. Subsequently, they may prioritize to spend their little income from the avocados on food and this is in line with other findings discussed in section two.

Additionally, prioritizing a radio may also come as no surprise for a country which has endured four decades of political instability and violent ethnic conflict. The radio serves to provide Burundian people, especially those living in rural areas, with information about the new developments in terms of security so that they can be able to plan accordingly. Table 2 suggests that households that sell avocados are less likely to be poor in terms of some assets, self-reported status and hunger.

Table 2: Avocado production and poverty indicators for the sampled households

	Percentage of 48 households who sold avocados	Pearson chi- square	Statistical test results
Assets ownership			
Bicycle	16.67	0.201	0.432
Radio	62.5	4.077	0.034*
Having meat	2	0.003	0.732
Having new clothes	31.25# ¹	4.603	0.028*
Saving for emergency	20.83#	2.464	0.098*
Affording medicine prescribed by a doctor	43.75	0.541	0.298
Self-reported economic status		2.478	0.085*
Not poor	54.16		
Poor	45.83		
Hunger (Adult)		7.015	0.007*
Never	43.75#		
Often	56.25		
Hunger (Children)		7.015	0.007*
Never	43.75#		
Often	56.25		

n=100, *statistically significant

Additionally, the logistic regression model was used in this study to test the relationship between whether the household had a child (17 years or younger) going hungry in the past 12 months because there was not enough food and whether the household sold avocados in the same period, controlling for confounders that influence the likelihood of sales. The model controlled for the sampled households' assets, the condition of their building and the distance for these households to the nearest market.² The logistic regression model predicts the logit of

¹ In the cases where percentages seem to be lower than expected, the explanation may be the big gap between the households who did not sell avocados and do not own an asset at the stake or their children went hungry and the households who sold avocados and own asset at the stake or their children never went hungry. Take for instance the latter as an example to illustrate this. In the sample (n=100), 42 households who did not sell avocados their children went hungry as compared to 21 households who sold the avocados and their children never went hungry.

² While land size is obviously an important influence on the quantity of avocado produced, this variable could not be included due to a high non-response. More than half of the respondents were unable to estimate the size of the land in meters. Actual measurement of the land would have been a

a dependent variable Y and one or more independent variables X1 to Xn. The logit refers to the natural logarithm (ln) of odds of the dependent variable Y. Odds refer to the ratios of probabilities (π) of the dependent variable Y happening (i.e., the household never had a child – 17 years or younger – going hungry in the past 12 months because there was not enough food) to probabilities (1- π) of the dependent variable Y not happening (i.e., the household had a child – 17 years or younger – going hungry in the past 12 months because there was not enough food). The following formula is derived:

$$\text{Logit}(Y) = \ln \left(\frac{\pi}{1-\pi} \right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

This implies that

$$\pi = \text{Probability} (Y = \text{household having a child going hungry} \mid X_1 = x_1, X_2 = x_2, \dots, X_n = x_n) = \frac{e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n}}{1 + e^{\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n}}$$

Where π is the probability of the outcome, α is the intercept of the dependent variable Y, β s are the regression coefficients, and Xs are the independent variables predicting the dependent variable Y.

The data were entered in the analysis as 0 or 1 coding for the dependent variable Y (the household having a child – 17 years or younger – going hungry in the past 12 months because there was not enough food was coded as 1=never and 0=often) and the independent variable (whether the household sold avocados in the past 12 months) was coded as 1=yes and 0=no. The logistic regression analysis was carried out by the logistic procedure in SPSS version 16.0 in the windows 2007 environment. The results are shown in table 3 below.

The results reported in table 3 show a positive relationship between whether the household had the child going hungry in the past 12 months and whether the household sold avocado in the same period. The Wald test results indicate that the variables in the model of avocado sales contribute significantly as a group to explain the absence of child hunger. The Nagelkerke pseudo R²= 0.243 statistic shows that the model fitted the data moderately well (p-value = 0.001). In fact, this table shows that the odds of a household who sold avocados in the past 12 months to have a child who never goes hungry in the same period are 2.5 times greater than the odds for a household who did not sell avocados in the same period. Simply put, the results from the logistic regression analysis show that the household who sold avocados in the past 12 months is less likely to have a child who went hungry in the same period than the household who did not sell avocado.

better strategy for data collection but was not possible given time and financial constraints.

Table 3: Relationship between hunger and selling avocados

	B	S.E	Wald	df	Sig.	Exp (B) (Odds Ratio)
Assets	.400	.197	4.096	1	.043	1.491
Condbuilding	.855	.501	2.916	1	.088	2.352
q6.10_avocadosold	.904	.491	3.393	1	.065	2.469
q4.2a_distmarket	-.380	.242	2.472	1	.116	.684
Constant	-	1.744	5.133	1	.023	.019
	.3.951					

Variable(s) entered on step 1: assets, condbuilding, q6.10_avocadosold, q4.2a_distmarket

N	100
Chi-square	18.947
Sign.	.001
-2 Loglikelihood	104.873
Nagelkerke R. square	.243
Cox&Snell R. square	.173

4.2 Analysis of the qualitative data

The results from qualitative data suggest that the nature of avocado production in Giheta looks very much similar to that of the avocado production in the Dak Lak province of Vietnam. The results show that farming of avocados in Giheta is rarely undertaken as a commercial orchard as avocados are predominantly produced as backyard crops and avocado trees are scattered in the farms where they are intercropped with other crops. Small-scale farmers do not seem to know the varieties of their avocados and undertake hardly any management of their avocado trees. The traditional avocado varieties seem to dominate the avocado farming in this area. The situation may change in the near future, however, as the avocado grafting activities which are rapidly expanding in Giheta have started making available modern avocado seedlings to the local small-scale farmers.

The burden for producing avocados seems to be fairly shared among members of the small-scale farming households as various categories of the households' members are more engaged in some aspects of the avocado production than others. For instance adult males are more involved in avocado planting whereas adult females are more involved in avocado selling processes. Qualitative results show further that there has been a spectacular growth of avocado production in Giheta for the past 30 years and this trend is likely to be maintained in the future. The underpinning factor for this rapid expansion of avocado

production seems to be increased consumer demand for avocados both locally and in the cities of Burundi, especially Bujumbura and Gitega, but not in the export market. The results show that, indeed, the internal market for avocados in Giheta is well developed and rapidly expanding. The local demand of avocados is potentially further boosted by the avocado oil firm established in this area which requires several tons of avocados per day to function to its full capacity. However this is undermined by the preference of this firm for hybrid varieties and the inability of local producers to supply these in sufficient bulk and their preference to sale to the local market.

The qualitative results also show that the profitability of the sector is quite significant. Of the eleven households that I interviewed, avocados were reported as the main source of income for eight households. Interestingly, coffee which is considered to be the main cash crop in Burundi was reported as the main source of income in only one household. This contribution together with an apparent shift of small farmers' economic interest from coffee to avocados seems, however, to be not well understood by various political leaders in Burundi involved in agricultural sector that I have interviewed. They tend to only focus on the role of avocados for the households' consumption and seem to be ignorant of the crucial role avocados are playing in increasing the income of small-scale farmers. Although this study is not a comparative study of coffee and avocados with regard to the contribution of these two crops to the income of small-scale farmers in particular and to the overall Burundian economy in general, the failure to detect this shift in the interests of small-scale may carry significant opportunity costs given the economic potential of this activity and its possible pro-poor outcomes.

Finally, the qualitative findings also show that avocados are widely consumed among all the small-scale farming households that participated in the study as the informants reported that all members of their households eat avocados. This widespread consumption of avocados among small-scale farmers in Giheta is very important given the high levels of malnutrition prevailing in this area and many nutritional attributes of this fruit as discussed in the introductory section. This was also confirmed by the medical doctor in charge of the health region in the province of Gitega.

5 Conclusion

This paper set out to investigate the contribution of avocados to the income generation and wellbeing of small-scale farmers in Giheta-Burundi. The results from both quantitative and qualitative analysis suggest that the avocado sector in Giheta seems to be a profitable business for all actors in the avocado value chain. From small-scale farmers to collectors, all seem to earn income in avocados albeit at

different levels. Additionally, avocados seem also to contribute to the government's revenue through various taxes collected from different actors in the avocado value chain. The transport sector and people who are making baskets also seem to benefit, to some extent, from the avocados in Giheta. Further, the quantitative results suggest that some assets ownership and self reported status in terms of economic conditions seem to be favorable among the sellers of avocados. However, the quantitative results also show that per capita income from avocados is still, to some extent, limited and this may be caused by a small number of avocado trees owned by the small-scale farmers on their farms.

The qualitative results show that small-scale farmers spend much of their income from avocados on food. The quantitative analysis also finds positive association between selling avocados and having food, new clothes and radio. The households' expenditure pattern on these items may have significant impact on the growth of the local food market and could contribute greatly to the flourishing of commercial activities in this area. All these have significant positive impact on rural economy and poverty reduction in Giheta.

The results from both qualitative and quantitative analysis further show that avocados are very well-known and widely consumed in Giheta. The driving force for this widely small-scale farming households' consumption of avocados in this area seems to be the taste of the fruit. The finding of both quantitative and qualitative analysis also shows that adults and children in small-scale farming households from Giheta like and eat avocados in substantial volumes and that those that sell avocados are less likely to experience hunger or to be poor than those that do not. The implication of this is that the contribution of avocados to their diet and the documented associated positive effects to their health are quite significant and important.

The finding of this paper support the agro-optimist view about the crucial role that agriculture can play as an engine of growth and a driving force for poverty reduction, especially in rural areas in developing countries.

5.1 Policy implications

The crucial role that avocados have been shown to play for the income generation, wellbeing and diet of the small-scale farmers in Giheta, has significance for policy for poverty reduction and rural development in this area. Although the majority of the small-scale farmers interviewed derive a significant share of their income from avocados, the avocado value chain remains largely one in which subsistence farmers are selling surplus crops in a limited national market. Costs are relatively high, and there are substantial inefficiencies along the

chain with wastage, poor institution support and virtually no quality improvement or beneficiation. As a result, small-scale farmers have not yet been able to reap substantial benefits from avocados as the levels of per capita income from avocados remain low. In order to increase the capacity of avocado production in this area and subsequently enabling small-scale farmers to gain a greater income from this sector, the avocado sector needs to be substantially supported by both the private and public sectors. Although some private organizations have already started investing in the sector especially in the area of avocado grafting, these efforts may not be able to attain desirable outcomes by their own. Small-scale farmers need other forms of support in order to engage sustainably and effectively in a viable avocado farming. Among other things they need access to farming land, fertilizers, extension services, avocado farming skills, financial credit, packaging, refrigerated transportation and processing. All these require a significant intervention of the government and strong commitment of political leaders involved in agricultural sector to promote avocado farming not only in Giheta but also in other parts of the country where this crop can grow. Such commitment will only be possible if political leaders appreciate the enormous economic opportunities that this crop presents to the income generation for the small-scale farmers and its potential to diversify the farming of cash crops in Burundi which is currently dominated by coffee, tea and cotton.

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