Moving off the Farm: Does Farming Efficiency Matter?
Insights from Long-Term Panel Data for Thailand

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TVSEP

1. Introduction

- Agriculture is one of the most important sectors for ensuring food security and supporting rural areas in Southeast Asia and other developing countries[1].
- As a crucial component of economic growth, agricultural transformation is characterized by the reallocation of labor from farm to non-farm sectors[2].
- However, there is limited evidence on how farming efficiency impacts the allocation of labor from farm to non-farm sectors at the household level.
- We explore the effects of farming efficiency on agricultural transformation and investigate its influence on the shift from full-time to part-time farming at the smallholder farm level.

2. Study area & data

- The data collected at the household level by the Thailand Vietnam Socio-Economic Panel (TVSEP) survey.
- Three provinces: Buriram, Nakonphanom, and Ubon Ratchathani.
- 10,549 observations collected from seven survey waves between 2007 and 2019.
- Rainfall data (CHIRPS: 0.05°) is matched with village GPS data from the TVSEP dataset, aligned with each survey year.

Fig. 1. : Study sites in Thailand under the TVSEP project

3. Empirical model

- a true random-effects stochastic frontier model with the Mundlak's adjustment to estimate farming efficiency[3].

- agricultural transformation indicators:
   1) Share of farm income *(SFIC)*
   2) Share of non-farm income *(SNFIC)*
   3) Per capita farm income *(CPFI)*
   4) Per capita non-farm income*(CPNFI)*
   5) Share of livestock income *(SLSIC)*
   6) Per hectare expenditure on mechanization *(PAME)*

- We used heteroscedasticity based instrumental variable (IV) approach to control for endogeneity following Lewbel (2012) [4].

$$Agri\_T_{it} = \beta_0 + \beta_1 FE_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (1)$$

$$FE_{it} = \delta + Agri\_T_{it} + \pi Z_i + \xi_i \quad (2)$$

- $Agri\_T_{it}$ = outcome variables for the ith household
- FE_{it} = early sowing dummy; β =constant and coefficient ; ε_{it} = random error
- X_i = control variables at household and village levels
- $Z_i \leq X_i$ (internal instruments); ξ_i= residuals
- External instrument: one-year lagged No of extreme rainfall days

4. Results

- farming efficiency positively and significantly affects the share of farm income, per capita income from farm activities, and per hectare expenditure on mechanization.
- while it has a negative and significant effect on the share of non-farm income, per capita non-farm income , and the share of livestock income in farm income.

Table 1: Impact of farming efficiency on agricultural transformation

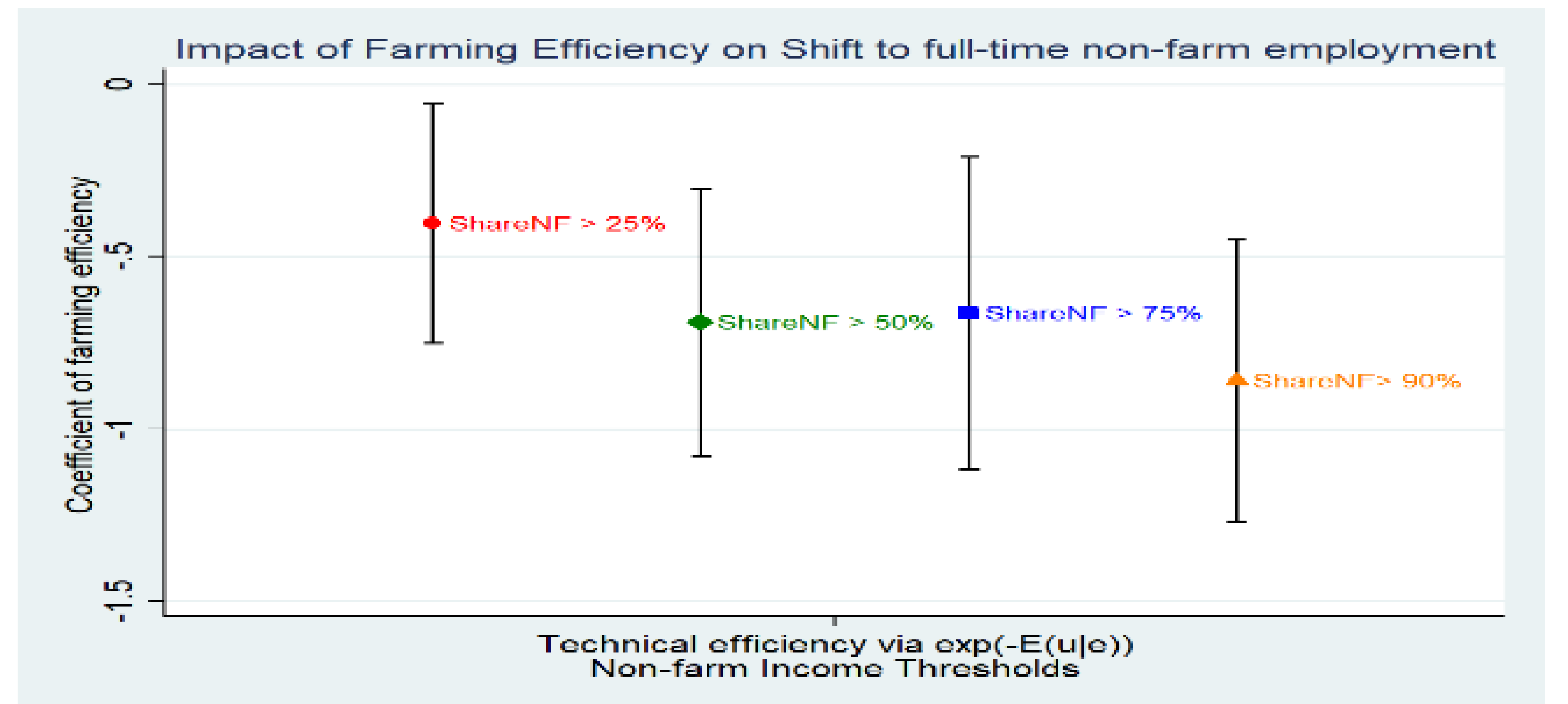| Variables	SFIC	SNFIC	CPFI	CPNFI	SLSIC	PAME
Farming efficiency	0.523***	-0.524***	16.361***	-2.499*	-0.457**	4.374*
	(0.150)	(0.151)	(3.335)	(1.476)	(0.184)	(2.502)
Control variables	yes	yes	yes	yes	yes	yes
R-squared	0.223	0.220	0.198	0.042	0.070	0.070

Fig. 2: Impact of farming efficiency on the shift of labor to the non-farm sector

- Farming efficiency decreases, and households increasingly transition from farming to non-farm activities
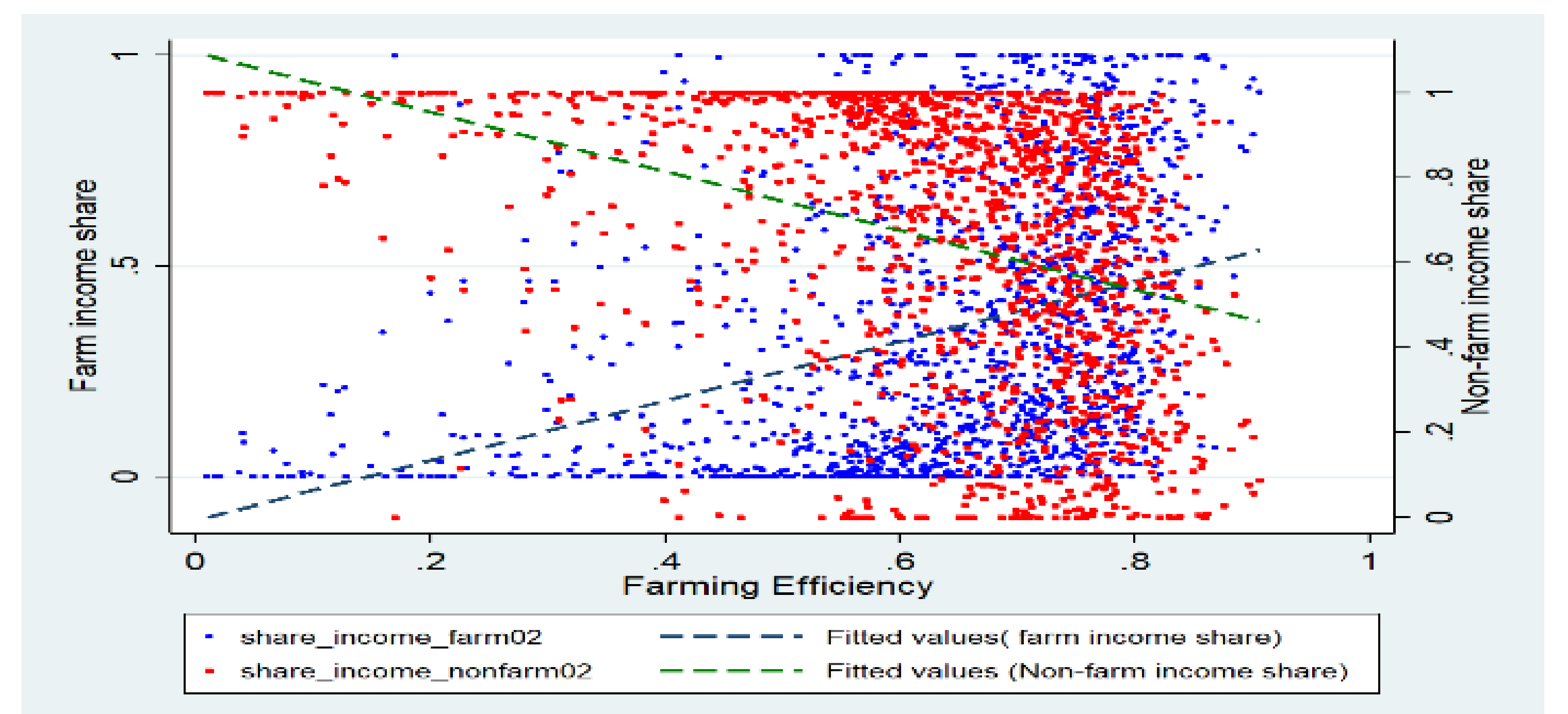- The results remain consistent when considering different levels of household engagement in non-farm employment

Fig. 3: Interrelationship between farming efficiency and shares of farm and non-farm income

5. Conclusion & implications

- Higher Farming efficiency pulls labor back into farming However lower Farming efficiency pushed them to towards non-farm sectors
- These results imply that more efficient farmers tend to stick to farming and apply mechanization in crop production, while less efficient ones shift to non-farm sectors.
- policies designed to support and encourage farm enlargement (increasing farm size) and labour allocation should be stimulated to accelerate agricultural transformation.

References

[1] Rigg, J., et al. (2023). *World Development*. 107, 327–337
[2] Amare, M., et al. (2023). *Cand J Agr Econ. 71:69–87.*
[3] Nguyen, T. T., et al. (2023). *Euro R of Agri Econ*, 48(1), 207–248.
[5] Lewbel, A. (2012). *Journal of Business & Economic Statistics*, 30(1), 67–80.

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