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Impacts of Large-Scale Agricultural Investment on the Livelhoods of the Local Community: The Case of Bambasi Woreda, BGRS

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Abstract
The study aims at examining the impacts of large-scale agricultural investment on the livelihoods of the local communities in Bambasi Woredas of the BGRS. The study areas are from the purposefully selected Kebeles of Wombaselam, Garabichwollega, and Shobergushi of Bambasi woreda, where large-scale agricultural investment projects on privately owned land are the targets. The data is collected through structured and semi-structured interviews, key informant interviews, focus group discussions, observations, and document review. The sampling was done using multi-stage stratified random sampling method. The study's findings show that the average treatment employment opportunity created for household members is 0.13 for the treatment group and 0.01 for the control group, with non-significant results at the 1% probability level, and the temporary employment opportunity is 0.87 for the treatment group and 0.49 for the control group, with significant results at the 1% probability level. According to the outcome variable findings, there is a statistically significant difference between the total asset accumulation at the 5% probability level and the total household income at the 10% probability level. The impact estimate (ATT) is insensitive to unobserved selection bias, and the kernel matching (KM) with band width 0.1 is chosen because it completely satisfies all three criteria of the best match estimators. According to the average treatment impacts on the treated, large scale agriculture investments have a negative influence on household asset accumulation and income.
Keywords: - Impacts, Large scale agricultural Investment, Livelihoods, Bambasi Woreda
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INTRODUCTION

The global phenomena of large scale land investments known as “land grabbing” is increasingly catching up public attention since 2007/2008 media, NGO reports, articles as well as scientific papers are being published. The attention catching term land grabbing refers to the rush for commercial land deals in the global by foreign governments, privet companies and investment funds. Those land investments are mainly aiming to secure one’s own access to food and fuel and often described as a form of “neo-colonialism”(Earth, 2010). By the end of 2009, such land investments acquisitions covered 56 million hectares of farmland around the world(Deininger, 2011). Whereas more than 70% such demands has been in Africa where land is comparatively affordable and in some place easily available (Earth, 2010).

Large-scale farming will undertake private investors in low land areas where abundant extensive land exists will be expanded and given due attentions. The necessary arrangements made to increase the privet investor’s participation by identifying areas that are not inhibited, but are suitable for agriculture. The studies are conducted to determine which forms of agricultural production enterprise are most suitable for each area identified. These areas are and the data concerning them will be registered and organized in a land bank. The necessary support will give to encourage the participation of Ethiopian investors. Efforts will make to attract foreign investment in a manner that will be beneficial for Ethiopia’s agriculture sector development(FDRE, 2010).

The GTP also specifies that Ethiopia will expand production of industrial crops; such as cotton, sugar, rubber and palm oil. Production increase from 0.7 million tons to 1.2 million tons. The GTP sets out while supporting private investment in large-scale farms, government’s focus is to ensure that the products produced from these farms are primarily for export or raw materials for domestic industries. For these reasons, emphasis will be put on cotton, date palm, tea, rubber tree and similar types of crops(FDRE, 2010).

Large-scale agricultural investments should not jeopardize local and indigenous communities; food security, socio cultural values, human and political rights, and access to land and based resource but rather strength it. The Comprehensive African agricultural Development Program (CAADP, 2003); provides a clear direction for African governments to take measure to attain food security, information, technology, physical and financial resource and to integrate farmers into the market economy in order to improve their access to the global market(NEPAD, 2003).

Still, facts on the ground seem to show the contrary; government has taken almost none of these recommendations seriously so far (Araya, 2013). The local smallholder’s communities were affected by the ongoing agricultural land investments in Ethiopia; in General Benishangul Gumuz in particularly in Bambasi

Woreda. Similarly, as those of low land areas of Ethiopia, Benishangul Gumuz (Bambasi Woreda) is negotiating its productive agricultural investments lands for long-term leases to forging and domestic investors. On the other hand, indications are limited about the role of local communities in the process of large-scale agricultural investments, its consequential adverse effects (positive and negative) on the local communities, its role in reducing poverty, its opportunities to the local communities and its interference on the livelihoods (economically & socially). The study mainly examines on the impacts of large-scale agricultural investment projects on the local communities in Bambasi Woreda's of Benishangul Gumuz regional state. In the Woreda's, there are 72 agricultural investment projects with the capital of 283,837,725.00 million-ethio birr invest. Out of the total investment projects 34 large-scale agricultural investment having more than 250ha of land which taken as large-scale land transfer in the region. However, in the region or Woreda's are not enhance the life of local people is not known in detail. Therefore, the research designed to study the effect of large-scale agricultural investments projects on the local community's livelihoods in Bambasi Woreda's of BGRS.

The general objective of the study was to examine the impact of large-scale agricultural investment on the livelihoods of the local communities of Bambasi Woreda in (BGRS). The study's specific objectives of the study were to examine the participation of local communities in large scale agricultural investments. to investigate the impact of large-scale agricultural investments on asset accumulation in local communities, as well as the impact of large-scale agricultural investments on household poverty.

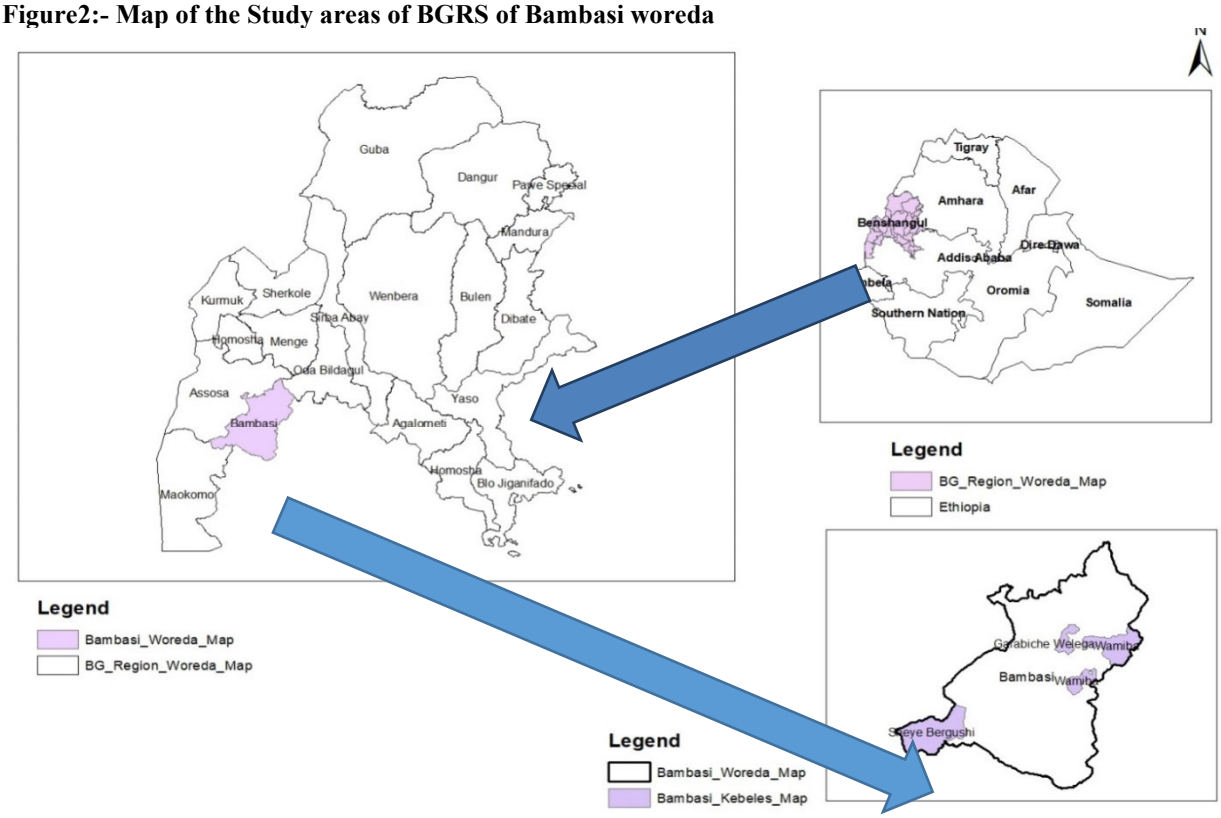
METHOD OF THE STUDY

Description of the Study area

The study was conducted in the regions of Assosa of zones of Bambasi Woreda. Bambasi Woreda lies in the Benishangul Gumuz regional states of the region and bound in the east by Oromiya region in some part, in the west Assosa Woreda, in the south some parts of Maokomo special Woreda and on the north Odablglidu Woreda. The populations of the Woreda's are male 31,539 female 31,154 and totally 62,693. The household populations of the Woreda's are 13,389 male and female 1065 totally 14,454. The Woreda head- quarters are Bambasi town the capital town of the Woreda located at 09017'- 12006' North Latitude and 34010-37004' East Longitude having an altitude of 580-2730m above sea level, which was 42kms away from the regional town Assosa, and 662 km away from Addis Ababa. The temperature reaches daily maximum of 21-35°c in the dry season with annual rainfall of 1350-1450. The Woreda consists of 38 Kebeles from those Kebeles the investment projects are found in nine Kebele, but large scale agricultural investment by mass found in the three Kebeles of Wombaselam, Garabichwollega and Shobergushi. Therefore, research studies focused on the three purposively selected Kebeles, where large-scale agricultural investments projects were owned land and implement their projects. The household of the purposively selected Kebeles was Wombaselam male 591 & female 22 totally 613, Garabichwollega male 240 & female 17 totally 257 and Shobergushi male 233 & female 29 totally 262. The economy of the people had depends on agriculture and natural resource utilization for sustaining their livelihoods. The economy was predominantly dependent on smallholder agriculture in which crop production, livestock raring, forest resource utilization (bamboo trees, honey production and fuels), mining (like gold) and other income encouraging activity. The crop grown in the areas include maize, sorghum, sesame, groundnut, paper, okra (kenkes) and other crops ((CSA, 2010), (BWARD, 2017).

The investment projects currently implementing in the areas are 72 projects investing on agricultural investment projects. These projects are sparsely implementing on their projects primarily by getting investment license from the regional investment office and making contractual agreements with the regional investment board head(regional administrative) and owned the land by collaborating the zonal, Woreda and Kebele stakeholder(Office, 2017). As states in the research questions and objectives, those projects investing in the Woreda's have its own implication in the study areas. The focus of the study is to investigate on what adverse (negative or positive) effect does those agricultural investment projects on the livelihoods of the local communities, especially on the indigenous community.

Figure2:- Map of the Study areas of BGRS of Bambasi woreda



The location of the study areas BGRS of Bambasi Woreda with the three sample Kebeles out of 38 Kebeles. Source (BGRS Environment, Forest and Land administration, GIS, 2018)

Study Approach

In order to achieve the research objectives, the researcher used mixed approaches (both quantitative and qualitative approaches). The focus of the study on participant's perceptions and experiences regarding large-scale agricultural investments and its effects on the local communities' livelihoods. The research able to describe their experiences and knowledge in their own views and generate data from the perspective organization and the field. The data obtained from the field was descriptive. The study combines the qualitative and quantitative approach for data collection instruments that used and data was collected through structured and semi structure interview, key informant interview, focus group discussion, observations and through documentary review.

Data Type and Sources

The data types available for the study were quantitative and qualitative data type. The quantitative data's are data that gathered through structured and semi structured interview of household. The qualitative data are data gathered through key informant interview, focus group discussions, and observations and filed notes. The data sources are both from primary and secondary sources of information that consulted to get more affordable data for the study. The primary data used to get fresh data from the field and the researcher directly gather the primary data by using different techniques of data collection. The primary sources of information for this studies were informants such as communities households surveys, traditional community elders, government officials(bureau head, directorates and experts), investment projects owner, project managers, extension workers(development agent), and household heads affected by large scale agricultural investment projects. To enhance the data from primary sources available secondary data's were refer from different books, literatures dealing with the issue under investigations and documentary review. The secondary data also collected and obtained from the review of documents and published works including policy documents, rules and regulations documents, regional and Woreda's investment data and reports from relative sectors where data were available.

Target Population

The target populations of this research are local community, the community having residence near to the investment projects (treated), community those far from investment projects (control) and community those get any opportunity from investment projects and large-scale agricultural investments (investors).

Sampling Technique

The method of sampling was done by using multi-stage sampling technique. Bambasi Woreda were selected from the region because of the existence of large-scale agricultural investment projects in the study area and the overcrowding investment projects that leading to land grabbing. From out of 38 Kebeles of the Woreda three Kebeles namely Wombaselam, Garabichwollega and Shobergushi are selected purposively, due to the fact that more large scale agricultural investment projects are concentrated in those Kebeles. The household from the treated groups those who have get employment opportunity (having one or more employed members in the large-scale agricultural investment) and the control group those who do not get employment opportunity (those who do not have employed member in large-scale agricultural investments) based on random sampling proportion to their population member. The treatment and control groups are decided based on the distances of investment projects to the local community.

Sample Size determination

The sample size of randomly selected population is determined by using Yamane's formula (Teklemariam, 2017). The household survey done on the randomly selected 172 households after consultations with the local administrations and development agents (Das) from the purposively selected three Kebeles where large-scale agricultural investments projects are more of practiced.

$$n = \frac{N1}{1+N1(e)^2}$$ n = the number of sample size of the households selected

N1= number of the households from purposively selected Kebeles

e = 0.07 is the percentage of the impressions of sampling error that can be tolerated

$$n = \frac{1132}{1+1132(0.07)^2} = 172$$ From the total **1132** HH(BWARD office Report,2018), of the purposively selected Kebeles, HH sampled for the survey are **172**where interviewed for the study, and LSAI projects sampled for key informant interview from **21** LSAIP is **12** LSAIP randomly selected

Methods and Instruments of data collection

The data collection instruments used for the studies were underling in order to gather the relevant primary data from the target informants. Those instruments of the studies are structured and semi structure interview, household survey, key informant interview, focus group discussion (FGD), observations and through documentary review.

Methods of Data analysis

The data collected are analyzed by using descriptive statistics and econometric models. The qualitative data collected through different data collection tools were organized. The quantitative data are coded and filled in to Microsoft excel and then imported to Stata software. The econometric model used to constructs the comparison groups based on the bases of the probability of participating, as the treatment is propensity score matching (PSM) is econometric analysis.

Descriptive analysis

The data's are also analyzed by using descriptive statistical tools like tabulation, graphs and charts, and reports are done by using appropriate graphs and tables. Ratio, percentage, mean and variance are applied to elaborate the data and to clearly analysis using the tools. The statistical correlations and regressions are used to test determinants of local livelihoods and livelihood dependency as well as the relationship between land lost because of the investments and food self-sufficiency, employment opportunity created, infrastructure developed and social service delivery as a result of large scale agricultural investment expansion on the study areas.

Econometric analysis

There are different types of non-experimental design used to analysis impact evaluations from those matching (Propensity score matching) selected to analysis the data. The statistical techniques to artificially construct comparison groups through identifying for possible observations under treatment and non-treatment (set of non-treatment observations) that has the most similar characteristics (Berhane, 2016). The econometric model used to analysis the data by using propensity score matching model (PSM). The propensity score matching is a method that improves on the ability of regression to generate accurate causal estimates by the virtue of its non-parametric approaches to the balancing of covariates between the "treatment" and "control" groups, which removes bias due to observable variables. The conventional approaches to assessing the impact of an intervention on using with and without methods have essentially been hampered by a problem of missing data. Due to these problems, the impacts of interventions cannot accurately estimated by simply comparing the outcomes of the treatment groups with the outcomes of the control groups (Heckman et al., 1998).

The propensity score matching approach aims to build matched pairs of comparable users from the program participants and non- participants that show a similarity in terms of their observable characteristics. The models also used to investigate the effect of a binary treatment on an outcome in an observation. It is the impact of treatment on the outcome of an individual speculation how the individual would have performed had the individual do not received the treatment and comparison of the variables (treatment variable and control variable).

PSM model match on the probability of being treated and receiving the conditional probability of the treatment, matching the treatment variable employment (E) as treatment and control group. This comparison of groups is used to evaluate the impacts of large scale agricultural investment on employment opportunity creation on treated groups of livelihoods. This ensures that the average treatment effects of employment opportunity created for the households will be accurately estimated. Let Yi^T and Yi^C be the amount of income for participants and non-participants respectively. The difference in outcome between the treatment and control groups can be seen from this mathematical calculation.

$\partial i = Yi^T - Yi^C$ (1)

∂i = change in outcome as result of treatment or change of income for participant in the program

Yi^T= outcome of treatment (income of i^{th} household when one or more household members are get employment opportunity from LSAI)

Yi^C = outcome of control (income of i^{th} household when one or more household members are does not participates as employment opportunity from LSAI).

The above will be questions expressed i causal effect notational form, by assigning Di= 1 as treatment variable takes the value of 1if the household participated as treatment (get employment opportunity) and 0 otherwise. Thus the average treatment effect of household i can be written as:-

$ATE = E(Yi^T|D= 1) - E(Yi^C|D=0)$ (2)

Where ATE, average treatment effect, which is the effect of treatment on income, $E(yi^T/D= 1)$; average outcomes for household, with treatment, if one or more of the household get employment opportunity from large scale agricultural investment (D= 1). $E(Yi^C/D=0)$; average outcome of untreated, when the households are not participate as employee in LSAI, (D=0).

To measure the Average Effects of Treatment on the treated (ATT) for the sample can be formulated as:-

$ATT = E(Yi^T - Yi^C)| D=1) = E(Yi^T| D=1) - E(Yi^C| D=1)$

The solution to this problem is to construct the unobserved outcome which is called the counterfactual outcome that individuals would have experienced, on average, had they not participated (Rosenbaum and Rubin, 1983), and these the central idea of matching. According to Rosenbaum and Rubin (1983), the effectiveness of matching estimators as a feasible estimator for impact evaluation depends on the two fundamental assumptions conditional independence assumption and assumptions of common support.

Model Specification

The Propensity score matching model (PSM) estimated by using probit or logit. The researcher use logit model to analysis the data. A logit regression of treatment status(1 if one or more of the household members get employment opportunity from large scale agricultural investment and 0 other wise) was run for the sampled households, those observable variables are sex of the hh head, age of the hh head, educational level of the hh head, occupation of the household head, size of the household members, distance of hh residence from investment projects, loss of useful land due to investment projects, size of land lost, rate of poverty within the household, technology transfer for the hh and infrastructure developed. The major concern of this regression was to predict the probability of a household to be participated in large scale agricultural investment as employers; to predict propensity scores, based on which the treatment and control groups of households were matched using the matching algorithms.

Choice of matching algorithms

The estimation of the propensity score is not enough to estimate the ATT of interest, due to the fact that the propensity score is continuous variable and the probability of observing two units with exactly the same propensity score is in principle zero. The methods differ from each other with respect to the way they select the control groups that are matched to the treated and with respect to the weights they attribute to the selected controls when estimating the counterfactual outcome of the treated. However, they all provide consistent estimates of the ATT under the Conditional independence assumption and overlap condition (Caliendo and Kopeining, 2008). The different algorithms commonly applied matching estimators are nearest neighbor matching, Caliper matching and Kernel matching are described.

RESULT AND DISCUSSIONS

Descriptive Analysis

The socio-economic and institutional characteristics of the households such as age, sex, educational level, family (household) size, technology transfer, occupation of the household, infrastructure developed, loss of land, and

distance of household residence from investment projects were hypothesized to affect the communities in the large scale agricultural program in turn the outcomes variables such as income and assets of the households. The incomes of the households are income from crop production, from livestock products, inputs of livestock keeping, off farm income, income from forest products and income from irrigations. The assets of the households are land, dwelling (house), machine/equipment, livestock, fruits and financial assets. From the total 172 sample respondents 86 were the treatment parts of the household members those get employment opportunity from investment projects and the rests 86 are the control those household far from investment projects their household members don't get employment opportunity from investment projects.

The descriptive results of continues variables for the whole sample of the households those nearest to large scale agricultural investment projects engage in different opportunity or affected by the large scale agricultural investment(treatment group) and those farm from investment projects not more affected by large scale agricultural investment(control group). The mean difference test between the treatment group and the control groups are presented in the table below.

Table 6: - descriptive statistics and mean different test between continuous variables

Variables	Treatment		Control		Total		t-value
	Mean	Std	Mean	Std	Mean	Std	
Age of hh	40.69	1.06	40.40	0.96	40.54	1.01	-0.80
Size of hh	8.78	0.42	8.45	0.46	8.62	0.44	1.04*
Size of land lost because of investment	1.84	0.38	0.00	0.00	0.92	0.19	2.90**
Numbers of employee opportunity created permanently	0.13	0.04	0.01	0.01	0.07	0.03	-5.56***
Numbers of employee opportunity created temporary	0.87	0.17	0.49	0.11	0.68	0.14	-10.98***
Months of hh own food production provide	2.55	0.10	2.67	0.10	2.61	0.10	0.60

Source: - Own survey 2019

Note: - *, **, *** significant at 10%, 5% and 1% probability level

As shown in table 6; the descriptive statistics show that there is no significant difference between the members of households employed and the households unemployed in terms of age, size of the household and months of household own food production provides. The average size of land lost due to investment projects by the whole sample is 0.92 with the average size of land lost due to investment projects is 1.84 for treatment groups (those households nearest to investment projects in terms of residence and farm lands) and null (0) for the control groups because of they are far from investment projects there will be no any loss of lands. The result indicated the household nearest to investment projects(in terms of residence and farm lands) loss land than those households far from investment projects there is significant difference in terms of size of land lost due to investment projects at 5% level. Regarding the numbers of employment opportunity created permanently the results of the study indicate that the average treatment employment opportunity for the household members created is 0.13 of the treatment group and 0.01 of the control groups that shows significant results at1% probability level. Regarding the numbers of employment opportunity created temporarily the results of the study indicate that the average employment opportunity created for the household members is 0.87 of the treatment groups and 0.49 of the control groups that shows significant results at 1% probability level.

As shown in table 7; the descriptive analysis of Pearson's chi square proportions difference test between the treatment groups of the households nearest to the farm projects and the control groups of those households far from investment projects for dummy explanatory variables show as the different variables that indicate the large scale agricultural investment has directly affect or indirectly affect on the livelihoods of local communities. Accordingly the respondents of the sample population groups the study show that the household loss of use full land due to investment projects 23(26.74%) in numbers out of the total treatment groups and 10(11.63%) of the total control groups. The results shows that as compared to the household loss of use full land due to investment projects is greater than in the household of treatment groups than the household loss of use full land due to investment projects of the control groups which indicate that households nearest to investment projects more affected than the household far from investment projects.

The consultation session done during the transfer of land to investment with the community was very low according to the study shown in table both the treatment groups 4(4.65%) and the control groups 1(1.16%). This shows that there will be no any consultation done when the land is transferred to the investment. The household nearest to the investment projects are evicted (displaced) from their home due to the expansions of investment projects. The study shows that from out of the total treatment groups 20(23.26%) in numbers are displaced from their home where as no any displacement in the case of the control groups. Those household displaced (evicted) from their homes are due to the settlement done in the area then their land is completely transferred to investment.

The investment projects investing in one area can either benefit or affect the community livelihoods but the study shows that out of the total respondents of the treatment groups 25(29.07%) and the control groups 11(12.79%) get opportunity in terms of employment opportunity, technology transfer, utilization of agricultural inputs, changing the working culture of the community and productivity of crop increase. This shows that the opportunity the investment project provides for the community is very low in both treatment and the control groups. The technology that the household get from the investment projects according to the study shows that from out of the total respondents 38(44.19%) numbers of the treatment groups get different technology than 12(13.95%) the control groups.

The contribution of large scale agricultural investment to household poverty reduction is very low as the study indicated in the table from out of the total respondents of the treatment groups10(11.63%) and11(12.79%) of the control groups there will be contribution of large scale agricultural investment on poverty reduction 76(88.37%) of the treatment groups and 75(87.21%) of the control groups of the household there will be no any contribution that the large scale agricultural investment can provide to alleviate poverty rather than the expansion of investment can aggravate poverty by eradicating the natural resources that generate income for the local community. The rate of poverty indicate that 80(93.02) of the treatment group and 79(91.86%) of the control groups responds the rate of poverty is increasing after the expansion of agricultural investment in the areas which results no any significant difference between the treatment group and the control groups in terms of poverty reduction. The household face food shortage within 12 months or one year of crop productions which indicates out of the total respondents 72(83.72%) of the treatment groups and 67(77.91%) of the control groups respond there will be shortage of food within twelve months. The results show that their high food shortage in the case of households nearest to investment projects than household far from investment projects.

The expansions of investment projects in different area can facilitate and build different infrastructure for the community as well as for the investment it, but the study show that 82(95.35%) of the treatment groups and 86(100%) of the control groups respond that there is no any infrastructure developed by the investment projects investing in the study area. The results show that the expansion of investment in area will be rather than building infrastructure computing with the community on the public infrastructures (like road, water pump and others).

Table 7: - descriptive statistics and proportion difference test for dummy variables

Dummy variables	Category	Treatment group		Control group		Total		x^2
		N	%	N	%	N	%	
HH Loss of useful land due to investment projects	Yes	23	26.74	10	11.63	33	19.19	17.73***
	No	63	73.26	76	88.37	139	80.81	
Consultation during land transferred to investment	Yes	4	4.65	1	1.16	5	2.91	9.96***
	No	82	95.35	85	98.84	167	97.09	
Evicted from home due to investment projects	Yes	20	23.26	0	0.00	20	11.63	4.65**
	No	66	76.74	86	100.00	152	88.37	
Opportunity investment proved for the household and community	Yes	25	29.07	11	12.79	36	20.93	20.43***
	NO	61	70.93	75	87.21	136	79.07	
Technology that the HH get from investment project	Yes	38	44.19	12	13.95	50	29.07	65.47***
	No	48	55.81	74	86.05	122	70.93	
Rate of poverty	Increase	80	93.02	79	91.86	159	92.44	0.16
	Decrease	6	6.98	7	8.14	13	7.56	
LSAI has contribution to HH poverty reduction	Yes	10	11.63	11	12.79	21	12.21	0.1
	No	76	88.37	75	87.21	151	87.79	
Infrastructure develop by investment projects	Yes	4	4.65	0	0.00	4	2.33	0.19
	No	82	95.35	86	100.00	168	97.67	
HH face food shortage last 12 months	Yes	72	83.72	67	77.91	139	80.81	1.69*
	No	14	16.28	19	22.09	33	19.19	

Source;-Own survey data of 2019

Note: - *,**,*** significant at 10%, 5% and 1% probability level

Mean different test of the Outcome Variable

The mean different test of the outcome variables of the studies are the asset accumulation of the household and income of the households. The total asset accumulations are from the land holding capacity of the household, dwelling (house), machine (equipment), livestock, fruits and other financial assets. The total income of the households is from crop production, income from livestock products, off farm income, income from forest products and income from irrigation.

Table 8:- mean different test for the outcome variable

Variables	unit	Treatment group		Control group		t-value
		Mean	Std	Mean	Std	
Total asset accumulation of the hh	birr	77,093.61	54,309.68	59,660.42	31,749.09	2.364**
Total income of the hh	birr	41,609.55	34,260.3	25,946.27	16,873.29	1.290*

Source: - Own Survey results
Note; - *, ** significant at 10% and 5% probability level

The average total asset accumulation of the household is 77,093.61 birr for the treatment groups which are nearest to investment projects in terms of residence and farm land and 59,660.42 birr for control groups those far from investment projects in terms of residence and farm lands. The total income of the household for the treatment groups is 41, 609.55 birr and for the control groups are 25, 946.27 birr. The results show that there is statistically significant difference in terms of total asset accumulation at 5% probability level of 17,433.19 birr and in terms of total income of the household at 10% probability level of 15,663.28 birr differences.

Furthermore the results show that the average total asset accumulation of the household nearest to investment projects is higher than those of the household far from investment projects by 12.75%. The average total income of the household nearest to investment projects (the treatment groups) is higher than the household far from investment projects by 23%. These indicate that the more asset accumulation and total income of the household of the treatment groups are the naturally income generating forest products (honey production, bamboo forest marketing and access of medicinal plants and fruits), technology transfer, employment opportunity; livestock production and crop production are higher than those of household control groups (far from investment projects).

Econometric Analysis

The econometric analysis is conducted to identify the determinants of getting employment opportunity (either temporary or permanent employee), technology transfer, infrastructure developed, livelihoods of household changes, loss of useful land due to investment projects, size of land lost due to investment projects, opportunity that investment project provide for the local community, contribution of large scale agricultural investment on poverty reduction, rate of poverty, household livelihood options and opportunity affected by investment projects, household income and asset accumulation affected by investment projects. Propensity score matching is choice as the estimator based on certain indicators and balancing tests was conducted to improve quality estimate.

Logit model determinants on impacts of LSAI on livelihoods of Local Community

Through employing the binary logit regression model the necessary variables explaining on the impacts of large scale agricultural on the livelihoods of local community were analyzed by using this model.

Table 9:- Binary logit regression results of household members get employment opportunity from LSAI

Employment opportunity from investment project	Coef.	Std. Err.	Z	P>|z|
Sex of household	.7480846*	.6038333	1.24	0.215
Age of household	-.0146987	.0300007	-0.49	0.624
Educational levels of household	-.9799356*	.5188885	-1.89	0.059
Occupation of the household	.5893314	.6756026	0.87	0.383
Size of household	.053701	.0651955	0.82	0.410
Distance of household residence from investment project	.625164*	.5103806	1.22	0.221
Loss of useful land due to investment project	.8589557*	.8506834	1.01	0.313
Size of land lost because of investment	-.0197312	.1182466	-0.17	0.867
Rate of poverty	1.786085**	.8010049	2.23	0.026
Technology get from investment project	1.589056**	.5205259	3.05	0.002
Infrastructure developed by investment projects	.8638262	1.387841	0.62	0.534
_cons	-3.031629**	1.451711	-2.09	0.037
LR chi2(11) = 40.41				
Prob > chi2 = 0.0000				
Pseudo R2 = 0.2194				
Number of obs =172				

Source: - Own survey data of 2019
Note: - *.** significant at 10% and 5%, probability level

The results show that out of the ten explanatory variables which were hypothesized to affect the participation of local community as employee (both temporary and permanent) in large scale agricultural investment projects and which in turn affects the outcome variables only three variables were found to be statistically significant

differences. These include educational level of the household, rate of poverty and technology transfer. Educational level of the household and technology transfer significantly and negatively affect the employment opportunity in large scale agricultural investment projects, whereas the rate of poverty affects it positively (table 10).

The reason for the positive contribution of those variables on the dependent variables the rate of poverty affects the participation of local community employee in large scale agricultural investment projects. This contributes that when the large scale agricultural investment projects create employment opportunity for the local community of the household's rate of poverty would be directly or indirectly minimized.

Matching Estimate of Propensity Score

As shown in the table 10, the estimate propensity scores vary between 0.07 and 0.96 with the mean of 0.41 for treatment groups (households members get employment opportunity from large scale agricultural investment projects) and the estimated propensity scores vary between 0.02 and 0.90 with the mean of 0.17 for the control groups (those household members do not get employment opportunity from large scale agricultural investment projects). The common support region would lies between 0.07 and 0.90. In other words, households whose estimated propensity scores are less than 0.07 and greater than 0.90 are not considered for matching exercise.

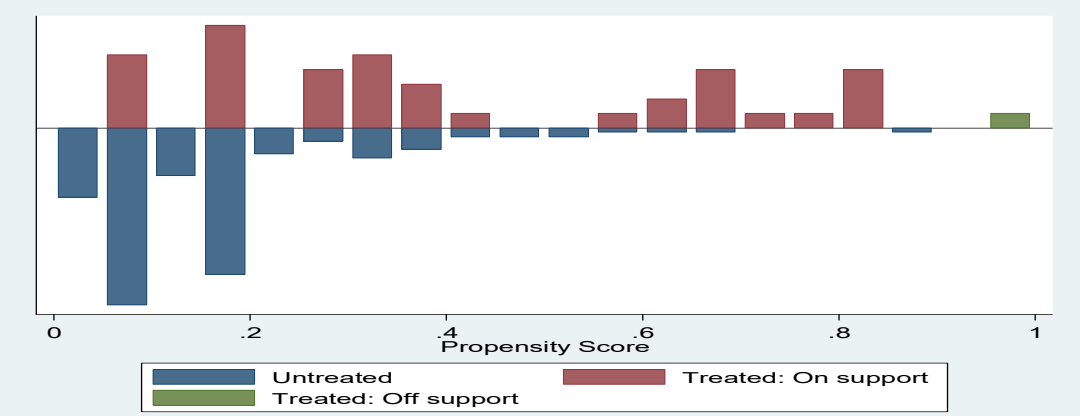
Table 10:- Distribution of estimated propensity scores

Group	Obs	Mean	Std. Dev.	Min	Max
Total households	172	0.23	0.21	0.02	0.94
Treatment households	39	0.41	0.26	0.07	0.96
Control households	133	0.17	0.15	0.02	0.90

Source: - Own survey results, 2019

The graphs of common support region lies as shown in the figure 3 will be the histograms of estimated propensity scores density for treated groups and control groups in collective actions schemes overlap. Treated on supports indicates the individuals in the participants groups who get appropriate and the treated off supports indicated in the participants who necessity inappropriate. From the graphs, all the* treated and untreated individuals were within the regions of common support indicating that all treated individuals have corresponding untreated individuals except some treated off support individuals. This assures that statistically treated and untreated individuals are comparable, but there will be some treated off support individuals which are not comparable with the untreated individuals.

Figure 3:- Propensity score distribution and common support for propensity score estimation



Matching Estimation Procedures

Estimating propensity scores results for the impacts of large scale agricultural investment on the livelihoods of local community will be aimed to check wither our cross sectional matching estimators are sensitive to the choices of a particular sample size, the common support conditions which is imposed, balancing propensity is set and satisfied in all regression at 1% significant level. In using the logit model to predict the probability of the impacts that the large scale agricultural investment address on the livelihoods of the local community and including the different ranges of household characteristics as regressors'. The results of the four matching algorithms (nearest neighbor matching, caliper matching, radius matching and kernel matching) are presented in the table 12 which is useful to check the consistency of the estimated causal effects.

Table 11:- Performances of Matching estimators

Matching algorithm	Psedo-R^2	Insignificant Variables	Sample size matched
Nearest Neighbor matching(NNM)			
NNM(1)	0.106	6/12	165
NNM(2)	0.078	11/12	147
NNM(3)	0.063	12/12	165
NNM(4)	0.039	12/12	165
NNM(5)	0.058	11/12	165
Caliper match(CM)			
Caliper (0.01)	0.063	11/12	158
Caliper (0.1)	0.075	9/12	165
Caliper (0.25)	0.109	8/12	165
Caliper (0.5)	0.150	4/12	165
Radius match(RM)			
Radius(0.01)	0.216	6/12	165
Radius(0.1)	0.180	7/12	165
Radius(0.25)	0.213	7/12	165
Radius(0.5)	0.216	6/12	165
Kernel matching(KM)			
Kernel(0.01)	0.029	11/12	158
Kernel(0.1)	***0.012***	***12/12***	***165***
Kernel(0.25)	0.043	12/12	165
Kernel(0.5)	0.072	9/12	165

Source: - Own survey data

Through matching the different algorithm for the estimations of the treatment effects, the numbers of the matched observations, the pseudo R-square value and the insignificant variables are the three criterion employed to select the best matching algorithms. According to the selection criterion the best matching algorithm selected would be kernel matching (KM) with 0.1 band width. This matching algorithm results with lowest pseudo R-square value (0.012), the numbers of insignificant variables (12/12) and the largest sample size matched (165). So the results in the table 13 show that kernel matching (KM) with band width 0.1 has the smallest pseudo R-square which 0.012 the numbers of insignificant variables 12 and the largest sample size matched 165. Therefore, kernel matching (KM) with band width 0.1 is selected as it full fill all the three criterion of the best match estimators.

Balancing Tests

The balancing tests of the t-test suggest that differences in household characteristics between the treatment and the control groups are jointly insignificant both before matching and after matching in some ways and significant in the other ways. In the individual covariates balances tests in the table 12; the numbers of variables with no statistically significant mean differences of the variables are the sample size unmatched (sex, age, educational levels of the hh, occupation of the hh and size of the hh), Sample KM at bandwidth with 0.25 (all variables have no significant differences), after KM (0.1) bandwidth (all variables have no significant differences) and sample after caliper radius with bandwidth at 0.25(sex, age, educational levels of the hh, occupation of the hh and size of the hh have no significant differences). The rest will be statistically significant difference at 10%, 5% and 1%. The balancing test shows that the numbers of covariates remain balanced after matching procedures. In other words, there is no significant difference in the mean and the frequency distributions of the covariates of the treatment and the control groups after the matching procedures. Thus, the estimations results of the treatment effects expressed and implemented based on the kernel matching.

Table 12: - Balance test of covariates with different algorithms

No_	Variables	Sample size Unmatched	Sample KM(0.25)	After KM(0.1)	Sample after Caliper Radius (0.25)
1	Sex of household				
	Mean(treatment)	0.80	0.87	0.84	0.87
	Mean(control)	0.79	0.87	0.88	0.83
	t-test	0.32	-0.08	-0.42	0.48
2	Age of household				
	Mean(treatment)	40.26	40.32	40.91	40.32
	Mean(control)	40.62	40.76	41.84	40.60
	t-test	-0.21	-0.19	-0.37	-0.13
3	Education levels hh				
	Mean(treatment)	0.56	0.53	0.53	0.53
	Mean(control)	0.61	0.59	0.54	0.60
	t-test	-0.76	-0.56	-0.10	-0.61
4	Occupations of hh				
	Mean(treatment)	0.87	0.87	0.84	0.87
	Mean(control)	0.87	0.89	0.88	0.88
	t-test	-0.01	-0.32	-0.46	-0.15
5	Size of hh				
	Mean(treatment)	9.08	9.05	9.31	9.05
	Mean(control)	8.48	10.05	10.11	8.57
	t-test	0.80	-0.80	-0.59	0.43
6	Distances of hh residence from investment project				
	Mean(treatment)	0.67	0.66	0.63	0.66
	Mean(control)	0.45	0.56	0.61	0.44
	t-test	2.39**	0.90	0.12	1.81*
7	Land loss due to investment project				
	Mean(treatment)	0.28	0.26	0.22	0.26
	Mean(control)	0.17	0.28	0.28	0.17
	t-test	1.63*	-0.21	-0.55	0.92
8	Size of land loss because of investment				
	Mean(treatment)	1.87	1.66	1.34	1.66
	Mean(control)	0.64	1.82	1.68	0.60
	t-test	2.57**	-0.19	-0.38	1.41*
9	Rate of poverty				
	Mean(treatment)	0.23	0.21	0.16	0.21
	Mean(control)	0.03	0.16	0.13	0.02
	t-test	4.37***	0.51	0.35	2.27**
10	Technology get from investment project				
	Mean(treatment)	0.62	0.61	0.53	0.61
	Mean(control)	0.20	0.52	0.52	0.18
	t-test	5.48***	0.74	0.12	3.72**
11	Infrastructure developed by investment projects				
	Mean(treatment)	0.08	0.05	0.03	0.05
	Mean(control)	0.01	0.02	0.02	0.01
	t-test	2.56**	0.83	0.34	0.98

Source: - Own survey data
*, **, *** significant at 10%, 5% and 1% probability levels

Thus, the only algorithms like kernel matching with band width 0.1 full fills all the three criteria listed in the table 12. The study has chose the kernel matching band width (0.1) matching methods as the best estimators then we run the ATT estimation with this best choice estimator.

Treatment effects on the treated (ATT)

The study of this thesis provides the evidences as to whether or not the impacts of large scale agricultural investments on the livelihoods of the local community have bring significant change on the total household asset accumulation(land holdings capacity of the household, dwelling(housing), machine(equipment), livestock, fruits and other financial assets), and total income of the household(income from crop production, income from livestock products, off-farm income, income from forest and income from irrigation products).

Table 13:- Average treatment effects on treated (ATT)

Variable	Treated	Controls	Difference	S.E.	T-stat
Total asset Accumulations of household(tasahh)	1.15625	1.28458361	-.128333607	.086586478	-1.48*
Total income of household(ticohh)	1.34375	1.45814267	-.114392666	.11026736	-1.04*

Sources:- Own survey results
Note: - * significant at 10% probability levels

The estimation results shown in the table 13; present a supportive evidence of statistically significant differences at different levels between the treatment groups and the control groups in terms of the total asset accumulations of the household by measuring the asset accumulations by converting in to birr and the total household income will be also measured by birr which obtained from different livelihood options like from crop productions, livestock products, forest products, irrigation and off farm incomes. The results from the propensity scores after matching shows that there is a statistically significant difference in the total asset accumulations of the households and the total household income by 10% probability levels. The results show that large scale agricultural investments have negative impacts on the household asset accumulation and the income of the households.

Sensitivity analysis

In order to control for unobserved bias in the table 14 presents the critical levels of gamma at which the causal inference of significant impacts of large scale agricultural investment on the livelihoods of local community. The estimate impacts of large scale agricultural investments on the livelihoods of the local community have positive for upper bound significance level and negative for lower bound significances levels.

Table 14: - Results of Sensitivity analysis

Gamma	sig+	sig-	t-hat+	t-hat-
1	.034377	.034377	-.166126	-.166126
1.05	.025489	.045563	-.167452	-.165245
1.1	.018843	.05868	-.168796	-.164241
1.15	.013894	.073711	-.170279	-.163147
1.2	.010222	.090593	-.172178	-.162414
1.25	.007506	.109228	-.172972	-.161952
1.3	.005502	.129482	-.174322	-.160678
1.35	.004027	.151202	-.174991	-.159973
1.4	.002943	.174216	-.176219	-.158362
1.45	.002148	.198341	-.17687	-.157762
1.5	.001567	.223392	-.177924	-.155973
1.55	.001141	.249181	-.179027	-.154659
1.6	.000831	.275526	-.180309	-.153623
1.65	.000604	.302254	-.180871	-.152796
1.7	.000439	.329198	-.182113	-.151868
1.75	.000319	.356205	-.184549	-.150616
1.8	.000232	.383135	-.186707	-.150108
1.85	.000168	.40986	-.188395	-.14954
1.9	.000122	.436265	-.190453	-.148342
1.95	.000088	.46225	-.193255	-.147734
2	.000064	.487729	-.198026	-.145507

* Gamma - log odds of differential assignment due to unobserved factors
sig+ - upper bound significance level
sig- - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate

The results show that the inference for the impacts of large scale agricultural investment on the livelihoods of local community is not changing while the treatment and control groups of the households has been allowed to differ in their odds of being treated in terms of unobserved covariates. i.e. for all outcome variables estimation at the different levels of gamma the p-critical values are significant that affected both treatment variables and the outcome variables. Thus, the impacts estimate (ATT) is insensitive to unobserved selection bias.

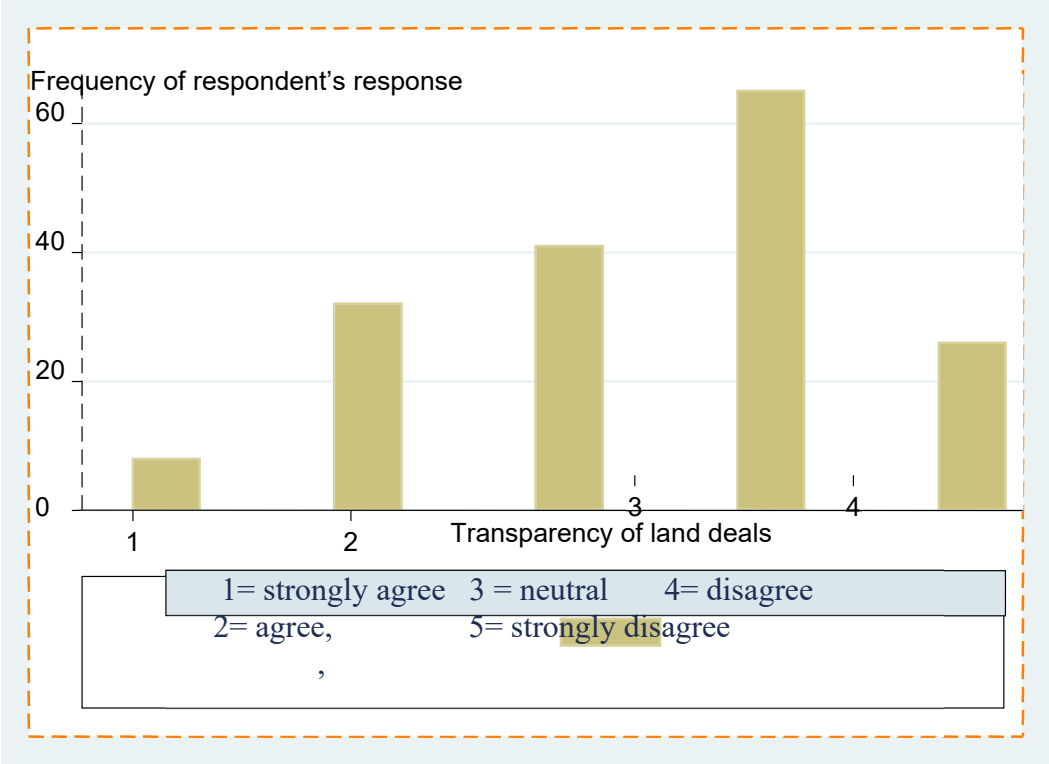
The effect of land transfer to investment projects on local community

The transfer of large scale agricultural land to investment has its own negative and positive effects on the

livelihoods of local communities through distracting natural resources, computation on infrastructures, loss of forest and forest products the local community depends on to sustain its livelihoods. As shown in the table 15, the transparency of land deals during land transfer to investment the information flow will be more of from the Woreda government sides than of the Kebele communities. The information on the land transfer to the community was 47.67 %(82) from government officials, 29.65 %(51) from Keble leaders, 22.09 %(38) from land management committee and 0.58 %(1) from investors. This indicate that the transfer of land to large scale agricultural investment without consulting the communities because the most of the household get the information of land transfer to investment from Woreda government officials than that of Keble leaders and Kebele land management committee.

The transparency of land deals to large scale agricultural investment not in regards with the agreement of the local communities. As shown in the table 15, and figure 4 the degree of agreement of land transfer to investment was 37.79 %(65) disagree, 23.84 %(41) neutral, 18.6 %(32) agree, 15.12 %(26%) strongly disagree and 4.65 %(8) strongly agree. The results indicate that most of the households have no interest on the expansion of the large scale agricultural investments because its negative impacts more than its positive impacts.

Figure 4: - Transparency of land deals to agricultural investment



Effects of large scale agricultural Investment on the livelihoods of local community

The livelihoods of local communities are directly or indirectly affected by large scale agricultural investment projects. The livelihoods that the large scale agricultural investment projects affects are loss of land, the extents of the direct effects on the means of livings of local community and loss of resources. As shown in the table 15, the type of land lost due to large scale agricultural investment projects were 12.21%(21) crop land loss, 3.49%(6) sources of forest products loss, 2.91%(5) loss of grazing land and the rest 80.23%(138) no loss of any useful land. The results indicate that no more loss of useful land but the crop land, grazing land and forest land lost are the livelihoods of the local community that negatively affected by the investment projects.

The direct effects of large scale agricultural investment on the means of livings of the local communities are vary from place to place and also vary in its degrees of addressing impacts. As the table 15, shown the direct effects of LSAI on the means of livings of the local community were 69.19 %(119) medium, 16.86 %(30) and 13.37(23) high. This results indicate that from out of 172 respondents 23 respondents are directly affected by the LSAIP than those of 119 and 30 respondents through loss of security of land holding, loss of access crop land, loss access to forest land and forest products, loss access to grazing land, computation on water (for drinking, irrigation and drinking for animals) and computation on infrastructures. The results of the study point out that out of 172 respondents 76.74 %(132 respondents) were depends on forest and forest products to sustain its livelihoods in order to generate income, to get food and medicine from natural forest.

Opportunity Large scale agricultural investment contribute for the local community

The expansion of large scale agricultural investment contributes different opportunity for the local community. As shown in the table 15, the opportunity that investment project provide for the local communities out of the 172 respondents are 8.72 %(15) employment opportunity creation, 4.65%(8) technology transferred, 3.49%(6) working culture of the community change, 2.33%(4) utilization of agricultural input increase, 2.33%(4) productivity of crop increase and 78.49%(135) respond there will not any opportunity created for the local community. The result indicates that most respondents respond there will no opportunity created for the local community by large scale agricultural investment projects.

Large scale agricultural investment contributes to change the livelihoods of local community and to household poverty reductions. As shown in the table 15, the livelihoods of household changes are 10.47 %(18)employment opportunity generated, 1.16%(2) asset accumulation of the household improved, 0.58%(1) food security problems of the household solved and 87.79%(151) of the household respond there will be no livelihoods of the household will be changed. The results indicate that the expansion of large scale agricultural have no contribution on the livelihoods of local community.

Conclusion and Recommendations

The total amount of land leased to investment projects and the cultivated lands are not appropriately implemented based on the agreements with governments. Out of the total investors investing in the area few of the perform very well, the rests of investment projects have no enough machinery, the camps are not mechanized, opportunity for the communities are not created, rent their land illegally for the other farmers and simply they grab the land. The results from the regressions proves that the explanatory variables which includes sex of the hh, distance the hh residence from the investment projects, loss of useful land due to investment projects, the rates of poverty and the technology transfer to the hh are positively affect the participation of the households as employment opportunity in large scale agricultural investments which is influenced by the stated explanatory variables.

The matching estimation procedures the matching algorithms used to analysis the estimations of propensity scores are nearest neighbor matching (NNM), caliper matching (CM), radius matching (RM) and kernel matching (KM). Out of the sated matching algorithms kernel matching with 0.1 band width is selected as the best matching estimators. The balance test of the unmatched ample size, KM sample with band width of 0.25, after KM (0.1) band width and after caliper radius with band width 0.25 balance tests are done, and there is no significant difference in the mean and frequency distributions of the covariates of the treatment and the control groups after the matching procedures and the covariates remain balanced. The estimation results of the average treatment effects on the treated indicate that the large scale agricultural investments have negative impacts on the household asset accumulations and incomes of the households.

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