



An Analysis of the Effects of Lao Agricultural Products on the Demand for Chinese Market on the Distribution of Income in Rural Areas

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Abstract

This research is attempted to evaluate the impact of Laos-China railway by focusing on household income in the rural areas of Lao PDR, and also it is analyzed the Chinese market's demand on specified 4 Lao agricultural products especially cassava, banana, rubber and sugarcane. Moreover, this study compares between Lao farmers who are exported and not exported the agricultural products to the Chinese market. Further, the 3 main econometric models which are utilized in this research including firstly: (DiD) difference-in-differences, secondly, (OLS) ordinary least squares and thirdly, Gini Decomposition analysis by using the data of the year 2019 and 2025. The research has found the export trends of rural households' agricultural products to the Chinese market increased after the railway. However, there are not all households in the rural areas of Laos received the advantage from the railway, before the railway opened there was 40% poorest households experience to measure increase their income. In this important point to find in this research is that not all poor households did not get the benefit from the increasing of agricultural products export to the Chinese market by using the Laos-China railway and also not all the higher-income households did not get the benefit from the agricultural exports. Finally, the result shows that infrastructure improvement is able to increase the agricultural export and increase the income of rural households.

Keywords: Lao Agricultural Products, Chinese Market Demand, Distribution Income, Rural Area and Laos-China Railway

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1. Introduction

Lao PDR or Laos is a landlocked country located in Southeast Asia the main economy of Laos agriculture which is covered 20% of total export. And Laos is the mountainous country most of people live in rely areas and doing the agriculture for livelihood (World Bank, 2024). Since the past until now, the Laos government also sees the agricultural sector is the most important part of the economy for domestic and

exporting by creating the policy and project to promote agricultural sector in whole country especially in the rural areas in the long-term development (Phakoxay, 2024). Due to currently Laos is under least Developed Country (LDCs) status so this is a good opportunity to Laos for receiving the import duty reduction from China and the ASEAN member countries as well, it is to make the strategic of Laos to link with international and regional trade (Phakoxay, 2024). Besides that, China is the largest market

of Lao agriculture products in 2020 this sector covered 30% that exported to China and the primary agricultural goods were casava, banana, rubber and sugarcane, Laos and China have the quickly growth of agricultural trade (World Bank , 2020). Laos exported agricultural goods to Chinese market raised about 80% of the total value export (Vientiane Times, 2024). However, Chinese market demand is not all of Laos agricultural goods but the needed of Chinese market were cassava, banana, rubber and sugarcane (Xinhua News Agency, 2024) To promote the Chinese investment Laos provided the land around 295,000 hectares of casava plantation, it is able to produce 7.4 million tons export to the Chinese market and the amount of export banana in that year was \$440 million (China.org.cn. , 2025). Laos-China railway can change from the exporting from Laos to China by the normal roads to use the railway instead, the railway can reduce the transportation cost approximately 20% - 40% and it is reduced the time approximately 40%-50% of exporting from Laos to China (World Bank, 2022) . As mentioned in the beginning of the introduction that Laos is the landlocked country in Southeast Asia, therefore the Laos-China railway is transformed Laos from Laos landlocked to be land linked country to connect Laos with the region (Xinhua News Agency, 2025) Laos-China railway increased the goods and it transported more than 171,000 tons of agricultural products in 2025, it has risen about 62.8% since its opening of the railway, and the Laos-China railway can be promoted the Lao agricultural products export to China (China.org.cn, 2025).

Despite this, the railway is able to promote macroeconomic and trade to reduce the poverty in Laos, but there are different groups to concern with the agricultural trade impact. (Asian Development Bank, 2015) reported that in the 20 years Lao household income of Gini Index raised from 0.311 to 0.364, that's meant it increased the inequality of the households in the rural and urban areas. The poverty alleviation could contribute about 28% of inequality increasing

which was showed in this study, meanwhile the Gini Index of Lao household was 38.8 in 2018. (World Bank Data , 2024) mentioned that income inequality is the main problem of Lao households which are high-income was at 34% and households at 45% was low-income of the Gini Index of Lao household was 42.4 in 2024. And then (Asian Development Bank, 2015) also reported that the overview of the economic growth by agricultural trade is enabled to increase the rural household income but it has the change that cannot distribute to all poor households in the rural areas. The research of (Phanthavong et al. (2026) mentioned about the infrastructure improvement such as building the long road has significantly assist long-run poverty reduction in Laos. The road can build the connection to access to the market, reduce transportation cost, and opportunity employment and household welfare and the study also found that the length of road increase 1% is associated 50.56 point to decrease the poverty indicator.

Furthermore, Xiang (2026) has found the GDP growth of Laos which has the positive impact from the Laos-China railway after it is officially opened the railway is able to connect the rural households to export their agricultural products to the big market especially Chinese market, and it is promoted the trading between Laos and China. (World Bank , 2022) In the rural community the households do not have a power to negotiate the agricultural price with the suppliers are able to export their agricultural in a high price, they also can earn high income at the same time. Sayavong (2022) has found that growth of Lao economy about 0.3% is from the Laos-China railway and it also can reduce the poverty rate falls from 17% to 15.7%, in the rural households if who are participated the contact farming with the Chinese companies, they will get the benefit from the agricultural trade and they will have the better producing resources. And Inthakoun (2025) mentioned that exporting banana from Lao farmers to the Chinese market can be benefited to the rural households but not all farmers who could get benefits from this

export. The research of (Wongpit et al. (2023) resulted that the farmers who were participated the contract farming with the Chinese companies will have the opportunities to export their agricultural products directly to China with the deal. This contract farming distributes to the farmers groups and the communities in the rural area. Phakoxay (2024) studied the balance of negotiation power between Lao small farmers and agribusiness with the agricultural products price, the contact farming brings opportunity for the Lao rural farmers that they can expanse their markets with exporting the high prices.

Moreover, regarding to the Laos-China railway project which has an impact which is enabled to increase the Lao economy and to promote the trading between Laos and China, it has a lot of related researches in these field. For example, Xiang (2026) study has found that even though the transportation improvement has a negative to the Gini index in the national level data however the Laos-China railway increases the trade volume positively and also it is affected to the growth of Lao GDP and GDP per capital significantly. Sayavong (2022) mentioned that the poverty rate was reduced from 17% to 15.7% and economic growth impact of 0.3% after establishing the Laos-China railway. Besides that, the study of (Wongpit et al. (2023) found the agricultural trade can increase the rural farmer's income significantly but not all of farmers to be included in this study focuses on the value chains for the Chinese market demand of Lao bananas. (Setboonsarng et al. 2008) resulted that the contract farming between Lao smallholders in the rural areas and agribusinesses can be benefited to the small farmers due to after harvest their crops they are able to sell to agribusinesses directly and they also have a power for negotiating the price in the contract, and it can be reduced the poverty rate in the rural areas in Laos. (Hepp et al. (2021) studied in the Northern part of Laos the transition from the relationship cropping to agricultural trade to reveal on the clustering the households in the villages can be accessed to the market by improving their

products to have more quality and productive the households get benefit from this trading by existing from the inequality.

In addition, this research including 3 main objectives such as 1) Investigating the increase of Chinese market demand on the Lao agricultural products which is affected to the rural households' income by comparing between exporting group and non-exporting group., 2) Figuring out the extent to which high-income households getting the benefits and compare to the low-income households across the pre-treatment rural income distribution by agricultural products export to China and 3). Evaluating the growth of agricultural exports to China enabled by the Laos-China railway, it has caused a differentiated change income inequality especially increase the Gini coefficient in the rural communities in Laos.

2. Materials and Methods

2.1 Data collection

The secondary data is untied in this research and the detail sources that taken data from as below:

1) Household-level data: this dataset has conducted from the Lao Expenditure and Consumption Survey (LECS) including the 6th LECS in 2018-2019 will be used as the pre-treatment group (Lao Statistics Bureau, 2020) and 7th LECS in 2024-2025 will be used as the post-treatment group (Lao Statistics Bureau., 2025),

2) Agricultural Trade and Export Data: This dataset is taken from the Lao PDR Agricultural Trade and Export Statistics Database (UN-COMTRADE) of the United Nations. It identifies trade data between Laos and China during 2018-2024 including cassava, bananas, rubber and sugarcane. In addition, data will be taken from FAOSTAT and The Lao Trade Portal.

3) Infrastructure and Geographic: Data This data is used for distance analysis to measure the intensity of ongoing maintenance without the need for mapping. Using data from the 6th and 7th LECS, which contain coordinate data, it is

possible to calculate the distance from the center of each village to the nearest Lao-China railway station.

4) Macro-level data in context: this dataset has taken from the World Bank and Asian Development Bank, the World Bank data also includes data on the Gini Index of Lao PDR, which is 42.4 in 2024.

2.2 Treatment Group and Control Group

This research paper was divided into 2 groups for data analysis: the treatment group, which was located on the Lao-China railway

corridor and exported agricultural products to China, which was identified as 5 provinces: Vientiane Capital, Vientiane Province, Luang Prabang Province, Oudomxay Province, and Luang Namtha Province; and the control group, which was not affected by the Lao-China railway but exported agricultural products to China, which was identified as 5 provinces: Phongsaly Province, Houaphan Province, Xiengkhouang Province, Savannakhet Province, and Champasak Province.

2.3 Key Variables

Table 1. Variables definition, Units of measurement and Data sources

No	Variables	Variable Names	Definition	Units	Data Sources
1	Dependent Variables	Income per capita (log)	Annual income of household members	Household	LECS 6 th and 7 th
		Gini coefficient	Measure income inequality by setting 0=equal and 1=inequal	Household	LECS 6 th and 7 th
		Income share of bottom quantiles	Share of total household income of the poorest 40%	Household	LECS 6 th and 7 th
2	Independent Variables	Treatment indicator (Treat_h)	Binary variable indicating household participation in exporting agricultural goods to China	Household	LECS 6 th and 7 th Specific in the Agricultural Sector
		Treatment intensity (Continuous)	Measuring the continued benefits of railways	Household	LAOSIS
		Post-treatment indicator (Post_t)	Variable indicating the period after the opening of the railway line	Household	LECS 6 th and 7 th
		DiD_interaction term (Treat_h/times Post_t)	Reasons for the impact of Chinese market demand on revenue	Household	LECS 6 th and 7 th
3	Control Variables	Household size	Number of household members	Household	LECS 6 th and 7 th
		Age of household head	Age of the head of household	Household	LECS 6 th and 7 th
		Education of household head	Completed level of education	Household	LECS 6 th and 7 th
		Gender of household head	Gender of household head	Household	LECS 6 th and 7 th
		Land holding size	Total area under agricultural production	Household	LECS 6 th and 7 th
		Livestock assets	Value or quantity of pets owned	Household	LECS 6 th and 7 th
		Non-farm income share	Proportion of total non-agricultural income	Household	LECS 6 th and 7 th
		Access to credits	Households with access to formal and informal loans	Household	LECS 6 th and 7 th
		Province fixed effects	Differences that have not changed over time at the provincial level	Household	LECS 6 th and 7 th
		Distance from home to Lao-China railway station	Distance from home to Lao-China railway station	Km	LAOSIS Specific in the Geographical Sector
4	Macro-level data in context	National Gini index	National income inequality	General	WB and ADB

2.4 Model

1) Difference in Differences DiD Estimation

This DiD model is used to analyze the level of households in rural areas producing agricultural products for export to the Chinese market after the opening of the railway compared to households producing agricultural products but not exporting to China, as shown equation below:

$$Y_{ihvt} = \alpha + \beta_1(Treated_h \times Post_t) + \beta_2 Treated_h + \beta_3 Post_t + X'_{ihvt}\gamma + \delta_p + \lambda_t + \varepsilon_{ihvt} \quad (1)$$

By using the DiD model to test the Parallel Trend Assumption, which identifies households in the Treatment Group and households in the Control Group. The data used for the analysis were from the 6th LECS to identify the Pre-treatment group.

2) Subsample Ordinary Least Squares (OLS)

Using Subsample Ordinary Least Squares (OLS) to analyze households divided into 5 income quantile groups ($q=1,2,3,4$ and 5) for each income quantile group. The analysis model is similar to the DiD analysis model, with the calculation equation as follows:

$$\ln(Income_{ihvt}) = \alpha_q + \beta_q(Treat_h \times Post_t) + \gamma_r Treat_h + \delta_p Post_t + X'_{ihvt}\theta_q + \lambda_t + \varepsilon_{ihvt} \quad (2)$$

3) Gini Decomposition

The Gini Decomposition is used to analyzed the Gini Index coefficient of income inequality of households in the Treatment Group compared to households in the Control Group after the opening of the Lao-China railway. It has two steps as follows:

Step 1: to determine the Gini Index coefficient at the village level, calculated separately for villages in the Treatment Group and villages in the Control Group. As an equation below:

$$G = \frac{\sum_{i=1}^n \sum_{j=1}^n |y_i - y_j|}{2n^2 y} \quad (3)$$

Step 2: This is an analysis to identify the contribution of income from agricultural exports to China to overall income inequality based on the Gini coefficient decomposition of (Lerman & Yitzhaki, 1985) the following equation:

$$G = \sum_{k=1}^K \left(\frac{\mu_k}{\mu} \right) R_k G_k \quad (4)$$

2.5 Hypothesis

1) Hypothesis 1: $H_1 > 0$ it is determined that households living in rural areas that produce agricultural products such as cassava, bananas, rubber and sugarcane have a demand for export to China and do not export to China.

2) Hypothesis 2: $H_2 > 0$ the impact of Chinese market demand on rural household income differs in the distribution of income between high- and low-income households.

3) Hypothesis 3: $H_2 > 0$ this is determined by the period after the Lao-China railway is opened in December 2021. The Gini Index of income inequality of rural households producing agricultural products for domestic sales and agricultural producers for export is used for this third hypothesis.

2.6 Statistical relationships and tools used in analysis

This study used the statistical software (STATA19) version 19 for statistical analysis, with statistical significance levels set at $*p < 0.05$, $**p < 0.01$, and $***p < 0.001$. Standard Errors are set at the village and area levels specified in this study.

3. Results

After investigated the increase of Chinese market demand on the Lao agricultural products which is affected to the rural households' income by comparing between exporting group and non-exporting group the result found that in Table 4, the first column contains the Treatment Indicator, the Post-period Indicator, the interaction between before and after ($treat \times post$) and the fixed effect of year, after the railway opened the equal of the DiD coefficient is 0.5116 (Standard Error 0.0066, $p < 0.01$), and the Treatment Group (the households who export agricultural products to China) increased to 0.51 more than the

households in the Control Group (the households who do not export agricultural products to China) which means the effect is significantly statistic and economic. The coefficient of the Treatment Group is 0.4660 this is specified before the opening of the Lao-China Railway the households in the Treatment Group increased high income, however the interaction factor showed that the Control Group is smaller additional income, for the DiD coefficient is 0.4985 (Standard Error 0.0130, $p < 0.01$). $p < 0.01$) When the control variables were added, it is showed in column 2 of Table 1, these controls included standardized households' size, age of the household head, education level, land size, distance to market, area of production and access to capital. The R-squared value increased from 0.903 to 0.986, it is indicated that control variable explained more in the R-squared value. The treatment effect decreased to a non-significant level with a value of (0.0112, $p > 0.1$) and the main effect at the latter period also became non-significant with a value of (0.0010), which is specified to the amount of difference between the previous group was explained by all the control variables. Thus, the figure 1 shows that the assumption of the real trend is important for the DiD simulation model. The income average in the DiD model of the treatment and control groups in 2019 is different about 14.5 compared to 14.0. Meanwhile, The income of the treatment group increases to about 15.2 in 2025, but the income of the control group increases only about 14.1, before the Lao-China railway opens. In Figure 1, the two parallel lines are almost parallel, but then they diverge rapidly. The results of the DiD simulation model are consistent with the first hypothesis, namely that the opening of Lao agricultural exports to China will help generate income for households in rural Laos.

Secondly, to figure out the extent to which high-income households getting the benefits and compare to the low-income households across the pre-treatment rural income distribution by agricultural products export to China to ensure that the treatment group outcomes differed by

starting income level, this study tested OLS regressions on subgroups within the pre-treatment income quantile. This applying avoids the problems that associate with estimating values from unconditional quantile regressions. In the table 5 shows the DiD (treat x post) constants for the five treatments, each with 20 observations. The DiD coefficient is estimated to be 0.000 for the two lowest quartiles (Q1 and Q2) both are indicating the poorest 40% of households with no standard deviation. It is meant that the model cannot find a constant or zero effect. In both cases, there is no statistical evidence that these groups have a positive treatment effect. The coefficient for quartile 3 (Q3) is 0.501 (Standard Error 0.023, $p < 0.01$), the coefficient for quartile 4 (Q4) is 0.531 (Standard Error 0.018, $p < 0.01$) and the highest quartile is in Q5 has coefficient of 0.503 (Standard Error 0.023, $p < 0.01$), thus households in the quartile have a medium to high pre-treatment income. At the same time, the large increase and significant in revenue from the Lao-China railway with coefficients is near an average DiD effect (≈ 0.50). The two lowest values indicate no measurable benefits. Moreover, in the figure 2 shows the constants with confidence intervals that confirm that the results of the control group experiment are positive and significant, especially for questions 3, 4, and 5, while questions 1 and 2 have no effect. This OLS test is consistent with hypothesis 2: the effects vary across income distribution. However, the coefficients for the three questions are very similar (0.50–0.53), which is not consistent with the hypothesis that the most important difference is among the poorest 40%. Thus, the benefits from China's market demand are not only for poor households but are shared by many households that are not in the low-income group.

Finally, to evaluate the growth of agricultural exports to China enabled by the Laos-China railway, it has caused a differentiated change income inequality especially increase the Gini coefficient in the rural communities in Laos the result found that in 2019 and 2025 the Gini

coefficient of the villages in the Control Group had the same value was at 0.32324. Meanwhile, in the Treatment Group the Gini coefficient was the same value in both year 2019 and 2025 that was 0.34948 that showed in the table 6. The income inequality of two groups has no change in the 6-year period. In addition, the railway and agricultural products exports growth did not reduce income inequality at the village level the result has shown in the figure 3 the change of Gini coefficient was 0.0001 it is indicated that the change almost zero. Even though, there was no change income inequality of the Gini Index in the year 2019-2025 but the households in the maintenance group increase their income average.

4. Discussion

The research results show that after the Laos-China railway opened the demand on Lao agricultural products increased, it is a facility to Lao farmers in the rural areas are able to export their products to Chinese market conveniently by using the railway. The key findings are analyzed with the related literatures as follows:

Firstly, the econometric model which is suitable to analyze in this research is Difference-in-Differences (DiD), after the railway opened the Lao agricultural products export increases and the most needed on Chinese market for Lao agricultural products are cassava, banana, rubber and sugarcane, thus DiD applied to analyze the changes between before and after railway open, it estimates about 0.50 log points by indicating the household who involved with producing the Agricultural for export to China. By using the DiD model in this research found the railway has positive impact to the rural households to improve their crop productions are able to export to the foreign market especially Chinese market and also improve the agricultural trade. The study of Do & Nguyen (2024) found that the small households increase their income from the agricultural trade by using the panel data of Southeast Asia. Meanwhile, Xie et al. (2025) mentioned that the primary of upgrading on technology and enhance the employment comes

from China's National Modern Agricultural Park which is increased the income of rural households approximately 1.8%. And Xiang (2026) also explained that the growth of Lao total GDP and GDP per capital positively from the railway freight volume. To employ the DID with the research of these findings provide the causal by focusing on the rural household produce the agricultural products to export to Chinese market with a high demanding.

Secondly, the income gains focus on the upper three quintiles (middle-income and above) by applying the OLS model with the pre-treatment income quintile the poorest households do not measure with benefiting is about 40%. This model is consider with the unequal gains on agricultural trade, Thus, the study of Wongpit et al. (2023) mentioned that the farmers who have the larger land can earn more income from the banana planting and selling but it does not contribute to the farmers who have the small size of land, And, Inthakoun (2025) found the agricultural investment from the foreign investors is better for the overall of country's economy but it does not bring benefit to the poorest households in the rural areas. However, there are similar case research from China, Xie et al. (2025) reported the upper-quintile households in the rural areas earn a larger the average income after they participated the rural integration projects because to projects focus on the credit constraints and asset poverty. In the estimation of hypothesis 2 has shown the same coefficients ≈ 0.50 through the third, fourth and fifth quintiles this meant that the impact of threshold is rather than monotonic gradient, this hypothesis shows the the higher income households would take the large number of agricultural exports further the literature emphasis the poorest which has 40% barrier from higher and middle-income households. Similarly, Seventer & Tarp (2020) found in Myanmar has the same case that the agricultural trade can be benefited to the lower-income households in the rural areas due to they can

access to the big markets from the transportation improvement.

Finally, the unchanged between treatment group and control group of the Gini coefficient at the village level on an income gains average of the treatment households in the rural areas. The studies of Asian Development Bank, (2015); Friis & Nielsen (2016) found the rural income inequality concerns to export expansion inevitably exacerbation. Furthermore, Xiang (2026) mentioned that the national Gini coefficient has negative impact to the Laos-China railway. Due to the detection of an increase in equality determined only six years observation. The upper 60% of the income gains were distribute to the small households of the impact of the railway. Meanwhile, 40% of poorest households so not gain an income, the inequality rate remains the same because treatment households were in the middle- and higher-income rank. In addition, World Bank (2022) mentioned that rural households can raise the average of their welfare without necessary increase income inequality, it is enabled to prove the benefit to the small elite not capture inclusively for the infrastructure improvement.

5. Conclusion

This research has provided the evidence clearly on the Laos-China railway after officially opening in the end of 2021 rural households are able to gain more income of those who are produced agricultural products for exporting by using the railway which are engaged with the crops that higher demand from the Chinese market such as casava, banana, rubber and sugarcane. In contrast, with the rural household who are produced the agricultural products but do not export their crop to Chinese market. Ultimately, reaching the first research target is applying DiD model to analyze the households persist after controlling and the assumption parallel trends was supported by statistic significantly effects about 0.50 log points. Secondly to apply the OLS regression models to the objective on the larger distributing benefits were captured a disproportion with the upper-

households in the pre-treatment income quintile created an obscure description, the poorest households 40% which is in the lowest two quintiles experienced that do not gain an income. At the same time, the significant increase of approximately 0.50 log points was in the third, fourth, and fifth quintiles, Notably, the distribution income benefit was remarkable through the three upper quintiles but they were not demonstrated on the top distribution for the poorest households. It is recommended to do not separate between high-income and middle-income but divide to the 40% poorest households. Finally, in the third purpose to investigate the income inequality whether the export expansion caused a differently increase. The unchanged of control group of the Gini coefficients of the village-level in the year 2021 and 2025 was 0.32324 and the treatment group of the Gini coefficients of the village-level in the year 2021 and 202 5 was 0.34948 which means the Gini coefficient is clearly rejected. Therefore, the agricultural products export enables to increase the average income significantly however the rural income inequality was not widely distributed to all households especially the poorest households. This research resulted that Laos-China railway is affected in increasing the average incomes nevertheless it would leave the rural poorest households behind of the village-level inequality exacerbation.

6. Conflict of Interest

I certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Table 2: Summary Statistics of Key Variables

	mean	SD	min	max
per_capita_income	2088925	1014060	1000000	4922500
Log per capita income	14.4511	.4390966	13.82	15.42
hh_size_std	-3.29e-16	1	-2.264664	1.552186
age_head_std	-2.56e-16	1	-2.328924	2.123431
edu_head_std	1.04e-16	1	-1.709238	2.37659
land_size_ha_std	-5.41e-16	1	-1.838022	2.161022
distance_km_std	1.95e-16	1	-1.065925	1.943635
nonfarm_share	.341	.0941147	.18	.55
credit_access	.54	.5009083	0	1
Treatment (export crops)	.5	.5025189	0	1
Post-railway period	.5	.5025189	0	1
DiD interaction (treat × post)	.25	.4351941	0	1

Table 3: Income by Treatment Period

treat	post	mean_inc	sd_inc	n_inc
0	0	1284400	175928	25
0	1	1368400	171140	25
1	0	2048000	293499	25
1	1	3654900	569399	25

Table 4: Difference-in-Differences Estimation (H₁)

VARIABLES	(1) Basic DiD	(2) With Controls
treat_post	0.5116*** (0.0066)	0.4985*** (0.0130)
treat	0.4660*** (0.0392)	0.0112 (0.0422)
post	0.0652*** (0.0045)	0.0010 (0.0189)
hh_size_std		0.0005 (0.0068)
age_head_std		0.0696*** (0.0211)
edu_head_std		0.1839*** (0.0136)
land_size_ha_std		-0.0418 (0.0510)
distance_km_std		-0.1127*** (0.0229)
nonfarm_share		-0.6041 (0.6023)
credit_access		0.0229 (0.0227)
2025o.year	-	-
Constant	14.0576*** (0.0277)	14.5141*** (0.2161)
Observations	100	100
R-squared	0.9030	0.9862
Year FE	YES	YES
Cluster	Village	Village
Controls		YES

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: DiD Treatment Effect by Pre-Treatment Income Quantile (H₂)

	(1) Log per capita income b/se	(2) Log per capita income b/se	(3) Log per capita income b/se	(4) Log per capita income b/se	(5) Log per capita income b/se
DiD interaction (treat × post)	0.000 (.)	0.000 (.)	0.501*** (0.023)	0.531*** (0.018)	0.503*** (0.023)
Observations	20	20	20	20	20

Table 6: Gini Decomposition by Income Quantile Group

	(1)	(2)	(3)	(4)	(5)
	log_income b	log_income b	log_income b	log_income b	log_income b
treat_post	0.000	0.000	0.501***	0.531***	0.503***
treat	0.000	0.000	-0.112	0.000	0.000
post	0.049	-0.016	-0.003	0.000	0.000
hh_size_std	-0.011	-0.017	0.038	-0.083***	-0.048*
age_head_std	0.053	0.046	0.056	-0.044*	0.047*
edu_head_std	0.063	-0.128	0.009	0.077***	0.033
land_size_ha_std	-0.104	0.142**	0.023	0.218***	-0.306***
distance_km_std	-0.052*	-0.283	-0.156*	0.149	-0.249
nonfarm_share	-1.702**	1.087	0.383	-0.905	-4.017**
credit_access	0.000	0.087*	0.101	-0.319***	0.000
2019.year	0.000	0.000	0.000	0.000	0.000
2025.year	0.000	0.000	0.000	0.000	0.000
_cons	14.705***	13.893***	14.162***	14.909***	15.701***
N	20	20	20	20	20

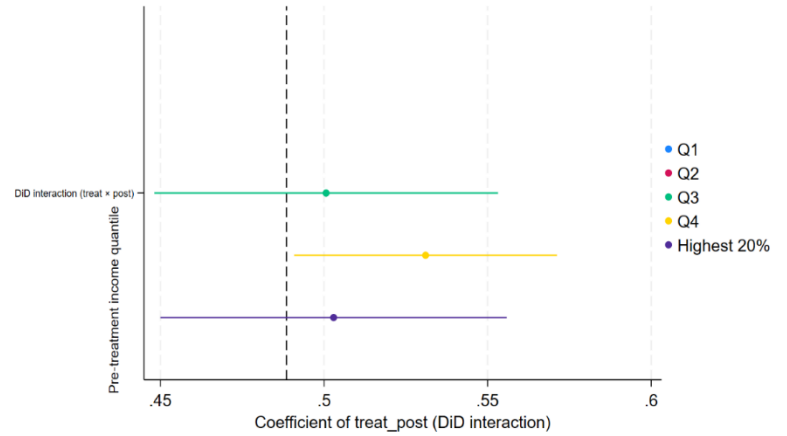
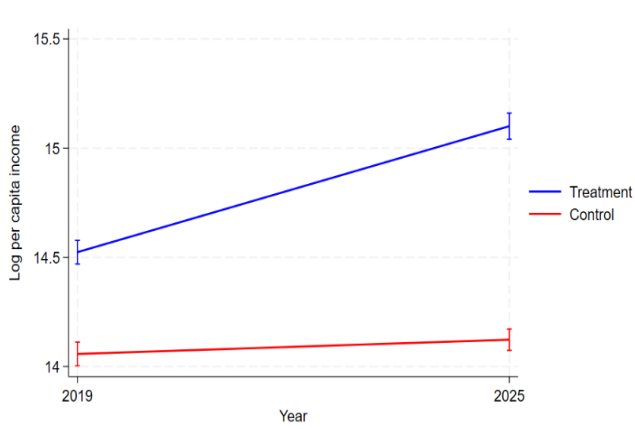


Figure 1: Income Trends by Treatment

Figure 2: Heterogeneous Treatment Effects by Income

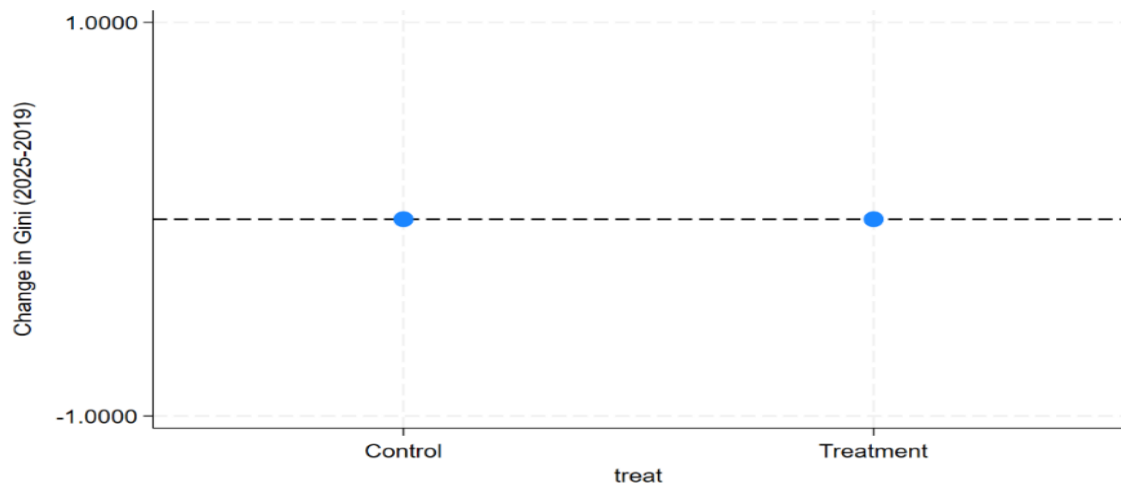


Figure 3: Change in Income Inequality by Treatment