CHAPTER 4: CONTRIBUTIONS OF LARGE-SCALE FARMING TO EMPLOYMENT AND HOUSEHOLD INCOMES

4.1 Introduction

Rising unemployment has become a global concern. Due to high population growth rates, the challenge of unemployment is alarming in Sub-Saharan Africa in general and in Ethiopia in particular. According to Guarcello and Rosati (2007), lack of broad-based employment opportunities in Ethiopia is one of the critical challenges of the country in terms of achieving the Millennium Development Goals (MDGs). Unemployment rates have worsened since the 2007–2008 economic meltdown that hit many countries in the world. National governments in the developing South took policy measures to attract investments as a panacea to create jobs for the needy.

Some studies (Oakland Institute 2011; FAO 2012b) conducted to examine the employment contributions of large-scale farming contended that incomes from employment in plantation agriculture serve as a valuable source of extra income for migrant farmers with small landholdings back home and also for the landless in certain areas. The World Bank report *Rising Global Interest in Farmland* also stated that large-scale agricultural investment can potentially contribute to poverty reduction through employment creation (Deininger *et al.* 2011). An empirical investigation in Mozambique by Cramer *et al.* (2008) revealed that foreign-owned plantations paid relatively higher median wages compared to those enterprises and plantations owned by Mozambicans and when wageworkers work for local farmers. On the other hand, Li (2011) challenged the view that large-scale farming contributes to employment generation by arguing that large-scale mechanized farms are more labour-repealing than labour-absorbing, and thus the expectations are unrealistic. Wiggins (2009) argued that small farms absorb more labour per hectare compared to large-scale farms, but with lower labour productivity and marginal returns to labour.

In Ethiopia, large-scale farming is promoted partly to generate more jobs for the landless youths and peasants who are under-employed due to an overall dwindling farm size. Nevertheless, as discussed in the previous chapter, the contribution from large-scale farms in the areas studied to

job creation is unsatisfactory to date. The contribution of large-scale farming to employment generation in Ethiopia is minimal, primarily due to the seasonal nature of the job and low wage rates. Regardless of the limited employment generated, which is far from the initial expectations, the promotion of large-scale farming in the country has continued and the government has vowed to generate more employment in future land deals.

In this chapter, I will estimate the average number of jobs generated by large-scale farming for each hectare of land under large-scale investment using data generated from the four case studies. Subsequently, I will identify the key factors that are relevant in determining different wage incomes among different groups of farm labourers using data collected from my survey among 264 employees. In addition, secondary data from large-scale farms will be used. The Mencer regression function is used to identify the key factors.[41] This helps to understand which groups within society (men or women, indigenous or migrant, youths or adults, etc.) are benefitting from large-scale farming, which will have implications for the understanding of income inequality and social differentiation among the different groups.

In addition, the impacts of large-scale farming on the income levels of the local people who are directly affected by large-scale land acquisitions are discussed in this chapter. Annual gross income data were collected through household surveys by capturing the different sources of incomes, such as wage income from crop, livestock and livestock products, income from petty trading and sale of local beverages, transfer payments through remittance and subsidies, and income generated from forests and non-timber forest products. The impacts of large-scale farming on the annual gross income levels of the local people who are directly affected by large-scale land acquisitions was estimated through the Difference-in-Difference method and the propensity score matching techniques.[42]

[41] Details about the sources of data and the Mincer regression function are discussed in Chapter 1.
[42] Details of the source of data and the DiD and PSM techniques are discussed in Chapter 1.

4.2 Results and Discussion

4.2.1 Contributions of large-scale farming to employment generation in Ethiopia

The number of jobs generated from each hectare of land show variation among the cases of this study. This is due to the level of mechanization put in place and the type of crop commodity produced by the companies. In general, the farms generated 0.08–0.28 jobs per ha during slack seasons, and 0.13–0.38 jobs per ha during peak seasons. Cultivation of non-food crops by Basen Farm (e.g. cotton) generated more jobs (0.28–0.38 jobs per ha) than production of food crops by Karuturi (0.09–0.13 jobs per ha in Karuturi-Oromia and 0.15–0.23 jobs per ha in Karuturi-Gambella). This is consistently true both during off- and peak farming seasons. Apart from ploughing and planting, most of the farm activities at Basen Farm are carried out with manual labour. Cotton harvesting is the most labour-demanding and highest paid activity, compared to other activities performed by the wageworkers on Basen Farm. In the case of S&P, once the pongomia tree is planted, there is very little opportunity to generate additional employment for the needy, and thus only a small number of jobs (0.08–0.22 jobs per ha) have been created, despite it being a non-food crop (Table 4.1).

Table 4.1: Employment generation from large-scale farms in Ethiopia

Variables	Large-scale farm			
	Karuturi (Oromia)	Karuturi (Gambella)	Basen (Gambella)	S&P (Benshanguel)
Number of wage jobs per year	200–300	600–1000	234–564	200–700
Going daily wage rate (ETB)	12	35	36	39
Number of permanent jobs	43–50	133	23–69	81
Number of jobs created per ha	0.09–0.13	0.15–0.23	0.28–0.38	0.08–0.22
% of immigrant labour	0%	76%	92%	93.8%
Proportion of women employee	58%	34%	36%	35.9%
Mean age of wageworkers	22.1	26.6	24.4	25.5
Mean education (Years)	6.3	7.8	8.3	9.5
Mean daily wage income (ETB)	13.5	46.2	92.4	57.6
Wageworkers with previous experience	14%	32%	50%	22%

Source: Own computations based on field surveys in 2012, 2013, and 2014

At present, the company has generated a number of jobs by cultivating food crops such as maize, sesame and pigeon pea, in addition to planting the biofuel tree. In the case of Karuturi, there is a

relatively high use of mechanization for the different farming activities such as cultivation, planting, spraying herbicides and harvesting. In Gambella, Karuturi used a combine harvester to do the first harvesting and manual labour for the second harvesting of maize stock, which was missed by the harvester because it was too short. The use of mechanization and the cultivation of food crops (maize) were the reasons for the small number of jobs generated per ha by Karuturi compared to Basen Farm.

A study by Deininger *et al.* (2011) in Ethiopia showed that plantation agriculture[43] generated 0.005 jobs/ha, which is significantly lower than the findings of this study, probably due to the aggregation of data collected from all large-scale farms that cultivated different types of crops (food and non-food) and employed different levels of mechanization. Similar studies in other countries indicated that it has generated 0.014 jobs/ha in Brazil (FAO 2012c), 0.351 jobs/ha in the Democratic Republic of Congo (Deininger *et al.* 2011), and 0.006 jobs/ha in Madagascar (Andrianirina-Ratsialonana & Teyssier 2010). The FAO (2012b) reported that plantation agriculture in Ghana and Uganda demonstrated a positive and significant contribution to the number of jobs generated for local people, but these were not sustainable as companies replaced labour-intensive work with capital-intensive technology over time. In addition, the wages remained low.

Although this study did not compare smallholder farming with large-scale farming, smallholder farming is contended to generate comparatively more jobs per ha than large-scale farming (FAO 2012c). The impact of large-scale land acquisition on income generation through employment increases if there is a linkage between large-scale and small-scale farms through contract farming, as is the case in Ghana (Vath & Kirk 2011).

The remainder of this section will discuss which groups have benefitted from the employment generated so far and the factors that determine levels of income from wage employment in large-scale farming. As expected, there are differences in the average daily wage rates paid by the large-scale farms operating in the different regional states in the country. The location factor is

[43] The definitions of large-scale farming used by the different studies cited here is mixed and sometimes not clear. For instance, Deininger *et al.* (2011) used a scale of 500 ha and above as the definition of large-scale farms. Others, like Cramer *et al.* (2014), defined large-scale farms based on the number of workers. Therefore, care should be taken when considering the citations.

found to be an important determinant in this regard. In Bako Tibe district (Oromia Regional State), where landlessness is very high, labour availability is relatively better. Corollary to this, the average wage rate paid to wageworkers (ETB 13.5) is relatively lower than the average wage rates paid in Gambella (ETB 46.2–92.4) and Benshanguel Gumuz Regional States (ETB 57.6) (Table 4.1). In Bako Tibe district, Karuturi pays a minimum daily wage of ETB 12 for manual jobs and a maximum daily wage of ETB 30 for technical jobs. In Gambella, the same company pays a minimum wage of ETB 35 a day, in addition to free accommodation services. There are some exceptions, however. The wages paid per day to women who provide water and weed in the oil palm nursery at Karuturi's Ilia site in Gambella Regional State was minimal compared to the going wage rate of ETB 35 per day. This was also the case for young boys under the age of 14 years, who earned ETB 10 per day for weeding jobs at Karuturi's Jikawo site in Gambella Regional State, while the going wage rate commonly paid by the company is ETB 35.

In Gambella Regional State (Basen's case), the maximum wage rates can go up to ETB 167 while the going (minimum) wage rate is ETB 36 per day. But, there are substantial variations in the wage rates offered to labourers, depending on the arrangements.[44] It can go as high as ETB 167 per day for cotton picking, which is an arrangement on the basis of volume of work performed. Cotton picking, which is the most laborious duty, is primarily performed by migrant labour from the Wolaita Sodo area of South Ethiopia and by highland settlers who live around the farm. The migrants from Woilata Sodo manage to harvest up to 167 kg of cotton at a rate of ETB 1 per kg, while the settlers collect only 25 kg per day. This brings the average wage paid by Basen Farm to ETB 92.4 per day (Table 4.1). Competition for meagre labour is a common practise in Gambella. In 2011, Basen cultivated 2,100 ha of cotton, but managed to collect only the cotton planted on 1,200 ha due to labour shortages and the crops being damaged by rain. Due to poor levels of road infrastructure and its remote location, cost of labour transport is huge and it costs the company ETB 450 to transport a labourer from Wolaita Sodo to the farm site.[45]

[44] Payment arrangements (such as wage rates and methods) show marked differences in rural labour market (cf. Cramer *et al.* 2008).

[45] Basen farm recruits labourers from Wolita Sodo area by making formal contact with SNNP Labour and Social Affairs Bureau. Unlike the case in which companies recruit labourers themselves from the local community, this type of formal labour arrangement provides transparent agreements in terms of pay scale and other secondary benefits (e.g. transportation and accommodation).

In Benshanguel Gumuz Regional State, S&P pays an average wage rate of ETB 57.6 per day. While the daily going (minimum) wage rate paid by the company is ETB 39, the maximum daily wage rate can go up to ETB 120[46] when wageworkers are offered jobs on the basis of a piece rate arrangement. A common piece rate arrangement is when an activity that takes 4–5 days is given to a labourer at a rate of ETB 600. Other investors in the district also use the piece rate arrangement and, for example, they set a task that takes 4–5 days at up to ETB 1500, which results in competition for meagre labour. During peak season, S&P employed up to 700 casual labourers, which went down to 200 during off-seasons. The maximum monthly salary for a permanent employee at the S&P Farm was recorded at ETB 30,000. There were 22 Indian expatriates working at the company before their number was reduced to only three in 2014.[47] Two of the expatriates work as Operations Managers, and the other one is working as a General Manager. All other employees are Ethiopians working in different capacities as Human Resource Managers and as technical persons.

Variations in wage rates and arrangements are observed in the lowland regions of Gambella and Benshanguel Gumuz. As a result of labour shortages, competition for labour is common. The Great Renaissance Hydroelectric Dam, which is being constructed in Guba District – a district located adjacent to Dangur District – contributed to the stiff competition for labour in Benshanguel Gumuz Regional State. In Gambella Regional State, Saudi Star – which is owned by the multi-billionaire Mohammed Hussein Al Amoudi – also resulted in stiff competition for labour.

As a sequel to an enquiry, I analysed the determinants of wage incomes from large-scale farming in Ethiopia using the Mincer-type earnings function. Theoretically, level of education, work experience, age, sex of employees, etc., determine incomes/wages of an employee and these were included in the analysis. Mincer (1958 and 1974) suggests including a variable that captures the effect of the interaction between schooling and experience, and the effect of returns to schooling at old age by squaring years of work experience. These two variables were included in the first estimation of the Mincer-type earning function (see Annex 4.1), but due to the multi-collinearity

[46] This was estimated from a piece rate arrangement provided by the company, and converted into wage income per day.
[47] S&P Farm reduced its operation in 2014 due to financial constraints and it laid off 19 Indian expatriates who had been working prior to 2014.

problem, the variables were excluded in the final estimation. The result of the final estimation is presented in Table 4.2. While salaries of employees in the skilled labour market are fairly determined based on objective criteria, such as level of academic qualification and work experiences, wage rates are, however, determined by less objective parameters in the unskilled labour market. In addition, the lack of minimum wage rate policy for unskilled labour in Ethiopia contributed to the arbitrary provision of wage rates by large-scale farms. Thus, this necessitated the identification and inclusion of other variables in the estimation of the Mencer-type earning function that would affect levels of wage income in Ethiopia. Variables such as origin of labourer, type of work, type of crop and location were identified as important variables during the exploratory survey conducted in all the three regions prior to the formal employee surveys, and thus, included in the analysis.

Table 4.2: Determinants of wage rates in large-scale farms in Ethiopia

Dependent variable: Ln(Wage per day)		Std.		Collinearity Statistics	
Independent variables	B	Error	t	Tolerance	VIF
Constant	2.461	0.087	28.27***		
Age of the employee (Years)	0.001	0.002	0.27	0.71	1.41
Sex of the employee (0= Female; 1=Male)	0.088	0.036	2.45**	0.86	1.17
Years of farming experience (Years)	0.041	0.006	7.11***	0.70	1.44
Education level (Years)	0.022	0.005	4.59***	0.87	1.15
Origin of employee (0=Immigrant; 1= indigenous)	-0.122	0.062	-1.97**	0.25	3.94
Type of work (0=Manual; 1=Technical)	0.172	0.041	4.24***	0.83	1.21
Location of the farm (0=Highland; 1=Lowland)	1.072	0.064	16.75***	0.25	3.94
Type of crop (0=Food crop; 1=Industry crop)	0.131	0.048	2.73***	0.68	1.47

Source: Survey data, 2012, 2013 and 2014

The performance of the Mincer-type earning function was generally good. The overall model fit was significant (F value=233.7 and $p<0.01$), the variables included in the model explained 87.8% of the variations in wage incomes, and the function is free from multi-collinearity problem.[48] The result of the Mencer-type regression that explained about 88% of the variations in wage incomes among different groups of wageworkers can be accepted as impressive, given that wage rates are

[48] A variance Inflation Factor (VIF) result less than five shows that there is no multi-collinearity problem

determined by less objective criteria and minimum wage rate policy is effectively absent in Ethiopia. Interestingly, most of the variables included in the Mencer-type earning function were statistically significant, and thus determined variations in wage incomes in large-scale farms in Ethiopia. Since the functional form of the regression was a log-linear model, the interpretation of results is based on the percentage value of the coefficients of the independent variables that appeared significant in the estimation (Table 4.2).

During the field survey, I observed that companies use young boys and girls as young as 11 years[49] for watching birds and watering nursery sites, and pay a small daily wage, much below the going wage rate. Boys and girls in Gambella received ETB 10 per day to watch birds and watering palm oil nursery site, which showed a similar trend in Bako in which a boy who watched birds received a wage as low as ETB 7 per day. The going wage rates in the two regions were ETB 35 and 12 respectively. However, the estimation result showed that earnings of wageworkers was not significantly different due to their age differences. This is perhaps because the age of majority of the wageworkers show little variability and only small proportion of young boys and girls participate in the wage employment. In this regards, the average age of our sample was 24 years, indicating that the majority are high school graduates and looking for job opportunities. In Bako, about 7% of the population is estimated to be landless. The youth in this area used to cultivate parcels that they held customarily. But with the advent of Karuturi, as a mechanism to compensate for the land lost, some of them became wage labourers on the farm and others seek opportunities elsewhere. A focus group discussion with five youths working at Karuturi Farm in Bako, which was held in *Goromitti* village on 08 April 2012, revealed that the wage income received from the company is too small to improve their life, but only serve as a mechanism to partially compensate incomes lost due to the land loss.

Wage incomes from plantation employment are biased towards male employees. Statistically, an employee's gender is found to determine the height of wage incomes significantly. The result showed that male workers receive about ETB 8.8% more per day than their female counterparts,

[49] The practice of involving young boys and girls in various activities is common in Ethiopia (Guarcello & Rosati 2007). It is estimated to contribute 4–7% to the family's income (Cockburn 2002), and often done at the expense of their school attendance (Guarcello & Rosati 2007). Poor families welcome children involvement in waged labour since it complements the income of the family. Against this background, authorities in Ethiopia seldom check large-scale farming companies that employ children despite the labour law (Proclamation 377/2003) prohibits employment of children under 14 years old.

since they have access to more paying jobs than females. The companies that are engaged in large-scale farming in the case study areas maintained the commonly held stereotype that women are less fit/efficient as compared to men in performing farm activities. As a result, women are offered jobs such weeding, watering nursery site, maize shelling, and work as housemaids. Thus, they are paid relatively low wages. Men, on the other hand, are offered better paying jobs such as tractor operation, harvesting and threshing using combine harvester and supervising daily labourers. In terms of the proportion of men and women participation in wage employment, more than half of the employees (58%) at Karuturi Farm in Oromia Regional State were women with a decline in participation (34–36%) in Gambella and Benshanguel Gumuz Regional States. In these regions, women are too busy doing different domestic activities and spend less time in wage employment.

The issue of who benefitted from wage employment is a critical question that a country with an ethno-linguistic federal arrangement needs to address. The proportion of the local indigenous people who were engaged in wage employment in the large-scale farms showed significant variations. In Oromia, all the wageworkers were from the local villages contrary to the case in the lowland regions. In Gambella and Benshanguel Gumuz Regional States, migrant labour is common, accounting for up to 94% of the total labour force (Table 4.1). The companies in these regions preferred migrant labour above the indigenous people for their experience in agricultural activities and partly due to the negative preconceptions regarding the work ethic of the local population. The latter case is also supported by Moreda (2015) in his study in Benshanguel Gumuz Regional State. At the Karuturi site in Gambella Regional State, 24% of the wageworkers were from the indigenous population, compared to the other cases (Basen Farm in Gambella and S&P Farm in Benshanguel Gumuz) in which the level of participation of the local people in wage employment was only 6–8%. Cotton picking at Basen Farm in Gambella Regional State is dominantly performed by migrant labour from Wolaita Sodo area. They are perceived by the employers as having the necessary dexterity and speed in picking the cotton fibre with minimum wastage. Due to their traditional livelihood system, the local Anuak are also less interested in cotton picking.

Migrants received better wages than locals and, on average, their wages per day are higher than those of the local people by ETB 12.2%. This takes us back to the question of whose resources are expropriated for investment in large-scale farming and for the benefit of whom? Apart from other political justifications, one of the reasons for the adoption of an ethno-linguistic federal arrangement by the Ethiopian government was to narrow down regional development disparities. Nevertheless, the result from this study show that the indigenous people are not benefitting in the same way as the migrants from wage income. The discussion about the overall returns for investment to the local economy (at district or regional level) from the different large-scale farms, which is presented in Chapter 3, also strengthens the lack of benefit from investment to the local people.

Work experience is seldom considered in the recruitment of wageworkers and in the determination of wage rates. This is because labourers do not have written testimony certifying their previous experiences, and word of mouth is rarely accepted as valid evidence. On the other hand, most of the activities do not require vast experience. As a result, work experience only matters if the remuneration is based on a piece rate system. A well-trained labourer will be able to be more productive and subsequently be rewarded a higher salary. So the interest here is to see how acquired earlier experience in large-scale farming (reflected in speed and volume of work performed) affects the wage income levels of labourers. The variable that captures previous experience of labourers was found to determine the amount of wage incomes significantly at $p<0.01$. This in particular is a reason for wage differentials among those wageworkers when payment is made based on piece rate agreement and on the volume of work performed. On average, those wageworkers who had previous working experience earned 4.1% higher wages per day than those without any experience. For example, at Basen Farm, the field observation revealed that experienced cotton pickers managed to harvest up to 167 kg of cotton per day enabling them to earn ETB 167 per day. Starters would earn not more than ETB 25 while the daily remuneration would be some ETB 36. The wage gap due to skill/experience difference might level off only after beginners acquire the needed skill/experience after some months.

The type of work performed by a wageworker is also a factor that determines wage income differences. Generally, those who perform manual work such as weeding, chemical spraying, harvesting, threshing, housemaid, etc., are paid with the going wage rates of the region. On the

other hand, those wageworkers who are engaged in supervising the labourers and operating machineries of different sorts received wage incomes higher than the going wage rates. On average, labourers that performed administrative and technical roles received a daily wage income that is 17.2% higher than those who performed menial jobs. Education is a factor that affects one's income level by affecting the type of work a wageworker performs. Better educated wageworkers have jobs as supervisors. They received, on average, a daily wage that is 2.2% higher than those with less years of schooling. While the positive contribution of educational attainment to wage incomes is very clear and was also documented by the World Bank in Ghana (Fasih 2008), this does not mean that improved education will automatically lead to higher wages, as there may not be sufficient skilled jobs in the large-scale farms in Ethiopia to fill this promise.

The other interesting finding from the analysis was that wage incomes differ between wageworkers who worked for large-scale farms that produced food crops and industrial crops. Labourers who worked on cotton farms in Gambella received wage incomes significantly higher than those who worked on food-crop producing farms such as Karuturi, both operating in the same regions. On average, a wageworker employed in a non-food crop producing farm received 13.1% higher wage per day than those employed in a food crop producing farm. Owing to the fact that the non-food crop producing farm is operated by a domestic investor (e.g. Basen Farm) and the other two food crop producing farms are operated by foreign investors, one may argue that the wage difference is not a result of the type of crop commodity, but because of a difference in the ownership of the farms. The going daily wage paid by Karuturi (ETB 35) and Basen (ETB 36), both operating in the same regional state but operated by foreign and domestic investors respectively, are comparable. The mean wage incomes paid by these two companies for the different types of activities are, however, significantly different. In this regard, on average, Basen paid ETB 92, while Karuturi paid ETB 46 (Table 4.1). Therefore, it is indicative that the difference in wage incomes is because of the type of crop commodity cultivated but not due to the ownership type. The government's strategy also iterated the significant roles of large-scale farms that produce raw materials for industries in terms of generating employment with a far-reaching income effect. In terms of the multiplying effect of wage employment, not addressed in this study, companies that produce raw materials for industries will have a much more significant impact than those that produce food commodities that are consumed domestically without much

value-addition. Cramer *et al.* (2008) also found similar results in Mozambique in which workers engaged in the production of non-food crops (such as sisal and cotton) received relatively high wage incomes compared to those who engaged in food crops production such as rice, maize, groundnuts and sesame.

As expected, the location of the farm affected wage rates significantly ($p<0.01$). In lowland parts of the country, labour is a serious constraint and competition for wageworkers is stiff. This has raised the wage rates in Gambella and Benshanguel Gumuz Regional States, and wageworkers in these regions received a daily wage which is 107.2% higher than those in Bako Tibe district of Oromia Regional State. This is also related to the harsh weather conditions, high risk of malaria infestation and snake bites, poor social infrastructure development, and high cost of living in those periphery regions. In these regions, unless wages are relatively high, labourers are not interested in taking up these job offers. Unlike the case of the large-scale farm in Oromia, the companies in Gambella and Benshanguel Gumuz Regional States offered free accommodation – sheds for labourers that accommodates 2–4 labourers – and set up basic health facilities to make their offers attractive. The large-scale farm in Bako does not have these facilities for the wageworkers since the labourers can operate from their own home. In addition to the advantage of enjoying relatively cheaper food prices compared to the large-scale farms in Benshanguel Gumuz and Gambella Regional States, its proximity to the nearby Bako town provides wageworkers with access to better social services. In an effort to address the sky-rocketing food commodity prices and costs of transportation, the companies operating in the lowland regions provided cantina services at a reasonable price and transportation services to employees once a week to buy food commodities in the nearby Gublak (in the case of S&P) and Gambella (in the case of Karuturi) towns. In order to attract labourers, the large-scale farms in the lowland regions included secondary labour conditions in their employment, unlike the case of Oromia Regional State where labour availability is not by and large a constraint.

4.2.2 Impact of large-scale farming on income levels of local people

Beyond knowing the determinants of wage incomes, perhaps, the most interesting issue is to examine how employment contributed to incomes of families and how this has impacted the life of the wageworkers (i.e. change in status of food security and well-being). The fact that the majority of the wageworkers are migrants who have other livelihood activities and families living

in their area of origin makes it difficult to examine impacts of employment at full scale. This is only possible if one traces remittance economy and amount of money invested in farming and non-farming activities by the wageworkers in their area of origin. Unfortunately, this was not addressed in this study. What this study examined was the impact of the land transfer on the income levels of households who have lost access to the lands under the leaseholds of the companies, and the impact of the land transfer on the food security status of the local people. While the latter will be discussed in the next chapter, the impact of losing land to large-scale agricultural farms on the income levels of the local people is addressed in the following section.

Annual gross income per household from different sources, such as wage income, petty trading, sales of different crop commodities, livestock and livestock products, remittance, collection and sale of non-timber forest products (e.g. forest fruit, wild honey, firewood, etc.) was systematically recorded and analysed for two different groups of households (affected and non-affected) and for the same households for two different time periods (before and after the intervention) using the technique of propensity score matching and the double-difference (DiD) method of impact study respectively. For Oromia, the impact of large-scale farming on the income levels of affected households was estimated using the Difference-in-Difference (DiD) method and discussed here in comparison with the estimation based on the PSM technique so as to show the robustness of the two estimation techniques. For Gambella, since I did not have the opportunity to collect data for two different time periods, I estimated its impacts on the income levels of households only using the PSM estimation technique and for Benshanguel Gumuz, the estimation based on DiD technique is presented.

Case one: Karuturi Agro Products PLC in Oromia Regional State

In Bako Tibe District, before the land was transferred to Karuturi, the gross mean annual income of households in the affected stratum (ETB 18035) and non-affected stratum (ETB 18207) were comparable and there was no statistically significant difference between them (Mean difference=171.8 and t-value=0.08). After Karuturi's intervention, the mean annual income of households in the affected stratum has declined by 34.6% (ETB 13,400) compared to their incomes before the intervention (ETB 18,035). However, those households in the non-affected stratum showed no significant change in their incomes after Karuturi's intervention (ETB 18,279)

compared to their incomes (ETB 18,207.4) before the intervention, albeit there is some positive increment. After the intervention, the mean income (ETB 13,400) of households in the affected stratum was 35.7% less than the income levels of those households in the non-affected stratum (ETB 18,279) (Table 4.3). But, it is not possible to attribute the difference in income levels between the two groups of households (i.e. 35.7%) entirely to Karuturi's intervention unless we do a DiD estimation to account for changes due to time factors[50] and factors other than Karuturi's intervention.

Table 4.3: Difference-in-difference estimation of the impact of Karuturi Farm on household annual gross income (ETB) in Bako Tibe District, Oromia Regional State

Mean gross income (in ETB)	Affected (n=75)	Non-affected (n=83)	DiD (n=158)
Before intervention in 2012 (a)	18,035.6	18,207.4	-171.8 (t=-0.08)
After intervention In 2014 (b)	13,400	18,278.6	-4,878.5 (t=-2.3)**
Mean income difference (b-a)	**-4,635.5**	**71.3**	**-4,706.8 (Impact)**
Standard Error	369.1	61.08	356.6
t statistics	-12.6***	1.167	-13.2***

Source: Survey data, 2012 and 2014 *** p<0.01; ** p<0.05; * p<0.1

Based on the DiD estimation technique, the loss in income levels of household's that can be fully attributed to the land transferred to the company is, on average, ETB 4,707 per annum, which is a 26% decline in income levels (Table 4.3). The figure is within the range of the estimated result by using the PSM technique. The households in the affected stratum showed, on average, a decline in income levels of ETB 2,949–4,760 per annum compared to those households in the non-affected stratum. There is decline in income levels of up to 24% due to Karuturi's intervention, which is statistically significant at p<0.05. The results of the two estimation techniques are comparable and consistent, and thus suggest the applicability of the PSM technique for this type of research problems under the Ethiopian context (Table 4.4).

[50] One of the weaknesses of the PSM technique is its inability to control for changes that come due to time factor and other unobservable covariates. The purpose of presenting the results of the two estimation techniques for Oromia is, therefore, a showcase to demonstrate the performance of the PSM under the Ethiopian context and can be viewed as a methodological contribution of the study.

Table 4.4: PSM estimation of the impact of Karuturi's intervention on household income and livestock ownership in Bako Tibe District, Oromia Regional State[51]

Outcome variable	Matching algorithms[a]	Matched samples		Impact (ATT)	Standard Error[b]	t statistics
		Affected	Non-affected	Income in ETB (%)		
Income (ETB)	NN	142	66	-4,760 (-24)	2,257.4	-2.2**
	Radius	36	39	-5,578 (-28.2)	5,246.5	-1.1
	Kernel	142	142	-2,949 (-14.9)	1,366.8	-2.2**
	SS	142	142	-3,477 (-17.6)	1,557.2	2.2**
Livestock size (TLU)	NN	142	66	-3.1 (23.8)	1.5	-2.0**
	Radius	36	39	-2.3 (17.3)	3.2	-0.7
	Kernel	142	142	-3.2 (24.6)	0.9	-3.4***
	SS	142	142	-3.6 (27.7)	1.2	-3.1***

[a] Radius matching is done with a calliper of 0.001 [b]Bootstrap standard error is calculated based on 100 replications; ***p<0.01; ** p< 0.05
Source: Survey data, 2012

The land under the leasehold of Karuturi Farm in Bako Tibe District of Oromia Regional State was used by five *kebeles* − Baca Ode Walde, Oda Gibe, Tirkafeta Gibe, Oda Korma, and Amarti Gibe − and was inhabited by 931, 531, 592, 411 and 852 households, respectively (Bako Tibe District Office of Agriculture and Rural Development, unpublished data). The local people owned a total of 22,000 head of cattle that depended on the grazing land on the flood plain (Schoneveld & Shete 2014). The local people in Bako used the valley bottom of the land transferred to Karuturi to graze their animals. Prior to the land transfer in 2008, households in both the affected and non-affected strata owned herds averaging 13 Tropical Livestock Units (TLU)[52]. After the intervention, while those in the non-affected stratum did not show any significant changes in ownership of livestock (Mean TLU=12.6), those households in the affected stratum owned 45% less livestock (Mean TLU=8.9), which is statistically significant at p<0.01 (Table 4.5).

[51] The common support option has been selected and it was [0.139, 0.999]. The balancing property is satisfied and in a block of 7, the mean propensity scores for affected and non-affected households are not different.

[52] Domestic animals owned by households were converted to Tropical Livestock Units (TLU) using the conversion factors suggested by Storck *et al.* (1991).

Table 4.5: DiD estimation of the impact of Karuturi Farm on household's livestock ownership (TLU) in Bako Tibe District, Oromia Regional State

Mean TLU	Affected (n=75)	Non-affected (n=83)	DiD (n=158)
Before intervention in 2012 (a)	12.9	12.8	0.1 (t=0.95)
After intervention in 2014 (b)	8.9	12.6	-3.6 (t=-2.7)**
Mean TLU difference (b-a)	-4.0	0.4	-3.7 (Impact)
Standard error	0.25	0.14	0.28
t statistics	-11.5***	0.2	-13.5***

*** p<0.01; ** p<0.05

Source: Survey data, 2012 and 2014

The decline in livestock ownership is due to a shortage of pasture after the land was leased to Karuturi. The decrease in household livestock ownership cannot, however, be fully attributed to the transfer of land to Karuturi. The DiD estimation result showed that livestock ownership, on average, decreased by 3.7 TLU after the land was transferred to Karuturi (Table 4.5). This is statistically significant at $p<0.01$, and the magnitude of loss in livestock ownership that can be attributed to the land transfer to Karuturi is equivalent to 28.7%. Based on the PSM estimation, households in the affected stratum owned 3–3.6 TLU less (depending on the different matching algorisms) compared to those in the non-affected stratum. This is statistically significant at $p<0.05$ for NN matching and at $p<0.01$ for kernel and SS matching, and it is equivalent to a 24–28% loss that can be attributed due to the land transfer to Karuturi (Table 4.4). The results based on the two estimation techniques are again comparable, indicating the robustness of the findings.

The loss of grazing land also changed the composition of herds owned by the local community. Households in the affected stratum significantly changed their holdings of livestock from large grazers (such as ox and cow) to small ruminants (such as sheep and goats). Grazers require more space and pasture than small ruminants, which can be kept in the homestead and fed on leaves, roughages, crop by-products, barks and bushes (Table 4.6).

Table 4.6: Distribution of livestock holdings and composition between affected and non-affected households

Type of herd	Affected households			Non-affected households		
	Before intervention (SD)	After intervention (SD)	Mean difference (t)	Before intervention (SD)	After intervention (SD)	Mean difference (t)
Oxen	2.78 (2.67)	1.23 (0.99)	-1.56 (-8.43)***	3.83 (4.58)	3.16 (2.17)	-0.67 (-1.72*)
Cows	3.86 (4.62)	1.61 (1.23)	-2.25 (-5.95)***	5.31 (6.82)	4.34 (4.48)	-1.0 (-2.8)***
Steers	1.82 (2.3)	1.01 (1.21)	-0.8 (-4.0)***	3.16 (5.61)	2.71 (3.54)	-0.46 (-1.61)
Heifers	1.9 (2.6)	1.05 (1.15)	-0.83 (-4.0)***	3.51 (4.96)	3.61 (4.57)	0.095 (0.72)
Calves	2.27 (3.43)	0.72 (0.56)	-1.55 (-5.58)***	3.38 (4.62)	3.03 (3.14)	-0.35 (-1.51)
Goats	0.15 (0.89)	2.81 (3.05)	2.65 (11.14)***	0.31 (0.33)	0.04 (0.3)	0.006 (0.38)
Sheep	0.42 (1.42)	1.2 (3.55)	0.78 (3.25)***	0.83 (1.95)	0.56 (1.5)	-0.27 (-2.05)**
Mules	0.04 (0.20)	0.04 (0.20)	0 (0.00)	0.15 (0.36)	0.16 (0.39)	0.01 (0.53)
Donkeys	0.40 (1.01)	0.26 (0.62)	-0.14 (-2.19)**	0.78 (1.21)	0.7 (0.97)	-0.09 (-1.1)
Chickens	2.41 (3.26)	14.7 (7.16)	12.25 (20.74)***	9.2 (11.2)	7.6 (8.33)	-1.35 (-2.1)**
Beehives	3.18 (5.95)	2.7 (7.16)	-0.49 (-0.69)	10.5 (18.3)	8.53 (14.6)	-1.93 (-1.72)*

***Significant at p<0.01 **Significant at p<0.05 *Significant at p<0.1

Source: Survey data

In terms of boosting the wealth status of households, supplying draft oxen-power for crop cultivation and increasing the availability of milk and milk products for family consumption and for marketable surplus, ownership of cows and oxen are vital for the local people in the study area. The change in livestock ownership from large-grazers to small ruminants will have a significant negative effect on incomes and food security (discussed in next chapter) of local people. Livestock plays a vital role in the livelihoods of households in Bako Tibe District and the loss of grazing land means a significant loss of income for households from reduced livestock production. Due to a shortage of pasture, some households sold their cattle while others lost them as a result of feed shortages. Milk and milk products are important sources of income as well as food for households in the Bako area. A decline in the ownership of cows had a significant impact on household income.

In the same vein, before the company started operations in the community, households used to cultivate, on average, about 2 ha of land to produce different food commodities, such as *teff*, maize and Niger seed. In terms of land ownership with statutory rights, local people own a mean land size of 1 ha. The remaining comes from customarily owned plots that were transferred to the company in 2008. The focus-group discussions also revealed that a significant proportion of landless youth used to generate income by cultivating *teff* and Niger seed along the hilly side of the vertic cambisol, which is now part of the company's concession (see Figure 1.2 in Chapter 1). Apart from the loss of grazing land, the loss of cultivation plots (estimated at 1 ha per household) contributed to the decline in income levels for the affected households.

Case two: Gambella Regional State

Matching of affected and non-affected households based on propensity scores is used to estimate the impact of Karuturi (both for the Nuer and the Anuak cases) and Basen farms on household income in Gambella. The propensity scores are estimated with the help of co-variates that are measured before the intervention for the affected and non-affected households. The results of estimations are presented below.

Karuturi Agro Products PLC in Gambella Regional State

The mean household annual gross incomes for the Anuak and for the Nuer were ETB 13,219 and ETB 21,518, respectively. When disaggregated, the mean income for affected households of the Anuak and the Nuer were ETB 12,475 and ETB 21,104, respectively. The results of the four matching algorisms indicated that there is no statistically significant difference between the affected and non-affected households in their annual gross income for the Nuer, despite the value being negative. In the case of the Anuak, however, the impact of Karuturi's intervention on the gross income of households affected by the intervention is negative and statistically significant at either 1%, 5% or 10%. On average, the Anuak households that are affected by Karuturi's intervention have experienced a 8.6–10% decline in their annual gross income provided that there is no selection bias due to unobservable covariates. The income contribution of the company through wage employment was insignificant in terms of offsetting the negative impacts of the intervention on the annual gross income of the Anuak in which land is key resource for their livelihood. The Anuak in Ilia village lost their cultivation plots as well as key forest-based food and income sources due to the destruction of trees by the company (Table 4.7).

Table 4.7: Impact of Karuturi's intervention on gross household income (ETB) in Gambella Regional State[53]

Case	Matching technique[a]	Matched samples		Impact (ATT)	Standard Error[b]	t-value
		Affected	Non-affected	Income in ETB (%)		
Anuak	NN	98	71	-1,333.3 (-9.6)	642.3	-2.08*
	Radius	92	108	-1,237.4 (-8.9)	485.0	-2.55**
	Kernel	98	120	-1,386.5 (-10)	440.7	-3.15***
	SS	97	121	-1,188.4 (-8.6)	391.0	-3.22***
Nuer	NN	100	4252	-2,257.8	2063.8	-1.09
	Radius	80	106	-1,277.7	2173.5	-0.59
	Kernel	100	122	-1,410.2	1491.4	-0.95
	SS	100	122	-1,208.9	1577.3	-0.77

[a] Radius matching is calculated in a calliper of 0.01; [b]Bootstrap standard error is calculated based on 100 replications; ***=p<0.01; **=p<0.05; *=p<0.1
Source: Survey data, 2013

The Nuer in Jikawo, where Karuturi is cultivating maize, received an offer to collect maize from the company's field. Karuturi's farm plot in Jikawo site was flooded for two consecutive years and the company did not harvest any maize grain. The Nuer who live around the farm were allowed to take the maize grain and stock (for livestock feed) for two years. On the other hand, since the company has not cultivated its entire leasehold concession, land is not currently a limiting factor. For these reasons, the welfare loss due to the loss of land is not statistically significant for the Nuer. The basic question here is will the free maize grain and stock offered by the company be sustainable in the future? This is probably impossible and the negative value, which is not significant now, may turn out to be strongly significant in the future when the entire land is put under crop production.

[53] Note: The common support option has been selected and it was [0.0689, 0.848] for the Anuak case and [0.1033, 0.9521] for the Nuer case. The balancing property is satisfied for both cases. The mean propensity scores for affected and non-affected households are not different in a block of 6 for the Anuak case and in a block of 7 for the Nuer case.

Basen Agricultural and Industrial Development PLC in Gambella Regional State

The mean annual income of households living in the vicinity of Basen's farm is ETB 21,023 per annum. The mean income of households in the affected stratum was ETB 15,894, which is 32.3% less than the mean income of the households in the area. Based on the matching test, the immigrant settlers who are enclaved by Basen Farm experienced, on average, a decline in their gross income by 31–34% compared to those in the non-affected category, provided that there is no selection bias due to unobservable co-variates (Table 4.8).

Table 4.8: Impact of Basen's intervention on gross household income (ETB) in Gambella Regional State[54]

Matching technique[a]	Matched samples		Impact (ATT)	Standard Error[b]	t-value
	Affected	Non-affected	Income in ETB (%)		
NN	100	54	-8,056.7	2852.5	-1.82
Radius	67	111	-6,452.8 (-30.7)	1347.1	-4.79***
Kernel	100	125	-6,810.6 (-32.4)	1825.8	-3.73***
SS	91	134	-7,075.2 (-33.7)	1657.8	-3.22***

[a] Radius matching is calculated in a calliper of 0.01; [b]Bootstrap standard error is calculated based on 100 replications; ***=p<0.01; **=p<0.05
Source: Survey data, 2013

As discussed earlier, the company prefers to recruit migrants from Wolaita Sodo area who are more experienced in cotton picking than those settlers who are originally from Wolo and Kembata areas. Participation of settlers in wage employment did not increase their annual gross income significantly. But, given the fact that labour is scarce in the area, the company would have positively and significantly contributed to annual household income levels had there been a mechanism of improving the cotton picking skills of the settlers through training.

Surprisingly, the settlers who experienced hardship due to the transfer of the land to Basen, preferred the company to continue operating in the area contrary to the negative perception of the Anuak, who are indigenous to the area but minimally affected by the company as they live some miles away from Basen Farm. The Anuak believe that the land under the leasehold of Basen and

[54] The common support option has been selected and it was [0.0996, 0.9309]. The balancing property is satisfied and the mean propensity scores for affected and non-affected households are not different in a block of 7.

under cultivation by the settlers since 1984 belongs to their ancestors. As a result, they are in constant conflict with both the settlers and the company. The settlers believe that the presence of Basen's investment in the area will provide them protection against any resistance from the indigenous people since the government backs investors in the area by mobilizing the military and the federal police when conflicts arise. Below, a comparative narrative of the life story of a settler, a migrant labourer from Wolaita Sodo and an Anuak living close to Basen's farm is presented (Box 1, Box 2 and Box 3).

Box 1: Life story of a migrant labourer on Basen Farm, Abobo District, Gambella Regional State

Aleyu Ketema (not his real name), 36 years old, is a migrant labourer picking cotton on Basen's farm. He came from Wolaita Sodo area to Abobo for three consecutive years. He has family back in his area of origin and explained that his plot of land is too small to feed his relatives and to cover other expenses. He earns a good income (estimated at ETB 12–15,000 during a fourth month stay) by working at Basen's cotton farm. With this additional income, he managed to buy a house in his area of origin, feed his family well and send his children to school. He mentioned that he invested in the money he received from the farm in buying farm inputs for agricultural production activities back home and this has increased his farm productivity and given him additional income and food for the family.

Box 2: Life story of immigrant settlers in Abobo District, Gambella Regional State

An elderly farmer, age 65, who started to live in Abobo District since 1984, narrated his life story as follows. Due to shortage of land, drought and land degradation in his area of origin, Wollo, the Derg regime moved several of his ethnic group to this area as a solution for their food insecurity problems. When he moved to this area, malaria infestation was a critical problem and several of them died due to this disease, while others returned back to their birthplace. Arega (not his real name) decided to settle here permanently and eke out a living in spite of malaria and other water-borne diseases. After some years, he established a family and he is now a father of five.

Until recently, farming in Abobo had been done without limited access to land and it was not difficult to feed family members and send children to school. After the land was transferred to Basen, according to Arega, the opportunity to cultivate additional plots was lost. Nowadays, he cultivates the small plots around his homestead. Employment opportunities from Basen Farm are limited and cannot compensate for the lost opportunity. Moreover, Basen's preference is to employ migrant workers from the Wolaita Sodo area, rather than people like Arega. Even worse, according to him, both the District Administration and the local people marginalize the immigrant settlers by describing migration as a form of exploitation launched by the previous junta. He explained that his property was looted and his claim for justice in the District's Justice Office was ignored. The Anuak believe that the wealth generated by the immigrant settlers belongs to them, since they consider themselves as the heirs of the land. Arega explained the conflicts the immigrant settlers have with the Anuak as a source of insecurity and making it difficult to invest in fixed assets.

Box 3: Life story of an Anuak, Abobo District, Gambella Regional State

Chan (not his real name) is 28 years old and was born in Abobo. He has three children and makes a living by cultivating maize, fishing in the Alewero River and hunting and gathering. He is against the large-scale farm investment taking place in his birthplace and the immigrants who were settled in Abobo by the Derg regime in 1984. He has the view that the land put under large-scale farming and used by the immigrants belongs to the Anuak and that the influx of farm investments and 'outsiders' is a threat to the Anuak since land for crop production will be scarce in the future. He explained that he is not interested in working for the large-scale farms. In fact, the investors are not willing to give them jobs, he narrated. Asked whether he experienced hardship due to the land transfer to Basen, Chan mentioned that, so far, land is not a critical problem and his farm plots are far from where Basen is farming.

Case 3: S&P Energy Solution in Benshanguel Gumuz Regional State

Before the land was developed by S&P, the mean annual gross income of households for both Kota and Badgosh village was estimated to be in the range of ETB 16,409–16,555, and there was no statistically significant difference in the average incomes of households between the two villages. The mean annual income estimated in 2014, i.e. after S&P Farm started cultivation, was in the range of ETB 16,383–16,520. However, there is no statistically significant difference between the households in the affected and non-affected villages. Although the impact of the intervention on average gross household gross income showed a negative value (loss), the DiD estimation revealed that the decline in income is not statistically significant (Table 4.9).

Table 4.9: Difference-in-difference estimation of the impact of S&P farm on annual gross household income (ETB) in Dangur District, Benshanguel Gumuz Regional State

Gross income in ETB	Affected (n=96)	Non-affected (n=100)	DiD (n=196)
Before the intervention in 2010 (a)	16408.7	16555.0	146.2 (t-value=0.11)
After the intervention in 2014 (b)	16382.7	16520.3	137.6 (t-value=0.11)
Mean income difference (b-a)	-26.0	-34.7	-8.6 (Impact)
Standard error	135.6	98.5	167.6
t statistics	-0.19	-0.35	-0.05

Source: Own computation from survey data, 2010 and 2014

Dangur District is predominantly inhabited by the Gumuz indigenous population whose major income source is gold mining. They complement their incomes through crop farming based on shifting cultivation, gathering of forest honey and other non-timber forest products. Farming is extensive. They develop new cultivation plots by clearing trees and bushes, and cultivate sorghum/sesame for one or two years using hand-hoe and then leave the old plots to rejuvenate. Land is not a limiting factor for production in the region. Since 2010, the regional government embarked on allocating parcels of up to 10 ha per household that are officially registered. The local people are no longer allowed to clear additional parcels for shifting cultivation.

After the land was allocated to S&P Farm, incomes from forest honey have declined and fallow periods shortened. For instance, a typical Gumuz used to collect up to 90 kg of honey from the

forest; this has declined to 25 kg due to the forest clearing by the S&P Farm. Research outputs on pongomia trees documented that pongomia flowers are a good source of pollen for honey bees. If there was a strategy to assist the Gumuz in honey bee domestication, the lost income from wild honeybees could be compensated for once the pongomia trees start flowering. On the other hand, leasing out land to highlanders from Amhara Regional State is a common practice in the region, and this serves as a source of income for the local people. Despite the fact that the practice is officially banned by the regional government, the Gumuz informally continue the practice and income from land leasing has not substantially decreased. Though the impacts of the S&P Farm on the income levels of affected households is not statistically significant, the value is negative. The outcomes of the intervention are currently inconclusive and the impact could change in the future when the company fully develops the entire 50,000 ha concession.

4.3 Conclusion

In general, the impacts of large-scale farming on the income levels of local communities is worse in the areas where mixed crop-livestock farming is predominantly practised (Karuturi in Bako and Basen in Abobo) and when a forest-based livelihood is an important source of income (e.g. the Anuak case in Gambella). Land scarcity is the common driving force for the direction of impact of the large-scale farms. As noted earlier, Bako Tibe District of Oromia Regional State is densely populated and expropriation of land to make way for large-scale farming has higher opportunity costs than is the case in Gambella and Benshanguel Gumuz Regional State where population density is low. Wage employment is seasonal and generally favours migrant workers.