

# Land Reform in Taiwan, 1950-1961: Effects on Agriculture and Structural Change \*

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## Abstract

Using two instrumental variables strategies, we study Taiwan's landmark 1950s land reform, long seen as central to its growth miracle. Phase II of reform redistributed formerly Japanese public lands, reducing tenancy, boosting rice yields, and pulling labor from manufacturing back to agriculture. By contrast, phase III, which reduced tenancy by breaking up larger estates, did not increase agricultural productivity and pushed labor out of agriculture. Phase II likely increased yields by lifting crop choice constraints, while phase III may have created farms too small to be economically viable. These differential results complicate traditional favorable narratives of Taiwan's reform.

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# 1 Introduction

Land reform has long been viewed by social scientists as a central policy behind the East Asian economic miracle (Amsden 1988; Wade 1990; Rodrik 1995). Each of the major East Asian economies underwent land reform prior to its growth takeoff: Japan and South Korea in the late 1940s, Taiwan in the 1950s, and Mainland China in the 1970s. Among these, Taiwan's is considered "the one to beat"—based on the share of households receiving land, its land redistribution was the most ambitious of its kind in a non-communist country (Studwell 2014).

This paper studies Taiwan's 1950s landmark land reform, which proceeded in three phases. First, in 1949, rents were capped at 37.5% of outputs. Second, in 1951, public lands formerly held by Japanese colonists were redistributed to tenants. Third, starting in 1953, larger landholdings were broken up and given to the tenants who farmed them—a "land to the tiller" redistribution. Economists and historians have long argued that these latter two phases of redistribution were central to Taiwan's economic takeoff: they redistributed over 71% of Taiwan's rented land to landless tenant farmers (Kuo 1983), and in the following years, Taiwan's agricultural productivity increased dramatically, with rice yields rising by more than 40% from 1950-61. However, despite the importance of the 1950s reforms to the Taiwanese and East Asian Miracles, there has been no modern empirical evidence to support these longstanding claims. This paper aims to fill this gap. By digitizing historical records and using two instrumental variables strategies that exploit exogenous variation across the latter two phases of redistribution, we provide the first causal evidence of the effects of land reform on Taiwan's economic development.

We have three main findings. First, we find that both the phase II public land redistribution and the phase III land to the tiller redistribution significantly reduced the share of tenant households, increasing the share of farmers who owned their land. Unlike many paper land reforms, Taiwan's redistributions appear to have successfully transformed its land tenure system into a nation of smallholders. Crucially, however, we do observe differing effects between the two phases: while the phase II public land redistribution had little effect on the farm size distribution across townships, the phase III redistribution substantially shrank the size of the median farm.

Second, we find that phase II and phase III of reform had dramatically different effects on agricultural productivity—in particular on rice, Taiwan's main staple crop. While the phase II

public land redistribution increased both rice output and yields, we find no evidence that the phase III private land redistribution had an effect on either. We do not observe any effect of either reform on other crops, like sweet potato or soybeans. The differential effect on rice yields by phase can be explained by two factors: first, the public land redistribution lifted the crop choice constraints for former tenant farmers, allowing them to plant rice instead of sugarcane, which boosted overall fertility; and second, the small farms created by the phase III land to the tiller redistribution may have been too small to be economically viable, pushing labor off the farm and reducing overall productivity.

Third, following these differential agricultural effects, we find that phase II and III of reform also had dramatically different effects on non-agricultural outcomes—in particular, sectoral allocations of labor. The second phase redistribution increased the share of workers in the primary sector and *decreased* the share of workers in the secondary sector, drawing workers away from manufacturing back to agriculture. By contrast, the third phase of reform had the reverse effect, decreasing the share of primary sector workers and increasing the share in the secondary sector, particularly manufacturing. Notably, these increases in manufacturing were concentrated among women. Higher agricultural productivity caused by the second phase increased real wages, pulling workers back into agriculture—consistent with a simple two-sector neoclassical model—while the small farm sizes created by the third phase pushed workers off the farm.

This paper’s findings complicate conventional, favorable views of Taiwanese land reform, which has also tended to lump the public and private land redistributions together as one unalloyed success. Among Western scholars, there is a strong historical consensus that Taiwan’s land reform raised agricultural yields—most of all in rice, the main staple crop (Kuo 1983; Mao and Schive 1995; Studwell 2014). In this narrative, land reform directly boosted agricultural incomes, growing overall economic output, and reducing rural poverty. Some scholars also credit land reform with Taiwan’s unusual pattern of rural industrialization, where roughly half of manufacturing value-added came from rural areas in 1971 (Ho 1979; Wade 1990; Hamilton and Kao 2018). By contrast, we find that though phase II of land reform boosted rice yields, it can explain only a sixth of their increase from 1950-61, while the phase III land redistribution had little observable effect. Conversely, it was phase III that had the strongest local effects on industrialization—but, it appears, by pushing surplus labor off of plots that were too small to be economically viable.

These results speak to a more nuanced, ambivalent literature among Taiwanese scholars that is reassessing longstanding claims about the 1950s land reform—a pillar of legitimacy for the authoritarian Nationalist regime (Z.-Y. Chen [2011](#); Chu [2017](#); Hsu and Liao [2017](#)).

More broadly, this paper contributes to the broader debate around land reform, which remains one of the oldest and most contentious policies in development. In particular, this paper contributes to a growing body of research on East Asian land reforms, including Kitamura ([2022](#)), which studies Japan’s 1950s reforms, Kim and Lee ([2024](#)), which studies South Korea’s 1950s redistribution and the effect on human capital accumulation, and Ferguson and Kim ([2023](#)), which studies China’s 1970s decollectivization. Moreover, this paper adds an important data point in the debate around the contentious “inverse farm size-productivity” relationship, where smaller farms are often observed to be more productive than larger ones (see Foster and Rosenzweig ([2017](#)) as an example finding evidence that small farms can be efficient than larger ones; and Adamopoulos and Restuccia ([2014](#)) as an example finding the reverse). Despite longstanding views that Taiwan’s shrinking of farm sizes boosted productivity, this paper does not find evidence that the famous land to the tiller redistribution increased rice yields.

The rest of the paper proceeds as follows. [Section 2](#) outlines the historical context around land reform. [Section 3](#) explains our data sources. [Section 4](#) presents our empirical strategy. [Section 5](#) presents our main results. [Section 6](#) concludes.

## 2 Historical Context

### 2.1 Prelude to Reform

Taiwan was colonized by Japan in 1895. From the start, the colonial regime invested considerable effort into developing Taiwan’s administrative and physical infrastructure. For instance, from 1898 to 1905, the colonial government conducted a cadastral survey to delineate property rights and collect taxes.<sup>1</sup> Starting in 1900, the colonial regime also began developing Taiwan’s sugar industry, building the factories and laying down the infrastructure that allowed the island to

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1. Koo ([2011](#)) studies this particular institutional change, and finds that it resulted in a significant increase in land prices as well as greater investment in organic fertilizer.

eventually become one of the key suppliers to Japan's domestic market.<sup>2</sup> By the 1930s, Taiwan and its sister colony Korea supplied more than 90% of the sugar and 98% of the rice imported by Japan (Ho 1984).

In 1945, after Japan lost the Second World War, control of Taiwan passed to the Republic of China, a one-party state run by Chiang Kai-shek's Nationalist Party.<sup>3</sup> Any optimism about the handover to China was quickly dashed, as the Nationalist government brought over its reputation for graft and incompetence from the mainland. Hyperinflation ensued, and tensions between the local Taiwanese and the mainlanders grew. On February 28, 1947, after Nationalist troops fired into a crowd, killing several civilians, the Taiwanese rose up across the island, taking control of urban areas (Minns and Tierney 2003). The Nationalist regime rushed in reinforcements from the mainland and violently crushed the uprising, killing thousands. Martial law was then imposed, which was not lifted for another forty years.

Meanwhile, the Nationalists were losing control of the Chinese mainland to Mao Zedong's Communists, who won vast support in the countryside with their promises of land reform. In 1949, the mainland regime collapsed, and around one million Nationalist soldiers and refugees fled to Taiwan (Yap 2021). As the party regrouped, Nationalist leaders recognized that they had been defeated on the mainland largely because they had lost the support of China's peasantry (Myers 2009). Moreover, after the February 28 incident, which had been led by urban elites, it was clear they needed a local base of support. To secure its hold on Taiwan, the Nationalist government began an ambitious land reform program—among the most extensive of its kind in a non-communist country.

## 2.2 Land Reform

When Taiwan was a Japanese colony, the standard rental agreement was based around a fixed rent paid in-kind at the end of the year, which the landlord would set based on the land's potential output.<sup>4</sup> Rents for paddy land were around 50%, and those for dry land around 35%

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2. However, according to Wu (2016), trade protections and subsidies to the sugar industry accounted for the bulk of its success.

3. "Nationalist Party" is the common translation of the party's Chinese name, Kuomintang, or KMT. We will use the two names interchangeably.

4. Some sources, such as Cheung (1969) and Hsiao (1975), erroneously claim that Taiwan operated under a share-cropping system, but Barrett (1984) shows that this is based on a misreading of rental agreements.

(Yeh 1996, 2001, 2007).

However, by the time the KMT took over in 1945, the disruption of the war had caused rural conditions to deteriorate rapidly (Booth and Deng 2017). With scarce arable land and a rapidly growing population, pressure to feed the population was immense. Agricultural rents rose dramatically—averaging 56.8% of yields in a 1948 household survey, and reaching as high as 70% in some counties—as did rates of landlessness (C. Chen 1961). By global standards, even the largest Taiwanese farms were not particularly large—over 60 percent of owner-cultivators owned less than 1 *chia* (around 1 hectare). But tenants were vulnerable to eviction, as contracts were rarely written down and often indefinite in length. Wolf Ladejinsky, an American agricultural economist who had helped to design Japan's land reform, described the appalling conditions in a 1949 field visit:

Of all the farmyards I have seen in the Far East, Southeast Asia, and in the Middle East, that of the average Taiwanese tenant is among the worst, both in appearance and in equipment. Tenants' huts, so-called barnyards, equipment, and livestock, as well as their health point to nothing but poverty. (Ladejinsky and Walinsky 1977)

To address these conditions and shore up its support among Taiwan's farmers, the Nationalist government passed three major land reform laws starting in the late 1940s. These reforms were funded in large part by aid from the United States, which set up the Sino-American Joint Commission on Rural Reconstruction (JCRR) to oversee implementation and provide technical assistance.

The first phase of land reform, passed in 1949, established fixed rents based on 26 possible grades of land productivity, with a maximum rent of 37.5% of the annual yield. (This law is thus commonly called the 375 rent reduction.) In addition to reducing rents, the law required that all contracts exist in writing, and last for at least six years. Tenancy committees, consisting of both tenant farmers and landlords, were set up to supervise the new contracts and adjudicate any disputes. By the end of 1949, 302,000 farm households had signed 393,000 new lease contracts, representing around 256,000 *chia* (248,300 hectares) of land.<sup>5</sup> However, there was still a widespread recognition that rent reduction alone was not enough to address the problems of

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5. 1 *chia*, the standard area unit in Taiwan, is 0.9699 hectares.

Taiwan's rural inequality.

The second phase of land reform, passed in 1951, redistributed the majority of public lands, around 20% of all arable land on Taiwan (C. Chen 1961). Most of these lands were confiscated from private Japanese colonists who had been expelled from Taiwan, while a minority had been inherited from the colonial government. A large portion of this land had been previously dedicated to sugar cultivation, in line with the Japanese government's goals for its colony. After a trial run in 1948, public land was sold in six lots from 1952 to 1958, starting with land owned by local governments, then proceeding to land owned by public enterprises like the Taiwan Sugar Company.<sup>6</sup> Much of this sugar company land had already been leased to tenants by a 1947 law, where crop choices were by and large limited to sugarcane; pressure from American advisors, including an appeal from the development economist Wolf Ladejinsky to President Chiang Kai-shek, eventually led the government to order the outright transfer of the Company's land as part of the broader land reform program in 1952 (Huang 1992).<sup>7</sup> Prices were set at 2.5 times the total annual yield of the cropland, and were to be paid in-kind in twenty biannual installments. Ultimately, 139,688 households bought land as part of the program, with an average purchase size of around 0.5 hectares.

The third phase of land reform, passed in 1953, was the largest in scope. Dubbed the "land-to-the-tiller" law, the reform broke up landholdings over cutoffs determined roughly by land quality (around 3 hectares for paddy land, 6 for dry land, of average fertility), and distributed the land to the tenants who tilled it. Landlords were compensated with either claims on agricultural output or shares of state-owned industrial enterprises, both of which were undervalued (Liu 1992). A cadastral survey in 1952, supervised by the Sino-American JCRR, helped identify the owners of plots for this redistribution. Through this last stage of reform, around 143,568 *chia* of arable land was transferred to 194,823 farming households (C. Chen (1961), pg 69).<sup>8</sup> To prevent the re-consolidation of large holdings, recipients were banned from selling their land for 10 years,

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6. C. Chen (1961) notes that the first (small) public land sale occurred in 1948, but the remainder of the program was put on hold until 1951 to concentrate on implementing the 375 rent reduction. There was also an additional seventh public land sale in 1964, after our study period.

7. Chung (2002) analyzes the influence Ladejinsky's letter had on the way the KMT dealt with the land of Taiwan Sugar Company.

8. One immediate consequence of the land-to-the-tiller policy, oftentimes overlooked in the literature, is the breakdown of joint land ownership. Nearly 100,000 *chia* of arable land transferred was confiscated from around 87,000 joint owners, according to *Land Tenure Statistics in Taiwan* (1952, 1955).

unless the price of the land was paid off early. The government also instituted regular follow-ups to ensure that the redistribution would not be reversed.

Figure 1 shows the transformative change in Taiwan’s land ownership distribution between 1950 and 1961. The overall distribution shifts to the right: in the median township, the share of households who fully owned their land doubled, from 32% in 1950 to 64% in 1961. All told, the three stages of land reform directly redistributed 215,231 hectares of land, or 24% of Taiwan’s 1950 total arable land area, and the share of tenant households fell from 36.3% to 21.5%.<sup>9</sup> The third stage of reform, the Land-to-the-Tiller law, was roughly double the size of the second stage public land redistribution in terms of area redistributed, and around 40% larger in terms of the number of households affected.

Figure 2 maps the second and third stage redistributions. The second stage of reform was concentrated in the south, in the counties of Changhua, Chiayi, and Pingtung, while the third-stage land-to-the-tiller redistribution was concentrated more in the north. The missing areas (shaded in white) in the interior of the island are mountainous, thinly populated, and unlikely to alter our basic results.

### 3 Data

#### 3.1 Sources

This paper combines several sources of archival data to measure the effects of land reform. First, to measure the effects of reform on land tenure, we digitized the JCRR’s 1950 *Report of Investigation on Ownership and Operation of Arable Land* to measure the pre-reform distribution of land. For the post-reform distribution, the 1961 agricultural census provides a comprehensive set of variables on land ownership, farming labor inputs, and crop yields. To be consistent with the availability of tenure information, our main outcomes below are long-differences between 1950 and 1961, pre- and post-land reform.

For outcome variables, our main source of data is Taiwan’s county guidebooks, which we have digitized for the first time. In 1950, Taiwan was divided into 21 counties and municipalities, which were further sub-divided into 361 townships. Every year, each county or municipal gov-

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9. Data are based on Tang (1954) and C. Chen (1961).



ernment compiled a guidebook that summarized socio-economic statistics at the township level, such as population, agricultural output, and employment by industry. A detailed household registration system, akin to the *hukou* on the mainland, also recorded statistics on births, deaths, and the township population share of migrants. We use data from Taiwan's Food Statbook from 1950 through 1961 for additional data on agricultural production.

One concern with this kind of historical data is the consistency of geographical units over time. The administrative divisions of postwar Taiwan mostly followed those of the 1920 Japanese colonial system, when the main island and the Penghu archipelago were divided into 342 townships. After 1945, the Nationalist government simply changed the names of Japanese divisions. Although there were some township splits during our study time period, the overall number of townships remained stable (370 in 1952-1960; 371 in the 1960s). We track name changes as well as splits and merges, treating 1956's set of divisions as authoritative.<sup>10</sup> We then pair our administrative data with open source Geographic Information System (GIS) data on the 1955 township borders from the Center for GIS, RCHSS, Academia Sinica.<sup>11</sup> As land reform mostly left "districts" (same administration level as township) under major cities intact, our main analysis focuses on the set of remaining townships on the island of Taiwan, giving us a sample size of around 250 observations.<sup>12</sup>

We supplement the county guidebooks data with more detailed demographic data from Taiwan's household registration in 1955, as well as 1956 and 1966 population censuses.<sup>13</sup> They all contain township-level population counts broken down by gender and place of origin, while the 1956 and 1966 censuses also contain detailed age distributions, education statistics, and occupation by sector and gender, which we use to measure structural transformation.

To test balance over colonial era statistics, we bring in Japanese data from the 1941 *Agricultural Basic Survey*, and the 1943 *Taiwan Rice Highlights* report. Lastly, we include potential yield changes through moving from low-inputs traditional agriculture to a high-input modern model, as measured by the UN FAO's Global Agricultural Ecological Zones dataset, to address concerns

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10. We thank Kelly Olds of National Taiwan University for providing a comprehensive locality coding system that tracks the division changes from 1905 to 1966.

11. This data is publicly accessible at <http://gissrv4.sinica.edu.tw/gis/twhgis/>

12. We exclude townships with fewer than 1% quantile households (328 households), which excludes only one township.

13. We thank Kelly Olds again for generously sharing digitized versions of 1955 and 1966 population censuses, as well as the 1947, 1951, and 1954 establishment-level directories.

regarding townships' natural land quality for rice production.

### 3.2 Summary Statistics

[Table 1](#) summarizes our key variables, measured at the township level. Taiwan saw rapid economic progress during the 1950s, with real GDP growing by over 7% a year from 1950 to 1961. A major contributor was the agricultural sector: from 1950 to 1961, rice output in the average township grew by 0.39 log-points (48%), almost entirely attributable to a 0.36 log-point (43%) increase in yields, rather than area cultivated. The population of the average township grew by 0.41 log-points (51%). In education, the share of the population with at least primary level schooling also grew by 12 percentage points, but the gains in middle school, high school, and higher education were relatively modest. In terms of employment, the share of those with occupations in the primary sector (primarily farming, fishing, and mining) fell by 17 percentage points, a major structural change. However, most of this labor reallocated to the tertiary (services) sector, not secondary sector (manufacturing, construction, and utilities).

The major institutional change during this period, of course, is that the share of tenant farmer households collapsed by 24 percentage points, while the share of full landowner households rose correspondingly by 26 percentage points. The following sections will systematically explore the empirical link between land reform and these changing socio-economic outcomes.

## 4 Empirical Strategy

This paper's main focus is causally identifying the effects of the phase II and III redistributions in Taiwan.<sup>14</sup> A natural concern is that the amount of land redistributed in each phase is correlated with social and economic variables that shaped later growth, complicating a causal interpretation. [Table 2](#) shows the regressions of phase II and III transfer shares on a battery of pre-period characteristics, with the amount of land transferred in phase III in particular significantly positively related to pre-reform manufacturing and infrastructure.

To address these concerns, we use instrumental variables strategies to separately estimate

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14. For those curious, the appendix presents regression evidence for the effects of land reform's first phase, the 375 rent reduction. However, because we lack an identification strategy for this phase, these results may be interpreted as strictly correlational.

the effects of the two phases of Taiwanese land redistribution. For each phase of land reform  $p \in \{2, 3\}$ , we estimate the following set of equations:

$$\Delta LandTransfers_{i,p} = \beta_0 + \beta_1 Z_{i,p} + X_i' \delta + \varepsilon_i \quad (1)$$

$$\Delta y_i = \gamma_0 + \gamma_1 \Delta LandTransfers_{i,p} + X_i' \Gamma + \eta_i \quad (2)$$

where for township  $i$ ,  $\Delta y_i$  is the long-differenced outcome,  $Z_{i,p}$  is the instrument for phase  $p$  (in phase II, the 1941 share of Japanese-owned land; for phase III, the 1950 share of land above the 3-hectare cutoff),  $\Delta LandTransfers_{i,p}$  is the change in land transfers between 1950 and 1961 (where the 1950 pre-reform amount is assumed to be 0), and  $X_i$  is a vector of controls.<sup>15</sup> We cluster using Conley (1999) standard errors to account for potential spatial correlation. The following section explains our instruments in greater detail.

#### 4.1 Phase II: Public Land Redistribution

Starting in 1951, the Nationalist government began redistributing public lands—around 20% of arable land on Taiwan—most of which had been confiscated from the departing Japanese. To identify the effect of this land reform, we instrument for the share of township land that was redistributed with the share of land that was Japanese-owned in 1941.

The critical exclusion assumption is that the share of Japanese-owned land was unrelated to outcome variables except through the mechanism of greater redistribution after 1951. We argue for this primarily on historical grounds. Prior to the handover to the Republic of China, Japanese-owned lands were worked in a way similar to local Taiwanese-held lands. In particular, even though most Japanese-owned land was focused in sugar cultivation, largely in the south, sugar cultivation in colonial Taiwan followed a rather unusual model of small-scale farming:

In the early twentieth century, Western colonial powers established extensive sugar plantations in Latin America, Indonesia, and elsewhere... In colonial Taiwan, however, the Japanese acquired sugarcane largely via contractual arrangements with small family farms... In the beginning stages of colonial rule, Japanese private capital, in

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15. The controls  $X_i$  include the land transfers in the other stage of reform: the phase II regression controls for the share of land transferred in phase III, and the phase III regression controls for the share of land transferred in phase II. Additional controls in our baseline model will be introduced after our falsification test.

the face of persistent family farms, tended to avoid direct involvement in agricultural production, preferring to exploit the peasant producers through market control and the provision of credit. Nevertheless, supported by the colonial state, a modern family-farming agriculture was created in order to facilitate capital accumulation by the Japanese. (Ka 1995)

Taiwan's relatively strong system of land rights, intended to win the support of local landlords for the colonial regime, made it difficult for sugar companies to amass land through coercion, as the Dutch did on Java. Instead, the Japanese left the basic structure of smallholder farming intact, contracting with these small farms for cane but maximizing profits by gaining control of the milling, refining, and marketing of sugar (Cheng, Fan, and Wu 2022). Similarly, most rice was also grown on small family farms, where Japanese attempts at vertical integration were less successful (Grabowski 2002). Thus, the 1951 public land redistribution was a policy shock that separated areas with more and less Japanese-owned land, but were otherwise initially operating under a similar system of small family farming.

## 4.2 Phase III: Land to the Tiller

The 1953 Land to the Tiller law set 3 hectares as the maximum holding size for paddy land of average quality, with any land above that cutoff eligible for redistribution. To estimate the effect of the third phase land reform, we therefore instrument for the amount of land transferred using the pre-reform share of township land in holdings just above the 3 hectare retention cutoff.

The JCRR's 1950 report contains township-level data on the size distribution of private estates, with counts of the holdings that fall into bins of 0-0.5 hectares, 0.5-1 hectares, 1-2 hectares, 2-3 hectares, 3-5 hectares, 5-7 hectares, etc. We convert these counts into land area by multiplying the number of holdings by the midpoint size of each bin: for example, 20 holdings in the 2-3 hectare bin means  $20 \times 2.5 = 50$  hectares of land in 2-3 hectare estates.<sup>16</sup> In the appendix, Figure 6 and Figure 7 show the national distribution of raw counts of estates and the amount of land, respectively. In 1950, the vast majority of estates in Taiwan, 65% were managed in estates smaller than one hectare. Another 19% were between one and two hectares. As a share of land, however,

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16. Table 11 shows that our main regression results are robust to using both the minimum and maximum of each bin instead.

roughly half of private land was held in estates larger than five hectares.

To construct our instrument, we take the amount of land just above the 3 hectare cutoff and divide it by the amount of land in the bins just below the 3 hectare cutoff to normalize it. We also control for the share of land in estates less than 2 hectares and greater than 5 hectares. The identification assumption then becomes that, holding fixed the land held in 2-5 hectare estates, changes in township outcomes were unrelated to the amount of land above the 3 hectare cutoff except through the channel of greater land transfers. Loosely, this can be thought of as related to a fuzzy regression discontinuity design, where, conditioning on a certain threshold around a policy cutoff, greater probability mass on one side of the cutoff is as good as randomly assigned.

### 4.3 Instrumental Relevance

Table 3 shows the results of the first-stage regressions in Equation 1. Both instruments are highly relevant in predicting the amount of land transferred in their respective phases of land reform, with F-statistics over 20. Firstly, column 1 shows that the share of Japanese-owned land in 1941 can strongly predict the share of land transferred in phase II of land reform. The coefficient between the 1941 Japanese land share and the share of land transferred in phase II is highly statistically significant, with an F-statistic around 32. Secondly, column 2 shows that the ratio of land just above the 3 hectare cutoff to the land just below is a highly relevant predictor of the amount of land redistributed in phase III, with an F-statistic of 22. In the appendix, Figure 5 plots the first-stage scatters of between each instrument and its respective phase of land reform, highlighting the clear positive relationships.

### 4.4 Falsification Tests

The previous sections outlined historical and design-based justifications for the exogeneity of our land reform instruments. A natural concern, however, is that these instruments are still correlated with economic, demographic, and other characteristics that may affect outcomes through other channels, violating the classical exclusion assumption. We can provide support for this assumption by estimating the relationship between each of our instruments and a battery of

socio-economic variables:

$$y_i = \delta_0 + \delta_1 Z_{i,p} + \theta_i. \quad (3)$$

where for township  $i$ ,  $y_i$  is the pre-period outcome,  $Z_{i,p}$  is the instrument in phase  $p$ , and  $\theta_i$  is an error term, which we cluster using a spatial Bartlett kernel with a 50 kilometer cutoff.

Table 4 presents the estimates of Equation 3. Since our main specification in Equation 2 is estimated in long-differences, implicitly differencing out the long-run level, in the first set of rows we primarily consider *changes* in key pre-period outcomes, akin to a test of parallel trends in a differences-in-differences specification. However, in the second set of rows, we also consider the levels of pre-period characteristics that may have caused post-treatment differences between areas that saw more and less land reform—in particular, access to infrastructure and existing industrial capacity.

Column 1 in Table 4 considers the relationship between townships' Japanese land share and pre-period variables. We find that a township's Japanese land share is not significantly related to pre-reform increases in the share of tenants, changes in the median farm size, growth in population, or changes in rice yields—suggesting that, prior to land reform, agricultural institutions and production were growing similarly in areas with more and less Japanese land. We also find township's Japanese land share is positively but not significantly related to other characteristics that could plausibly be tied to sugar production: townships with more Japanese land did not have systematically higher sugar cane yields (though the standard error is large), greater presence of factories or sugar mills, or shorter distance to main trunk railway stations, sugar rail stations and bank branches.<sup>17</sup> One variable particularly worth highlighting is the mainlander share of the population in 1955, the earliest available data point showing residents' origin. A reasonable concern is that these new arrivals were settled in areas where they could be granted former Japanese land; however, we do not find evidence that this was the case.<sup>18</sup> Broadly speaking, then, these results validate the historical assessment that Japanese-held land was cultivated in a similar, small-scale fashion to land held by the local Taiwanese—and, consequently, the assumption

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17. We thank the authors of Huang and Jheng (2021) for providing us with geographical bank branches data.

18. One caveat is that the official statistics started including the household registration of mainlander soldiers (as opposed to general citizens from mainland) since 1969 (Yap 2021). We use the mainlander population share from the 1970 county guidebook and again observe no significant correlation of it with the Japanese land share in 1941.

that areas with more and less Japanese land were largely similar except in their exposure to land reform.

Next, column 2 considers the relationship between pre-reform variables and our 3-hectare cutoff instrument for the third phase of land reform. Similar to with the Japanese land variable, we do not find that the 3-hectare cutoff is significantly related to pre-period changes in tenancy, household farm size, rice yields, or population. The 3-hectare cutoff instrument is also not significantly related to most of our battery of pre-reform level variables, except for the number of 1947 factories—we control for number of factories in 1947 to achieve balance for the rest of variables, and find that our results are qualitatively similar whether the control is included or not. Overall, these results suggest that townships with more land just above the 3-hectare cutoff appeared to be growing on a similar trajectory to townships with relatively more land just below the cutoff in the years just before the 1953 Land to the Tiller reform.

Informed by the falsification test, we add controls in addition to the land transfers in the other stage of reform. To summarize, for phase II, we control for phase III transfer share as well as the mainlander population share in 1955; for phase III, we include phase II transfer share, the share of landholdings outside the 2-5 hectare bandwidth, and the number of sugar mills in 1947. In our baseline specifications, treatment status is thus balanced across pre-reform agricultural and socio-economic characteristics.

## 5 Empirical Results

### 5.1 Land Tenure

We begin by studying land reform’s effects on tenancy, ownership, and farm sizes. It is not a given that land reform altered the actual institutions on the ground, as reform efforts in other developing countries have often been co-opted by landed elites (Albertus 2015). Testing the effect of phase II and III land transfers on land tenure is thus a critical “zeroth” stage for meaningful effects on downstream socio-economic outcomes.

Table 5 estimates the effect of land reform on tenure outcomes using Equation 2. Firstly, both the phase II public land transfer and the phase III redistribution caused the share of tenant households to fall significantly from 1950 to 1961, by 1.2 and 1.6 percentage points respectively for

each 1 percentage point increase in the share of land transferred. The share of partial landowners (households who owned some land and leased the rest) increased in response to both phases of land reform, though both effects are not statistically significant. The main effect of land reform can be seen in the change in the share of full landowner households (households who fully owned their land), which increased by 0.9 and 1.5 percentage points, respectively, for each 1 percentage point increase in land transfers. By contrast, phase II left the median operating size of farms largely unaffected, while phase III significantly shrank the median farm size, by around 0.19 ha for every 10 percentage point increase in the share of land transferred.

These effects are substantial, and explain a large portion of the observed aggregate changes in Taiwan's land tenure from 1950 to 1961. The IV estimates imply that in the mean township, which saw 8% of its land transferred in phase II and 16% transferred in phase III, the phase II public land distribution increased the full landowner share by 7.4 percentage points, while the phase III land-to-the-tiller redistribution boosted the full landowner share by 23.7 percentage points. This suggests that the bulk of the land ownership changes were brought about by land to the tiller redistribution, not the public land reform. (The magnitude of the OLS estimates are similarly larger for phase III than for phase II.)

The IV estimates are generally larger than the OLS coefficients. One reasonable explanation is that compliers experienced larger heterogeneous treatment effects. This is perhaps not surprising, particularly for phase III, as the farms created by breaking up an estate over 3 hectares were particularly small, and hence a township with more land just above the cutoff would likely have disproportionately suffered from the effects of labor being pushed off the land. Treatment variation induced by a higher cutoff would likely have had smaller effects. Another reasonable possibility is that OLS may be downward biased due to negative correlation with the error term. [Table 2](#) highlights that, using univariate OLS, townships that saw more phase III transfers were significantly different prior to reform: they had far less agriculture, smaller farm sizes, and far greater access to urban infrastructure. By contrast, the instrumental variable does not show imbalance in these characteristics.

Taken together, these results suggest that both the public land redistribution and the land to the tiller law substantially changed land tenure institutions on the ground, turning rural society in Taiwan from one of tenant farmers to smallholders. However, the two phases of land reform



differed significantly in their impact on the *size* distribution of farms—a result with important implications for agricultural productivity.

## 5.2 Agriculture

Table 6 shows the effects of the phase II and III redistributions on agricultural outcomes. Our main focus is rice, Taiwan’s main staple crop, covering half of acreage in 1951. We find a stark difference between the phase II public land redistribution and the phase III land-to-the-tiller reform. In the left set of columns, both the OLS and IV estimates show that the public land redistribution significantly increased rice output. The OLS estimates show a 0.7% increase in rice output in response to a 1% share of land transferred, while our preferred IV estimates show around a 1.6% increase in output. The effect on total rice output can be attributed roughly evenly to increases in yield (land productivity), 0.8%, and rice acreage, 0.9%. By contrast, in the right columns, we do not find evidence that phase III land-to-the-tiller reform increased rice output or yields—in fact, the point estimate for output is largely negative but insignificant.

We find limited evidence that either phase of land reform affected the growth of other crops. We cannot distinguish the effect of land reform on the output, yield, and area of sweet potato (the second major staple) and soy bean (a key source of protein) from 0. We note, however, that the point estimates on sweet potato and soybean areas are positive, while the point estimate on yield for soybean is negative (though the standard errors on these estimates are wide due to missing data). This suggests that land reform’s increase of rice yields and output did not come at the significant expense of the productivity of other crops.

**Mechanisms** The estimated effects of phase II of land reform on rice yields are economically significant—in the mean township where 8% of land was transferred, the IV estimates imply that land reform caused a 6.1% increase in rice yield, or a sixth of observed growth from 1950-61. However, the observed effects of phase III are minimal. Why did the phase II public land redistribution increase rice yields, but the phase III land-to-the-tiller reform did not?

One likely explanation is that the public land redistribution shifted acreage away from sugar cane towards a second crop of rice. The phase II reform redistributed land previously dedicated for supply to the Taiwan Sugar Company to private owners. Privatizing this land lifted this

crop choice constraint, causing farmers to shift towards planting a second crop of rice (Hou 1988). Unfortunately, sugar production was not systematically recorded in township yearbook data, so we cannot directly observe the change in sugar area. However, we can observe a strong and significant increase in rice acreage in Table 6, largely driven by the second crop. Moreover, contemporary Taiwanese government reports strongly suggest that the reallocation of land away from sugar was a key effect of the public land redistribution. In 1954, Taiwan's Land Bureau asked several county governments to conduct a survey regarding the private use of the Taiwan Sugar Company's land after transfer. In June, the Hualien County government replied:

... the other half stopped planting sugarcane only after the government took over and released the land. The most important reason for this is the low sugar prices... Based on the statistics in 1953, only 6% of the Sugar Company's original land is used to cultivate sugarcane (Hou (1988), p. 600).

Other counties, like Kaohsiung and Taitung (where Figure 2 shows high transfers of public land), similarly reported that few farming households were willing to grow sugarcane.

The public land redistribution's effects on sugar cultivation had knock-on effects on rice. In Taiwan's agricultural calendar, after the first rice crop, farmers could choose to plant a second rice crop or sugarcane; sugarcane takes another year and a half to mature, three times longer than an average rice crop (Koo and Wu 1996). Freed from an obligation to the Taiwan Sugar Company, and cut off from Japanese colonial-era sugar subsidies that propped up prices (Hsieh 1953), the new Taiwanese operator-owners chose to switch to a second crop of rice—reflected in the increased second crop acreage shown in Table 6. Increased double-cropping, in turn, improves the yield of the first rice crop:

Rice-fields planted with a second crop generally give higher yields each season than those which are only single-cropped, thanks to the additional ploughing and manuring, and also to the beneficial effects of drying out the soil... If the field is continuously planted with wet rice its fertility, unlike that of dry fields, will not diminish over time even if few or no fertilisers are used, for the nutrient content of the irrigation water, together with the nitrogenising power of the naturally occurring algae, are sufficient to maintain regular returns from traditional rice varieties (Bray (1994), p. 16).

This explains why the public land redistribution may have increased yields. But why did the land-to-the-tiller reform fail to increase yields, in sharp contrast with the consensus view that Taiwan's private redistribution was a success?

One obvious explanation is that, unlike with the public land redistribution, private lands redistributed under land-to-the-tiller did not benefit from a shift in crop choice, since they were not previously contracted to the Taiwan Sugar Company—Table 6 shows that second rice crop acreage was largely unchanged by phase III.

But another important factor to consider is the operating size of farms. Without increased investment of capital (which was not historically documented in Taiwan during this period), increased double cropping implies more intensive use of labor, including by women, children, and the elderly. Yet the phase III land-to-the-tiller may have created holdings that were too small to be economically viable to fully support most households. The IV estimate in Table 5 implies that the land-to-the-tiller reform shrank the median farm by 0.30 hectares in the average township—almost 60% of the median farm (0.53 hectares) in the average 1950 township. Using the 1961 average rice yield (2.4 tons/hectare) and the implied median farm sizes of the mean treated townships (0.2 hectares) as a rule of thumb, this implies that the average holding produced just 480 kilograms of rice a year—less than what it takes to support a single adult on 2,000 calories a day, and far too little to support a whole household.<sup>19</sup> By contrast, areas with more public land redistribution saw operating farm sizes largely unchanged, with the median farm (still relatively small at half a hectare) able to comfortably support the annual caloric needs of two adults with its rice output.

These null results are supported by a growing Taiwanese qualitative literature that is skeptical of longstanding Kuomintang claims about land-to-the-tiller's success. In particular, a large portion of redistributed land was jointly owned by multiple individuals (as opposed to by corporate bodies and religious groups) (Tang 1954; Liu 1992)—breaking up these holdings may have fragmented land to an inefficiently small size, resulting in farms of irregular shapes.<sup>20</sup> The Director

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19. 480 kilograms of cooked rice provides around 624,000 calories, using the 1,300 calories/kg estimate from the US Department of Agriculture. An adult consuming 2,000 calories a day would need 730,000 calories to survive—and this is before considering other nutritional needs.

20. Aside from corporate bodies and religious groups, joint ownership mostly stems from generations of inheritance, or joint investments between friends and family members. According to statistics reported in Tang (1954), the rate of expropriation for leased communal land was 81.8%, significantly higher than the 28.2% for individually owned land.

of the Land Bureau, Shen Shike, once told a provincial councilor: "Although the total amount of communal land is large, once divided, it becomes overly fragmented".<sup>21</sup>

Taken together, these results suggest that the phase II public land redistribution freed farmers from their obligations to the Taiwan Sugar Company, allowing them to use the land more intensively and increasing rice yields. By contrast, the phase III land to the tiller reform did not substantively affect rice crop, and actually reduced median farm sizes, pushing labor off the farm. We turn to these non-agricultural outcomes next.

### 5.3 Non-agricultural Outcomes

Table 7 considers the effects of land reform on non-agricultural outcomes. We do not find statistically significant evidence that land reform in either phase II or III affected population growth. Nor do we find evidence that either phase of land reform had significant effects on educational attainment. In the period of 1951 to 1961, prior to the nine-year compulsory education reform in 1968, the share of the population with a primary school education or above increased by 12 percentage points. Our analysis does not support that land reform affected households' educational decisions, contrary to the prediction of Galor, Moav, and Vollrath (2009) that land reform is conducive for human capital investment.<sup>22</sup>

However, we do find significant effects of land reform on structural transformation that differ by phase. While phase II public land redistribution increased the share of the population engaged in the primary sector (agriculture and mining), the phase III land-to-the-tiller reform reduced it. For the phase II public land transfers, this movement back to the primary sector was entirely driven by large decreases in secondary sector (manufacturing) and, to a lesser extent, tertiary sector (services) employment. By contrast, the phase III land redistribution appears to have decreased primary sector employment, pushing workers into the secondary sector—though this coefficient is not statistically significant.

We can further explore these effects by dividing occupation share by gender and subsector.

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21. See the discussion in Hsiung (1952), the concluding remarks of Tang (1954), and *Special Edition: First Session of the Second Meeting, the Provisional Provincial Assembly of Taiwan Province* 臺灣省臨時省議會第一屆第二次大會專輯 <https://drtpa.th.gov.tw/index.php?act=Display/image/70064Q2GsIip#aeJ>

22. Mixed results have been shown in recent studies of land reform in various contexts. For instance, the Peruvian land reform led to a decrease in education attainment (Albertus, Espinoza, and Fort 2020), whereas Kim and Lee (2024) find that South Korea's land reform boosted the human capital accumulation.

Table 8 shows that phase II land reform increased primary sector employment mostly in farming and herding, while decreasing secondary sector employment mainly in manufacturing; these patterns are reversed for phase III land reform. Moreover, male and female workers sorted into different occupations in the distinct stages of land reform. For phase II, higher agricultural yields pulled both men and women out of manufacturing (women with a larger magnitude); by contrast, phase III pushed women into manufacturing, while producing no discernible effect for men. Table 9, which disaggregates by finer subsector, shows that much of the increase was driven by employment in textiles.

In the appendix, we consider further socio-economic outcomes. Table 9 shows changes in occupation share by finer sector classifications. Table 10 shows land reform's effect on the development of Farmers' Associations (FAs)—local organizations that implemented agricultural policy and provided farmers with access to credit, production inputs (especially chemical fertilizer), and technical knowledge.<sup>23</sup> We find limited evidence that land reform increased FAs' financial capital, but generally fail to find evidence that their membership or balance sheets were significantly affected by land reform.

**Mechanisms** We find that phase II of land reform, which increased yields, pulled labor from manufacturing into agriculture; conversely, phase III, which shrank median farm sizes, pushed labor away from agriculture into manufacturing. Phase II's effects are consistent with the prediction of a standard two-sector model where agents choose sectors based on relative real wages. All else equal, higher land productivity is consistent with higher relative real wages in the agricultural sector—by increasing yields, Taiwan's phase II reform created a regional specialization of treated townships towards agriculture.

Phase III, which had little effect on yields, requires some more explanation beyond the classical model. As discussed in the previous section, growing rice is labor-intensive, and (particularly in developing contexts in Asia) yields benefit from the labor of household members who are seen as more socio-economically marginal—women, children, and the elderly (Bray 1994). However, by breaking up Taiwan's already-small holdings, the land to the tiller shrank the operating sizes

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23. Several recent studies (Looney 2020; Strauss 2020; Luo 2024) revisit and shed light on the role of FAs in promoting a rural-biased policy environment prior to 1970s, and discuss the political power redistribution within the organization following land reform.

of farms below the level where they could realistically support all this additional labor. In this context, it is not surprising that phase III of land reform pushed labor—in particular, female labor—off the farm to seek work in other sectors of the economy.<sup>24</sup>

These results add a critical social dimension to our understanding of land reform. Factory labor has long been viewed as a critical factor in shaping Taiwanese women’s growing economic and social independence throughout the mid-20th century (Kung 1994), but a link with land reform has not been previously shown. In rural Taiwan, as in many patriarchal societies, men were seen as the primary earners in the household, while women were of secondary status, with few property rights of their own (Gallin 1989). In this context, it is not surprising that reductions in farm size led to women being pushed off the farm first—and hence that women’s sectoral choices were far more elastic than men’s to the real wage changes induced by land reform.

It is worth noting, however, that at the aggregate level Taiwan did not see extensive reallocation from agriculture to manufacturing during the 1950s. True, in the average township, the primary sector occupation share fell by 16.8 percentage points—but the average increase in the share of secondary sector employment was just 1.5 percentage points. The bulk of this labor movement was absorbed by the *services* sector: from 1951-61, the average township saw a 15.3 percentage point increase in the tertiary sector share. To the extent that we observe structural shifts from agriculture to manufacturing (or the reverse) induced by phase II or III of land reform, these estimates likely reflect large local average treatment effects in townships treated by land reform, and not drivers of aggregate structural transformation.

## 5.4 Robustness Checks

The main concern with our instrumental variables design is that township shares of Japanese-held land and land above the 3-hectare cutoff are correlated with other socio-economic factors that could have caused the observed socioeconomic effects. In the appendix, Table 13 considers the effects of both phases of land reform on key outcomes with varying sets of controls. We include controls for latitude and longitude, the pre-treatment township *level* characteristics shown in Table 4, and the pre-treatment *changes* also from Table 4. Cumulatively adding all these

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24. There may also have been labor effects along the *intensive* margin, where farmers dedicated more of their time off-farm, but we unfortunately cannot observe labor hours in our data.

controls in some cases widens the standard errors, but the main results remain qualitatively similar: phase II decreased tenancy, significantly increased rice output, and decreased secondary sector employment, while phase III decreased tenancy and median operating farm size, and had no effect on either rice output or the sectoral employment share.

Finally, the paper's results are also robust to alternative definitions of the main treatment variable. [Table 17](#) presents the main regression results using land reform transfers per capita (using townships' 1951 population), rather than as a share of land. The results are qualitatively similar, with both phases showing significant decreases in tenancy, but only phase II showing large increases in rice yields and decreases in the secondary sector employment share.

## 6 Conclusion: The Form of Land Reform Matters

By digitizing archival data and employing an instrumental variables design, this paper brings new causal evidence to the two redistributive phases of Taiwan's historic land reform. We find evidence that both supports and contradicts long-held views about this landmark policy in East Asian development. Both phases of reform were successful at reducing tenancy and increasing rates of land ownership, but while the public land transfers increased agricultural productivity in rice, the land-to-the-tiller reform had surprisingly little effect. We attribute this difference to public land redistribution's lifting of the crop choice constraint and encouraging double-cropping in rice, and to private land redistribution's shrinking of farm sizes, to the point that they were no longer economically viable. This, in turn, pushed labor—in particular, women's labor—off the farm, into non-agricultural sectors like manufacturing.

The longstanding academic consensus is that Taiwanese land reform—and, in particular, the land to the tiller redistribution—was a major boon to agricultural productivity and a central driver of Taiwan's growth miracle (Kuo 1983; Studwell 2014). Our results complicate these traditional favorable narratives: while phase II increased rice yields, it can only explain around a sixth of the roughly 40% increase in the 1950s—and the effect of the famous phase III land-to-the-tiller reform cannot be distinguished from 0. This suggests that other policy and technical changes, like growth in extension services and the introduction of new high-yield varieties, may have been more important at boosting Taiwanese agricultural productivity and kick-starting its

growth miracle. Our limited findings may also help reconcile the effects of Taiwan's reform with more recent, disappointing episodes of redistribution. Moreover, the differential results between phase II and III highlight that, far from a uniform policy, the *form* of land reform is central: policymakers should consider the source of the land being redistributed, the shape of the existing land distribution, and the potential interactions with the non-agricultural sector.

To close, it is worth noting that this paper has focused exclusively on the local economic effects of land reform—but land reform may also worked through other channels. At the macro level, higher yields may have helped create an exportable agricultural surplus in the 1950s, earning valuable foreign exchange to pay for capital goods. Regional specialization following land reform may have aided industrialization by complementing trade-opening policies in the 1960s. But the political-economic effects may have been the most crucial. By creating relatively egalitarian wealth distributions, Taiwan's land reform may have encouraged the adoption of pro-growth development policies, rather than growth-distorting rent-seeking (Rodrik [1995](#)). Most importantly of all, in the absence of land reform, the exiled Kuomintang regime may not have survived on Taiwan without the rural power base built by land reform (Albertus [2015](#))—leading, perhaps, to conquest by the Communists or an indigenous Taiwanese regime. On these striking counterfactuals we must remain silent.



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## Tables

**Table 1:** Summary Statistics

	N	Mean	SD
<i>Treatment variables</i>			
Phase II: Share of land transferred	259	0.08	0.10
Phase III: Share of land transferred	258	0.16	0.12
Phase II land transfers per capita	277	0.01	0.02
Phase III land transfers per capita	281	0.02	0.02
Share of Japanese-owned land (1941)	288	0.11	0.15
Japanese-owned land, p.c. (1941)	313	0.02	0.04
<i>Land Tenure</i>			
<i>Dependent variables</i>			
$\Delta$ Share of full landowners 1950-61	252	0.26	0.20
$\Delta$ Share of partial landowners 1950-61	252	-0.02	0.14
$\Delta$ Share of tenants 1950-61	252	-0.24	0.17
$\Delta$ Median farm size 1950-61	252	0.02	0.30
$\Delta$ Log-Pop change, 1951-66	305	0.41	0.16
$\Delta$ ln Rice output 1950-61	298	0.39	0.47
$\Delta$ ln Rice yield 1950-61	293	0.36	0.18
$\Delta$ ln Rice area 1950-61	293	0.04	0.43
$\Delta$ Share primary school or above, 1951-61	298	0.12	0.07
$\Delta$ Share middle school or above, 1951-61	298	0.03	0.02
$\Delta$ Share high school or above, 1951-61	298	0.01	0.01
$\Delta$ Share higher education, 1951-61	298	0.00	0.00
$\Delta$ Occupation share: primary sector, 1956-66	311	-0.17	0.09
$\Delta$ Occupation share: secondary sector, 1956-66	311	0.01	0.04
$\Delta$ Occupation share: tertiary sector, 1956-66	311	0.15	0.09
<i>Pre-reform variables</i>			
$\Delta$ Share of tenants, 1941-50	252	0.03	0.10
$\Delta$ Log population, 1942-50	300	-0.03	0.51
$\Delta$ Attainable rice yield, low-to-high inputs	308	4075.23	1509.72

**Table 2:** Balance table for phase II and III transfer shares

	N	PII Transfer share (SE)	N	PIII Transfer share (SE)
$\Delta$ share of tenants, 1941-50	248	0.13 (0.12)	248	0.05 (0.08)
$\Delta$ median hhld farm size, 1941-50	248	-0.07 (0.24)	248	-0.74** (0.27)
$\Delta$ Attainable rice yield, low-to-high inputs	255	939.50 (658.68)	255	602.86 (958.97)
$\Delta$ log rice yield, 1950-52	251	0.02 (0.10)	250	0.02 (0.07)
$\Delta$ log population, 1942-50	252	0.31 (0.20)	251	0.44** (0.15)
Mainlander share of pop., 1955	258	-0.01 (0.04)	257	0.06 (0.04)
Sugar cane yield (tons/Ha), 1951	161	5634.79 (19259.69)	161	-19835.71 (12253.73)
Total Manuf. firms, 1947	254	-4.40 (9.56)	254	18.09* (8.02)
Potential rice yields (FAO-GAEZ)	258	0.72 (0.58)	257	-1.17* (0.49)
Sugar mill in township = 1, 1947	258	0.00 (0.23)	257	-0.50*** (0.14)
Log distance to nearest rail station (km)	258	0.81 (1.02)	257	-2.12*** (0.59)
Log distance to nearest sugar rail station (km)	258	-3.36 (2.14)	257	3.71* (1.64)
Number of bank branches (<10km)	258	-2.96 (1.63)	257	5.81** (2.20)
Employment share in agriculture, 1951	236	0.39* (0.18)	235	-0.47*** (0.14)
Employment share in manufacturing, 1951	233	-0.02 (0.01)	233	0.02 (0.02)

This table shows the estimates of [Equation 3](#), with the independent variables being the phase II transfer share (column 1) and phase III transfer share (column 2) instead of the instruments. Standard errors are clustered to allow for spatial correlation using a Bartlett kernel with a 50 kilometer cutoff. \*  $\leq 0.05$ , \*\*  $\leq .01$ , \*\*\*  $\leq .001$ .

**Table 3:** First-stage regressions for phase II and III transfers, shares

	(1) Phase II	(2) Phase III
Share of Japanese-owned land (1941)	0.35*** (0.06)	
Relative share of landholdings: 3-5 Ha to 2-3 Ha		0.13*** (0.03)
Observations	255	248
$R^2$	0.363	0.240
F-stat	31.89	22.10

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

This table shows the estimates for [Equation 1](#), the first-stage relationship between the share of township land transferred by 1961 in phase II and III of land reform and the 1941 share of Japanese-owned land and the ratio of land in 3-5 hectare bins to land in 2-3 hectare bins, respectively.

**Table 4:** Balance table for phase II and III transfer instruments, shares

	Japanese land share		3-5 Ha share/ 2-3 Ha share	
	N	(SE)	N	(SE)
$\Delta$ share of tenants, 1941-50	251	0.12 (0.10)	251	-0.00 (0.03)
$\Delta$ median hhld farm size, 1941-50	251	0.04 (0.17)	251	-0.03 (0.09)
$\Delta$ Attainable rice yield, low-to-high inputs (FAO-GAEZ)	284	61.43 (523.75)	249	-92.33 (239.78)
$\Delta$ log rice yield, 1950-52	261	0.08 (0.06)	249	0.01 (0.02)
$\Delta$ log population, 1942-50	271	-0.07 (0.14)	243	0.09 (0.06)
Mainlander share of pop., 1955	282	0.04 (0.03)	251	0.01 (0.01)
Sugar cane yield (tons/Ha), 1951	174	422.19 (9100.65)	155	-2700.14 (4993.02)
Total Manuf. firms, 1947	281	12.38 (15.55)	248	8.08* (3.47)
Sugar mill in township = 1, 1947	287	0.20 (0.16)	251	0.12 (0.07)
Log distance to nearest rail station (km)	279	-0.34 (0.58)	251	-0.41 (0.21)
Log distance to nearest sugar rail station (km)	279	-1.45 (1.26)	251	0.35 (0.48)
Number of bank branches (<10km)	280	-1.98 (1.27)	251	0.66 (0.40)
Employment share in agriculture, 1951	254	0.19 (0.11)	227	-0.09 (0.05)
Employment share in manufacturing, 1951	254	0.01 (0.01)	227	0.01 (0.00)

This table shows the estimates of [Equation 3](#), where the outcomes are key pre-treatment socio-economic characteristics, and the independent variables are the Japanese land share instrument (column 1) and the 3 hectare cutoff instrument (column 2). Standard errors are clustered to allow for spatial correlation using a Bartlett kernel with a 50 kilometer cutoff. \*  $\leq 0.05$ , \*\*  $\leq .01$ , \*\*\*  $\leq .001$ .



**Table 5:** Land Tenure Effects of Land Reform

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ Share of tenants 1950-61	-0.55*** (0.09)	248 .	-1.19*** (0.21)	248 30.15	-1.02*** (0.08)	247 .	-1.56*** (0.32)	247 22.89
$\Delta$ Share of partial landowners 1950-61	0.08 (0.13)	248 .	0.26 (0.27)	248 30.15	0.25* (0.11)	247 .	0.08 (0.36)	247 22.89
$\Delta$ Share of full landowners 1950-61	0.47** (0.15)	248 .	0.93** (0.35)	248 30.15	0.77*** (0.13)	247 .	1.48*** (0.45)	247 22.89
$\Delta$ Median farm size 1950-61	0.04 (0.19)	248 .	-0.10 (0.42)	248 30.15	-0.04 (0.17)	247 .	-1.90* (0.93)	247 22.89

This table shows the effect of phase II and phase III of land reform on township-level land tenure outcomes. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from [Equation 2](#), with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 6:** Agricultural Effects of Land Reform

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta \ln$ Rice output 1950-61	0.71** (0.23)	251 .	1.64*** (0.46)	250 29.51	-0.15 (0.29)	247 .	-0.15 (0.63)	247 22.89
$\Delta \ln$ Rice output (1st crop), 1950-61	1.22** (0.43)	244 .	1.06 (0.85)	243 30.80	0.67 (0.51)	240 .	1.65 (0.93)	240 21.93
$\Delta \ln$ Rice output (2nd crop), 1950-61	0.37 (0.89)	244 .	1.39 (1.37)	243 30.80	-2.54* (1.04)	240 .	-0.75 (2.64)	240 21.93
$\Delta \ln$ Rice yield 1950-61	0.28 (0.16)	251 .	0.76** (0.24)	250 29.51	-0.25** (0.10)	247 .	-0.00 (0.37)	247 22.89
$\Delta \ln$ Rice yield (1st crop), 1950-61	0.32 (0.22)	244 .	1.14*** (0.29)	243 30.80	-0.42** (0.14)	240 .	0.61 (0.73)	240 21.93
$\Delta \ln$ Rice yield (2nd crop), 1950-61	0.15 (0.22)	251 .	0.29 (0.42)	250 29.51	-0.24 (0.14)	247 .	-0.23 (0.57)	247 22.89
$\Delta \ln$ Rice area 1950-61	0.42* (0.20)	251 .	0.88* (0.39)	250 29.51	0.10 (0.27)	247 .	-0.14 (0.55)	247 22.89
$\Delta \ln$ Rice area (1st crop), 1950-1961	0.98* (0.43)	245 .	0.16 (0.88)	244 31.58	1.03 (0.54)	241 .	1.12 (0.76)	241 21.68
$\Delta \ln$ Rice area (2nd crop), 1950-1961	0.62** (0.24)	251 .	1.10** (0.35)	250 29.51	0.00 (0.31)	247 .	-0.25 (0.68)	247 22.89
$\Delta \ln$ Sweet potato output 1950-61	0.80* (0.40)	203 .	0.39 (0.71)	202 26.02	-0.74 (0.41)	195 .	0.28 (0.70)	195 19.30
$\Delta \ln$ Sweet potato yield 1950-61	0.20 (0.28)	203 .	0.28 (0.46)	202 26.02	-0.37 (0.24)	195 .	0.04 (0.41)	195 19.30
$\Delta \ln$ Sweet potato area 1950-61	0.61* (0.27)	203 .	0.11 (0.60)	202 26.02	-0.37 (0.28)	195 .	0.25 (0.56)	195 19.30
$\Delta \ln$ Soybean output 1950-61	0.13 (0.96)	92 .	0.29 (1.77)	91 19.38	0.61 (1.02)	84 .	4.45 (4.98)	84 5.66
$\Delta \ln$ Soybean yield 1950-61	-0.09 (0.94)	91 .	0.56 (1.45)	90 19.50	0.37 (0.66)	83 .	4.47 (3.31)	83 7.33
$\Delta \ln$ Soybean area 1950-61	0.21 (0.58)	91 .	-0.34 (1.26)	90 19.50	0.33 (1.03)	83 .	-0.55 (3.64)	83 7.33

This table shows the effect of phase II and phase III of land reform on key township-level agricultural outcomes. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from Equation 2, with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 7:** Non-agricultural Effects of Land Reform

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ Log-Pop change, 1955-66	0.12 (0.09)	256 .	0.04 (0.11)	255 32.20	0.04 (0.08)	247 .	-0.12 (0.17)	247 22.89
$\Delta$ Occupation share: primary sector, 1956-66	0.16** (0.06)	255 .	0.15 (0.09)	254 32.05	-0.10 (0.07)	246 .	-0.20 (0.20)	246 23.29
$\Delta$ Occupation share: secondary sector, 1956-66	-0.07** (0.02)	255 .	-0.13** (0.05)	254 32.05	0.05* (0.02)	246 .	0.12 (0.07)	246 23.29
$\Delta$ Occupation share: tertiary sector, 1956-66	-0.08 (0.06)	255 .	-0.03 (0.10)	254 32.05	0.05 (0.07)	246 .	0.08 (0.22)	246 23.29
$\Delta$ Share primary school or above, 1951-61	0.04 (0.04)	252 .	0.00 (0.09)	251 31.19	-0.00 (0.04)	243 .	-0.20 (0.14)	243 23.47
$\Delta$ Share middle school or above, 1951-61	-0.01 (0.01)	252 .	-0.02 (0.03)	251 31.19	0.01 (0.01)	243 .	-0.01 (0.03)	243 23.47
$\Delta$ Share high school or above, 1951-61	-0.00 (0.01)	252 .	-0.02 (0.02)	251 31.19	0.00 (0.01)	243 .	-0.01 (0.01)	243 23.47
$\Delta$ Share higher education, 1951-61	-0.00 (0.00)	252 .	-0.01 (0.01)	251 31.19	0.00 (0.00)	243 .	-0.00 (0.00)	243 23.47

This table shows the effect of phase II and phase III of land reform on key township-level non-agricultural outcomes. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from Equation 2, with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

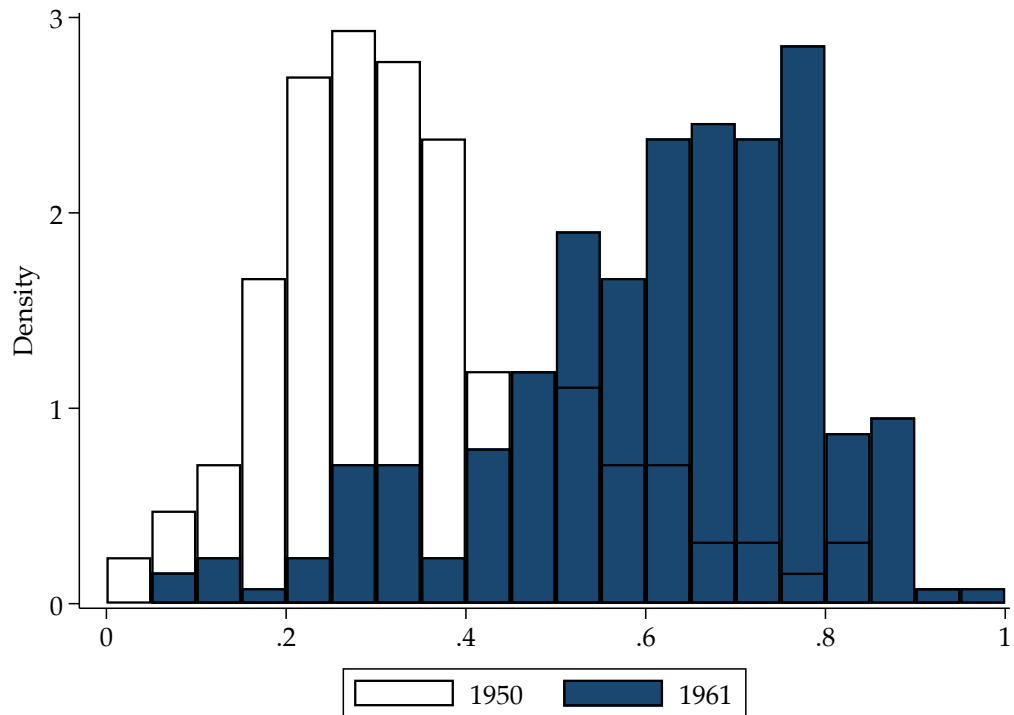
**Table 8:** Land reform and Changes in Occupation share, by Gender

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ Farming occupation share (male), 1956-66	0.19** (0.06)	255 .	0.03 (0.17)	254 32.05	-0.10 (0.07)	246 .	-0.16 (0.19)	246 23.29
$\Delta$ Farming occupation share (female), 1956-66	0.01 (0.22)	255 .	0.28 (0.22)	254 32.05	0.01 (0.18)	246 .	-0.14 (0.58)	246 23.29
$\Delta$ Manufacturing occupation share (male), 1956-66	-0.04* (0.02)	255 .	-0.08* (0.04)	254 32.05	0.03 (0.02)	246 .	0.04 (0.05)	246 23.29
$\Delta$ Manufacturing occupation share (female), 1956-66	-0.14** (0.05)	255 .	-0.21** (0.08)	254 32.05	0.05 (0.08)	246 .	0.43* (0.17)	246 23.29
$\Delta$ Service occupation share (male), 1956-66	-0.10 (0.06)	255 .	-0.03 (0.11)	254 32.05	0.10 (0.10)	246 .	0.10 (0.28)	246 23.29
$\Delta$ Service occupation share (female), 1956-66	0.10 (0.08)	255 .	0.10 (0.11)	254 32.05	-0.24*** (0.07)	246 .	-0.25 (0.16)	246 23.29

This table shows the effect of phase II and phase III of land reform on changes in sector of occupation by gender. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from Equation 2, with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

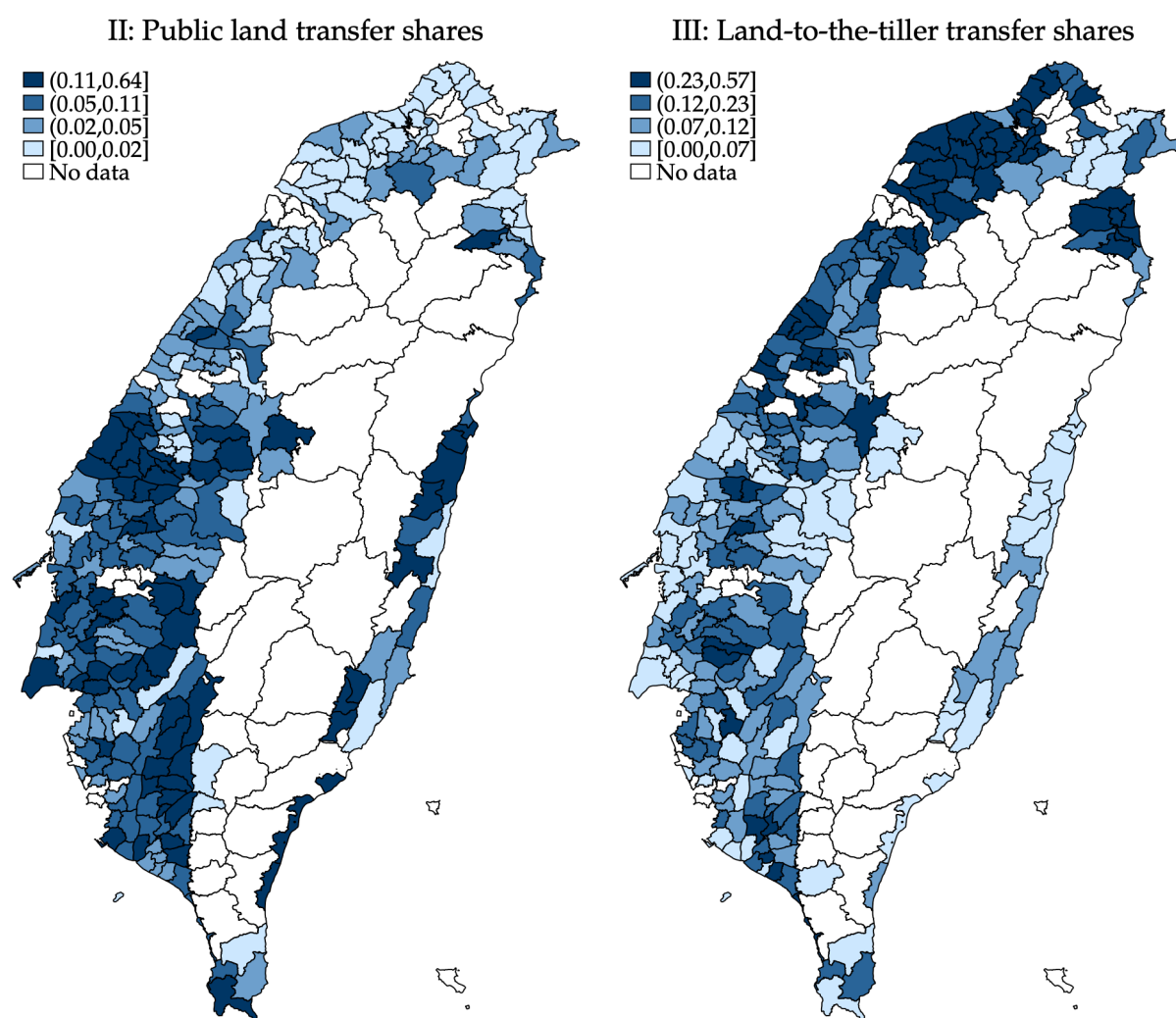
## Figures

**Figure 1:** Share of full-landowning households, 1950 and 1961



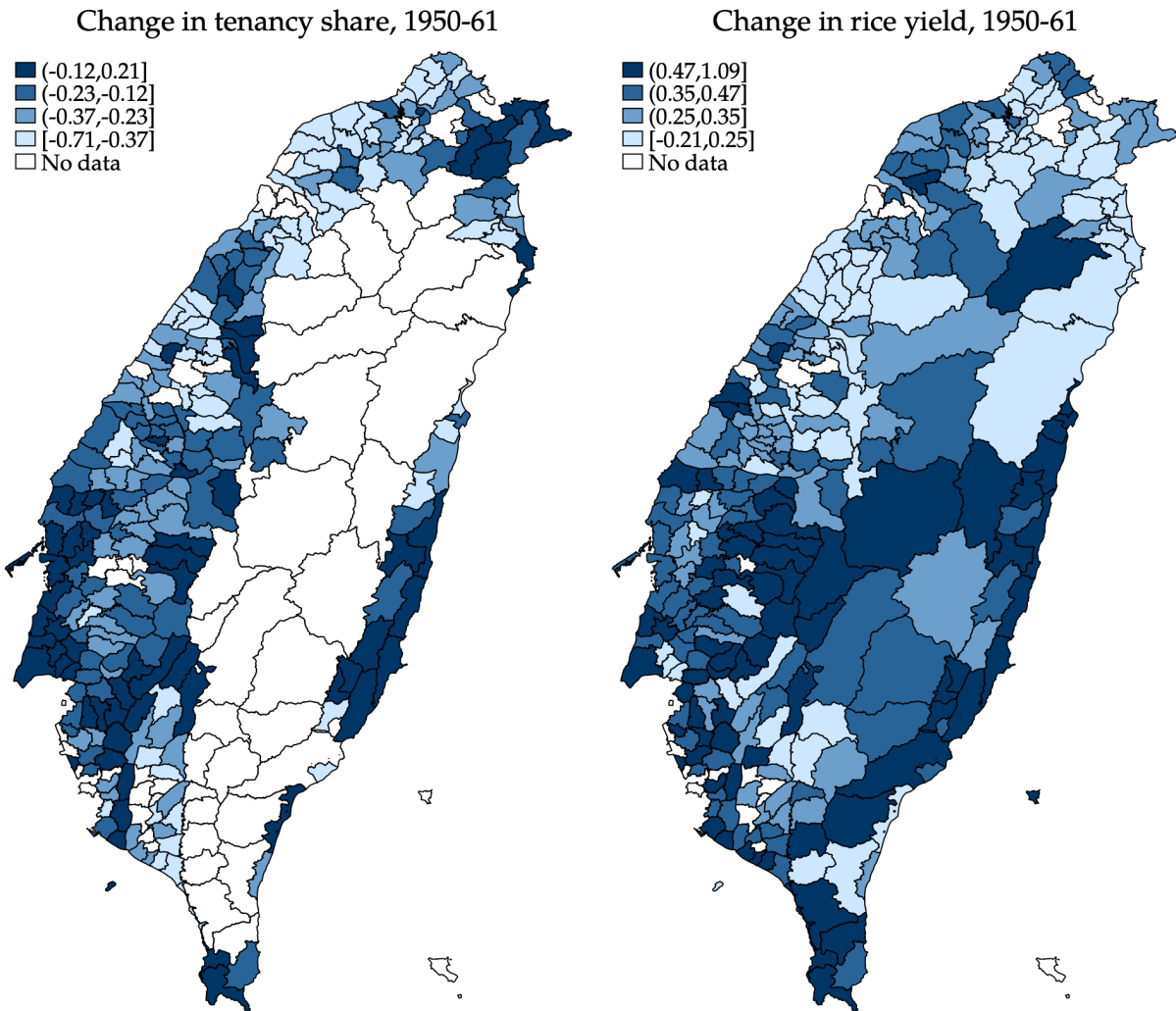
This figure shows the change in the distribution of the share of full-landowning households by township between 1950 (white) and 1961 (blue).

**Figure 2: The Geography of Phase II and III Land Reforms**



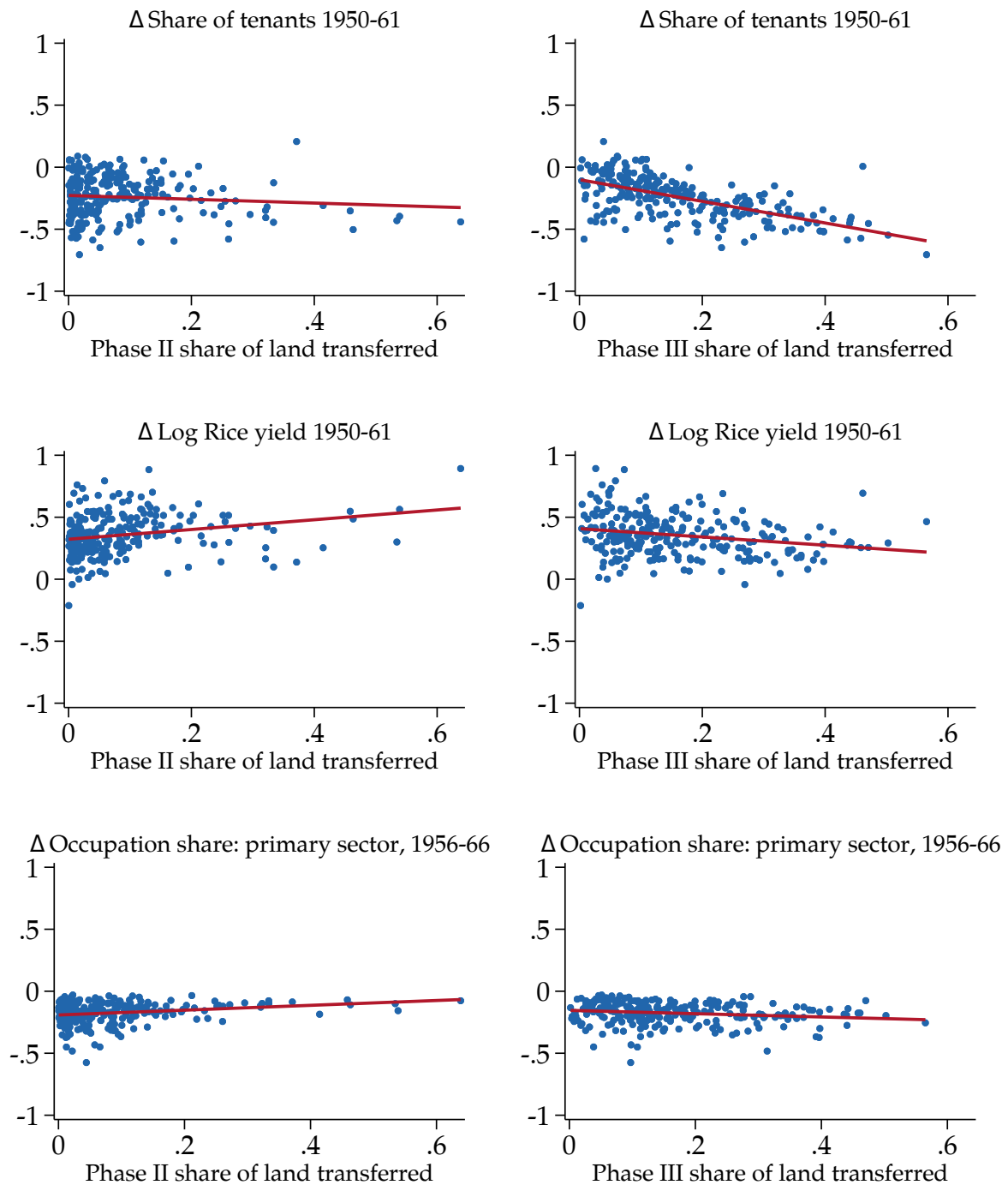
This figures shows the geographic distribution of the amount of land transferred by 1960 under the Phase II public land redistribution (left panel) and the Phase III land-to-the-tiller law (right panel), as a share of total arable land in that township.

**Figure 3:** Changes in Key Agricultural Variables, 1950-61



This figures shows maps of the 1950-61 change in the share of households that were tenants (left panel) and the 1950-61 change in the rice yield (right panel).

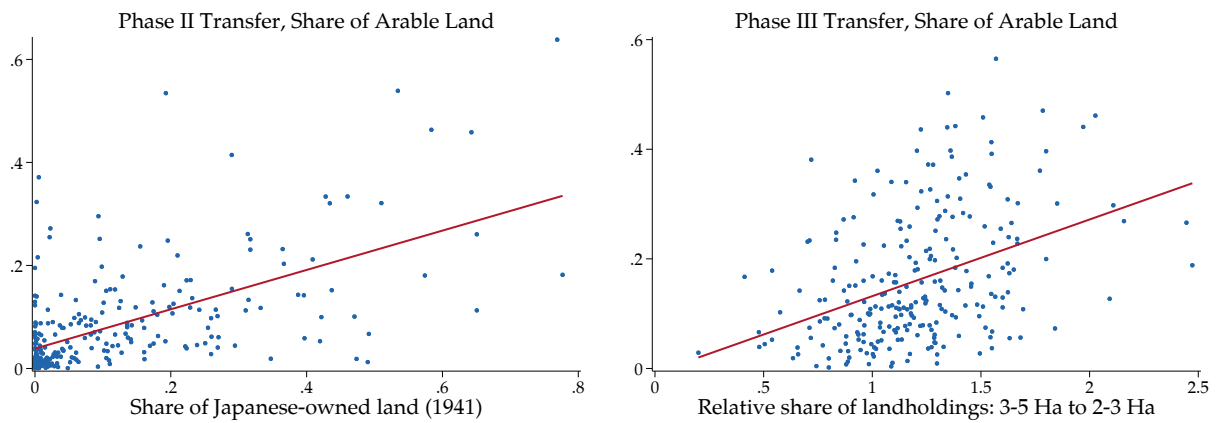
**Figure 4:** Scatters of Key Outcomes and Land Reform



This figures shows the raw correlation between three key outcomes—1950-61 change in tenancy share, 1950-61 log-change in rice yields, and 1950-61 change in primary-sector occupation share—and phase II land transfers (left column) or phase III land transfers (right column).



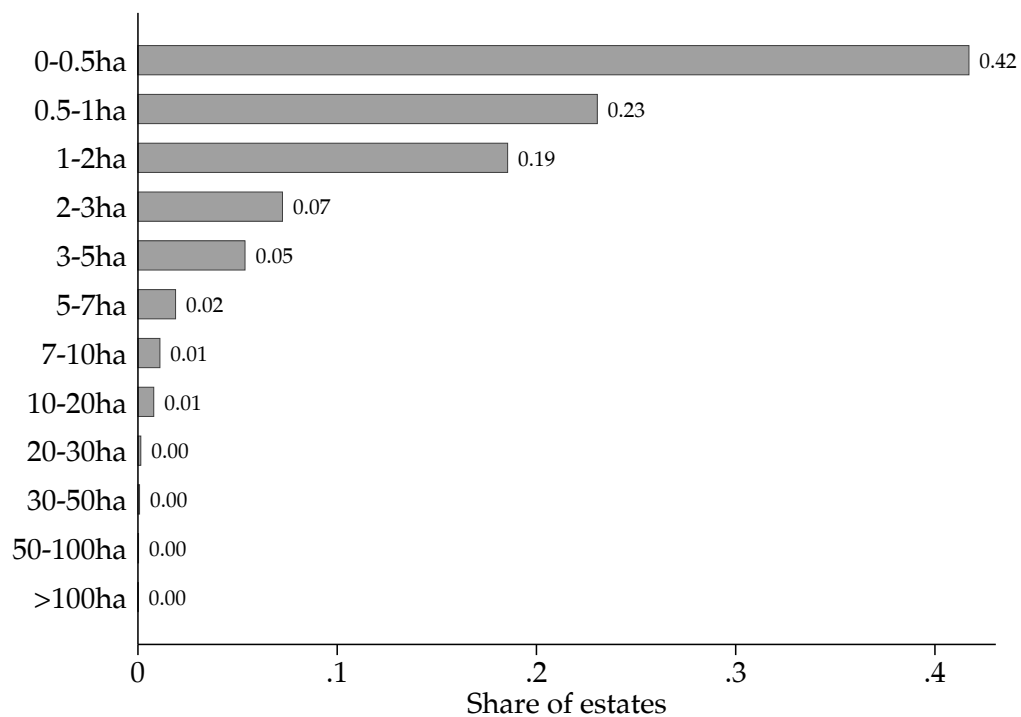
**Figure 5:** Scatters of First-stage Instrumental Variables Relationships



These figures show the raw first-stage correlation between land reform transfers as a share of arable land and the phase II instrument of the 1941 share of Japanese-owned land (left) and the phase III instrument of the ratio of land in 3-5 Ha to 2-3 Ha bins (right).

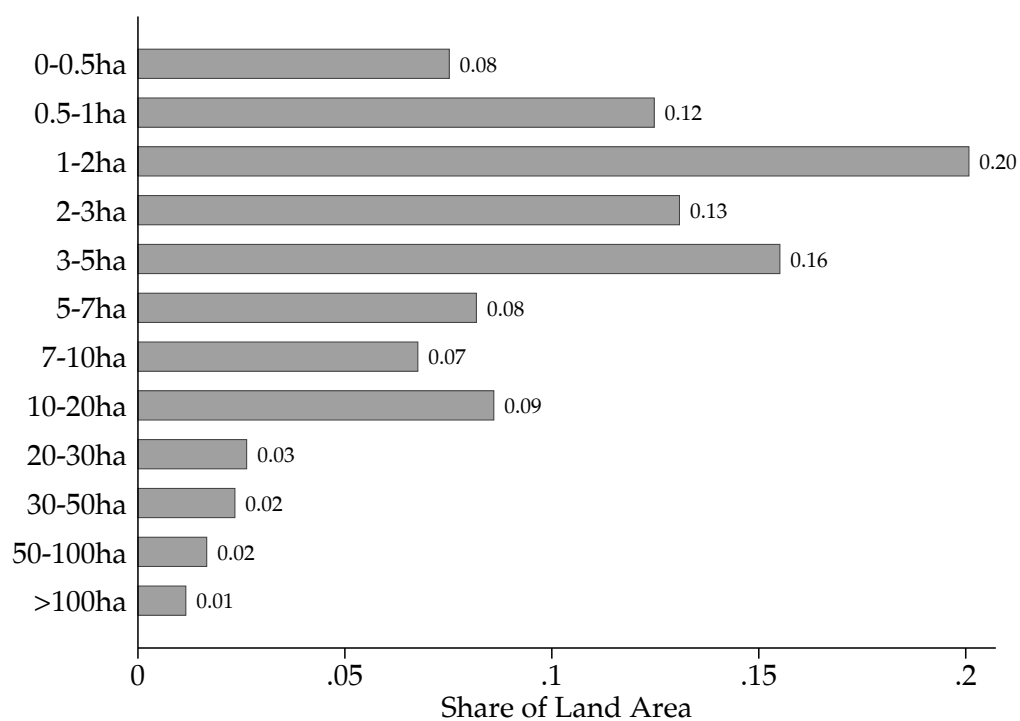
## Appendix

**Figure 6:** Private land holding size distribution, 1950



This figure shows the distribution of private landholdings by size in Taiwan, from the Joint Committee on Rural Reconstruction's 1950 report.

**Figure 7: Private land holding distribution as a share of total area, 1950**



This figure shows the distribution of private landholdings by size in Taiwan as a share of total land area, from the Joint Committee on Rural Reconstruction's 1950 report. Sizes of holdings are imputed using the midpoint of each bin (i.e., 0.25ha for the 0-0.5ha bin, 0.75ha for the 0.5-1ha bin, etc., with 150ha assumed for the last >100ha bucket).

**Table 9:** Land reform and changes in occupation share, detailed

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ Mining share 1956-66	-0.02 (0.02)	255 .	-0.02 (0.02)	254 32.05	-0.01 (0.01)	246 .	-0.04 (0.04)	246 23.29
$\Delta$ Food processing share, 1956-66	0.00 (0.01)	255 .	-0.02 (0.02)	254 32.05	0.01*** (0.00)	246 .	0.00 (0.01)	246 23.29
$\Delta$ Textile share, 1956-66	-0.01* (0.01)	255 .	-0.01 (0.01)	254 32.05	-0.00 (0.02)	246 .	0.04* (0.02)	246 23.29
$\Delta$ Construction share, 1956-66	-0.00 (0.01)	255 .	0.00 (0.01)	254 32.05	-0.00 (0.01)	246 .	0.01 (0.01)	246 23.29
$\Delta$ Utility share, 1956-66	-0.00 (0.00)	255 .	-0.01 (0.00)	254 32.05	0.00 (0.00)	246 .	0.01 (0.01)	246 23.29
$\Delta$ Commerce share, 1956-66	0.01* (0.01)	255 .	-0.01 (0.01)	254 32.05	-0.02* (0.01)	246 .	-0.02 (0.03)	246 23.29
$\Delta$ Communication share, 1956-66	0.00 (0.00)	255 .	-0.01 (0.01)	254 32.05	-0.00 (0.00)	246 .	-0.01 (0.01)	246 23.29

This table extends the result of [Table 8](#) by more detailed sub-industries. \*  $\leq 0.05$ , \*\*  $\leq .01$ , \*\*\*  $\leq .001$ .

**Table 10:** Land reform and the Farmers' Associations

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ FA members, 1956-66	0.31 (0.19)	251 .	0.34 (0.25)	251 30.29	-0.09 (0.11)	243 .	-0.27 (0.46)	243 21.75
$\Delta$ FA capital, 1956-66	0.65 (0.34)	250 .	1.50* (0.65)	250 30.17	-0.28 (0.22)	242 .	1.20 (2.13)	242 21.80
$\Delta$ FA fixed assets, 1956-66	0.08 (0.36)	251 .	1.77 (1.08)	251 30.29	-0.46 (0.28)	243 .	0.29 (1.08)	243 21.75
$\Delta$ FA deposits, 1956-66	1.22 (0.69)	242 .	0.11 (1.26)	242 32.72	0.63 (0.43)	234 .	0.95 (1.25)	234 23.20
$\Delta$ FA loans, 1956-66	0.78 (0.88)	235 .	-0.55 (1.09)	235 31.99	1.11 (0.68)	227 .	1.01 (1.61)	227 19.39
$\Delta$ FA fertilizer income, 1964-69	0.55 (0.40)	248 .	0.51 (0.70)	248 29.91	-0.36 (0.37)	240 .	-0.81 (0.84)	240 21.00

This table shows the effect of phase II and phase III of land reform on key farmers' association outcomes. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from [Equation 2](#), with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 11:** Main regression results, using bin min and max

	Phase III Min		Phase III Max	
	IV (SE)	N (F)	IV (SE)	N (F)
Δ Share of full landowners 1950-61	-4.02 (2.82)	248 2.00	1.27*** (0.36)	248 20.05
Δ Share of partial landowners 1950-61	-0.18 (1.09)	248 2.00	0.06 (0.33)	248 20.05
Δ Share of tenants 1950-61	4.19 (3.26)	248 2.00	-1.33*** (0.31)	248 20.05
Δ Median farm size 1950-61	5.73 (4.04)	248 2.00	-1.81* (0.72)	248 20.05
Δ ln Rice output 1950-61	0.73 (1.59)	248 2.00	-0.23 (0.53)	248 20.05
Δ ln Rice yield 1950-61	0.30 (0.96)	248 2.00	-0.09 (0.32)	248 20.05
Δ Log-Pop change, 1955-66	0.20 (0.56)	248 2.00	-0.06 (0.18)	248 20.05
Δ Occupation share: primary sector, 1956-66	0.55 (0.62)	247 2.05	-0.18 (0.17)	247 20.07
Δ Occupation share: secondary sector, 1956-66	-0.26 (0.21)	247 2.05	0.08 (0.06)	247 20.07
Δ Occupation share: tertiary sector, 1956-66	-0.29 (0.63)	247 2.05	0.09 (0.19)	247 20.07
Δ Share primary school or above, 1951-61	0.63 (0.59)	244 1.96	-0.20 (0.13)	244 20.00
Δ Share middle school or above, 1951-61	-0.05 (0.10)	244 1.96	0.02 (0.03)	244 20.00
Δ Share high school or above, 1951-61	-0.01 (0.05)	244 1.96	0.00 (0.01)	244 20.00
Δ Share higher education, 1951-61	-0.01 (0.01)	244 1.96	0.00 (0.00)	244 20.00

This table shows the main regression results for phase III of land reform, using cutoff instruments defined using the minimum (left) and maximum (right) acreage of each bin. \*  $\leq 0.05$ , \*\*  $\leq .01$ , \*\*\*  $\leq .001$ .

**Table 12:** Land reform's Long-Run Effects

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
$\Delta$ Log-Pop change, 1951-70	0.20 (0.19)	234 .	-0.01 (0.28)	233 29.57	0.36 (0.23)	225 .	-0.32 (0.39)	225 19.78
$\Delta$ Log-Pop change, 1951-80	0.15 (0.23)	233 .	-0.04 (0.45)	232 31.76	1.04 (0.53)	224 .	-0.07 (0.98)	224 19.71
$\Delta$ Migrant share, 1955-70	-0.01 (0.02)	236 .	-0.08* (0.03)	235 30.43	0.04 (0.03)	227 .	-0.03 (0.05)	227 19.43
$\Delta$ Migrant share, 1955-80	-0.06 (0.03)	235 .	-0.09 (0.07)	234 32.87	0.21 (0.11)	226 .	0.13 (0.16)	226 19.37
$\Delta$ Manuf. firms, 1954-76	0.26 (0.58)	252 .	0.38 (0.76)	252 32.04	1.41** (0.52)	245 .	-1.49 (1.71)	245 21.14
$\Delta$ Manuf. labor, 1954-76	-1.18* (0.56)	251 .	-1.62 (1.07)	251 30.86	3.10** (1.10)	244 .	1.75 (3.05)	244 20.06
$\Delta$ Manuf. capital, 1954-76	-0.50 (0.66)	252 .	0.61 (1.14)	252 32.04	0.80 (0.81)	245 .	-1.40 (2.67)	245 21.14
Night Light Intensity, 1992	-6.79 (12.48)	256 .	-35.14 (26.06)	255 32.20	44.28** (17.14)	247 .	32.65 (41.66)	247 22.89
Night Light Intensity, 2013	3.03 (12.57)	256 .	-24.42 (25.45)	255 32.20	41.19** (14.42)	247 .	20.27 (42.40)	247 22.89

This table shows the effect of phase II and phase III of land reform on long-run population and industrialization outcomes. Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from Equation 2, with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 13: Core Regression Results, Varying Controls**

	Phase II						Phase III					
	IV (SE)	N	IV (SE)	N	IV (SE)	N	IV (SE)	N	IV (SE)	N	IV (SE)	N
Δ Share of full landowners 1950-61	1.19*** (0.34)	248 25.75	1.12** (0.36)	238 21.07	1.60** (0.58)	151 11.60	1.35** (0.42)	247 17.84	1.56*** (0.46)	238 19.54	1.77** (0.64)	151 11.59
Δ Share of partial landowners 1950-61	0.15 (0.23)	248 25.75	0.11 (0.25)	238 21.07	0.05 (0.39)	151 11.60	0.31 (0.29)	247 17.84	0.20 (0.24)	238 19.54	0.50 (0.35)	151 11.59
Δ Share of tenants 1950-61	-1.33*** (0.23)	248 25.75	-1.24*** (0.23)	238 21.07	-1.65*** (0.41)	151 11.60	-1.65*** (0.43)	247 17.84	-1.76*** (0.43)	238 19.54	-2.27*** (0.53)	151 11.59
Δ Median farm size 1950-61	0.10 (0.39)	248 25.75	-0.33 (0.54)	238 21.07	-0.13 (0.80)	151 11.60	-2.84* (1.42)	247 17.84	-2.53* (1.22)	238 19.54	-2.40 (1.50)	151 11.59
Δ ln Rice output 1950-61	1.50** (0.58)	250 25.34	1.22* (0.54)	238 21.07	1.38 (0.93)	151 11.60	0.28 (0.84)	247 17.84	-0.03 (0.81)	238 19.54	-0.74 (0.92)	151 11.59
Δ ln Rice yield 1950-61	0.55* (0.26)	250 25.34	0.37 (0.27)	238 21.07	0.19 (0.36)	151 11.60	0.46 (0.45)	247 17.84	0.40 (0.46)	238 19.54	0.33 (0.62)	151 11.59
Δ Log-Pop change, 1955-66	-0.08 (0.14)	255 27.09	-0.18 (0.13)	238 21.07	-0.58* (0.26)	151 11.60	0.06 (0.19)	247 17.84	-0.04 (0.19)	238 19.54	-0.45 (0.26)	151 11.59
Δ Occupation share: primary sector, 1956-66	0.15 (0.11)	254 27.04	0.18 (0.12)	237 21.03	0.14 (0.16)	150 11.56	-0.23 (0.24)	246 18.38	-0.18 (0.25)	237 20.41	0.03 (0.37)	150 11.31
Δ Occupation share: secondary sector, 1956-66	-0.11* (0.05)	254 27.04	-0.12* (0.05)	237 21.03	-0.13* (0.06)	150 11.56	0.09 (0.08)	246 18.38	0.11 (0.09)	237 20.41	-0.04 (0.08)	150 11.31
Δ Occupation share: tertiary sector, 1956-66	-0.04 (0.09)	254 27.04	-0.06 (0.10)	237 21.03	-0.01 (0.15)	150 11.56	0.15 (0.25)	246 18.38	0.07 (0.25)	237 20.41	0.01 (0.38)	150 11.31
Δ Share primary school or above, 1951-61	-0.02 (0.09)	251 26.30	0.04 (0.09)	237 21.03	0.05 (0.12)	151 11.60	-0.24 (0.19)	243 18.30	-0.24 (0.19)	237 19.88	-0.35 (0.23)	151 11.59
Δ Share middle school or above, 1951-61	-0.01 (0.02)	251 26.30	-0.01 (0.03)	237 21.03	-0.04 (0.04)	151 11.60	-0.02 (0.04)	243 18.30	-0.04 (0.05)	237 19.88	0.04 (0.05)	151 11.59
Δ Share high school or above, 1951-61	-0.01 (0.01)	251 26.30	-0.01 (0.01)	237 21.03	-0.02 (0.02)	151 11.60	-0.01 (0.02)	243 18.30	-0.02 (0.02)	237 19.88	0.02 (0.02)	151 11.59
Δ Share higher education, 1951-61	-0.01 (0.01)	251 26.30	-0.00 (0.01)	237 21.03	-0.01 (0.01)	151 11.60	-0.01 (0.01)	243 18.30	-0.01 (0.01)	237 19.88	0.02* (0.01)	151 11.59
Lat/Lon	X		X		X		X		X		X	
Pre-reform changes			X		X				X		X	
Pre-reform levels					X						X	

This table shows the regression results for our core set of outcome variables, including latitude and longitude, the pre-reform change variables from [Table 4](#), and the pre-reform level variables from [Table 4](#).



**Table 14:** Balance table for phase II and III transfers, per capita

	Japanese land pc		3-5 Ha share/2-3 Ha share	
	N	(SE)	N	(SE)
Δ share of tenants, 1941-50	248	0.33 (0.32)	251	-0.00 (0.03)
Δ median hhld farm size, 1941-50	248	-0.33 (0.65)	251	-0.03 (0.09)
Δ Attainable rice yield, low-to-high inputs	302	4927.06* (1940.14)	249	-92.33 (239.78)
Δ log rice yield, 1950-52	285	0.04 (0.28)	249	0.01 (0.02)
Δ log population, 1942-50	299	1.88* (0.74)	243	0.09 (0.06)
Mainlander share of pop., 1955	307	0.07 (0.10)	251	0.01 (0.01)
Sugar cane yield (tons/Ha), 1951	175	17147.93 (33108.09)	155	-2700.14 (4993.02)
Total Manuf. firms, 1947	286	-143.70** (55.37)	248	8.08* (3.47)
Potential rice yields (FAO-GAEZ)	362	3.72* (1.54)	251	-0.09 (0.14)
Sugar mill in township = 1, 1947	312	0.26 (0.49)	251	0.12 (0.07)
Log distance to nearest rail station (km)	301	-3.07 (2.10)	251	-0.41 (0.21)
Log distance to nearest sugar rail station (km)	301	-3.65 (3.75)	251	0.35 (0.48)
Number of bank branches (<10km)	302	-4.50 (3.53)	251	0.66 (0.40)
Employment share in agriculture, 1951	276	0.75 (0.44)	227	-0.09 (0.05)
Employment share in manufacturing, 1951	264	-0.02 (0.04)	227	0.01 (0.00)

This table shows the estimates of [Equation 3](#), with the independent variables being Japanese land per capita (column 1) and the 3 hectare cutoff instrument (column 2). Standard errors are clustered to allow for spatial correlation using a Bartlett kernel with a 50 kilometer cutoff. \*  $\leq 0.05$ , \*\*  $\leq .01$ , \*\*\*  $\leq .001$ .

**Table 15:** First-stage regressions for phase II transfers, per-capita

	(1) No Controls	(2) Lat/Lon Poly.	(3) Baseline
Phase III land transfers per capita (Land to the Tiller)	-0.02 (0.03)	0.01 (0.04)	-0.02 (0.04)
Japanese-owned land, p.c. (1941)	0.37*** (0.07)	0.35*** (0.07)	0.37*** (0.07)
Mainlander share of pop., 1955			-0.05** (0.02)
Observations	316	316	266
$R^2$	0.545	0.551	0.556
F-stat	27.17	23.28	26.16

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ 

This table shows the estimates for Equation 1, the first-stage relationship between the per capita of township land transferred by 1961 in phase II of land reform and the 1941 per capita of Japanese-owned land and the ratio of land in 3-5 hectare bins to land in 2-3 hectare bins, respectively.

**Table 16:** First-stage regressions for phase III transfers, per-capita

	(1) No Controls	(2) Lat/Lon Poly.	(3) Baseline
Phase II land transfers per capita (public land)	-0.10 (0.05)	-0.04 (0.04)	-0.11* (0.05)
Relative share of landholdings: 3-5 Ha to 2-3 Ha	0.03*** (0.01)	0.02*** (0.00)	0.03*** (0.00)
Share of land outside of 2-5 Ha holdings	-0.05 (0.03)	-0.04 (0.03)	-0.05 (0.03)
Total factories, 1947			-0.00** (0.00)
Observations	246	246	245
$R^2$	0.253	0.308	0.276
F-stat	25.56	38.23	32.33

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ 

This table shows the estimates for Equation 1, the first-stage relationship between the per capita of township land transferred by 1961 in phase II of land reform and the 1941 per capita of Japanese-owned land and the ratio of land in 3-5 hectare bins to land in 2-3 hectare bins, respectively.

**Table 17:** Main results for phase II and III transfers, per capita

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
Δ Share of full landowners 1950-61	1.12 (0.69)	246 .	1.57 (1.07)	243 24.79	4.62*** (0.67)	245 .	6.61*** (1.74)	245 30.96
Δ Share of partial landowners 1950-61	0.65 (0.52)	246 .	0.51 (0.83)	243 24.79	0.86 (0.64)	245 .	0.41 (1.64)	245 30.96
Δ Share of tenants 1950-61	-1.77*** (0.46)	246 .	-2.07*** (0.58)	243 24.79	-5.48*** (0.47)	245 .	-7.02*** (1.22)	245 30.96
Δ Median farm size 1950-61	0.67 (0.87)	246 .	-0.22 (1.13)	243 24.79	-0.74 (1.34)	245 .	-8.25** (3.14)	245 30.96
Δ ln Rice output 1950-61	3.00** (0.97)	258 .	5.21** (1.71)	254 24.94	0.00 (1.26)	245 .	-1.24 (2.77)	245 30.96
Δ ln Rice yield 1950-61	2.10** (0.68)	258 .	3.19*** (0.84)	254 24.94	-0.31 (0.54)	245 .	-0.15 (1.62)	245 30.96
Δ Log-Pop change, 1955-66	0.78* (0.32)	271 .	0.68 (0.35)	266 25.31	0.01 (0.38)	245 .	-0.60 (0.83)	245 30.96
Δ Occupation share: primary sector, 1956-66	0.51* (0.23)	269 .	0.39 (0.27)	264 25.22	-1.29*** (0.25)	244 .	-1.10 (0.86)	244 31.20
Δ Occupation share: secondary sector, 1956-66	-0.30** (0.11)	269 .	-0.36* (0.16)	264 25.22	0.31* (0.13)	244 .	0.57 (0.31)	244 31.20
Δ Occupation share: tertiary sector, 1956-66	-0.21 (0.20)	269 .	-0.03 (0.30)	264 25.22	0.97** (0.31)	244 .	0.52 (0.96)	244 31.20
Δ Share primary school or above, 1951-61	0.02 (0.22)	270 .	-0.07 (0.26)	265 25.22	0.07 (0.21)	244 .	-0.91 (0.70)	244 31.33
Δ Share middle school or above, 1951-61	-0.05 (0.05)	270 .	-0.09 (0.08)	265 25.22	0.00 (0.07)	244 .	-0.02 (0.15)	244 31.33
Δ Share high school or above, 1951-61	-0.01 (0.02)	270 .	-0.03 (0.04)	265 25.22	-0.03 (0.03)	244 .	-0.03 (0.07)	244 31.33
Δ Share higher education, 1951-61	-0.01 (0.01)	270 .	-0.02 (0.01)	265 25.22	-0.00 (0.01)	244 .	-0.01 (0.02)	244 31.33

This table shows the effect of phase II and phase III of land reform on key township-level agricultural and socio-economic outcomes, and the . Each group of columns first reports the simple OLS coefficient estimate (with controls for phase III transfers and mainlander population share in 1955 for phase II, and controls for phase II transfers, land area outside the 2-5 hectare bin, and total firms in 1947 for phase III) and the instrumental variable estimate of  $\gamma_1$  from Equation 2, with the standard error in parentheses. We also report the  $N$  of each regression and, for the IV, the first-stage F-statistic. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .