Land Reform, Agricultural Productivity, and Human Capital Accumulation*

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Abstract

We examine the effects of land reform on agricultural productivity and human capital accumulation, focusing on South Korea's 1950 land reform. The reform transferred land ownership from landlords to cultivators, effectively eliminating tenancy farming. Leveraging regional variations in pre-reform tenancy rates, we find that areas with higher initial tenant shares experienced greater increases in agricultural productivity and primary/secondary school enrollment. Motivated by these findings, we develop a quantitative model incorporating farmers' land-use decisions and households' education investments. We show that land reform enhanced productivity by reducing Marshallian inefficiency, outweighing negative effects of land ceilings. Additionally, school enrollment rose significantly among previously landless households, highlighting the reform's redistributive benefits.

Keywords: Land Reform, Agricultural Productivity, Human Capital Accumulation
JEL Codes: O1, O4

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1 Introduction

Governments in many countries implement land redistribution programs with the goal of reducing poverty and fostering broad-based agricultural growth (Binswanger-Mkhize, Bourguignon and van den Brink, 2009). Despite their prevalence in developing economies and extensive literature on land reforms, empirical research has largely concentrated on a few countries (e.g., India), with limited quantitative analysis of their effects on agricultural productivity and other key macroeconomic variables. Additionally, while land reform may provide opportunities for poor households to invest in education, empirical evidence on its impact on human capital accumulation remains scarce.

This paper quantitatively examines the effects of land reform on agricultural productivity and human capital investment, focusing on the 1950 land reform in South Korea. Since World War II, large landlord estates in countries such as Bolivia, China, Eastern India, Ethiopia, Iran, Japan, Korea, and Taiwan have been redistributed to tenants through land reforms (Binswanger, Deininger and Feder, 1995). Korea's land reform was a large-scale redistribution initiative aimed at correcting severe inequalities in land ownership. As a result, tenancy farming, which previously accounted for over 70% of agricultural land, was virtually eliminated (Shin, 1976).

The reform primarily transferred ownership to cultivators while keeping farm sizes largely unchanged. Because the reform was implemented nationwide, regions with higher pre-reform tenancy rates experienced more significant changes. Leveraging regional variations in tenant land shares from the late 1930s, we analyze whether greater exposure to land reform was associated with larger changes in macroeconomic variables. Our empirical findings indicate a strong correlation between a higher pre-reform share of tenant land and increases in both agricultural productivity and primary/secondary school enrollment rates after the reform.

Motivated by these empirical results, we develop a quantitative model that incorporates farmers' land-use decisions in the presence of a rental market. In the model, landless tenant farmers share half of their output with landlords, whereas owner-cultivators retain their entire farm output and may earn rental income. Under this contract, landless tenant farmers have lower incentive to put their efforts and make investments, which leads to Marshallian inefficiency. On the household side, parents allocate resources between consumption and their children's education, considering primary and secondary schooling costs and returns.

The land reform is modeled as an exogenous government-led redistribution program,

mirroring Korea's historical experience. It features three key elements: (i) ownership transfer with land ceilings, (ii) compensation to landlords, and (iii) imperfect enforcement. Our results indicate that land reform led to gains in both agricultural productivity and human capital accumulation, aligning with empirical evidence. The primary driver of productivity gains was the reduction in distortions in farmers' input choices—specifically, the elimination of Marshallian inefficiency. Given that over 80% of farms previously operated under tenancy contracts, the reduction in these inefficiencies outweighed any negative effects of farm size restrictions. Moreover, school enrollment increased significantly among previously landless households, who likely lacked the resources to invest in education prior to the reform. Our findings highlight both the aggregate benefits of land reform in raising productivity and human capital, as well as its redistributive role in the economy.

This paper contributes to the macroeconomic literature on the aggregate effects of land reform in various contexts. Recent studies have emphasized the potential for efficient land reallocation to enhance agricultural productivity (Chen, Restuccia and Santaeulàlia-Llopis, 2023), while also cautioning that centrally managed redistribution—without well-functioning land markets—may exacerbate misallocation and reduce productivity (Adamopoulos and Restuccia, 2020). Most of this literature focuses on the static misallocation effects of land reform. Our study expands this work by analyzing Korea's land reform through the lens of ownership transfer and its role in alleviating Marshallian inefficiency.

Empirically, we provide new insights into how land reform influences human capital accumulation across generations. Prior research on land reforms has primarily examined their effects on poverty reduction (Besley and Burgess, 2000; Besley, Leight, Pande and Rao, 2016), agricultural productivity, and overall welfare (Banerjee, Gertler and Ghatak, 2002; Ghatak and Roy, 2007; Mendola and Simtowe, 2015; Kitamura, 2022; Kim and Wang, 2024). Our contribution lies in documenting the relationship between land reform and human capital formation (Deininger, Jin and Yadav, 2011; Albertus, Espinoza and Fort, 2020; Galán, 2020; Hong and Kim, 2020). While Korea's land reform is often cited as a success, isolating its impact from concurrent economic transformations poses challenges. To address this, we integrate a quantitative model with empirical evidence drawn from historical data. In doing so, we align with a recent trend in macro-development research that leverages causal estimates from microdata to inform and validate macroeconomic models (Kaboski and Townsend, 2011; Buera, Kaboski and Shin, 2021).

The remainder of the paper is organized as follows. Section 2 provides historical context on Korea's land reform and presents empirical findings on its effects on agricultural productivity and human capital. Section 3 presents a simple framework of sharecropping

contracts to highlight the key mechanisms. Section 4 introduces the quantitative model. Section 5 details the calibration strategy and model fit. Section 6 presents quantitative results on the aggregate and distributional impacts of land reform. Finally, Section 7 concludes.

2 Empirical Analysis

2.1 Land Reform in Korea

During the Japanese colonial period, the proportion of independent farmers declined, and the proportion of tenant farmers increased. In 1942, more than 70% of agricultural households were tenant farmers (Shin, 1976). When Korea was liberated from Japanese colonial rule in 1945, tenant farmers demanded land reform. When the government of the Republic of Korea (South Korea) was established in 1948, land reform became one of the most urgent tasks. The Land Reform Act of 1950 was designed and implemented on April 10, 1950.

The Land Reform Act of 1950 redistributed two types of farmlands: (i) government-purchased lands and (ii) government-vested lands. Government-purchased lands included farmlands owned by absentee landlords and non-self-cultivators and farmlands which exceeded 3 *chungbo* (hectares) per farm household. Government-vested lands included farmlands owned by the government and ownerless farmlands. The government purchased the lands of absentee landlords and large farmers with Land-value Bills called *Chika Chungkwon* (地價證券) for the land value compensation in five annual payments. Lands were sold to tenant farmers who had been actually cultivating the tenant lands. In general, the land reform merely transferred ownership to cultivators, leaving the size of farms almost unchanged. The government provided for the transfer of ownership of the distributed lands to the cultivators. However, any sale, donation, and mortgage of the distributed lands were prohibited until the distributed land was completely paid off. The act also permanently abolished any forms of land tenancy, though some land tenancy was left illegally.

2.2 Data

We exploit pre-reform regional variations to evaluate the contribution of land reform on human capital accumulation, agricultural productivity, and structural transformation. Therefore, we collect land distribution before the reform, school enrollment rates before

and after the reform, rice yield per land or household and industry distribution before and after the reform for each county.

First, we rely on the share of tenant land in the late 1930s to measure differential sizes of land reform shock in each county. We focus on the area of South Korea because we don't have information on outcome variables from North Korea. The data is hand-collected from agricultural statistics published by each of the eight provinces between 1935 and 1940. The average share of tenant land in 154 counties was 61% with a standard deviation of 13%. Appendix A.1 provides more information on data sources. Figure D1 shows the distribution of tenancy shares across countries in Korea.

The share of tenant land before the reform may not represent actual exposure to the reform, if each county had differential capacity to implement the reform. In order to overcome this limitation, we collect the size of allocated land through the reform by county and calculate the share of allocated land. Appendix B reports regression results on agricultural productivity and schooling with this alternative independent variable. The share of tenant land before the reform and the share of allocated land as an outcome of reform are highly correlated, and the results are robust under the alternative measure.

Second, agricultural productivity is measured as rice output per hectare or rice output per household. Before the land reform, we collect rice yield, total area cultivated, and total number of households for each county from the survey in 1933 (Government of Colonial Korea, 1940). After the reform, we collect the same information from the 1960 Census (National Statistical Office of South Korea, 1960). Appendix A.4 provides further discussions on data sources.

Third, we collect the number of children in primary school in 1938 from *Chosŏn Jibang Jaejeong Yoram* (Chosŏn Chongdokbu, 1938) (Korea Local Government Finance Report[1]) and the number of primary school-age population from the 1935 Census for each county. It allows us to calculate primary enrollment rates before the land reform. We use the 1955 Census to calculate primary school enrollment rates after the land reform. The average primary school enrollment rate increased from 22% in 1938 to 61% in 1955. The number of students in secondary school before the land reform for each county is not known. However, in our calculation combining the 1935 Census and 1937 學事參考資料 (Academic Reference Materials), the secondary school enrollment rate in Korea (combining South and North Korea) is only 1.8%. In 1955, the average secondary school enrollment

[1]Joseon is the name of the dynastic kingdom of Korea that existed until the Japanese occupancy in 1910. During the Japanese occupancy, colonial Korea was typically referred as Choson, a Japanese pronounciation of Joseon.

rate across counties increased to 23%. Appendix A.2 and A.3 provide further discussions on data sources.

2.3 Land Reform and Agricultural Productivity

We run the following regression to test the effect of land reform on agricultural productivity.

$$\Delta \ln \text{Prod}_{cp} = \alpha + \beta \text{ Tenant Share}_{cp,\text{ before}} + \ln \text{Prod}_{cp,\text{ before}} + X_{cp} + \delta_p + \epsilon_{cp} \quad (1)$$

where $\Delta \ln \text{Prod}_{cp}$ denotes the change in agricultural productivity, measured as rice yield per hectare, and $\text{Tenant Share}_{cp,\text{before}}$ is the share of tenant farming in county c before the land reform. X_{cp} are county-level control variables. We include rice productivity and population growth rate as controls. δ_p are province-level fixed effects.

Table 1: Regression of Tenant Shares on Change in Agricultural Productivity

	Change in rice yield per hectare		
	(1)	(2)	(3)
Tenant share (total)	0.539***		
	(0.106)		
Tenant share (paddy-fields)		0.549***	
		(0.106)	
Tenant share (dry-fields)			0.363***
			(0.101)
$\ln \text{Prod}_{cp,\text{ before}}$	-0.900***	-0.892***	-0.891***
	(0.053)	(0.053)	(0.056)
Population growth rate (in logs)	0.046	0.044	0.052
	(0.048)	(0.047)	(0.050)
Observations	125	125	125
Province FEs	Yes	Yes	Yes
R-squared	0.753	0.754	0.728

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on change in rice yield per hectare after the reform as in equation (1). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

Table 1 presents the regression result of tenant shares on the change in agricultural productivity, measured as rice yield per hectare.[2] The results from our preferred specification are in column 2, where we use the tenant share in paddy-fields, because our measure depends on rice. However, coefficients are positive and significant in other specifications as well. One standard deviation (10 percentage points) higher tenant share was associated with a 5 percentage point higher growth in rice yield per hectare.

2.4 Land Reform and Schooling

Next, we run the following regression to test the effect of land reform on primary school enrollment rates.

$$\Delta s_{cp}^{\text{primary}} = \alpha + \beta \text{Tenant Share}_{cp,\text{before}} + s_{cp,\text{before}}^{\text{primary}} + X_{cp} + \delta_p + \epsilon_{cp} \tag{2}$$

where $\Delta s_{cp}^{\text{primary}}$ is the change in primary school enrollment rate in county c in province p, and $\text{Tenant Share}_{cp,\text{before}}$ is the share of tenant farming in county c before the land reform. X_{cp} are county-level control variables. We include rice productivity and population growth rate as controls. δ_p are province-level fixed effects.

Because we don't have secondary school enrollment rates before the land reform, we rely on the secondary enrollment rates after the land reform, given that the rates were close to zero before the land reform. The regression becomes

$$s_{cp,\text{after}}^{\text{secondary}} = \alpha + \beta \text{Tenant Share}_{cp,\text{before}} + X_{cp} + \delta_p + \epsilon_i \tag{3}$$

where $s_{i,after}^{\text{secondary}}$ is the secondary school enrollment rate in county i after the land reform. We use the same control variables and province-level fixed effects.

Table 2 and 3 present the regression results of tenant shares on the change in primary school enrollment rates and secondary school enrollment rates after the reform, respectively. The effects on the change in primary school enrollment rates turn out to be positive, though it is only significant at the 10% level with paddy-fields tenant share. The effects on secondary enrollment rates are positive in all specifications and significant in two specifications. The land reform facilitated human capital accumulation by increasing primary and secondary school enrollment rates. One standard deviation (10 percentage points) higher tenant share was associated with a 0.3 to 1.0 percentage point increase in

[2]Table C1 in the Appendix presents the regression result of tenant shares on the change in agricultural productivity, measured as rice yield per household, and results are consistent.

Table 2: Regression of Tenant Shares on Change in Primary School Enrollment Rates

	Change in primary school enrollment rates		
	(1)	(2)	(3)
Tenant share (total)	0.069		
	(0.064)		
Tenant share (paddy-fields)		0.106*	
		(0.063)	
Tenant share (dry-fields)			0.030
			(0.057)
$s^{\text{primary}}_{cp,\text{before}}$	-0.508***	-0.515***	-0.485***
	(0.174)	(0.171)	(0.173)
log(Rice productivity)	0.055*	0.054*	0.059*
	(0.031)	(0.031)	(0.032)
Population growth rate (in logs)	0.021	0.020	0.022
	(0.028)	(0.028)	(0.028)
Observations	125	125	125
Province FEs	Yes	Yes	Yes
R-squared	0.620	0.626	0.617

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on change in primary enrollment rates as in equation (2). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy fields, and column 3 uses tenant shares in dry fields.

primary school enrollment rates and a 0.20-0.26 percentage point larger secondary school enrollment rates after the reform.

Taking stock, the empirical results indicate that land reform increased agricultural productivity and facilitated human capital accumulation. In the next section, we develop a quantitative model to synthesize these findings.

Table 3: Regression of Tenant Shares on Secondary School Enrollment Rates after the Reform

	Change in secondary school enrollment rates		
	(1)	(2)	(3)
Tenant share (total)	0.110**		
	(0.051)		
Tenant share (paddy-fields)		0.122**	
		(0.051)	
Tenant share (dry-fields)			0.058
			(0.047)
log(Rice productivity)	0.016	0.017	0.020
	(0.026)	(0.025)	(0.026)
Population growth rate (in logs)	0.075***	0.074***	0.076***
	(0.023)	(0.023)	(0.023)
Observations	125	125	125
Province FEs	Yes	Yes	Yes
R-squared	0.417	0.422	0.401

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on secondary enrollment rates after the reform as in equation (3). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

3 Illustrative Model

This section presents a simple framework of sharecropping contracts to highlight the key mechanisms. Sharecropping contracts create inefficiencies by discouraging tenants from applying the optimal level of inputs in production, as they do not retain the entire output they produce. The model also demonstrates how land reform can mitigate such inefficiencies; however, it may simultaneously introduce a new source of inefficiency by imposing a ceiling on farm size.

Consider an environment where household income (y) is determined by their farming output, which depends on land (l) and individual effort (e) as inputs. The production function is given by:

$$y = zf(l, e)$$

where z is household-specific idiosyncratic productivity. We assume that f is a well-behaved function that exhibits positive but diminishing returns to both land and effort. We assume that households can choose the level of effort they exert. Although we describe it as "effort," it could be interpreted broadly to include everything that determines the effective quality of labor. Exerting effort is costly, and it is captured by the cost function $\psi(e)$, which represents the cost of effort converted into monetary term.

There are two types of households: landless and landed. Landed households, possess l_e units of land as their initial endowment and only need to access the rental market if their land demand exceeds their endowment ($l > l_e$). Conversely, when the demand is less than their endowment ($l < l_e$), they can rent out the excess land to the rental market at price q. Consequently, the profit of a landed household can be expresssed as follows:

$$\pi_{\text{landed}} = zf(l, e) - \psi(e) - q\,(l - l_e) \tag{4}$$

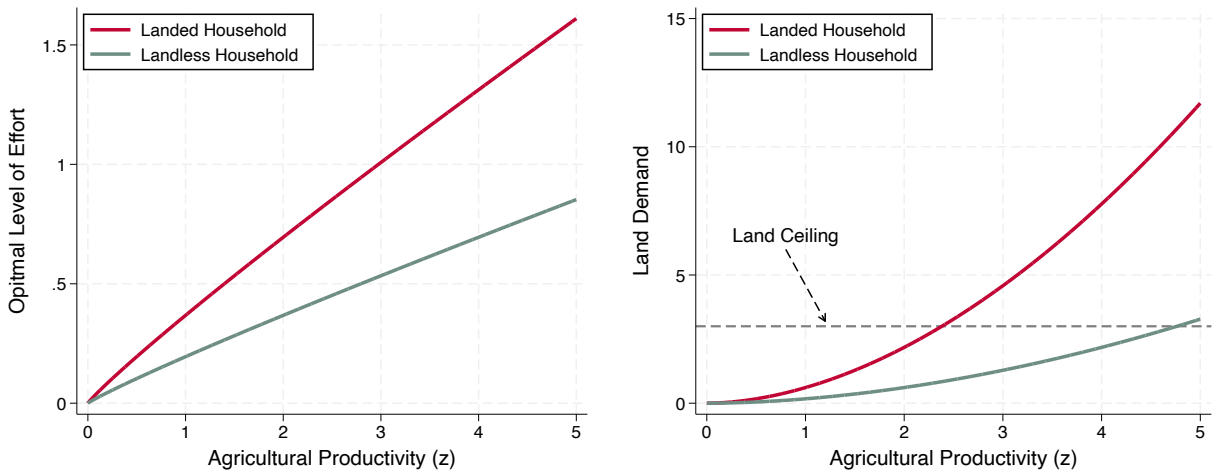
Landless households, on the other hand, must rent land from the land rental market by entering a sharecropping contract. Under this arrangement, in addition to paying the rental price q per unit of land, they are required to give a $(1 - s)$ share of their final output to the landlord, where $s \in (0, 1)$ represents the tenant's share of the produced output[3]. The profit of a landless farmer under a sharecropping contract is hence:

$$\pi_{\text{landless}} = \underbrace{szf(l, e)}_{\text{sharecropping}} - \psi(e) - ql \tag{5}$$

Solving for the optimal level of effort for the landed and landless households makes it straightforward to see how this contractual structure introduces a disincentive for tenants to exert optimal effort. As the landless household do not retain the full return on their effort, their optimal level of effort is lower than that of landed farmer with the same agricultural productivity. Figure 1a illustrates the distortion in effot choice, assuming $y = zl^{0.2}e^{0.5}$ and $\psi(e) = e^2$. For any given individual productivity z, landed households choose higher level of effort.

One implication of the results from this simple model is that whenever land is distributed without regard to individual productivity, distortions arise from the sharecropping contracts. As shown in Figure 1b, these distortions in effort choice extend to the optimal

[3]In this simplified model, we omit the payment of a $(1 - s)$ share of the final output to the landlord. Later, we will examine the decision-making process of the landed household, incorporating the general equilibrium effects from both the sharecropping and rental markets.



(a) Effort

(b) Land Demand

Figure 1: Distortion from Sharecropping

demand of land, resulting in an aggregate loss in production. This result is famously known as the *Marshallian inefficiency*—suboptimal provision of input by tenants under sharecropping contract. The magnitude of the Marshallian inefficiency is greater when land is initially more unequally distributed and when the correlation between land endowment and individual productivity is weaker. In such cases, productive households are more likely to rely on sharecropping contracts, amplifying the inefficiencies in input choices and further reducing aggregate output.

The simple framework also offers insights into how land reform can mitigate the Marshallian inefficiency arising from sharecropping contracts. By abolishing sharecropping and reallocating land to previously landless farmers, land reform incentivizes these farmers to increase their input levels, as they now retain the full returns from their efforts. This improved incentive structure not only enhances individual productivity but also leads to an increase in aggregate agricultural productivity.

However, another common feature of land reform can limit or even potentially reverse the productivity gains. Since the total amount of land in the economy is fixed, and land reform initiatives often aim to distribute land to as many landless farmers as possible, they are typically accompanied by restrictive ceilings on farm size. These ceilings may prevent more productive farmers from operating at an optimal scale, introducing a new source of inefficiency that offsets some or all of the gains from improved incentives. As illustrated by the dashed horizontal line in Figure 1b, the land ceiling constrains productive farmers from expanding their land use beyond a certain threshold, thereby restricting

their ability to fully leverage their productivity.

In summary, the illustrative model highlights several channels through which land reforms affect aggregate agricultural productivity. The overall impact of land reform on productivity depends on three key factors: the pre-existing degree of Marshallian inefficiency, the restrictiveness of land ceilings, and whether the redistributed land is allocated to more productive farmers. The following section turns to quantifying the magnitude of Marshallian inefficiency and how land reform addresses it. The full quantitative model builds on the core insights of the simplified framework while incorporating additional realistic features and general equilibrium effects that are omitted in the illustrative model.

4 Quantitative Model

4.1 Environment

Motivated by the fact the empirical regression uses the county-level variations in land ownership inequality, We model an economy consisting of many counties with potentially different county-specific agricultural productivity and land ownership inequality. The economy consists of N counties, and each county i is populated with a continuum of individuals. The unit of production is a farm. Individual j in county i produce output by working on his farm, which use land (l) and own effort (e) as inputs.[4]. The production function is defined as

$$y \equiv zf(l,e) = z(l^{\alpha}e^{1-\alpha})^{\gamma}$$

where z is the individual and location-specific productivity, which is independently drawn from a Lognormal distribution with location-specific mean μ_z^i and common variance σ_z.

$$z \sim LN(\mu_z^i, \sigma_z)$$

Exerting effort is costly. As before, we denote the monetary cost of effort as $\psi(e)$, where $\psi' > 0$ and $\psi'' > 0$. Each county is endowed with a fixed amount of L land units, which is exogenously distributed across households, reflecting the highly unequal distribution of land ownership in the pre-reform economy. Specifically, the land endowment of a household in county i is determined by the following equation:

$$l_e = (1-x)\tau$$

[4]We assume that every household owns their own farm and supplies their own labor to their farm without hiring from outside through the labor market.

where $x \sim$ Bernoulli(p_l^i) controls the extensive margin of land ownership, and $\tau \sim LN(\mu_l, \sigma_l)$ determines the intensive margin of land sizes, conditional on having land. Separately modeling the extensive and intensive margins of the land endowment is necessary to generate a substantial fraction of landless households in the pre-reform economy.

4.2 Land Rental Market

We model tenancy farming contracts in a parsimonious way, where a zero-profit land rental agency collects and allocates the rented land at a given price. Landed households can use their land for production and rent out excess land through the rental agency. When using their own land, farmers do not pay anything. Tenants, on the other hand, can rent the land from the rental agency. A tenancy contract is characterized by two features. First, the output sharing rule, dictates how a tenant and a landlord split the output. We model that tenants only keep a s fraction of the output produced from the rented land. The second, per-land rental price q, represents all the other expenses the tenants are required to pay to the landlord, proportional to the size of the rented land. This part of the cost encompasses the taxes and maintenance fees of the land, which were typically burdened by the tenants.

Given the price q and the output sharing rule s, the rental agency's revenue is the sum of all per-land payments made by tenants and the landlord's share of output collected from them. The rental agency then redistributes the collected output to the landlords as a lump-sum transfer, where the amount of the transfer is proportional to their respective supplies of excess land. Define the vector of individual state variable (z, l_e) as $\mathbb{X}$ and let $\mu(\mathbb{X})$ be the distribution of the state variables. The zero-profit condition of the rental agency is then written as follows:

$$\int_{l_e > l} \mathbb{T}(l_e - l)\mu(\mathbb{X}) = \int_{\text{tenants}} (1-s)y\mu(\mathbb{X})$$

where $\mathbb{T}(l_e - l)$ represents the lump-sum transfer to landlords as a function of the supply of land $(l_e - l)$, and $(1-s)y$ denotes the share of tenants' final output that goes to the landlords.

4.3 Profit Maximization

Given the tenancy contract rule and land ownership distribution, households fall into three categories: owner cultivators, partial tenants, and pure tenants.

Owner cultivators Owner-cultivators farm exclusively on their endowed land without renting additional land and serve as net land suppliers. They include both local landlords with modest holdings who lease out excess land and large landowners who rent out most of their land. Since they are not bound by tenancy contracts, they retain their full farm output and earn capital income from leasing land. The profit of an owner-cultivator with agricultural productivity z , land endowment l_e , and land demand l is defined as follows:

$$\pi|_{\text{owner cultivator}} = zf(l,e) - \psi(e) + \underbrace{q\,(l_e - l) + \mathbb{T}(l_e - l)}_{\substack{\text{capital income from} \\ \text{renting out land}}}$$

Partial tenants Partial tenants represent the land-owning households whose land demand exceeds their endowment. These households rent the additional land through the rental market. Since the rented portion of their farm is bound to the tenancy contract, they only keep s share of the output produced from the rented land. The profit of a partial tenant is expressed as follows:

$$\pi|_{\text{partial tenant}} = \underbrace{zf(l_e, e_o) - \psi(e_o)}_{\text{Profit from own farm}} + \underbrace{szf(l - l_e, e_r) - \psi(e_r) - q(l - l_e)}_{\text{Profit from rented farm}}$$

where e_o and e_r denote the efforts put into the own and rented farm, respectively. Note that for the profit from the rented farm, only a s fraction of the output is kept.

Pure tenants Pure tenants represent the landless households whose entire land demand needs to be rented through the rental market, which accounted for the vast majority of the farmers in the pre-reform period. The profit for a pure tenant is defined as follows:

$$\pi|_{\text{pure tenant}} = szf(l,e) - \psi(e) - ql$$

4.4 Preference and Schooling Choice

Households maximize a log-linear utility function over their own consumption (c) and human capital of child (h):

$$U(c,h) = \log(c) + \beta \log(h)$$

The utility function implies that households directly draw utility from their children's human capital h. Households choose the educational attainment of their children by sending them to school. The schooling system consists of primary (P) and secondary (S) school,

and each school increases the human capital of each child deterministically by η_s, where $s \in \{P, S\}$. The human capital of a child with schooling s is summarized as follows:

$$h = \begin{cases} \eta_S \eta_P & \text{if } s = S \text{ (secondary education)} \\ \eta_P & \text{if } s = P \text{ (primary education)} \\ 1 & \text{if } s = N \text{ (no education)} \end{cases}$$

Sending children to school is costly. The cost represents not only the various pecuniary costs (e.g., school fees, school uniforms, meals, etc.) but also the opportunity cost of forgone child labor. We model the schooling costs in a reduced form way as κ_p for primary schooling and κ_s for secondary schooling. Given the cost of schooling, the household's budget constraint is as follows:

$$c + \kappa_P \mathbb{I}_{(s=P)} + (\kappa_P + \kappa_S)\, \mathbb{I}_{(s=S)} = \pi$$

where $\mathbb{I}_{(s=P)}$ $\mathbb{I}_{(s=S)}$ are indicator functions which takes the value of 1 when the chosen schooling level s is P and S, respectively. We assume that secondary schooling can only be selected with primary schooling—skipping primary education and receiving only secondary education is not allowed.

4.5 Equilibrium

To save notations, define the vector of individual state variable (z, l_e) as $\mathbb{X}$ and let $\mu(\mathbb{X})$ be the distribution of the state variables. The equilibrium is defined as follows:

1. Given the land rental price q and expected payment from potential tenants, $\mathbb{T}(l_e - l)$, landowners chooses land supply $l_e - l$

2. Given output-sharing rule s and rental price q, tenants choose land demand l

3. Land rental market clears

$$\int_{\text{tenants}} l\mu(\mathbb{X}) = \int (l_e - l)\mu(\mathbb{X})$$

4. Rental agency earns zero profit

$$\int_{l_e > l} \mathbb{T}(l_e - l)\mu(\mathbb{X}) = \int_{\text{tenants}} (1 - s) z f(l, e) \mu(\mathbb{X})$$

5 Calibration

We now parameterize the model and use it to assess the impacts of land reform on agricultural productivity, human capital investment, and the sectoral reallocation of labor. Specifically, we calibrate the benchmark economy to pre-reform Korea, guided by the data from Section 2. The calibration proceeds in two steps. First, some parameter values are chosen externally based on direct data counterparts or related literature. Second, the remaining parameters are chosen to match relevant data moments to discipline the quantitative importance of mechanisms through which land reform affects agricultural productivity and human capital investment.

5.1 Externally Calibrated Parameters

Table 4 summarizes the externally calibrated parameters. We set the number of counties to 125, which equals the number of counties in the regressions of Section 2. This allows us to run comparable regressions in the model as in the data. One period in the model corresponds to 25 years in reality so that two periods roughly correspond to a life span of a generation. With the standard annual discount factor of 0.99, this implies that the value of the model discount factor β is 0.75.

Table 4: Externally Calibrated Parameters

Parameter	Description	Value	Source
N	Number of counties	123	Number of counties in the data
ω	Cost of effort	1	Normalization
α	Land income share	0.3	Adamopoulos and Restuccia (2020)
γ	Effort income share	0.7	Adamopoulos and Restuccia (2020)
β	Discount factor	0.75	Annual discount factor 0.99
η_P	Efficiency of primary education	1.6	10% annual return
η_S	Efficiency of secondary education	1.9	15% annual return
s	Tenant's share of output	0.5	Tenancy Custom in Korea (1932)

Parameters related to the farm production function are taken from Adamopoulos and Restuccia (2020). These include the land income share, α, and the returns to scale parameter of the production function, γ. We assume a standard quadratic function for the cost of effort, i.e., $\psi(e) = \omega e^2$. The scale parameter for the cost function, ω, is normalized to one.

Schooling efficiency parameters, η_P and η_S, are set to be consistent with the education premium in the 1930s Korea. Cha, Hwang and Lee (2014) estimate skill premium in the

Korean financial industry from 1922-1944 using personnel records left by the Development Bank of Colonial Korea and report 90% and 60% of primary and secondary education premia. Given that primary and secondary schools ran for six and three years in the 1930s, the numbers translate to 15% returns to additional years of primary education, and 20% for secondary education.[5] Table 4 summarizes the values of the externally calibrated parameters.

The tenant's share of output under the tenancy contract is set to 0.5, meaning that tenants and landlords split the output equally. This 50-50 arrangement was the most common tenancy contract practice in the pre-reform period. *Tenancy Custom in Korea*, published by the colonial government in 1932, indeed states that the 50-50 arrangement was the most commonly observed output-sharing ratio in Korea.

5.2 Internally Calibrated Parameters and Model Fit

The remaining parameters are jointly calibrated to match relevant aggregate or county-specific moments in the pre-reform economy. We choose parameters to minimize the distance between the data and their counterparts generated by the model. These moments are reported in Table 6, and Table 5 reports the value of the calibrated parameters. Although all parameters will jointly determine the model's ability to match the data, we discuss each set of parameters in conjunction with their most closely associated data targets to help build intuition.

Five internally calibrated parameters, $\{\kappa_P, \kappa_S, \sigma_z, \sigma_l, L\}$, are common across counties. The first set of parameters, $\{\kappa_P, \kappa_S\}$, is the cost of primary and secondary education and affects the households' education decision. The values of these parameters are chosen to match the aggregate primary and secondary school enrollment rate in 1935, calculated from the 1935 census. The corresponding enrollment rates are 19.9% for primary education and 1.8% for secondary education.

The standard deviation of the agricultural productivity distribution, σ_z, is disciplined to match the size distribution of farms. We choose $\sigma_z = 0.4$ to match the pre-reform size distribution reported in the 1938 Korean Economic Yearbook (Bank of Chosŏn, 1938), as shown in Figure 2.

The aggregate land endowment is calibrated to match a pre-reform average farm size of 0.84 hectares, taken from the Agricultural Households Survey Statistics in 1949. Lastly,

[5] human capital h in the model does not directly correspond to the earnings. SHOULD WE MENTION THIS?

Table 5: Internally Calibrated Parameters

Parameters	Description	Value
Common across counties		
κ_P	Primary schooling cost	0.33
κ_S	Secondary schooling cost	1.14
σ_z	StDev of agricultural productivity draw	0.40
L	Total size of land in the economy	0.84
σ_l^2	Lognormal StDev of land ownership draw	Figure
County-specific		
μ_z^i	Mean of agricultural productivity dist.	Figure 3
p_l^i	Probability of having land	Figure 3

the standard deviation of the exogenous land ownership draw is chosen to align with the land ownership distribution in 1942. While detailed data on land ownership distribution is unavailable, "Chosŏn Gyŏngje Yŏnbo (조선경제연보, 朝鮮經濟年報)" published in the years 1938 and 1942, provides information on land holdings among large landowners possessing more than 5 hectares.[6] Figure D4 presents this distribution alongside the model's simulated counterpart.

In addition to the parameters common across counties, two sets of parameters, $\{\mu_z^i, p_l^i\}$, are jointly calibrated so that the model replicates the variations at the country level of (i) agricultural productivity and (ii) share of land within each county under the tenancy contract. Note that both moments are endogenously generated through the model through the land demand of the households. Figure 3 illustrates that the counties in the model resemble their empirical counterparts on these dimensions.

While the calibration targets the share of tenancy farming, defined as the fraction of land under tenancy contracts, the model also closely matches the share of households engaged in tenancy farming, as shown in the second panel of Table 5. In the data, only 18% of agricultural households were owner-cultivators before the land reform. The model predicts that 17.1% of households farm on their own land, while the remaining households are either pure or partial tenants.

[6] Appendix A.5 contains detailed information about the data sources.

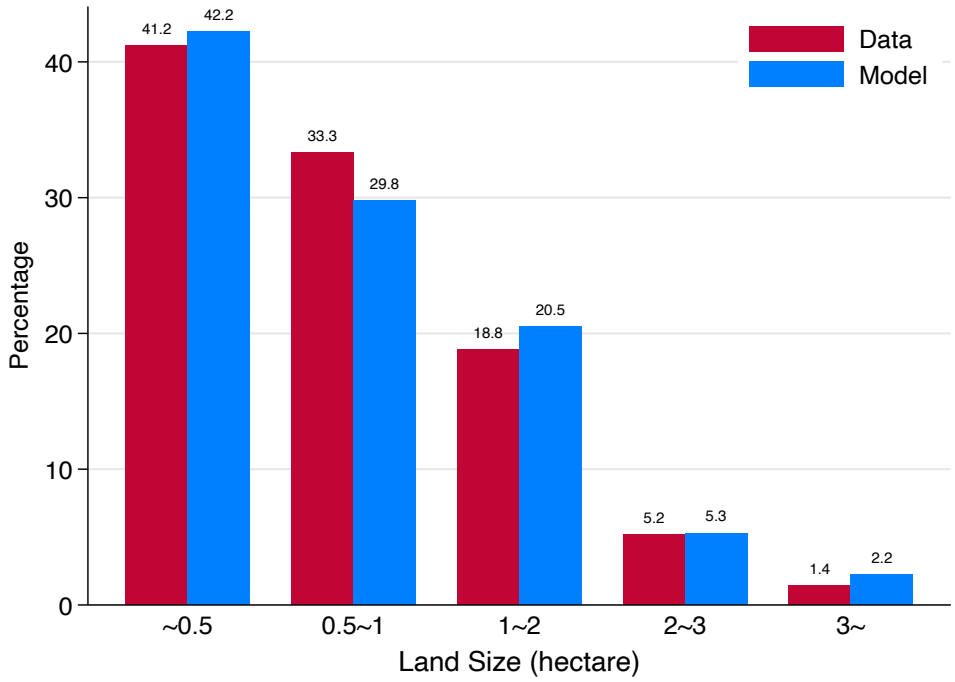


Figure 2: The Size Distribution of Farms

6 Quantitative Results

We now use the calibrated model to quantify the aggregate consequences of land reform on agricultural productivity and human capital accumulation by replicating the land reform in the model in a similar way it was implemented in reality.

6.1 Implementation of the Land Reform in the Model

The land reform in South Korea is characterized by several distinctive features. In this section we discuss each of these features and how we replicate those in the model.

Ownership transfer and ceiling The Korean government bought above-ceiling (3-hectare) farmlands at forced prices and re-distributed the land to the tenants at below-market rates. The redistribution aimed to transfer the ownership to the tenancy farmers for the farms they were already cultivating. We replicate the land reform within the model by collecting the above-ceiling (3 hectares per household) land from the landowners and transferring the ownership of the forfeited land to the tenants. The amount of land each farmer receives depends on their pre-reform farm sizes. In other words, those who were operating larger farms before the reform received a larger amount of land from the reform. The land awarded to each farmer under the reform is treated as an endowment.

Table 6: Model Fit

Moments	Data	Model
Targeted Moments		
Pre-reform primary enrollment rate	19.9%	19.6%
Pre-reform secondary enrollment rate	1.8%	1.8%
Average farm size (ha)	0.84	0.84
Land ownership distribution	Figure D4	
Farm size distribution	Figure 2	
Non-targeted Moments		
Fraction of pure + partial tenants	81.1%	82.9%
Fraction of pure tenants	52.7%	57.5%
Fraction of owner cultivators	18.9%	17.1%

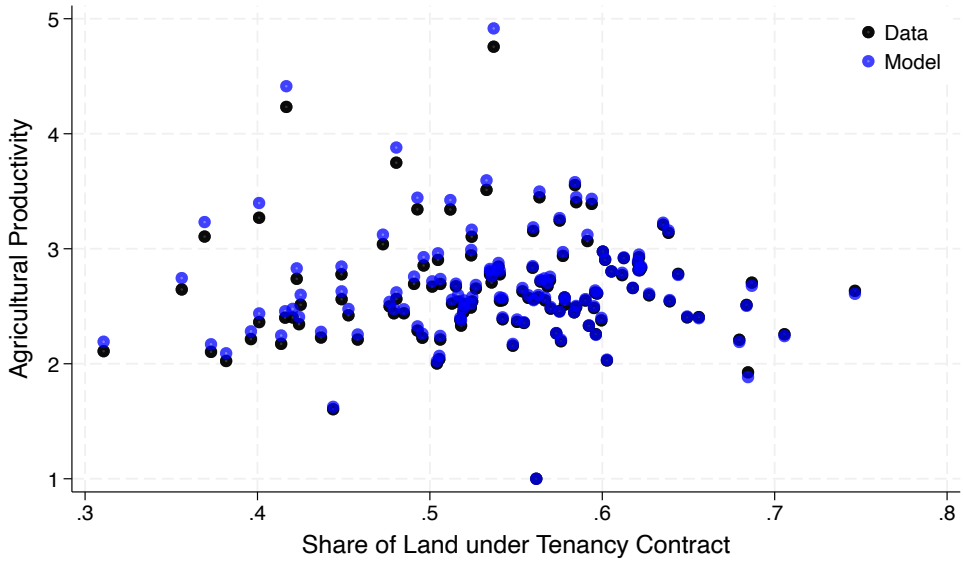


Figure 3: County-Level Tenancy Ratio and Agricultural Productivity

Compensation to the landlords When taking over the above-ceiling farmland from the landlords, the Korean government also compensated the land owners for 150% of the average annual production, paid over five years. While 150% of the average annual product is well below the market price of land, the compensation must have protected the landowners from losing a vast portion of their wealth. In the model, we reflect this compensated forfeiture by also compensating the landowners for 150% of the average annual

revenue per land, evaluated by the equilibrium price at the time of the reform.

Imperfect enforcement The land reform acts specify that even within the ownership ceiling, any land not cultivated by the owning household (and thus rented out) is subject to forfeiture. This aligns with the reform's goal of eliminating tenancy farming altogether. However, due to the government's limited capacity, the enforcement of forfeiture for such within-ceiling land was imperfect. By 1960, only 62% of the total land subject to redistribution had been redistributed. Reflecting this feature, we set the parameter governing the degree of enforcement. Specifically, $(1-\theta)$ fraction of landlords could retain the land up to the ceiling, whether or not they are farming up to the ceiling. For the remaining θ fraction of the landlords, any land not cultivated by themselves is forfeited. The value of θ is adjusted to ensure that 62% of the land subject to redistribution was actually redistributed in the model.

Elimination of the rental market Lastly, the reform also banned farmland ownership by non-farmers and hence eliminated tenancy farming.[7] To reflect this feature, we model that the landlords who were not working in the agricultural sector had their entire land forfeited, while only the above-ceiling portion was subject to forfeiture for those working as farmers themselves (and renting out the excess land). We also eliminate the land rental market after the reform, so the farmers who receive the land cannot rent out the land through the rental market.

6.2 Aggregate Consequences of Land Reform

6.2.1 Agricultural Productivity

While the previous section focused on the longer-run effects of the land reform by focusing on the outcomes of the next generation, this section investigates the instantaneous effects of the land reform on agricultural productivity. Table 7 summarizes the effect of land reform on aggregate agricultural productivity and the distribution of farm sizes. To be consistent with the measure of agricultural productivity in the data (rice yield per land), agricultural productivity in the model is calculated as agricultural output per land and averaged across farmers.

The results show that the reform increases agricultural productivity by 9% without affecting the average farm size. The stability in farm size aligns with the fact that the reform

[7]The reform aimed to eliminate so-called *absentee landlords*, the landlords who are not residing in the village nor working in the agricultural sector, which was prevalent in the pre-reform periods.

Table 7: Effects of Land Reform on Agricultural Productivity

	Pre-Reform	Post-Reform
Aggregate agricultural productivity	1 (Normalized)	1.09
Average farm size	0.84	0.84
Variance farm size	0.61	0.66

primarily transferred ownership to tenants. Figure 4 compares the distributions of farm size before and after the reform. As shown in the figure, the reform eliminates the above-ceiling size farms while increasing the fraction of smallholder farms in turn. Since only a small fraction of farms (2.2%) exceeded the ceiling before the reform, its impact on reducing average farm size was minimal. This pattern aligns with the observed change in farm size distribution, as illustrated in Figure D3.

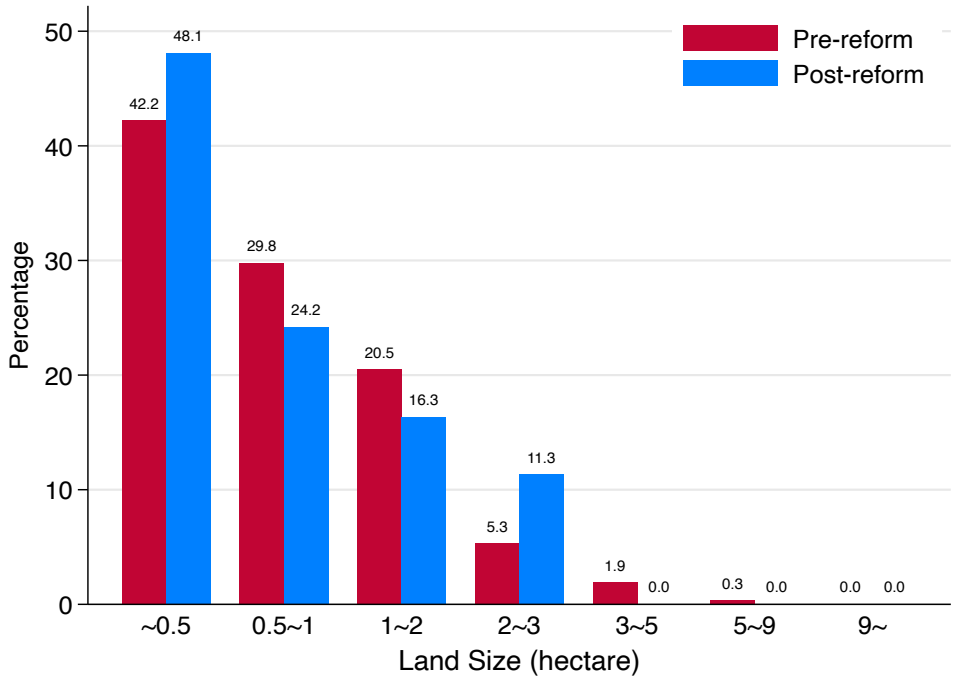


Figure 4: The Size Distribution of Farms, Pre- vs. Post-Reform

The increase in agricultural productivity primarily reflects a reduction in distortions in farmers' input choices—that is, a reduction in Marshallian inefficiency. By transferring farm ownership directly to former tenant farmers, the land reform effectively eliminated

tenancy farming, making these farmers full residual claimants of their output. This strengthened their incentives to exert more effort in production, boosting agricultural productivity. Given that over 80% of farms previously operated under tenancy contracts, the reduction in Marshallian inefficiency quantitatively outweighs the potential negative effects of the restrictive ceiling on productivity.

The extent of the agricultural productivity increase depends on the initial level of inefficiency, which is primarily determined by the output-sharing rule s in the tenancy contract. Since the distortion arises from tenants not being full residual claimants of their output, a lower share of output (lower s) for tenants implies great inefficiency. To illustrate this, we recalibrate the model with varying values of s and examine how changes in agricultural productivity respond. Figure 5 presents the results.

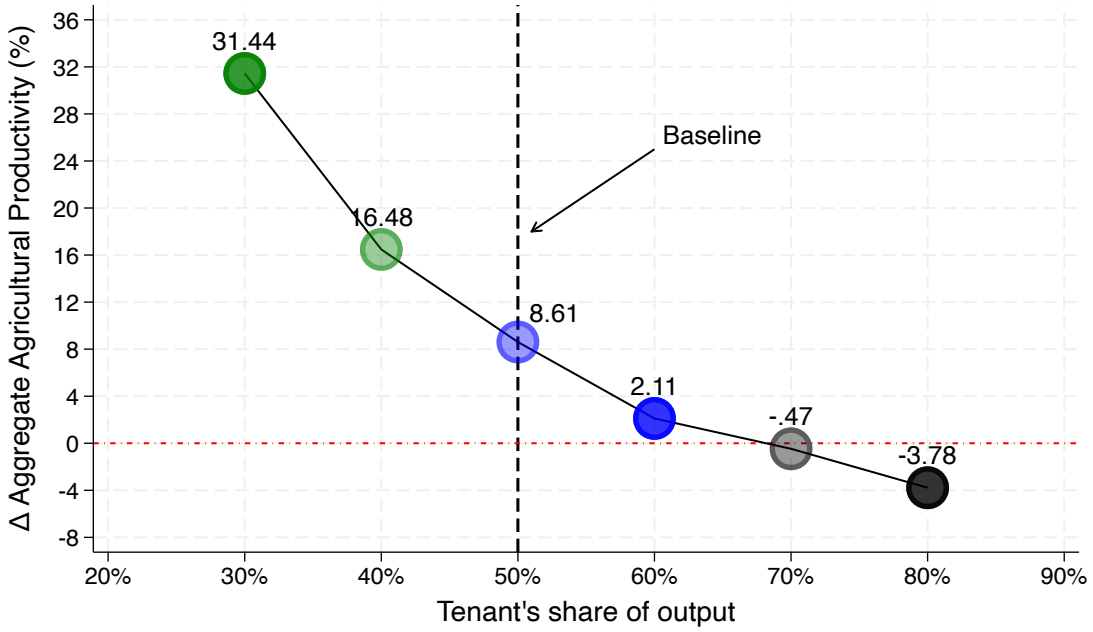


Figure 5: Land Reform on Agricultural Productivity, varying Output Sharing Rule

The results underscore the central role of tenancy contracts in determining the agricultural productivity effects of land reform. When tenants retain 80% of their output, land reform turns out to *reduces* aggregate agricultural productivity. This finding aligns with Adamopoulos and Restuccia (2020), which documents a negative impact of land reform on agricultural productivity in the Philippines. Conversely, when tenants retain only 30% of their output, the productivity gains from land reform are even larger. These results highlight the importance of prevailing contractual arrangements in assessing the productivity effects of land reforms.

6.2.2 Human Capital Accumulation

Table 8 summarizes the impact of land reform on human capital accumulation, proxied by changes in primary and secondary school enrollment rates. Overall, both enrollment rates nearly double as a result of the reform. Given that primary and secondary school enrollment rates in 1960 (ten years after the reform) were 62.7% and 28.0%, respectively, the model's land reform accounts for 35% of the increase in primary education enrollment and 7

Table 8: Effects of Land Reform on Human Capital Accumulation

	Pre-Reform	Post-Reform
Primary school enrollment rate	19.6%	35.1%
Secondary school enrollment rate	1.8%	3.8%

Table 9 presents how the policy's impact varies by pre-reform land ownership status. The results indicate that the human capital accumulation effects of the reform are largely driven by previously landless households. As shown in the first column, primary education enrollment increased disproportionately among these households, who were likely too poor before the reform to invest in their children's education. Indeed, the reform increases their income by 226%, enabling them to allocate part of their additional income toward schooling costs.

On the other hand, the second and the third column of Table 9 shows that the reform was a large negative income shock for the households who owned land. Despite receiving compensation for forfeited land, their post-reform income increases by only 16%. The impact is even more pronounced for households that previously owned land but did not fully cultivate it due to low agricultural productivity. The primary source of income for these households before the reform is the capital gain from the rental market, which is eliminated by the reform. As a result, both their income and their children's school enrollment rates decline after the reform. Overall, the results highlight both the human capital-enhancing effects of land reform and its redistributive role.

Table 9: Heterogeneous Effects of the Reform by Pre-Reform Status

	Landless (30%)	Landed (65%)	Landed + Low productivity (30%)
Income gain from reform (%)	**225.8**	**16.4**	**-21.3**
Pre-reform, Primary Enrollment	0.4	45.6	42.0
Post-reform, Primary Enrollment	21.2	54.0	32.6
Pre-reform, Secondary Enrollment	0.0	4.2	4.5
Post-reform, Secondary Enrollment	1.1	7.7	1.4

7 Conclusion

We examine the long-term effects of South Korea's 1950 land reform on agricultural productivity and human capital accumulation. Using regional variations in pre-reform tenancy rates, we find that greater exposure to land reform led to significant increases in agricultural productivity and school enrollment. Our quantitative model explains these effects by highlighting how the reform reduced Marshallian inefficiency and improved incentives for education investment, particularly among landless households. While land ceilings could have constrained productivity, the benefits of eliminating tenancy distortions outweighed these limitations. More broadly, our findings underscore the dual role of land reform as both a productivity-enhancing and redistributive policy.

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ONLINE APPENDIX (NOT FOR PUBLICATION)

A Data Appendix

A.1 Share of Tenant Land

The share of tenant land (rice paddies (답), dry paddies (전) and total (총)) serves as the independent variable for this study. Data are collected from agricultural reports of the 8 provinces, all of which are issued by the Chosŏn Chongdokbu. For instance, in the case of Gyeonggi-do, detailed statistics are sourced from the "Gyeonggi-do Nongsa Tonggye" report of 1940. Similarly, data for Gangwon-do, Chungcheongnam-do, Chungcheongbuk-do, Gyeongsangnam-do, Gyeongsangbuk-do, Jeollanam-do, and Jeollabuk-do are sourced from respective publications from the late 1930s and early 1940s. All numbers are collected at the prefecture (부군, 府郡) level, for 154 prefectures in total.

English Title	Korean Title	Japanese Title	Year	Pages
Gyeonggi-do Nongsa Tonggye	경기도 농사통계	京畿道 農業統計	1940	21-22
Gangwon-do Nongeop Tonggye	강원도 농업통계	江原道 農業統計	1937	2-3
Chungcheongnam-do Nongeop Tonggye	충청남도농업통계	忠淸南道 農業統計	1938	11
Chungcheongbuk-do Nongeop Tonggye	충청북도 농업통계	忠淸北道 農業統計	1937	10
Gyeongsangnam-do Dose Gaeram	경상남도 도세개람	忠淸北道 農業統計	1939	76
Gyeongsangbuk-do Dose Ilban	경상북도 도세일반	慶尙南道 道勢槪覽	1939	42-44
Jeollanam-do Nongeop Tonggye	전라남도 농업통계	全羅南道 農業統計	1938	19
Jeollabuk-do Nongeop Tonggye	전라북도 농업통계	全羅北道 農業統計	1935	2-3

Table A1: Sources of tenant land data by region

The process of calculating the share of tenant land involves manual extraction from primary sources, a method necessitated due to observed calculation errors in the original figures. Taking Gyeonggi province as an example, data are extracted from the bottom half of "Table 6. Area by Landed Farmers and Sharecroppers" (Figure A1) from the aforementioned source material. The four columns on the bottom half of the left page indicate "Non-tenant land of landed & sharecroppers," "Tenant land of landed & sharecroppers", "Non-tenant land of landed farmers," and "Tenant land of sharecroppers." Numbers pertaining to rice paddies and dry fields are recorded separately in each of the subcolumns. The share of tenant land is calculated through the division of the total sharecropping area by the total farming area, the latter of which is calculated by the sum of sharecropping and landed farmer areas. Similar methodologies are applied to other provinces.

$$Share\ of\ tenant\ land = \frac{Total\ tenant\ land}{Total\ farming\ land} \tag{6}$$

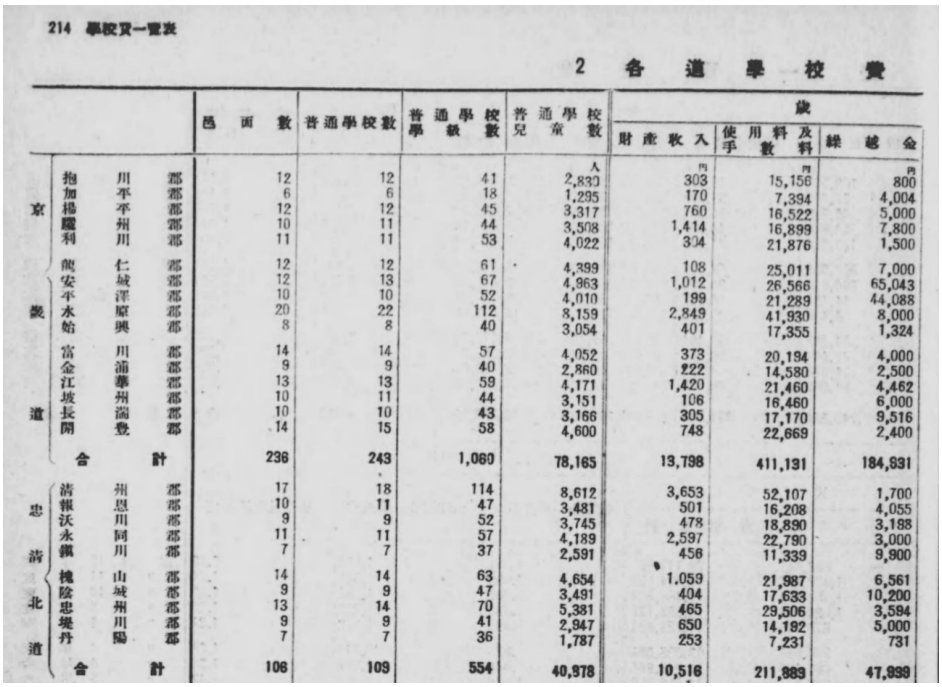
where $Total\ tenant\ land$ = (Tenant land of landed & sharecroppers) + (Tenant land of sharecroppers) and $Total\ farming\ land$ = (Tenant land of landed & sharecroppers) + (Tenant land of sharecroppers)+(Non-tenant land of landed & sharecroppers) + (Non-tenant land of landed farmers).



Figure A1: Farming land data from *Gyeonggi-do Nongsa Tonggye*

A.2 School Enrollment Rate

Regarding school enrollment rates, numbers are retrieved from the "Chosŏn Jibang Jaejŏng Yoram" publication of 1938 issued by the Chosŏn Chongdokbu. Numbers are provided for 143 prefectures (부군, 府郡). For reasons unknown, numbers for the 11 Bu (부, 府) 's are not available.



214 學校費一覽表

2 各 道 學 校 費

		邑面數	普通學校數	普通學校學級數	普通學校兒童數	歲 財産收入	歲 使用料及手數料	歲 繰越金
					人	円	円	円
京畿道	抱川郡	12	12	41	2,830	303	15,156	800
	加平郡	6	6	18	1,295	170	7,394	4,004
	楊平郡	12	12	45	3,317	760	16,522	5,000
	驪州郡	10	11	44	3,508	1,414	16,899	7,800
	利川郡	11	11	53	4,022	304	21,876	1,500
	龍仁郡	12	12	61	4,399	108	25,011	7,000
	安城郡	12	13	67	4,963	1,012	26,566	65,043
	平澤郡	10	10	52	4,010	199	21,289	44,088
	水原郡	20	22	112	8,159	2,849	41,930	8,000
	始興郡	8	8	40	3,054	401	17,355	1,324
	富川郡	14	14	57	4,052	373	20,194	4,000
	金浦郡	9	9	40	2,860	222	14,580	2,500
	江華郡	13	13	59	4,171	1,420	21,460	4,462
	坡州郡	10	11	44	3,151	106	16,460	6,000
	長湍郡	10	10	43	3,166	305	17,170	9,516
	開豊郡	14	15	58	4,600	748	22,669	2,400
	合計	236	243	1,060	78,165	13,798	411,131	184,831
忠淸北道	淸州郡	17	18	114	8,612	3,653	52,107	1,700
	報恩郡	10	11	47	3,481	501	16,208	4,055
	沃川郡	9	9	52	3,745	478	18,890	3,188
	永同郡	11	11	57	4,189	2,597	22,790	3,000
	黃川郡	7	7	37	2,591	456	11,339	9,900
	槐山郡	14	14	63	4,654	1,059	21,987	6,561
	淸原郡	9	9	47	3,491	404	17,633	10,200
	忠州郡	13	14	70	5,381	465	29,506	3,594
	堤川郡	9	9	41	2,947	650	14,192	5,000
	丹陽郡	7	7	36	1,787	253	7,231	731
	合計	106	109	554	40,978	10,516	211,889	47,999

Figure A2: Enrollment rates from *Chosŏn Jibang Jaejeong Yoram*

From the primary source, "Table 1. 각도학교비별일람표, 各道學校費別一覽表"" from "Section 8. School Expenses (학교비 일람표, 學校費一覽表)," pp.212-222 is used. Taking Figure A2 as an example, which contains data for Gyeonggi-do and Chungcheongbuk-do, numbers are retrieved from the fourth column, where the number of children in primary school (보통학교아동수, 普通學校兒童數) are recorded.

A.3 Census Data (1935, 1955)

Population census data describing the education levels for individuals by age, gender, and region were downloaded from the KOSIS website (kosis.kr). The primary sources are "Chosŏn Guksejosa (조선국세조사, 朝鮮國勢調査)" for 1935 and "Kani'ingu chongjosa (간이인구총조사)" for 1955.

A.4 Rice Output and Area Cultivated

Prefecture-level data on rice output and the area cultivated are sourced from "Nongka Gyŏngje Kaehwang Chosa" (농가경제개황조사, 農家經濟概況調査), published by the Government of Colonial Korea in 1940. In an effort to evaluate the effectiveness of its pro-peasant tenancy reform in 1934, the surveys were carried out in 1933 and 1938, collecting data from 3,587 rural households, including 1,728 tenant farmers and 1,859 part-owner

farmers. The findings were published in 1940, providing valuable insights into peasants' consumption and production behavior during a period of significant agrarian distress.

The survey is published in two volumes: the first contains information on tenant farmers, and the second focuses on part-owner farmers. Total numbers for rice output and area cultivated for all farmers were thus calculated by aggregating the data from both volumes according to the tenancy rates. The pages from which data are retrieved for both volumes on each province are as follows: Gyeonggi-do (pp.148-149), Gangwon-do (pp.176-177), Chungchŏngnam-do (pp.166-167), Chungchŏngbuk-do (pp.160-161), Gyŏngsangnam-do (pp.134-135), Gyŏngsangbuk-do (pp.120-121), Jeollanam-do (pp.106-107), Jeollabuk-do (pp.96-97). From these pages, the columns "Farming Area (作村面積)" and "Output (生高)" for rice under the "Agricultural Output (農作物生高)" column were retrieved for the years 1933 and 1938 respectively, as shown in Figure A3.

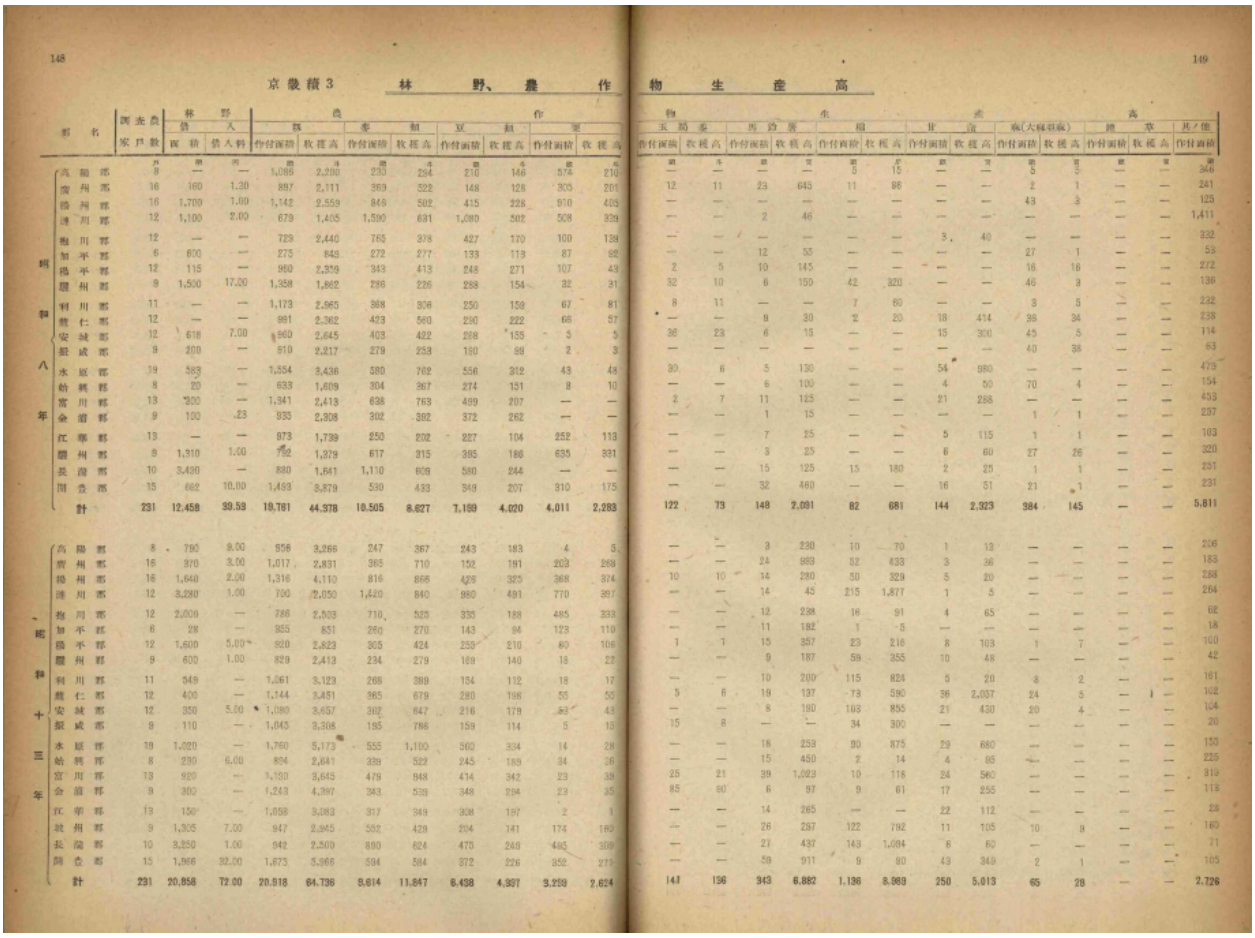


Figure A3: Rice output and area cultivated from *Nongka Gyŏngje Kaehwang Chosa*

The data for rice output and area cultivated in 1960 are drawn from the South Korean agricultural censuses (농림어업총조사), which can be accessed online through the website

of National Statistical Office of South Korea (KOSIS).

To ensure consistency across datasets, the units are standardized as follows. For area cultivated, the unit in the 1940 source was "mu(畝)" (1 mu = 30 pyŏng), while the unit in the 1960 source was "dan(段)" (1 dan = 300 pyŏng). Given that 1 hectare(ha) is equivalent to 3,000 pyŏng, all area measurements are standardized to hectares (ha). As for rice output, the unit is standardized to litre(L), As the unit in the 1940 source is "du (斗)," where 1 du = 18L, the numbers are adjusted accordingly to match the 1960 dataset.

A.5 Farm size distribution

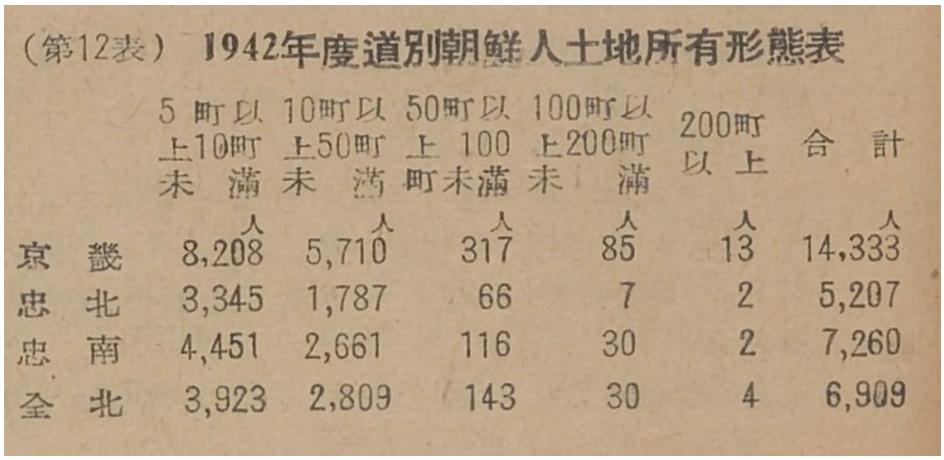
Information on farm size distribution is retrieved from the "Chosŏn Gyŏngje Yŏnbo (조선경제연보, 朝鮮經濟年報)" published in the years 1938 and 1942. Figure A4 shows Table 10 of the 1938 publication, which contains information on the number of farming households by farm size and ownership type. The first column indicates the farm size, starting from "less than 3 dan (段)" to "more than 20 chŏngbo (町)," where 1 chŏngbo (町) translates into 10 dan (段). The first row displays the ownership type: "landed ", "landed and sharecropping", "sharecropping and landed", and “sharecropping".

For 1942, information is available for the number of farming households by farm size per province(도,道), as seen in Figure A5. In this dataset, farm size ranges from "more than 5 chŏngbo (町) & less than 10 chŏngbo (町)" to "more than 200 chŏngbo (町)."

(第10表) 1938年度耕作面積別農家戶數表

	自作	自兼小	小兼自	小作	合計
	戶	戶	戶	戶	戶
3段未滿	71,686	48,164	67,566	300,893	488,309
3段—5段	91,667	74,106	94,342	353,264	613,379
5段—1町	114,398	92,893	115,968	390,005	713,264
1町—2町	114,933	82,819	96,130	271,735	565,617
2町—3町	86,879	47,479	46,812	131,619	312,789
3町—5町	47,177	20,004	18,274	50,653	136,108
5町—9町	14,190	4,518	4,194	11,098	34,000
10町—20町	2,172	521	536	2,112	5,341
20町以上	343	44	25	45	457
合計	543,445	370,548	443,847	1,511,424	2,869,264

Figure A4: Number of farming households by farm size and ownership type (1938)



(第12表) 1942年度道別朝鮮人土地所有形態表

	5町以上10町未満	10町以上50町未満	50町以上100町未満	100町以上200町未満	200町以上	合計
	人	人	人	人	人	人
京畿	8,208	5,710	317	85	13	14,333
忠北	3,345	1,787	66	7	2	5,207
忠南	4,451	2,661	116	30	2	7,260
全北	3,923	2,809	143	30	4	6,909

Figure A5: Number of farming households by farm size per province (1942)

A.6 Share of Allocated Lands

The share of allocated lands is calculated by placing the *area of allocated lands* in the numerator and the *total cultivated area* in the denominator. Data on *total cultivated area* are retrieved from the "Nongka Gyŏngje Kaehwang Chosa" (농가경제개황조사, 農家經濟槪況調査), as described in the previous section. This section explains the "Data on Agricultural Land Reform History" (농지개혁사 관계자료집), from which the *area of allocated lands* is obtained.

"Data on Agricultural Land Reform History" is a six-volume compilation published in 1984 by the Korea Rural Economic Institute (한국농촌경제연구원). This collection provides a comprehensive record of the South Korean land reform process, encompassing legal frameworks, administrative records, statistical data, newspaper reports, and financial records. Each volume addresses a distinct aspect of land reform. Volume 1 includes legal documents such as laws, presidential decrees, and administrative guidelines issued from the post-liberation U.S. military administration to the early years of the Republic of Korea. Volume 2 contains official government notices and directives related to the implementation of land reform policies from the late 1940s to the 1970s. Volume 3 presents detailed statistical data on farmland ownership, land transactions, tenancy rates, and the redistribution process, serving as a crucial quantitative source for analyzing the economic and structural impacts of land reform. Volume 4 comprises reports from Shinhan Corporation, the entity responsible for overseeing confiscated Japanese-owned land during the U.S. military administration. Volume 5 compiles newspaper articles discussing land reform policies, public reception, and implementation challenges in post-liberation South Korea. Volume 6 preserves administrative documents from Shinhan Corporation regard-

ing land transactions and land administration during the transition from Japanese colonial rule.

For this study, Volume 3 was utilized as it compiles quantitative data from 1945 to 1949 on land ownership, farmland distribution, and agricultural labor. This volume is organized into three primary sections. The first section, Basic Land Reform Statistics (농지개혁 기본 통계), provides fundamental statistics on farmland ownership, the number of farming households, landlord classifications, agricultural labor, and land utilization. The second section, Agricultural Households Survey Statistics (농가 실태 조사 통계), includes survey data detailing farm sizes, the agricultural population, and classifications of farming households. The third section, Land Reform Project Statistics (농지개혁 사업 통계), documents the implementation of land reform, including land purchase and allocation records, compensation payments to former landowners, debt repayment statistics for land recipients, and property registration and legal disputes.

From this volume, data from pages 114 to 128 of Volume 3 are extracted. As shown in A6, the dataset specifically captures the extent of land allocated during the land reform process. Data is provided at the provincial and county levels for confiscated land (귀속농지) and purchased land (매수농지), which together sum to the total allocated land area (필지 면적). In addition to the allocated land area, the dataset also records the number of farming households that received land. Furthermore, the dataset differentiates between land types, classifying them as paddy fields and dry fields. Meanwhile, it should be noted that the numbers for Jeollanam-do are not included in this source, as the original data "were not preserved". Accordingly, this study constructs the share of allocated lands for all provinces except Jeollanam-do.

Based on the two sets of data each extracted from "Data on Agricultural Land Reform History" and "Nongka Gyŏngje Kaehwang Chosa" (농가경제개황조사, 農家經濟槪況調査), the share of allocated lands for each province and county is calculated. The total allocated land area, originally recorded in chŏngbo (町), is converted into danbo(段) by multiplying 10 given that one chŏngbo (町) is equivalent to 10 danbo(段). The allocated land share is then calculated by dividing the total allocated land area by the sum of the total cultivated land. Similarly, the proportion of allocated paddy fields is determined by dividing the allocated paddy field area by the total available paddy field area, while the proportion of allocated dry fields is calculated by dividing the allocated dry field area by the total available dry field area.

〈 京 畿 道 〉

區分 / 市·郡別	買收農地 農家戶數	筆數 畓	筆數 田	筆數 計	分配面積 畓	分配面積 田	分配面積 計	離農 農家戶數	離農 筆地 畓	離農 筆地 田
仁川	4,474	7,624	4,256	11,880	1,530	673	2,203	3,407	3,925	4,967
水原	1,918	2,126	2,020	4,146	431	303	734	2,322	3,223	2,143
議政府	908	1,659	1,416	3,075	242	178	420	186	488	685
楊州	11,111	16,753	15,834	32,587	3,287	2,667	5,954	869	1,200	1,580
驪州	9,276	15,134	12,063	27,197	3,006	1,570	4,576	505	408	425
平澤	10,681	22,474	13,340	35,814	4,600	1,676	6,276	4,412	7,652	3,637
華城	18,843	34,787	24,975	59,762	5,533	3,156	8,689	2,318	7,898	4,077
始興	6,900	12,920	9,167	22,087	2,716	1,328	4,044	990	1,134	1,632
富川	5,970	12,897	7,227	20,124	1,395	639	2,034	3,295	5,805	4,507
坡州	10,176	18,922	13,068	31,990	4,330	2,340	6,670	1,229	3,204	878
高陽	7,508	13,500	9,892	23,392	2,891	1,099	3,990	3,761	3,454	2,817
廣州	6,969	9,450	8,691	18,141	161	121	282	387	528	1,035
儒川	101	86	76	162	15	25	40	16	26	35
抱川	4,494	5,998	5,542	11,540	986	1,069	2,055	130	152	295
加平	2,470	2,570	3,130	5,700	196	263	459	105	81	165
楊平	7,385	9,913	8,351	18,264	433	138	571	365	320	387
利川	10,735	19,352	14,519	33,871	4,081	1,915	5,996	1,427	1,561	1,224
龍仁	10,125	9,504	7,504	17,008	3,044	1,744	4,788	2,306	1,889	916
安城	12,645	20,784	16,253	37,037	4,261	2,126	6,387	1,569	1,480	955
金浦	7,661	16,912	10,289	27,201	3,578	1,160	4,738	1,478	4,669	783
江華	9,282	19,143	7,180	26,323	3,967	766	4,733	336	359	221
3.8以南 小計	159,632	272,508	194,793	467,301	50,683	24,956	75,639	31,413	49,456	33,564
儒川	1,682	1,759	1,988	3,747	631	550	1,181	664	1,044	85
抱川	782	755	852	1,607	261	107	368	17	33	3
3.8以北 小計	2,410	2,514	2,840	5,354	892	657	1,549	681	1,077	88
合計	162,042	275,022	197,633	472,655	51,575	25,613	77,188	32,094	50,533	33,652
70.12.31 累計集計結果	168,219	276,650	198,201	474,851	64,839	28,900	93,739	31,700	49,525	33,733

"註" 本道는 70. 12. 31 現在 最終 報告書에 總括表以外의 市·郡別 集計가 揭載되어 있지 않으므로 不得已 60. 12. 31 現在의 市·道別 集計表를 參考로 하여 揭載함.

1960年 12月 31日 現在
單位：面積，町

農地 數 計	農地 分配面積 畓	農地 分配面積 田	農地 分配面積 計	合計 農家戶數	合計 筆數 畓	合計 筆數 田	合計 筆數 計	合計 分配面積 畓	合計 分配面積 田	合計 分配面積 計
8,892	1,023	657	1,680	7,881	11,549	9,223	20,772	2,553	1,330	3,883
5,366	672	288	960	4,240	5,349	4,163	9,512	1,103	591	1,694
1,173	10	45	55	1,094	2,147	2,101	4,248	252	223	475
2,780	223	234	457	11,980	17,953	17,414	35,367	3,510	2,901	6,411
833	259	159	418	9,781	15,542	12,488	28,030	3,265	1,729	4,994
11,289	765	364	1,129	15,093	30,126	16,977	47,103	5,365	2,040	7,405
11,975	1,432	604	2,036	21,161	42,685	29,052	71,737	6,965	3,760	10,725
2,966	341	458	799	7,890	14,054	10,999	25,053	3,057	1,786	4,843
10,312	581	451	1,032	9,265	18,702	11,734	30,436	1,976	1,090	3,066
4,082	522	109	631	11,405	22,126	13,946	36,072	4,852	2,449	7,301
6,271	1,048	572	1,620	11,269	16,954	12,709	29,663	3,939	1,671	5,610
1,563	139	127	266	7,356	9,978	9,726	19,704	300	248	548
61	7	15	22	117	112	111	223	22	40	62
447	48	65	113	4,624	6,150	5,837	11,987	1,034	1,134	2,168
246	7	20	27	2,575	2,651	3,295	5,946	203	283	486
707	515	636	1,151	7,750	10,233	8,738	18,971	948	774	1,722
2,785	291	176	467	12,162	20,913	15,743	36,656	4,372	2,091	6,463
2,805	448	230	678	12,431	11,393	8,420	19,813	3,492	1,974	5,466
2,435	513	142	655	14,214	22,264	17,208	39,472	4,774	2,268	7,042
5,452	835	98	933	9,139	21,581	11,072	32,653	4,413	1,258	5,671
580	221	71	292	9,618	19,502	7,401	26,903	4,188	837	5,025
83,020	9,900	5,521	15,421	191,045	321,964	228,357	550,321	60,583	30,477	91,060
1,129	45	13	58	2,346	2,803	2,073	4,876	676	563	1,239
36	2	4	6	745	788	855	1,643	263	111	374
1,165	47	17	64	3,091	3,591	2,928	6,519	939	674	1,613
84,185	9,947	5,538	15,485	194,136	325,555	231,285	556,840	61,522	31,151	92,673
83,258	14,700	8,252	22,952	199,919	326,175	231,934	558,109	79,539	37,152	116,691

Figure A6: Area of allocated lands from *Data on Agricultural Land Reform History*

B Empirical Analysis with Alternative Independent Variables

In the main text, we rely on the share of tenant land in the late 1930s to measure differential sizes of land reform shock in each county. Instead, we may use the share of allocated land as an outcome of the land reform. The limitation is that county-level data is not available in one province (Jeollanam-do), which reduces the number of observations. Appendix A.6 provides further discussion on data sources.

Similar to the main text, we run the following regression to test the effect of land reform on agricultural productivity.

$$\Delta \ln \text{Prod}_{cp} = \alpha + \beta \text{ Allocated Land Share }_{cp,\text{ before}} + \ln \text{Prod}_{cp,\text{ before}} + X_{cp} + \delta_p + \epsilon_{cp} \quad (7)$$

where $\Delta \ln \text{Prod}_{cp}$ denotes the change in agricultural productivity, measured as rice yield per hectare, and $\text{Allocated Land Share}_{cp,\text{before}}$ is the share of allocated land in county c as an outcome of the land reform. X_{cp} are county-level control variables. We include rice productivity and population growth rate as controls. δ_p are province-level fixed effects.

Again, similar to the main text, we run the following regressions to test the effect of land reform on primary and secondary school enrollment rates.

$$\Delta s_{cp}^{\text{primary}} = \alpha + \beta \text{Allocated Land Share}_{cp,\text{before}} + s_{cp,\text{before}}^{\text{primary}} + X_{cp} + \delta_p + \epsilon_{cp} \quad (8)$$

$$s_{cp,\text{after}}^{\text{secondary}} = \alpha + \beta \text{Allocated Land Share}_{cp,\text{before}} + X_{cp} + \delta_p + \epsilon_i \quad (9)$$

where $\Delta s_{cp}^{\text{primary}}$ is the change in primary school enrollment rate in county c in province p, $s_{i,after}^{\text{secondary}}$ is the secondary school enrollment rate in county i after the land reform, and $\text{Allocated Land Share}_{cp,\text{before}}$ is the share of allocated land in county c as an outcome of the land reform. X_{cp} are county-level control variables. We include rice productivity and population growth rate as controls. δ_p are province-level fixed effects.

Tables B1, B2, and B3 present the regression results of allocated share of land on agricultural productivity and schooling. Results are consistent to the ones reported in the main text with tenant shares as benchmark independent variables. If any, we find stronger correlations with allocated land shares as alternative independent variables.

Table B1: Regression of Tenant Shares on Change in Agricultural Productivity (with alternative independent variables)

	Change in rice yield per hectare		
	(1)	(2)	(3)
Allocated land share (total)	0.229***		
	(0.067)		
Allocated land share (paddy-fields)		0.257***	
		(0.067)	
Allocated land share (dry-fields)			0.176***
			(0.065)
$\ln \text{Prod}_{cp,\text{ before}}$	-0.947***	-0.953***	-0.936***
	(0.059)	(0.058)	(0.060)
Population growth rate (in logs)	0.039	0.029	0.074
	(0.063)	(0.062)	(0.062)
Observations	98	97	97
Province FEs	Yes	Yes	Yes
R-squared	0.781	0.793	0.772

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on change in rice yield per hectare after the reform as in equation (7) with alternative independent variables. Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

Table B2: Regression of Tenant Shares on Change in Primary School Enrollment Rates (with alternative independent variables)

	Change in primary school enrollment rates		
	(1)	(2)	(3)
Allocated land share (total)	0.149***		
	(0.034)		
Allocated land share (paddy-fields)		0.141***	
		(0.035)	
Allocated land share (dry-fields)			0.134***
			(0.032)
$s^{\text{primary}}_{cp,\text{before}}$	-0.345*	-0.321*	-0.341*
	(0.179)	(0.183)	(0.180)
log(Rice productivity)	0.065**	0.065**	0.071**
	(0.030)	(0.031)	(0.030)
Population growth rate (in logs)	-0.063*	-0.062*	-0.51
	(0.033)	(0.034)	(0.032)
Observations	98	97	97
Province FEs	Yes	Yes	Yes
R-squared	0.673	0.658	0.678

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on change in primary enrollment rates as in equation (8). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

Table B3: Regression of Tenant Shares on Secondary School Enrollment Rates after the Reform (with alternative independent variables)

	Change in secondary school enrollment rates		
	(1)	(2)	(3)
Allocated land share (total)	0.158***		
	(0.028)		
Allocated land share (paddy-fields)		0.159***	
		(0.028)	
Allocated land share (dry-fields)			0.148***
			(0.025)
log(Rice productivity)	0.013	0.011	0.019
	(0.024)	(0.025)	(0.002)
Population growth rate (in logs)	0.023	0.024	0.033
	(0.026)	(0.026)	(0.024)
Observations	98	97	97
Province FEs	Yes	Yes	Yes
R-squared	0.432	0.427	0.437

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on secondary enrollment rates after the reform as in equation (9). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

C Additional Tables

Table C1: Regression of Tenant Shares on Change in Agricultural Productivity (Per Household)

	Change in rice yield per household		
	(1)	(2)	(3)
Tenant share (total)	1.137***		
	(0.263)		
Tenant share (paddy-fields)		1.078***	
		(0.271)	
Tenant share (dry-fields)			0.695***
			(0.239)
$\ln \text{Prod}_{cp,\text{ before}}$	-0.398***	-0.398***	-0.344***
	(0.067)	(0.068)	(0.068)
Population growth rate (in logs)	0.011	0.009	0.026
	(0.113)	(0.115)	(0.118)
Observations	125	125	125
Province FEs	Yes	Yes	Yes
R-squared	0.450	0.438	0.404

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents the regression of tenant shares on change in rice yield per household after the reform as in equation (3). Column 1 uses total tenant shares, column 2 uses tenant shares in paddy-fields, and column 3 uses tenant shares in dry-fields.

D Additional Figures

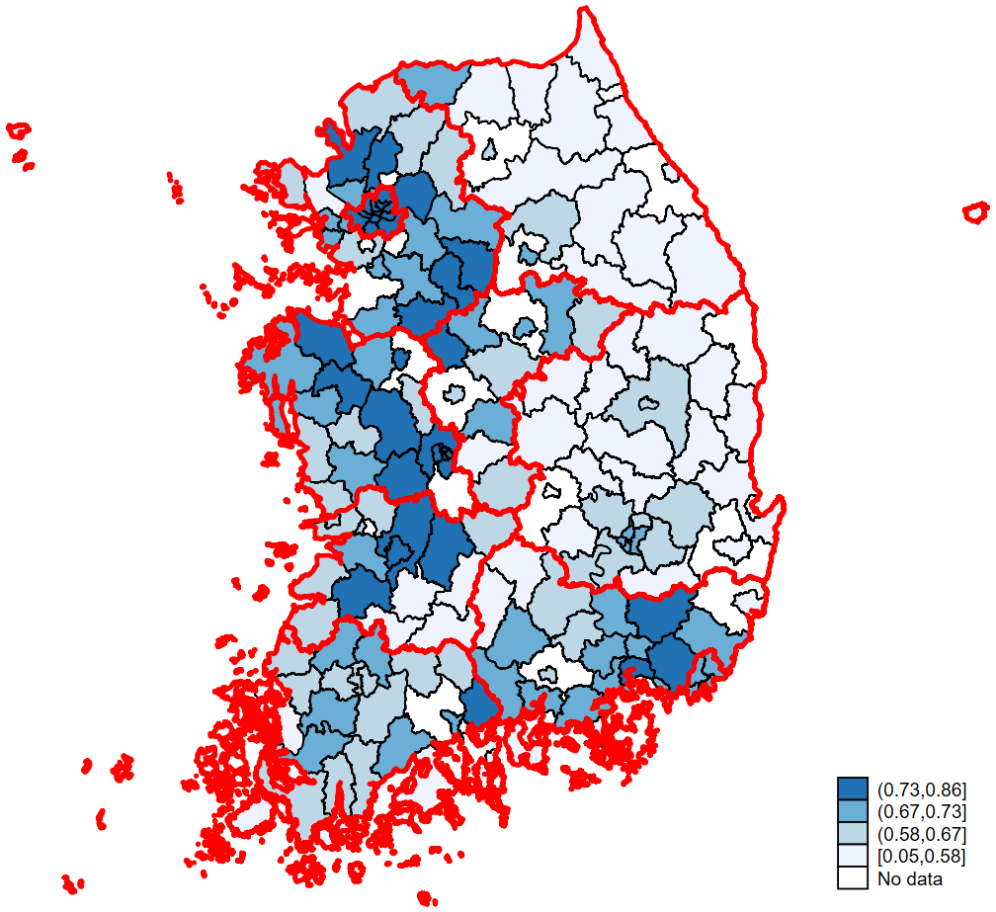


Figure D1: Share of Tenancy Farming in 1935-1940

Note: Black boundaries represent counties and red boundaries represent provinces.

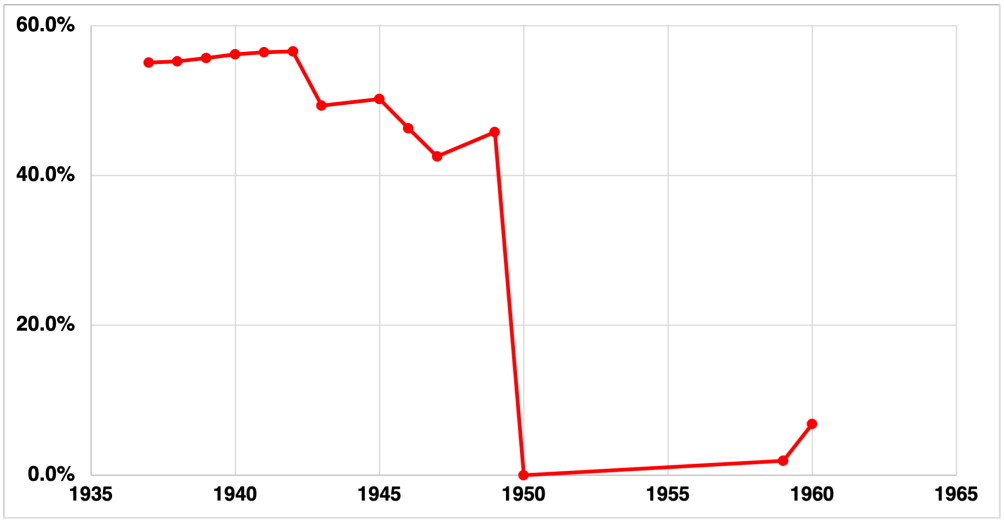


Figure D2: Share of Tenancy Farming over Time

Note: Sourced from Hong and Kim (2020)

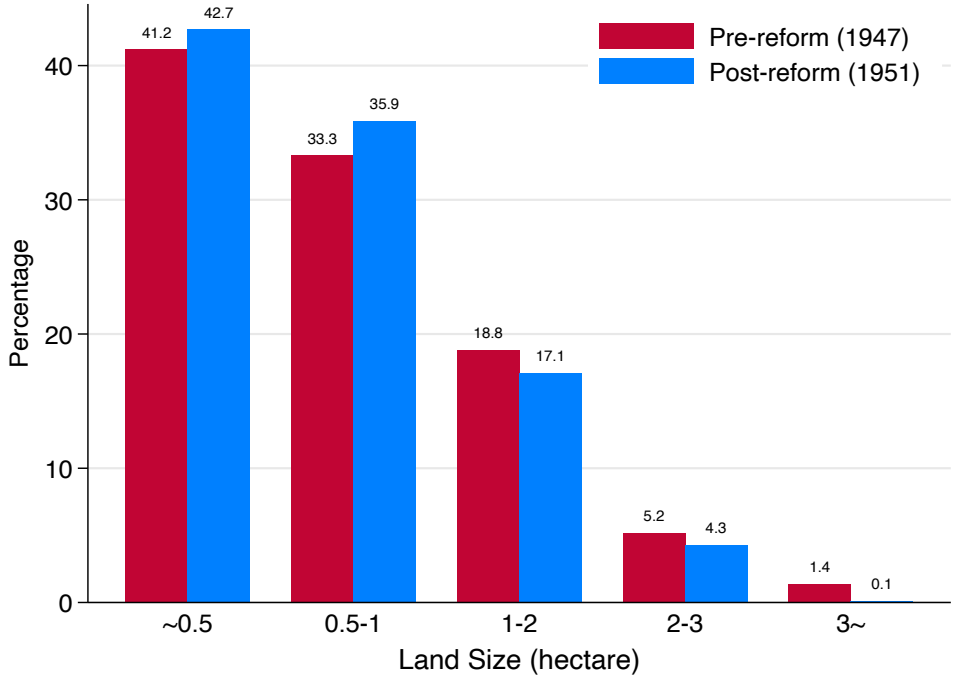


Figure D3: Farm Size Distribution, Pre- and Post-Reform (Data)

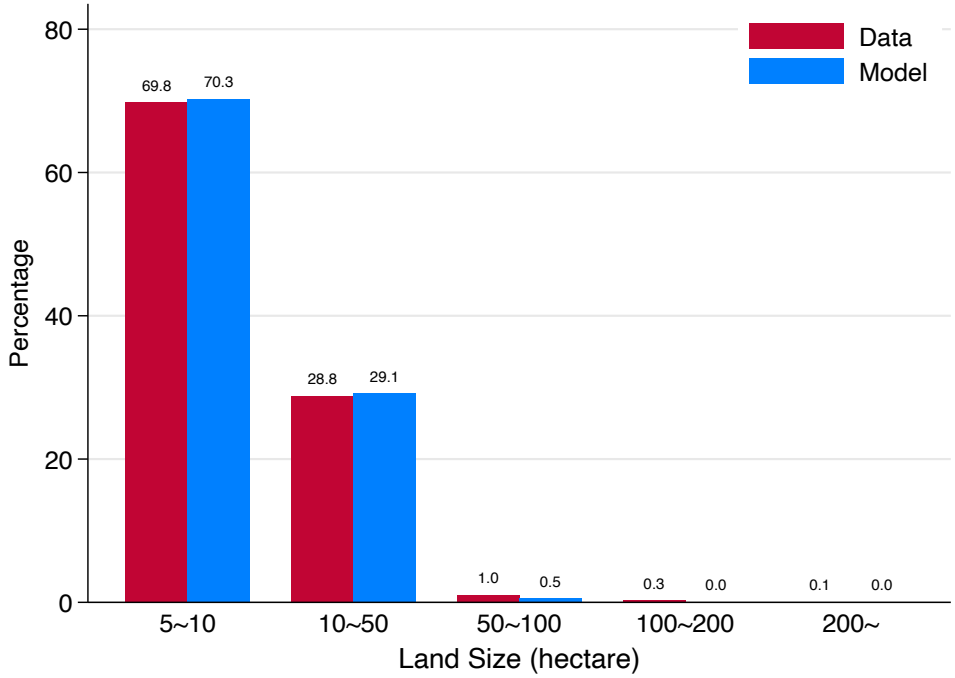


Figure D4: Land Ownership Distribution (conditional on >5ha)