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

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Abstract

We study Taiwan's landmark 1950s land reform, long seen as central to its growth miracle. Phase II of reform—which redistributed formerly Japanese public lands—reduced tenancy, boosted rice yields, and increased the share of labor in agriculture. By contrast, phase III—which reduced tenancy by breaking up larger estates—did not increase agricultural productivity and pushed labor (in particular, female labor) out of agriculture into manufacturing. Phase II likely increased yields by lifting crop choice constraints, while phase III may have created farms too small to be economically viable. However, phase II can still explain at most one-sixth of observed 1950s rice yield growth. These results challenge the longstanding view that land reform was a major factor behind Taiwan's economic takeoff, and highlight the varying effects of different forms of land redistribution.

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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 output. Second, in 1951, public lands formerly held by Japanese colonists (particularly sugar companies) were redistributed to tenants. Third, starting in 1953, larger landholdings were broken up and given to tenants—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 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 theorized importance of the 1950s reforms to Taiwan's economic miracle, 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.

In stark contrast to the academic consensus, our main finding is that land reform's contribution to Taiwanese agricultural growth was limited at best. 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. However, while phase II significantly increased both rice output and yields, phase III surprisingly had no effect on either. We trace these differential effects to two factors: first, phase II's redistribution of sugar company land relaxed crop choice constraints, allowing farmers to plant a second rice crop; second, unlike phase II, phase III's land-to-the-tiller redistribution lowered median farm sizes, creating farms that were too small to be economically viable. However, even though phase II increased yields, it

can still only explain a sixth of their 1950-61 growth, suggesting policies other than land reform may have been more important.

Moving beyond agriculture, we find that phase II and III of reform also had dramatically different effects on structural change. In aggregate, the share of primary sector workers in Taiwan fell by 14 percentage points from 1950 to 1961—but phase II of redistribution grew the share of workers in the primary sector while *shrinking* the share in the secondary sector. In effect, then, by likely increasing agricultural productivity and real wages, phase II encouraged the retention of workers in agriculture. By contrast, phase III 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. The smaller farms created by phase III may have been too small to be economically viable, pushing workers (particularly those more socio-economically marginal) out of agriculture.

This paper's findings complicate conventional, favorable views of Taiwanese land reform, which have 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 phase II can explain only a small fraction of the growth in rice yields from 1950-61, while phase III 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 larger 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 (for instance, Foster and Rosenzweig (2017) finds that small farms can be efficient than larger ones, while Adamopoulos and Restuccia (2014) finds that reducing farm sizes reduces efficiency). 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. This perhaps helps reconcile Taiwan's historical experience with more recent, disappointing episodes of land reform.

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.[1] 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 eventually become one of the key suppliers to Japan's domestic market.[2] 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.[3] Any optimism about the

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.

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

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.[4] Rents for paddy land were around 50%, and those for dry land around 35% (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

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.

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.[5] However, there was still a widespread recognition that rent reduction alone was not enough to address the problems of Taiwan's rural inequality.

The second phase of land reform, passed in 1951, redistributed most public lands—around 20% of all arable land on Taiwan (C. Chen 1961). Most of these lands were confiscated from private Japanese colonists expelled from Taiwan—in particular, the four major Japanese sugar corporations, which the Nationalists consolidated into the single Taiwan Sugar Company (Williams 1980). 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

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

Taiwan Sugar Company.[6] Much of this sugar company land had already been leased to tenants in a 1947 law; 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).[7] Prices were set at 2.5 times the total annual yield of the cropland, 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 land bonds (claims on future agricultural output) or shares of state-owned industrial enterprises, both of which were undervalued and the latter soon procured by local elites (Liu 1992).[8] 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).[9] To prevent the re-consolidation of large holdings, recipients were banned from selling their land for 10 years, unless 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

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 concern is that the stock compensation may have encouraged smallholder landlords to enter industry, providing another channel for land reform's effects (Chu 2022). However, Hong (2021) shows that board membership of these public enterprises after 1954 was dominated by prewar local elites, not by landlords compensated for land redistribution.

9. 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).

1950 total arable land area, and the share of tenant households fell from 36.3% to 21.5%.[10] 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 government 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

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

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.[11] 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.[12] 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.[13]

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.[14] 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 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

11. We thank Kelly Olds of National Taiwan University for providing a comprehensive locality coding system that tracks the division changes from 1905 to 1966.
12. This data is publicly accessible at http://gissrv4.sinica.edu.tw/gis/twhgis/
13. We exclude townships with fewer than 1% quantile households (328 households), which excludes only one township.
14. 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.

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 occupied 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 the secondary sector (manufacturing, construction, and utilities).

The major institutional change during this period, of course, is that 8 percentage points of arable land were transferred in phase II of land reform, while 16 percentage points were transferred in phase III. The share of tenant farmer households simultaneously collapsed by 24 percentage points, while the share of full landowner households rose by 26 percentage points. Figure 4 presents scatter plots between key outcomes—tenancy, agricultural output, and the share of primary sector occupation—and the phase II and phase III transfer shares, suggesting an empirical link. The following sections will systematically explore the *causal* effect of land reform on 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.[15] 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 the effects of the two phases of Taiwanese land redistribution. For each phase of land reform

15. The appendix presents regression evidence for the effects of phase I of land reform, the 375 rent reduction. These results may only be interpreted as strictly correlational. Yeh (2012) shows that up to 1951 (prior to phase II), as the policy simply decreases the lump sum rent instead of the marginal rental rate, it had no effect on productivity and did not change tenants' entitlement to operation. While the policy was in effect during our study period, Table 4 suggests that tenancy changes were not significantly related to either later 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, Δy_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.[16] 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 contracted out to large sugar companies, 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

16. 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). The sugar companies then used a system of advances to ensure that farmers planted sugar (Williams 1980). Similarly, most rice was also grown on small family farms, where Japanese attempts at vertical integration were less successful (Grabowski 2002). These practices persisted with the handover of Taiwan to the Nationalists, and the consolidation of the Japanese sugar corporations into the Taiwan Sugar Company. 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.[17] In the appendix, Figure 6

17. Table 13 shows that our main regression results are robust to using the maximum of each bin instead. Using the minimum does not create enough variation, generating a weak first-stage.

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, 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:

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

where for township i, y_i is the pre-period outcome, $Z_{i,p}$ is the instrument in phase p, and θ_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.[18] 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.[19] Broadly speaking, then,

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

19. 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

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 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 tests, we add controls in addition to the land transfers in the other stage of reform. For phase II, we control for the phase III transfer share and the 1955 mainland population share; for phase III, we include the 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. We also present the OLS estimates with controls for comparison.

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.

1970 county guidebook and again observe no significant correlation of it with the Japanese land share in 1941.

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 primary 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). In the appendix, Table 12 shows similarly null results for the effects of land reform other specialty crops.

Mechanisms The estimated effects of phase II of land reform on rice yields suggest that 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. These effects are economically significant, though smaller than has been suggested previously for Taiwanese land reform (Kuo 1983). However, by contrast, the observed yield effects of phase III are minimal.

Why did the phase II public land redistribution significantly 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, where "a system of advances... effectively deprived the farmers of freedom of choice" (Williams 1980). 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.[20] However, we can observe a strong and significant increase in rice acreage in Table 6, largely driven by the second crop. Moreover, contemporary government reports strongly suggest that the phase II redistribution caused land to be reallocated away from sugar. In 1954, the 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:

20. Postwar sugar output data can be found in Taiwan Sugar Company's Yearbooks, but the observation unit is at the mills level, often covering more than one township.

> 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 public land, private lands redistributed under land-to-the-tiller did not benefit from freer 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: the land-to-the-tiller reform may have created holdings that were too small to fully support most households economically. The IV estimate in Table 5 implies that land-to-the-tiller 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. Applying 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, 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.[21] 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 quantitative results join a growing qualitative literature by Taiwanese scholars that is skeptical of longstanding Kuomintang claims of land-to-the-tiller's success. In particular, a large portion of redistributed land was jointly owned by multiple individuals (Tang 1954; Liu 1992)—breaking up these holdings may have fragmented land to an inefficiently small size,

21. 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.

resulting in farms of irregular shapes.[22] The Director 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".[23]

One remaining concern is that sugar remained an important part of Taiwanese agriculture—from 1950 to 1961, sugar sales accounted for 40-60% of overall exports (Williams 1980), and sugarcane yields increased from 6 tons/ha in 1953 to 9 tons/ha in 1960 (Wu 2023). However, township-level data on sugarcane cultivation does not exist to directly prove or disprove that land reform had an effect. (Sugar production was reported by catchment area around each mill, which do not map directly to the township-level land reform data.) Qualitative evidence, however, suggests that land reform's effect on sugar was limited. According to the survey in Hou (1988) quoted previously, most sugar cultivation took place on the remaining holdings of the Taiwan Sugar Company, which phase III left untouched. Moreover, 1960 yields were still lower than their Japanese-era peak ($\approx$ 10 tons/ha in 1932)—much of the growth could simply reflect post-war recovery.

One question remains—if land reform's contribution was limited, why did rice yields increase by 40% throughout the 1950s? Two likely explanations are increases in fertilizer use and the introduction of high-yield varieties. From 1950 to 1961, chemical fertilizer use rose from 0.235 tons per hectare to 0.437 tons (Chu and Lin 2018). This increase was funded in large part by the United States—roughly $188 million of American aid flowed into Taiwan for fertilizer procurement, channeled through the Joint Committee on Rural Reconstruction and other public entities.[24] The JCRR also significantly funded the development of agricultural extension services, bringing the widespread adoption of high-yield varieties like *Chianong No. 242*, which was introduced in 1956 and increased yields in field trials by 10-20% (Wang and Yang 1957).[25] The absence of large effects from land reform shifts the locus of explanation of Taiwan's agricultural miracle

22. Aside from corporate bodies and religious groups, joint ownership mostly stems from generations of inheritance or joint investments by 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.

23. 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

24. Source: *Overview of U.S. Aid Loans* 美援貸款概況 *Meiyuan Daikuan Gaikuang*, Council for International Economic Cooperation and Development, 1964.

25. Capital like tractors are less likely to have increased productivity, as machine imports from Japan only started in the 1960s (Lee 1980).

to these technical, rather than institutional, developments.

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 yields, 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. From 1951 to 1961, the share of the population with a primary school education or above increased by 12 percentage points. Our analysis does not support the claim that Taiwanese 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.[26]

However, we do find significant effects of land reform on structural transformation that differ by phase. While phase II public land redistribution increased the relative 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 relative increase in primary sector employment was entirely driven by large decreases in secondary sector (manufacturing) and, to a lesser extent, tertiary sector (services) employment. (It is worth emphasizing that this primary sector increase was *relative*, in an overall environment of structural change out of agriculture—while the share of workers in the primary sector fell by 14 percentage points on average, townships with more phase II land reform, on average, saw 1.28 percentage points ($8\% \times 0.16$) *less* of a fall in the primary sector share.) 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.

26. Recent studies of land reform have found mixed results in various contexts. For instance, (Albertus, Espinoza, and Fort 2020) find that Peru's land reform led to a decrease in educational attainment, while Kim and Lee (2024) find that South Korea's land reform boosted human capital accumulation. The main change to Taiwanese education was a 1968 reform that increased compulsory education from six to nine years.

We can further explore these effects by dividing occupation share by gender and subsector. 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 and long run effects. 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.[27] 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.

In Table 11 we further examine the longer run effect of land reform after the 1960s. Aside from that Phase II lowers the share of migrants until 1970, we do not observe that either stage contributed to population growth till 1980, industrialization till 1976, and night light intensity till 1992 and 2013.

Mechanisms We find that phase II of land reform, which increased yields, also increased the relative share of labor in 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 additional explanation beyond the classical

27. 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.

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 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.[28]

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

28. 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.

that could have caused the observed socioeconomic effects. In the appendix, Table 14 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 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 18 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 the public land redistribution's lifting of the crop choice constraint and encouraging of double-cropping in rice, and to the 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 technical changes, like the increased use of chemical fertilizers 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 the disappointing results of more recent episodes of land 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. At the same time as land reform, there were also policies that have imposed taxes on agriculture output—namely, rice procurement and the fertilizer barter program (Koo 1996)—attenuating any positive effects of land reform.

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 from phase II 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 also have aided industrialization by complementing trade liberalization in the 1960s. But the political-economic effects may have been the most crucial. By creating a relatively egalitarian distribution of wealth, Taiwan's land reform may have encouraged the adoption of pro-growth development policies, rather than growth-distorting rent-seeking (Rodrik 1995). Most importantly, 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 the emergence of an indigenous Taiwanese regime. On these striking counterfactuals we must remain silent.

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Tables

Table 1: Summary Statistics

	N	Mean	SD
Treatment variables			
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
Land Tenure			
Dependent variables			
Δ Share of full landowners 1950-61	252	0.26	0.20
Δ Share of partial landowners 1950-61	252	-0.02	0.14
Δ Share of tenants 1950-61	252	-0.24	0.17
Δ Median farm size 1950-61	252	0.02	0.30
Δ Log-Pop change, 1951-66	305	0.41	0.16
Δ ln Rice output 1950-61	298	0.39	0.47
Δ ln Rice yield 1950-61	293	0.36	0.18
Δ ln Rice area 1950-61	293	0.04	0.43
Δ Share primary school or above, 1951-61	298	0.12	0.07
Δ Share middle school or above, 1951-61	298	0.03	0.02
Δ Share high school or above, 1951-61	298	0.01	0.01
Δ Share higher education, 1951-61	298	0.00	0.00
Δ Occupation share: primary sector, 1956-66	311	-0.17	0.09
Δ Occupation share: secondary sector, 1956-66	311	0.01	0.04
Δ Occupation share: tertiary sector, 1956-66	311	0.15	0.09
Pre-reform variables			
Δ Share of tenants, 1941-50	252	0.03	0.10
Δ Log population, 1942-50	300	-0.03	0.51
Δ 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)
Δ share of tenants, 1941-50	248	0.13	248	0.05
		(0.12)		(0.08)
Δ median hhld farm size, 1941-50	248	-0.07	248	-0.74**
		(0.24)		(0.27)
Δ Attainable rice yield, low-to-high inputs	255	939.50	255	602.86
		(658.68)		(958.97)
Δ log rice yield, 1950-52	251	0.02	250	0.02
		(0.10)		(0.07)
Δ log population, 1942-50	252	0.31	251	0.44**
		(0.20)		(0.15)
Mainlander share of pop., 1955	258	-0.01	257	0.06
		(0.04)		(0.04)
Sugar cane yield (tons/Ha), 1951	161	5634.79	161	-19835.71
		(19259.69)		(12253.73)
Total Manuf. firms, 1947	254	-4.40	254	18.09*
		(9.56)		(8.02)
Potential rice yields (FAO-GAEZ)	258	0.72	257	-1.17*
		(0.58)		(0.49)
Sugar mill in township = 1, 1947	258	0.00	257	-0.50***
		(0.23)		(0.14)
Log distance to nearest rail station (km)	258	0.81	257	-2.12***
		(1.02)		(0.59)
Log distance to nearest sugar rail station (km)	258	-3.36	257	3.71*
		(2.14)		(1.64)
Number of bank branches (<10km)	258	-2.96	257	5.81**
		(1.63)		(2.20)
Employment share in agriculture, 1951	236	0.39*	235	-0.47***
		(0.18)		(0.14)
Employment share in manufacturing, 1951	233	-0.02	233	0.02
		(0.01)		(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

	N	Japanese land share (SE)	N	3-5 Ha share/ 2-3 Ha share (SE)
Δ share of tenants, 1941-50	251	0.12	251	-0.00
		(0.10)		(0.03)
Δ median hhld farm size, 1941-50	251	0.04	251	-0.03
		(0.17)		(0.09)
Δ Attainable rice yield, low-to-high inputs (FAO-GAEZ)	284	61.43	249	-92.33
		(523.75)		(239.78)
Δ log rice yield, 1950-52	261	0.08	249	0.01
		(0.06)		(0.02)
Δ log population, 1942-50	271	-0.07	243	0.09
		(0.14)		(0.06)
Mainlander share of pop., 1955	282	0.04	251	0.01
		(0.03)		(0.01)
Sugar cane yield (tons/Ha), 1951	174	422.19	155	-2700.14
		(9100.65)		(4993.02)
Total Manuf. firms, 1947	281	12.38	248	8.08*
		(15.55)		(3.47)
Sugar mill in township = 1, 1947	287	0.20	251	0.12
		(0.16)		(0.07)
Log distance to nearest rail station (km)	279	-0.34	251	-0.41
		(0.58)		(0.21)
Log distance to nearest sugar rail station (km)	279	-1.45	251	0.35
		(1.26)		(0.48)
Number of bank branches (<10km)	280	-1.98	251	0.66
		(1.27)		(0.40)
Employment share in agriculture, 1951	254	0.19	227	-0.09
		(0.11)		(0.05)
Employment share in manufacturing, 1951	254	0.01	227	0.01
		(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)
Δ Share of tenants 1950-61	-0.55***	248	-1.19***	248	-1.02***	247	-1.56***	247
	(0.09)	.	(0.21)	30.15	(0.08)	.	(0.32)	22.89
Δ Share of partial landowners	0.08	248	0.26	248	0.25*	247	0.08	247
1950-61	(0.13)	.	(0.27)	30.15	(0.11)	.	(0.36)	22.89
Δ Share of full landowners 1950-61	0.47**	248	0.93**	248	0.77***	247	1.48***	247
	(0.15)	.	(0.35)	30.15	(0.13)	.	(0.45)	22.89
Δ Median farm size 1950-61	0.04	248	-0.10	248	-0.04	247	-1.90*	247
	(0.19)	.	(0.42)	30.15	(0.17)	.	(0.93)	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 γ_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)
Δ ln Rice output 1950-61	0.71**	251	1.64***	250	-0.15	247	-0.15	247
	(0.23)	.	(0.46)	29.51	(0.29)	.	(0.63)	22.89
Δ ln Rice output (1st crop), 1950-61	1.22**	244	1.06	243	0.67	240	1.65	240
	(0.43)	.	(0.85)	30.80	(0.51)	.	(0.93)	21.93
Δ ln Rice output (2nd crop), 1950-61	0.37	244	1.39	243	-2.54*	240	-0.75	240
	(0.89)	.	(1.37)	30.80	(1.04)	.	(2.64)	21.93
Δ ln Rice yield 1950-61	0.28	251	0.76**	250	-0.25**	247	-0.00	247
	(0.16)	.	(0.24)	29.51	(0.10)	.	(0.37)	22.89
Δ ln Rice yield (1st crop), 1950-61	0.32	244	1.14***	243	-0.42**	240	0.61	240
	(0.22)	.	(0.29)	30.80	(0.14)	.	(0.73)	21.93
Δ ln Rice yield (2nd crop), 1950-61	0.15	251	0.29	250	-0.24	247	-0.23	247
	(0.22)	.	(0.42)	29.51	(0.14)	.	(0.57)	22.89
Δ ln Rice area 1950-61	0.42*	251	0.88*	250	0.10	247	-0.14	247
	(0.20)	.	(0.39)	29.51	(0.27)	.	(0.55)	22.89
Δ ln Rice area (1st crop), 1950-1961	0.98*	245	0.16	244	1.03	241	1.12	241
	(0.43)	.	(0.88)	31.58	(0.54)	.	(0.76)	21.68
Δ ln Rice area (2nd crop), 1950-1961	0.62**	251	1.10**	250	0.00	247	-0.25	247
	(0.24)	.	(0.35)	29.51	(0.31)	.	(0.68)	22.89
Δ ln Sweet potato output 1950-61	0.80*	203	0.39	202	-0.74	195	0.28	195
	(0.40)	.	(0.71)	26.02	(0.41)	.	(0.70)	19.30
Δ ln Sweet potato yield 1950-61	0.20	203	0.28	202	-0.37	195	0.04	195
	(0.28)	.	(0.46)	26.02	(0.24)	.	(0.41)	19.30
Δ ln Sweet potato area 1950-61	0.61*	203	0.11	202	-0.37	195	0.25	195
	(0.27)	.	(0.60)	26.02	(0.28)	.	(0.56)	19.30
Δ ln Soybean output 1950-61	0.13	92	0.29	91	0.61	84	4.45	84
	(0.96)	.	(1.77)	19.38	(1.02)	.	(4.98)	5.66
Δ ln Soybean yield 1950-61	-0.09	91	0.56	90	0.37	83	4.47	83
	(0.94)	.	(1.45)	19.50	(0.66)	.	(3.31)	7.33
Δ ln Soybean area 1950-61	0.21	91	-0.34	90	0.33	83	-0.55	83
	(0.58)	.	(1.26)	19.50	(1.03)	.	(3.64)	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 γ_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)
Δ Log-Pop change, 1955-66	0.12	256	0.04	255	0.04	247	-0.12	247
	(0.09)	.	(0.11)	32.20	(0.08)	.	(0.17)	22.89
Δ Occupation share: primary sector,	0.16**	255	0.15	254	-0.10	246	-0.20	246
1956-66	(0.06)	.	(0.09)	32.05	(0.07)	.	(0.20)	23.29
Δ Occupation share: secondary sector,	-0.07**	255	-0.13**	254	0.05*	246	0.12	246
1956-66	(0.02)	.	(0.05)	32.05	(0.02)	.	(0.07)	23.29
Δ Occupation share: tertiary sector,	-0.08	255	-0.03	254	0.05	246	0.08	246
1956-66	(0.06)	.	(0.10)	32.05	(0.07)	.	(0.22)	23.29
Δ Share primary school or above,	0.04	252	0.00	251	-0.00	243	-0.20	243
1951-61	(0.04)	.	(0.09)	31.19	(0.04)	.	(0.14)	23.47
Δ Share middle school or above,	-0.01	252	-0.02	251	0.01	243	-0.01	243
1951-61	(0.01)	.	(0.03)	31.19	(0.01)	.	(0.03)	23.47
Δ Share high school or above, 1951-61	-0.00	252	-0.02	251	0.00	243	-0.01	243
	(0.01)	.	(0.02)	31.19	(0.01)	.	(0.01)	23.47
Δ Share higher education, 1951-61	-0.00	252	-0.01	251	0.00	243	-0.00	243
	(0.00)	.	(0.01)	31.19	(0.00)	.	(0.00)	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 γ_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)
Δ Farming occupation share (male), 1956-66	0.19**	255	0.03	254	-0.10	246	-0.16	246
	(0.06)	.	(0.17)	32.05	(0.07)	.	(0.19)	23.29
Δ Farming occupation share (female), 1956-66	0.01	255	0.28	254	0.01	246	-0.14	246
	(0.22)	.	(0.22)	32.05	(0.18)	.	(0.58)	23.29
Δ Manufacturing occupation share (male), 1956-66	-0.04*	255	-0.08*	254	0.03	246	0.04	246
	(0.02)	.	(0.04)	32.05	(0.02)	.	(0.05)	23.29
Δ Manufacturing occupation share (female), 1956-66	-0.14**	255	-0.21**	254	0.05	246	0.43*	246
	(0.05)	.	(0.08)	32.05	(0.08)	.	(0.17)	23.29
Δ Service occupation share (male), 1956-66	-0.10	255	-0.03	254	0.10	246	0.10	246
	(0.06)	.	(0.11)	32.05	(0.10)	.	(0.28)	23.29
Δ Service occupation share (female), 1956-66	0.10	255	0.10	254	-0.24***	246	-0.25	246
	(0.08)	.	(0.11)	32.05	(0.07)	.	(0.16)	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 γ_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. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

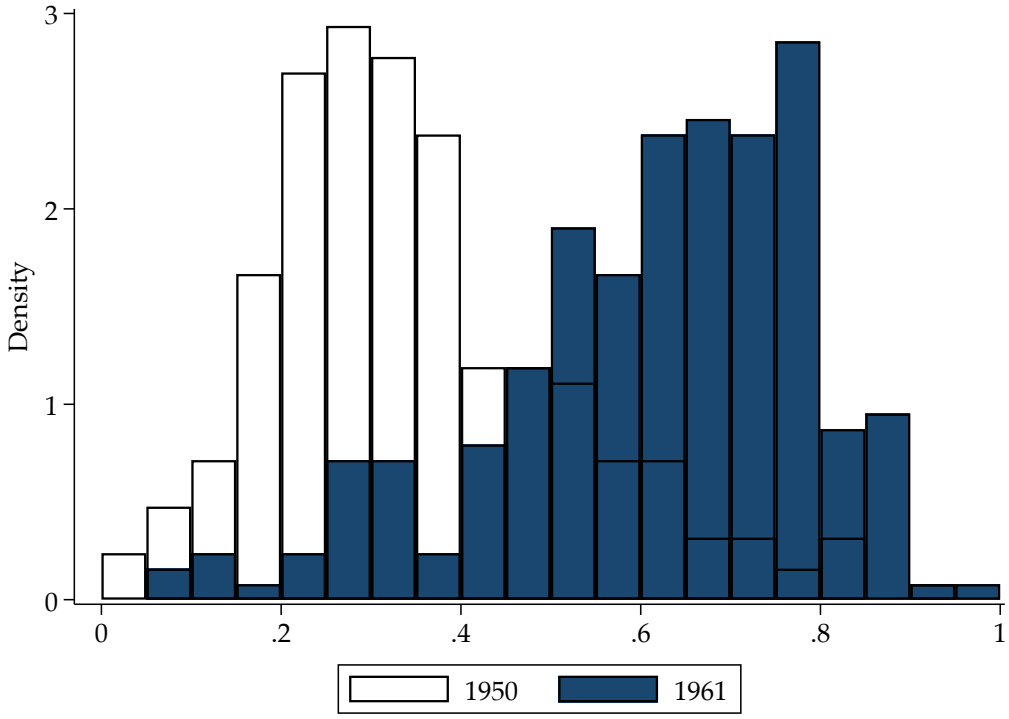
Table 9: Land reform and changes in occupation share, detailed

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

This table extends the result of Table 8 by more detailed sub-industries. $^{*} \leq 0.05$,$^{**} \leq .01$,$^{***} \leq .001$.

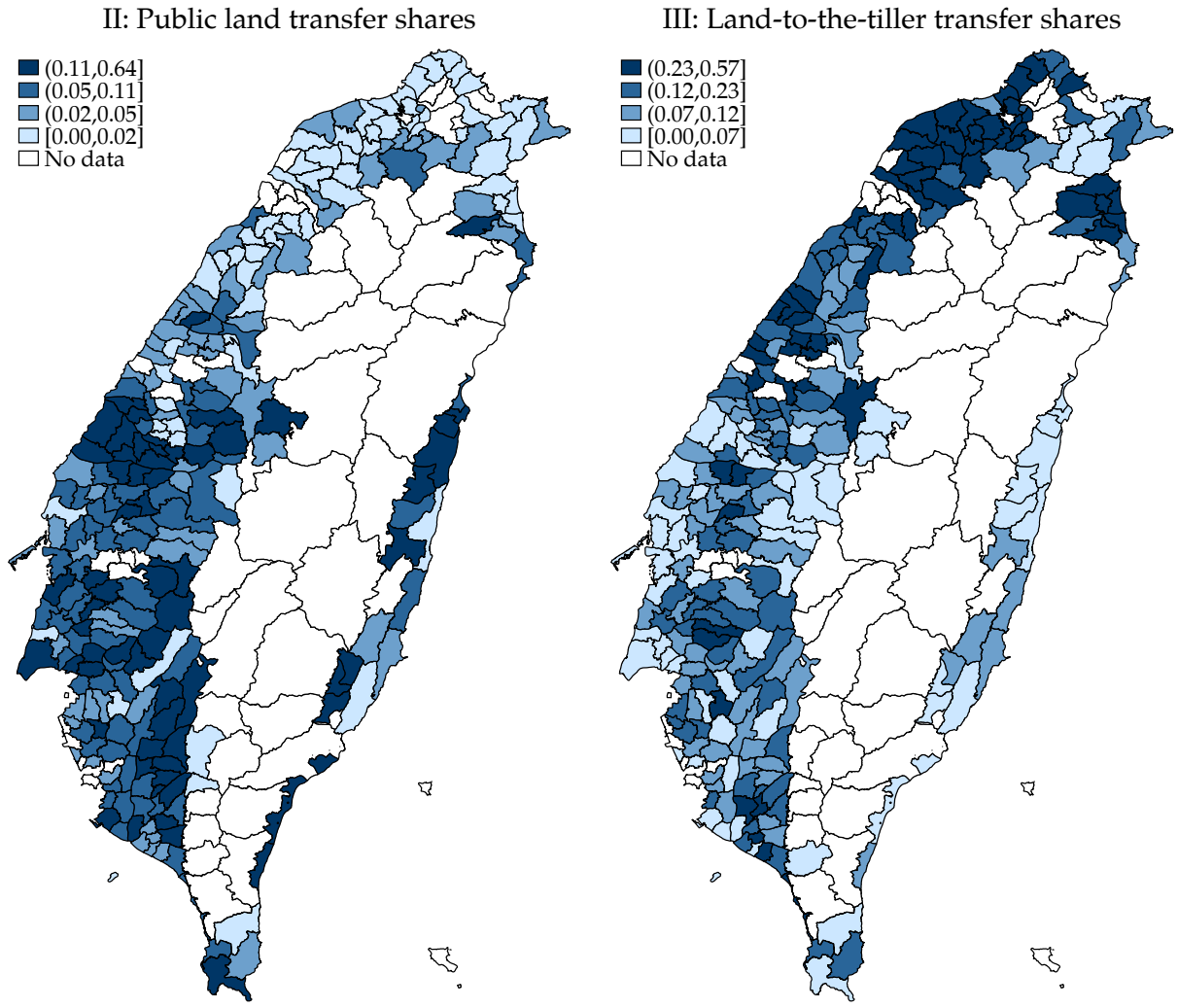
Figures

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



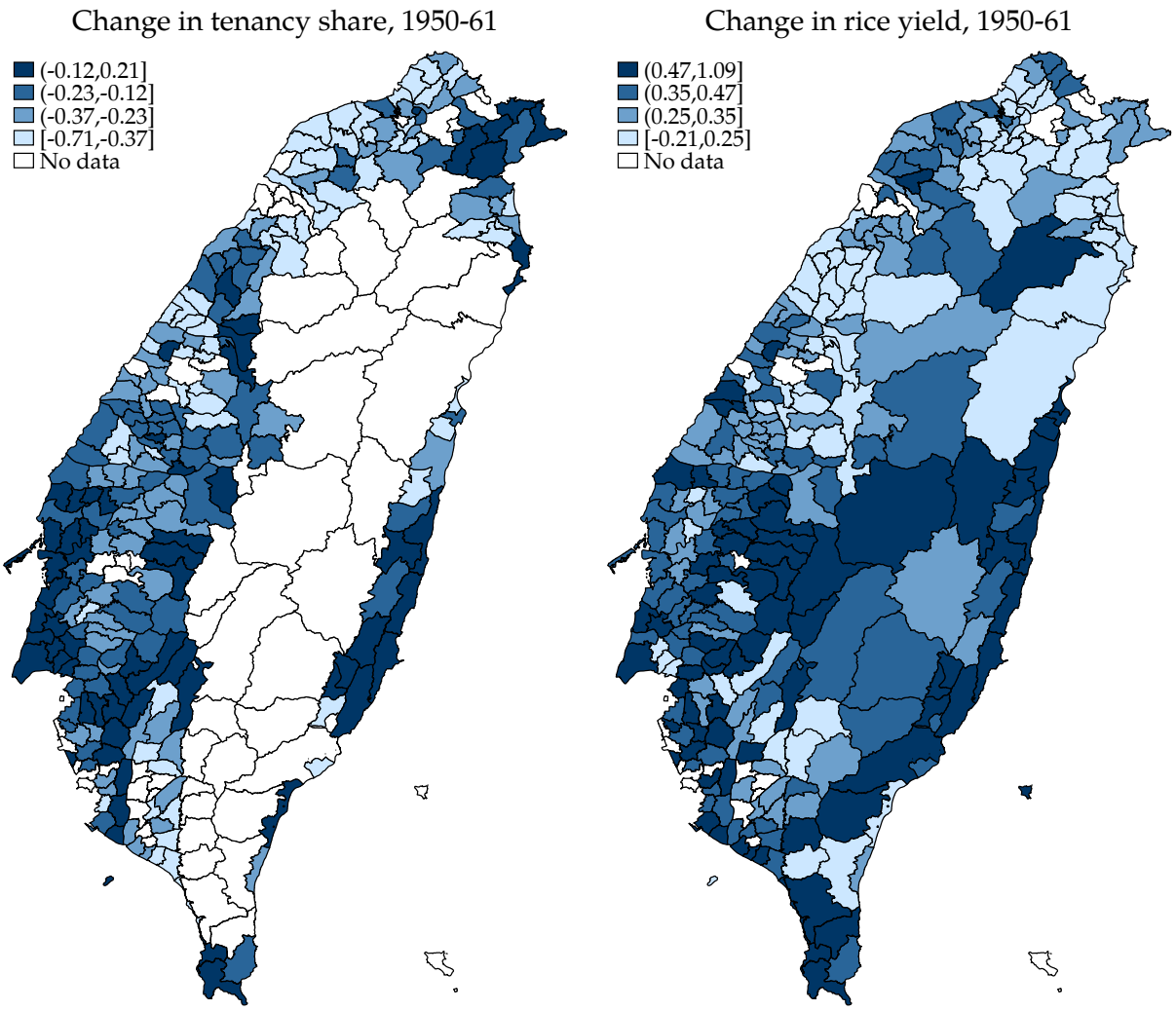
This figure shows the change in the distribution of the share of full-landowning households by township between 1950 (white) and 1961 (blue).

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



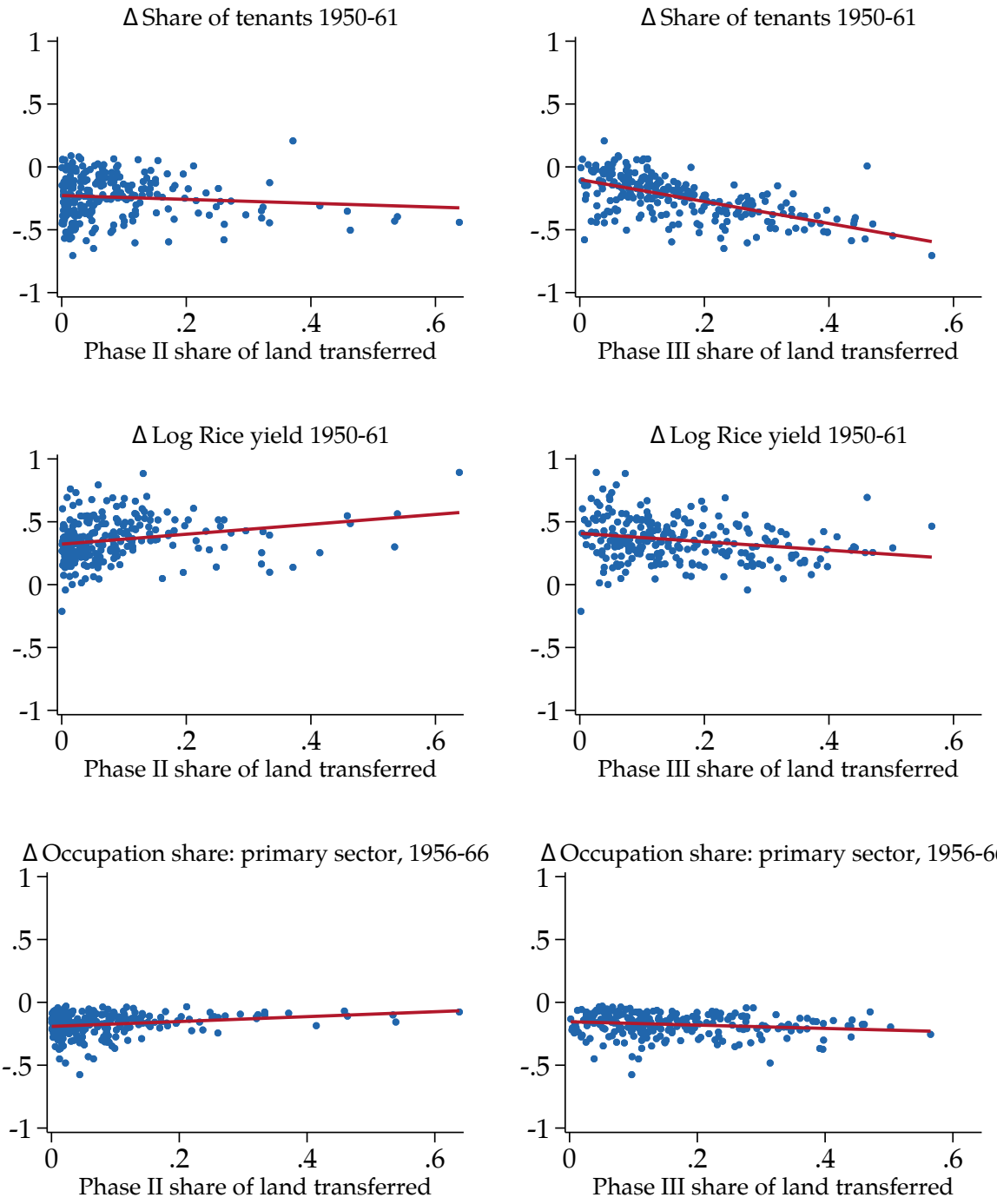
This figures shows the geographic distribution of the amount of land transferred by 1960 under the Phase II public land redistribution (left panel) and the Phase III land-to-the-tiller law (right panel), as a share of total arable land in that township.

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



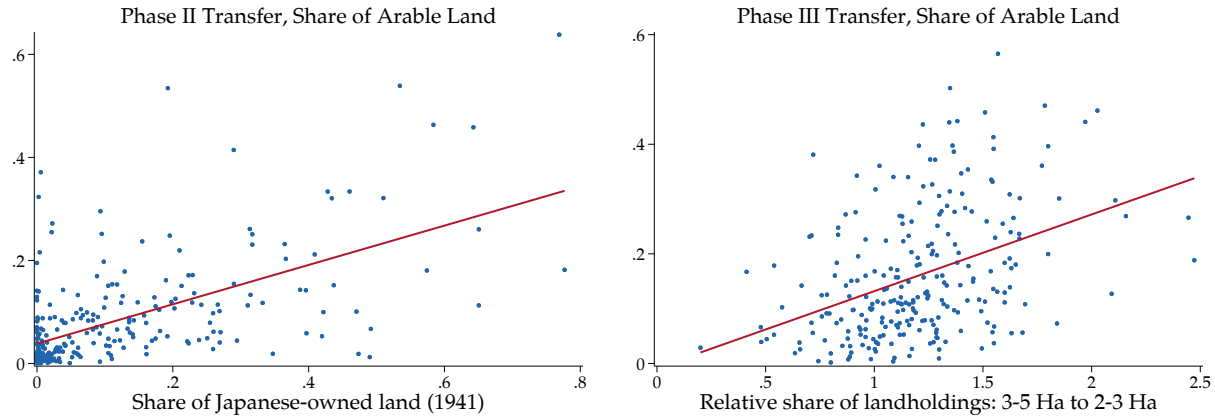
This figures shows maps of the 1950-61 change in the share of households that were tenants (left panel) and the 1950-61 change in the rice yield (right panel).

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).

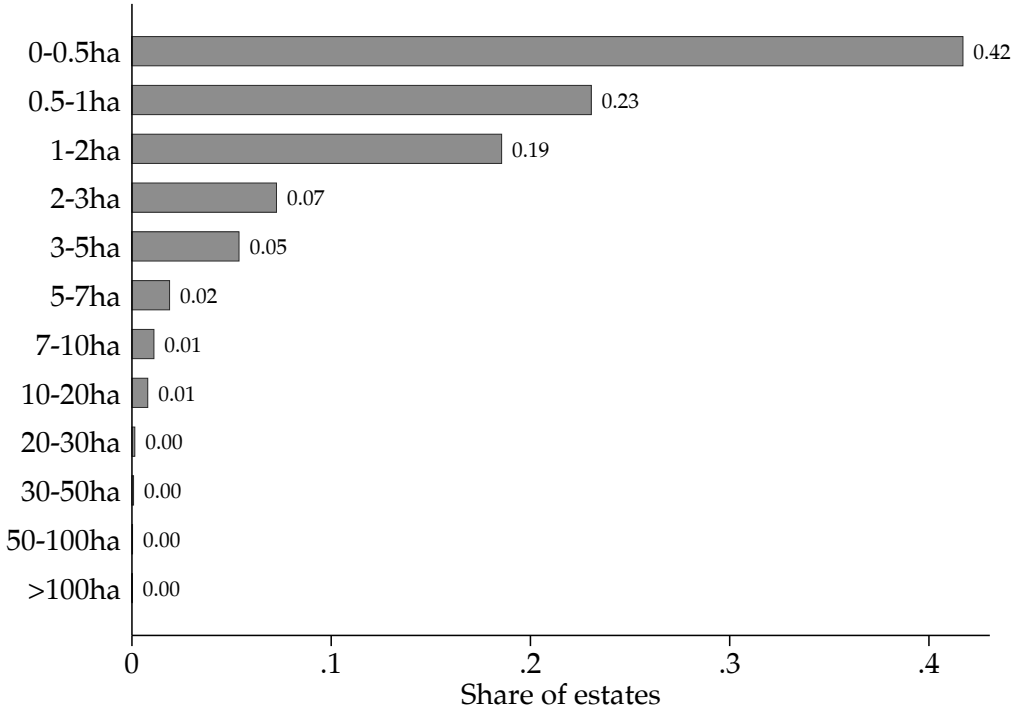
Figure 5: Scatters of First-stage Instrumental Variables Relationships



These figures show the raw first-stage correlation 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).

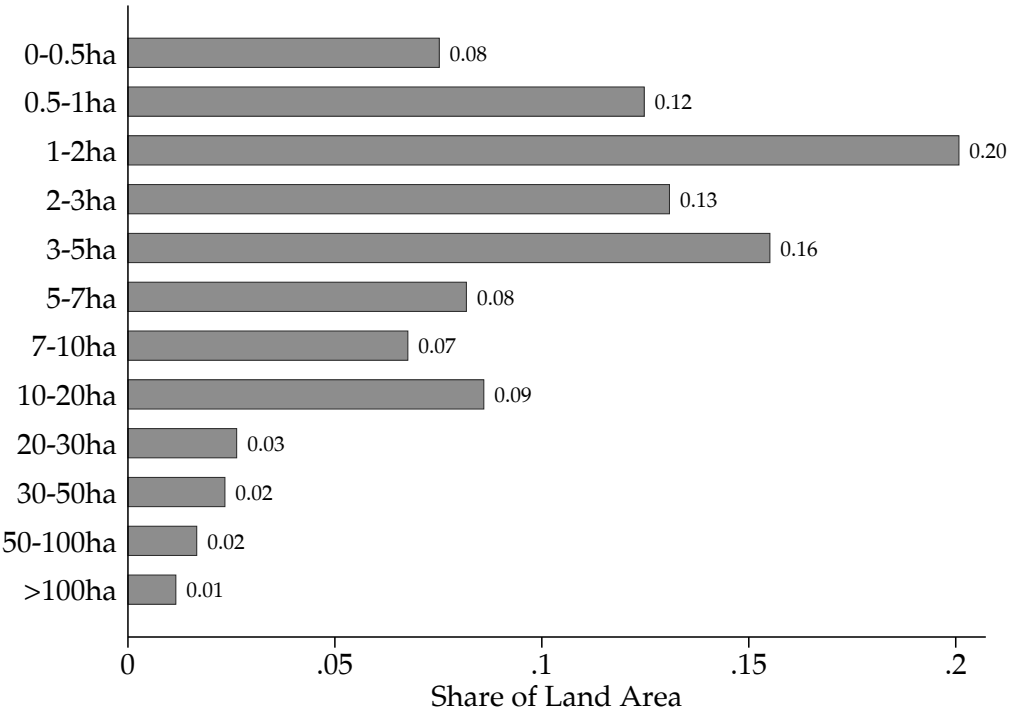
Appendix

Figure 6: Private land holding size distribution, 1950



This figures shows the 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 figures shows the 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 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)
Δ FA members, 1956-66	0.31	251	0.34	251	-0.09	243	-0.27	243
	(0.19)	.	(0.25)	30.29	(0.11)	.	(0.46)	21.75
Δ FA capital, 1956-66	0.65	250	1.50*	250	-0.28	242	1.20	242
	(0.34)	.	(0.65)	30.17	(0.22)	.	(2.13)	21.80
Δ FA fixed assets, 1956-66	0.08	251	1.77	251	-0.46	243	0.29	243
	(0.36)	.	(1.08)	30.29	(0.28)	.	(1.08)	21.75
Δ FA deposits, 1956-66	1.22	242	0.11	242	0.63	234	0.95	234
	(0.69)	.	(1.26)	32.72	(0.43)	.	(1.25)	23.20
Δ FA loans, 1956-66	0.78	235	-0.55	235	1.11	227	1.01	227
	(0.88)	.	(1.09)	31.99	(0.68)	.	(1.61)	19.39
Δ FA fertilizer income, 1964-69	0.55	248	0.51	248	-0.36	240	-0.81	240
	(0.40)	.	(0.70)	29.91	(0.37)	.	(0.84)	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 γ_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: Land reform's Long-Run Effects

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
Δ Log-Pop change, 1951-70	0.20	234	-0.01	233	0.36	225	-0.32	225
	(0.19)	.	(0.28)	29.57	(0.23)	.	(0.39)	19.78
Δ Log-Pop change, 1951-80	0.15	233	-0.04	232	1.04	224	-0.07	224
	(0.23)	.	(0.45)	31.76	(0.53)	.	(0.98)	19.71
Δ Migrant share, 1955-70	-0.01	236	-0.08*	235	0.04	227	-0.03	227
	(0.02)	.	(0.03)	30.43	(0.03)	.	(0.05)	19.43
Δ Migrant share, 1955-80	-0.06	235	-0.09	234	0.21	226	0.13	226
	(0.03)	.	(0.07)	32.87	(0.11)	.	(0.16)	19.37
Δ Manuf. firms, 1954-76	0.26	252	0.38	252	1.41**	245	-1.49	245
	(0.58)	.	(0.76)	32.04	(0.52)	.	(1.71)	21.14
Δ Manuf. labor, 1954-76	-1.18*	251	-1.62	251	3.10**	244	1.75	244
	(0.56)	.	(1.07)	30.86	(1.10)	.	(3.05)	20.06
Δ Manuf. capital, 1954-76	-0.50	252	0.61	252	0.80	245	-1.40	245
	(0.66)	.	(1.14)	32.04	(0.81)	.	(2.67)	21.14
Night Light Intensity, 1992	-6.79	256	-35.14	255	44.28**	247	32.65	247
	(12.48)	.	(26.06)	32.20	(17.14)	.	(41.66)	22.89
Night Light Intensity, 2013	3.03	256	-24.42	255	41.19**	247	20.27	247
	(12.57)	.	(25.45)	32.20	(14.42)	.	(42.40)	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 γ_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 12: Land reform and crop choices, detailed

	Phase II				Phase III			
	OLS (SE)	N	IV (SE)	N (F)	OLS (SE)	N	IV (SE)	N (F)
Δ ln Cabbage yield 1950-61	-0.13	85	-1.43*	85	0.98	78	2.18	78
	(0.50)	.	(0.73)	19.16	(0.59)	.	(4.17)	10.03
Δ Cabbage share 1950-61	0.01	78	0.01	78	-0.01	78	-0.20*	78
	(0.01)	.	(0.02)	15.80	(0.02)	.	(0.10)	10.03
Δ ln Sino Cabbage yield 1950-61	-0.52	88	-0.97	88	0.59	81	2.12	81
	(0.48)	.	(0.78)	14.94	(0.74)	.	(3.54)	9.59
Δ Sino Cabbage share 1950-61	-0.06*	82	-0.16	82	-0.04	82	0.62	82
	(0.03)	.	(0.09)	13.29	(0.03)	.	(0.49)	13.82
Δ ln Leaf mustard yield 1950-61	-0.79	82	-1.20	81	0.61	74	2.07	74
	(0.99)	.	(1.45)	18.15	(1.13)	.	(5.46)	7.64
Δ Leaf mustard share 1950-61	-0.01	86	-0.02	86	-0.01	86	0.00	86
	(0.00)	.	(0.01)	23.19	(0.01)	.	(0.01)	6.98
Δ ln Vegetable yield 1950-61	0.50	88	-1.22	88	-0.44	88	-0.72	88
	(0.35)	.	(1.44)	2.03	(0.32)	.	(0.49)	25.06
Δ Vegetable share 1950-61	0.06	88	-0.23	88	-0.02	88	-0.41*	88
	(0.07)	.	(0.29)	2.03	(0.07)	.	(0.17)	25.06
Δ ln Banana yield 1950-61	0.82	134	1.65	133	0.49	126	-0.62	126
	(0.48)	.	(0.94)	27.40	(0.71)	.	(1.58)	18.34
Δ Banana share 1950-61	0.05	126	0.13	126	-0.00	126	0.07	126
	(0.05)	.	(0.11)	25.04	(0.05)	.	(0.07)	18.34
Δ ln Pineapple yield 1950-61	-1.05	76	-1.62	75	-1.33	74	-1.65	74
	(0.55)	.	(1.12)	14.92	(0.99)	.	(1.76)	3.84
Δ Pineapple share 1950-61	0.16*	76	0.32*	76	0.28	76	0.57	76
	(0.07)	.	(0.13)	15.21	(0.18)	.	(0.43)	7.14

This table shows the effects of land reform on vegetable and fruit cultivation. $^{*} \leq 0.05$,$^{**} \leq .01$,$^{***} \leq .001$.

Table 13: 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	248	1.27***	248
	(2.82)	2.00	(0.36)	20.05
Δ Share of partial landowners 1950-61	-0.18	248	0.06	248
	(1.09)	2.00	(0.33)	20.05
Δ Share of tenants 1950-61	4.19	248	-1.33***	248
	(3.26)	2.00	(0.31)	20.05
Δ Median farm size 1950-61	5.73	248	-1.81*	248
	(4.04)	2.00	(0.72)	20.05
Δ ln Rice output 1950-61	0.73	248	-0.23	248
	(1.59)	2.00	(0.53)	20.05
Δ ln Rice yield 1950-61	0.30	248	-0.09	248
	(0.96)	2.00	(0.32)	20.05
Δ Log-Pop change, 1955-66	0.20	248	-0.06	248
	(0.56)	2.00	(0.18)	20.05
Δ Occupation share: primary sector,	0.55	247	-0.18	247
1956-66	(0.62)	2.05	(0.17)	20.07
Δ Occupation share: secondary sector,	-0.26	247	0.08	247
1956-66	(0.21)	2.05	(0.06)	20.07
Δ Occupation share: tertiary sector,	-0.29	247	0.09	247
1956-66	(0.63)	2.05	(0.19)	20.07
Δ Share primary school or above,	0.63	244	-0.20	244
1951-61	(0.59)	1.96	(0.13)	20.00
Δ Share middle school or above,	-0.05	244	0.02	244
1951-61	(0.10)	1.96	(0.03)	20.00
Δ Share high school or above, 1951-61	-0.01	244	0.00	244
	(0.05)	1.96	(0.01)	20.00
Δ Share higher education, 1951-61	-0.01	244	0.00	244
	(0.01)	1.96	(0.00)	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 14: 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***	248	1.12**	238	1.60**	151	1.35**	247	1.56***	238	1.77**	151
	(0.34)	25.75	(0.36)	21.07	(0.58)	11.60	(0.42)	17.84	(0.46)	19.54	(0.64)	11.59
Δ Share of partial landowners 1950-61	0.15	248	0.11	238	0.05	151	0.31	247	0.20	238	0.50	151
	(0.23)	25.75	(0.25)	21.07	(0.39)	11.60	(0.29)	17.84	(0.24)	19.54	(0.35)	11.59
Δ Share of tenants 1950-61	-1.33***	248	-1.24***	238	-1.65***	151	-1.65***	247	-1.76***	238	-2.27***	151
	(0.23)	25.75	(0.23)	21.07	(0.41)	11.60	(0.43)	17.84	(0.43)	19.54	(0.53)	11.59
Δ Median farm size 1950-61	0.10	248	-0.33	238	-0.13	151	-2.84*	247	-2.53*	238	-2.40	151
	(0.39)	25.75	(0.54)	21.07	(0.80)	11.60	(1.42)	17.84	(1.22)	19.54	(1.50)	11.59
Δ ln Rice output 1950-61	1.50**	250	1.22*	238	1.38	151	0.28	247	-0.03	238	-0.74	151
	(0.58)	25.34	(0.54)	21.07	(0.93)	11.60	(0.84)	17.84	(0.81)	19.54	(0.92)	11.59
Δ ln Rice yield 1950-61	0.55*	250	0.37	238	0.19	151	0.46	247	0.40	238	0.33	151
	(0.26)	25.34	(0.27)	21.07	(0.36)	11.60	(0.45)	17.84	(0.46)	19.54	(0.62)	11.59
Δ Log-Pop change, 1955-66	-0.08	255	-0.18	238	-0.58*	151	0.06	247	-0.04	238	-0.45	151
	(0.14)	27.09	(0.13)	21.07	(0.26)	11.60	(0.19)	17.84	(0.19)	19.54	(0.26)	11.59
Δ Occupation share: primary sector,	0.15	254	0.18	237	0.14	150	-0.23	246	-0.18	237	0.03	150
1956-66	(0.11)	27.04	(0.12)	21.03	(0.16)	11.56	(0.24)	18.38	(0.25)	20.41	(0.37)	11.31
Δ Occupation share: secondary sector,	-0.11*	254	-0.12*	237	-0.13*	150	0.09	246	0.11	237	-0.04	150
1956-66	(0.05)	27.04	(0.05)	21.03	(0.06)	11.56	(0.08)	18.38	(0.09)	20.41	(0.08)	11.31
Δ Occupation share: tertiary sector,	-0.04	254	-0.06	237	-0.01	150	0.15	246	0.07	237	0.01	150
1956-66	(0.09)	27.04	(0.10)	21.03	(0.15)	11.56	(0.25)	18.38	(0.25)	20.41	(0.38)	11.31
Δ Share primary school or above,	-0.02	251	0.04	237	0.05	151	-0.24	243	-0.24	237	-0.35	151
1951-61	(0.09)	26.30	(0.09)	21.03	(0.12)	11.60	(0.19)	18.30	(0.19)	19.88	(0.23)	11.59
Δ Share middle school or above,	-0.01	251	-0.01	237	-0.04	151	-0.02	243	-0.04	237	0.04	151
1951-61	(0.02)	26.30	(0.03)	21.03	(0.04)	11.60	(0.04)	18.30	(0.05)	19.88	(0.05)	11.59
Δ Share high school or above, 1951-61	-0.01	251	-0.01	237	-0.02	151	-0.01	243	-0.02	237	0.02	151
	(0.01)	26.30	(0.01)	21.03	(0.02)	11.60	(0.02)	18.30	(0.02)	19.88	(0.02)	11.59
Δ Share higher education, 1951-61	-0.01	251	-0.00	237	-0.01	151	-0.01	243	-0.01	237	0.02*	151
	(0.01)	26.30	(0.01)	21.03	(0.01)	11.60	(0.01)	18.30	(0.01)	19.88	(0.01)	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 15: 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	251	-0.00
		(0.32)		(0.03)
Δ median hhld farm size, 1941-50	248	-0.33	251	-0.03
		(0.65)		(0.09)
Δ Attainable rice yield, low-to-high inputs	302	4927.06*	249	-92.33
		(1940.14)		(239.78)
Δ log rice yield, 1950-52	285	0.04	249	0.01
		(0.28)		(0.02)
Δ log population, 1942-50	299	1.88*	243	0.09
		(0.74)		(0.06)
Mainlander share of pop., 1955	307	0.07	251	0.01
		(0.10)		(0.01)
Sugar cane yield (tons/Ha), 1951	175	17147.93	155	-2700.14
		(33108.09)		(4993.02)
Total Manuf. firms, 1947	286	-143.70**	248	8.08*
		(55.37)		(3.47)
Potential rice yields (FAO-GAEZ)	362	3.72*	251	-0.09
		(1.54)		(0.14)
Sugar mill in township = 1, 1947	312	0.26	251	0.12
		(0.49)		(0.07)
Log distance to nearest rail station (km)	301	-3.07	251	-0.41
		(2.10)		(0.21)
Log distance to nearest sugar rail station (km)	301	-3.65	251	0.35
		(3.75)		(0.48)
Number of bank branches (<10km)	302	-4.50	251	0.66
		(3.53)		(0.40)
Employment share in agriculture, 1951	276	0.75	227	-0.09
		(0.44)		(0.05)
Employment share in manufacturing, 1951	264	-0.02	227	0.01
		(0.04)		(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 16: 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	0.01	-0.02
	(0.03)	(0.04)	(0.04)
Japanese-owned land, p.c. (1941)	0.37***	0.35***	0.37***
	(0.07)	(0.07)	(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 17: 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	-0.04	-0.11*
	(0.05)	(0.04)	(0.05)
Relative share of landholdings: 3-5 Ha to 2-3 Ha	0.03***	0.02***	0.03***
	(0.01)	(0.00)	(0.00)
Share of land outside of 2-5 Ha holdings	-0.05	-0.04	-0.05
	(0.03)	(0.03)	(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 18: 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	246	1.57	243	4.62***	245	6.61***	245
	(0.69)	.	(1.07)	24.79	(0.67)	.	(1.74)	30.96
Δ Share of partial landowners 1950-61	0.65	246	0.51	243	0.86	245	0.41	245
	(0.52)	.	(0.83)	24.79	(0.64)	.	(1.64)	30.96
Δ Share of tenants 1950-61	-1.77***	246	-2.07***	243	-5.48***	245	-7.02***	245
	(0.46)	.	(0.58)	24.79	(0.47)	.	(1.22)	30.96
Δ Median farm size 1950-61	0.67	246	-0.22	243	-0.74	245	-8.25**	245
	(0.87)	.	(1.13)	24.79	(1.34)	.	(3.14)	30.96
Δ ln Rice output 1950-61	3.00**	258	5.21**	254	0.00	245	-1.24	245
	(0.97)	.	(1.71)	24.94	(1.26)	.	(2.77)	30.96
Δ ln Rice yield 1950-61	2.10**	258	3.19***	254	-0.31	245	-0.15	245
	(0.68)	.	(0.84)	24.94	(0.54)	.	(1.62)	30.96
Δ Log-Pop change, 1955-66	0.78*	271	0.68	266	0.01	245	-0.60	245
	(0.32)	.	(0.35)	25.31	(0.38)	.	(0.83)	30.96
Δ Occupation share: primary sector,	0.51*	269	0.39	264	-1.29***	244	-1.10	244
1956-66	(0.23)	.	(0.27)	25.22	(0.25)	.	(0.86)	31.20
Δ Occupation share: secondary sector,	-0.30**	269	-0.36*	264	0.31*	244	0.57	244
1956-66	(0.11)	.	(0.16)	25.22	(0.13)	.	(0.31)	31.20
Δ Occupation share: tertiary sector,	-0.21	269	-0.03	264	0.97**	244	0.52	244
1956-66	(0.20)	.	(0.30)	25.22	(0.31)	.	(0.96)	31.20
Δ Share primary school or above,	0.02	270	-0.07	265	0.07	244	-0.91	244
1951-61	(0.22)	.	(0.26)	25.22	(0.21)	.	(0.70)	31.33
Δ Share middle school or above,	-0.05	270	-0.09	265	0.00	244	-0.02	244
1951-61	(0.05)	.	(0.08)	25.22	(0.07)	.	(0.15)	31.33
Δ Share high school or above, 1951-61	-0.01	270	-0.03	265	-0.03	244	-0.03	244
	(0.02)	.	(0.04)	25.22	(0.03)	.	(0.07)	31.33
Δ Share higher education, 1951-61	-0.01	270	-0.02	265	-0.00	244	-0.01	244
	(0.01)	.	(0.01)	25.22	(0.01)	.	(0.02)	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 γ_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 19: The 375 Rent Reduction

	OLS (SE) (1)	N
Δ share of tenants, 1941-50	-0.01	216
	(0.04)	
Δ ln Rice yield, 1950-52	0.01	214
	(0.04)	
Δ median hhld farm size, 1941-50	0.04	216
	(0.09)	
Δ Attainable rice yield, low-to-high inputs	-101.64	214
	(319.43)	
Δ log population, 1942-50	0.41***	211
	(0.11)	

This table shows the effect of phase I land reform, the 375 rent reduction program, on key township-level agricultural and socio-economic outcomes prior to the phase II and phase III land reform. Control variables include latitude, longitude and terrain ruggedness. Standard errors are spatially clustered using a Bartlett kernel with a 50km cutoff. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.