When Tenants Got Their Own Lands: The Effect of Taiwan's Land Reform in 1953 on Agriculture Output

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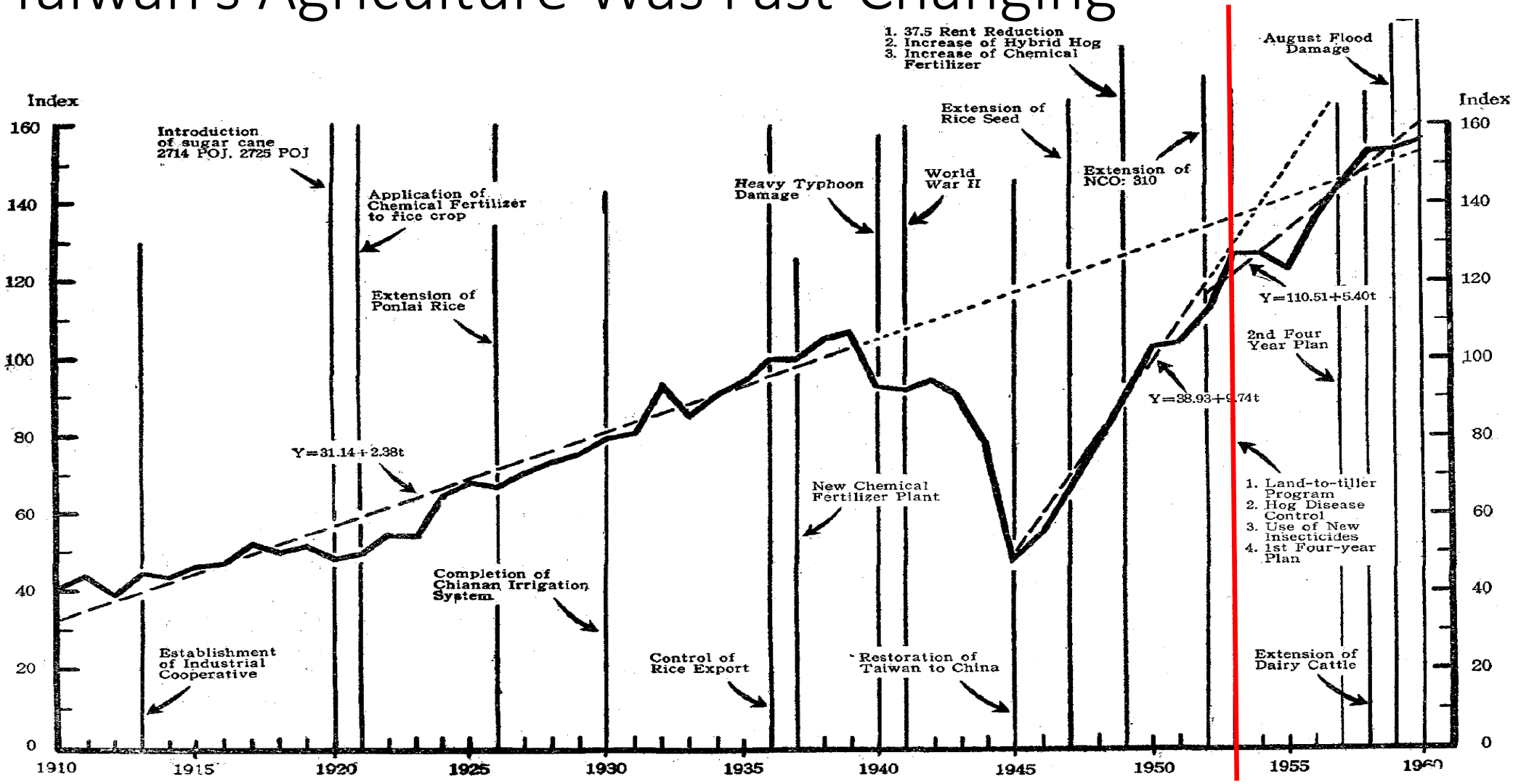
Land Reform could Boost Economic Development

- Land Reform: Redistributing ownership of farmland from wealthy landowner to poor tenants
- Studwell (2013) : Land reform incentivized small farmers, raised agricultural production and savings, and hence provided an initial productive surplus for future industrial development in the East Asian countries
- Boyce et al. (2005): Land reform brough relatively egalitarian distribution of wealth and income, enabling governors to implement economic growth policy more effectively without compromising to interest group and by reducing rent-seeking behavior.

Past Literature Mainly Uses Country-Level Time Series Data but Hardly Built Causality

- Case study; regression of input on output with time series data
- Land reforms in the post-war period and enjoy high economic growth after 1960s
- Japan (1946~1950): Kawagoe, 1999
- Korea (1945~1950): Jeon and Kim, 2000
- Taiwan (1949~1953): Koo, 1968

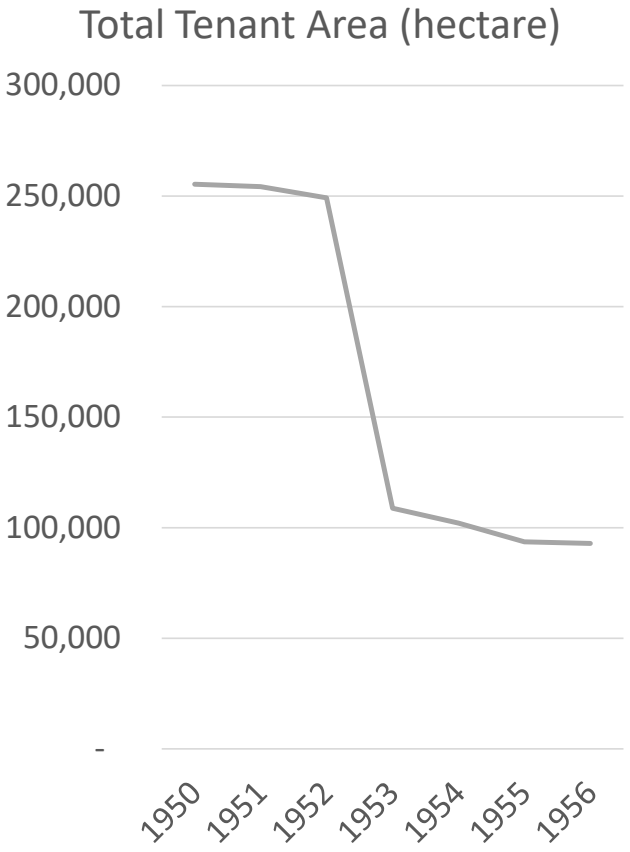
Taiwan's Agriculture Was Fast-Changing

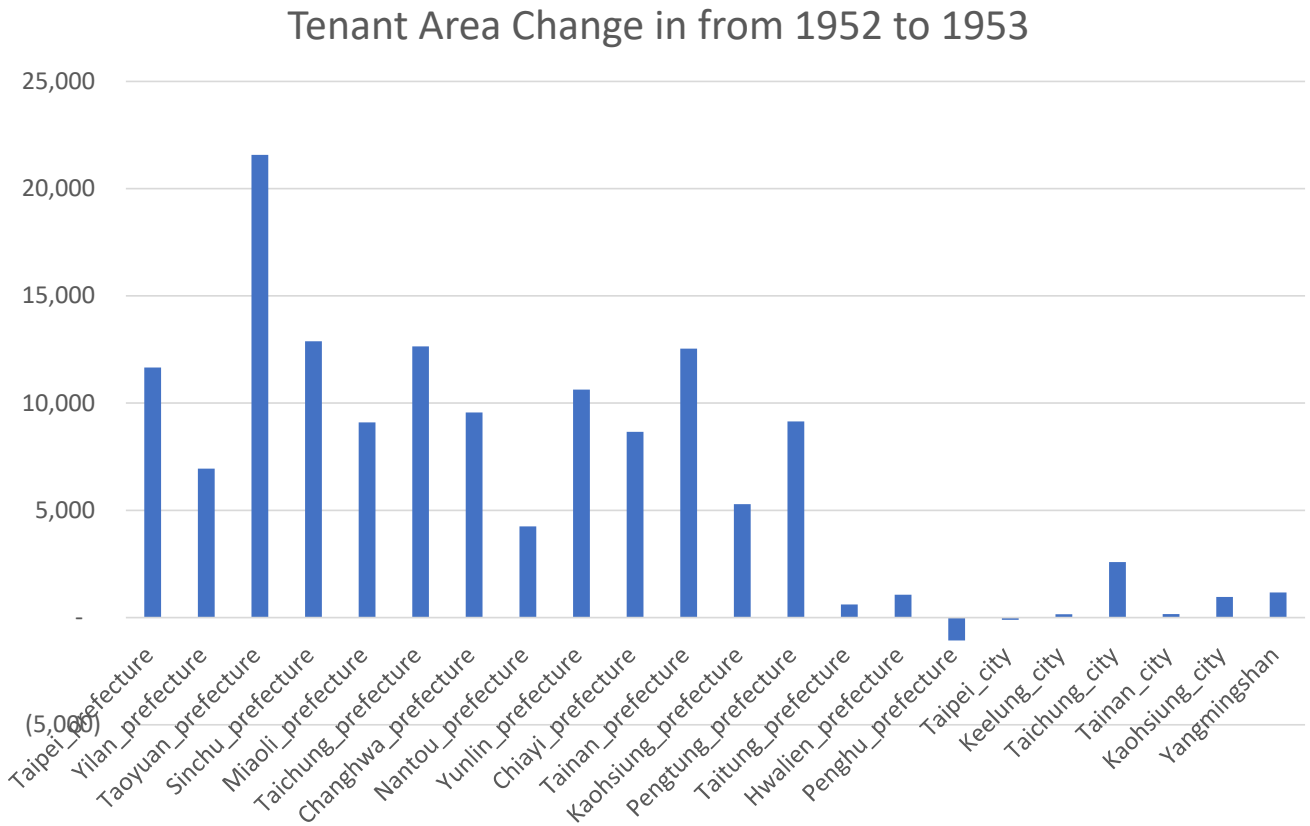


Some Recent Literature Uses Micro Data and Gets Different Results in Different Countries

- Adamopoulos and Restuccia, 2020
- Mendola and Simtowe, 2014
- Ghatak and Roy, 2007

Utilize the Regional Variations in Affected Levels by Land Reform to Identify its Effect

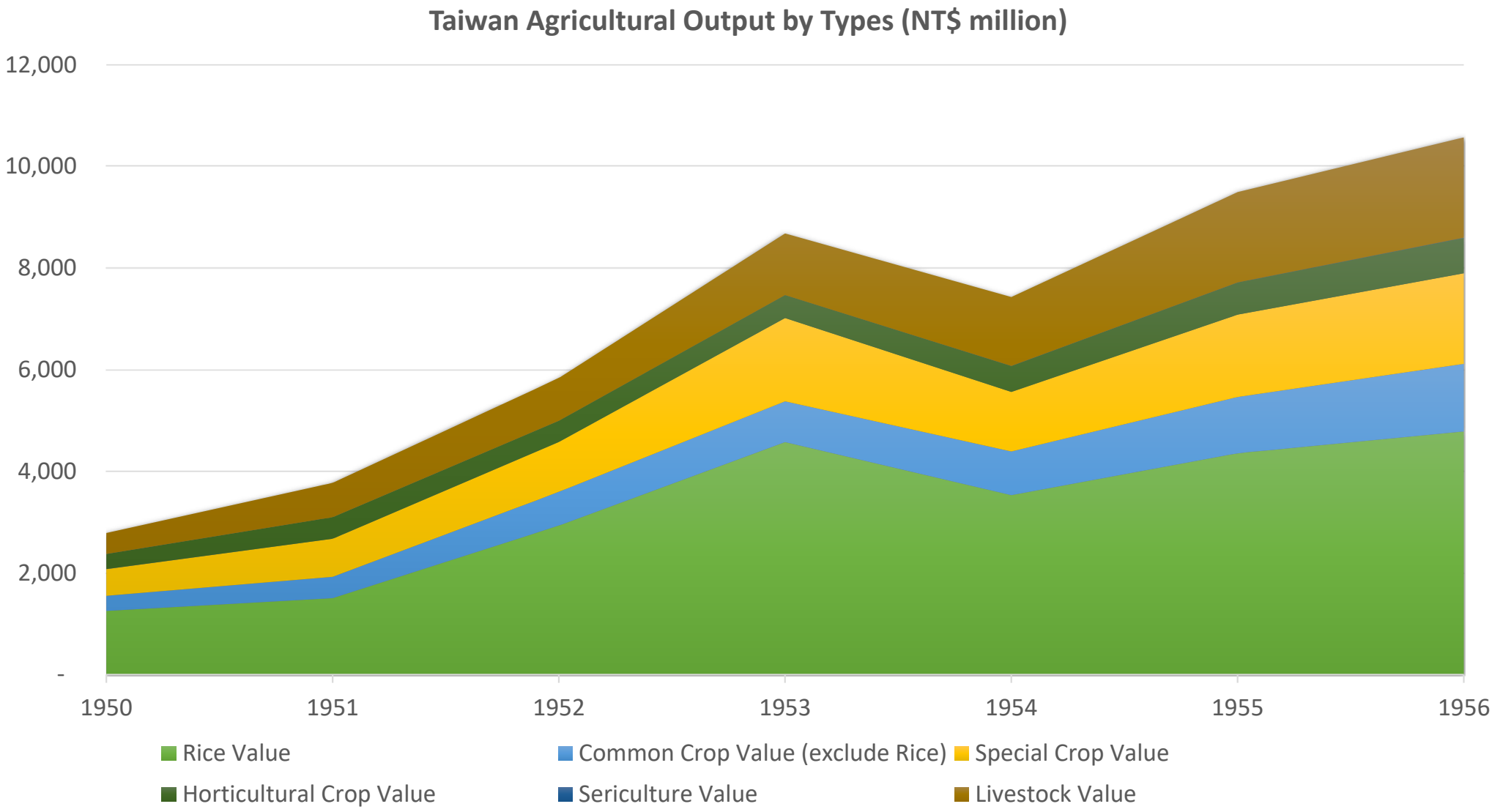




Difference-in-Differences with a Continuous Treatment

- First difference: Before and after land reform in 1953
- Second difference: Different regions with different affected levels

$$Agricultural\_Output_{it} = Region_i + After\_Land\_Reform_t + After\_Land\_Reform_t * Change\_Tenant\_Area\_in\_1953$$


Taiwan Agricultural Output by Types (NT$ million)
12,000
10,000
8,000
6,000
4,000
2,000
-
1950
1951
1952
1953
1954
1955
1956
Rice Value
Common Crop Value (exclude Rice)
Special Crop Value
Horticultural Crop Value
Sericulture Value
Livestock Value

Result

	total_value	total_value (1953)	total_value (1954)	total_value (1955)	total_value (1956)	rice_total_value	rice_total_value (1953)	rice_total_value (1954)	rice_total_value (1955)	rice_total_value (1956)
after_reform	1.00e+08***	4.80e+07***	4.34e+07***	8.37e+07***	1.00e+08***	3.89e+07***	1.79e+07***	1.98e+07**	3.40e+07**	2.81e+07***
	(2.85e+07)	(1.55e+07)	(1.40e+07)	(2.60e+07)	(2.73e+07)	(1.33e+07)	(5871714)	(8150534)	(1.26e+07)	(8790888)
after_tenant_area_change	19266.26***	12729.28***	4542.765	12927.35**	18019.96***	11099.08***	8906.505***	1159.928	4816.792*	8789.62***
	(5840.986)	(3312.881)	(2799.946)	(5294.401)	(5540.529)	(2691.854)	(1308.877)	(1735.044)	(2545.4)	(1630.339)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.6484888	0.7807647	0.6714055	0.7640779	0.8302784	0.5936727	0.8020624	0.3513128	0.5837387	0.7962743
N	154	44	44	44	44	154	44	44	44	44

Result

	common_crop_ex_rice_value	common_crop_ex_rice_value (1953)	common_crop_ex_rice_value (1954)	common_crop_ex_rice_value (1955)	common_crop_ex_rice_value (1956)	special_crop_value	special_crop_value (1953)	special_crop_value (1954)	special_crop_value (1955)	special_crop_value (1956)
after_reform	1.24e+07**	2486230	4589148**	9115548**	1.38e+07**	1.69e+07**	1.42e+07*	3482730*	1.16e+07*	2.09e+07**
	(5236061)	(1684283)	(1911785)	(4011038)	(6294835)	(7557564)	(7422569)	(2013743)	(5948014)	(9634661)
after_tenant_area_change	2090.673*	602.5843*	690.0494*	1726.753*	2599.027*	3054.111*	2441.301	779.229**	2736.942**	2414.757
	(1170.302)	(321.8474)	(346.8062)	(856.8391)	(1396.77)	(1621.54)	(1722.505)	(371.8529)	(1163.012)	(2041.047)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.3931075	0.3289457	0.5898917	0.6077087	0.6094285	0.3749466	0.482832	0.4555352	0.6390564	0.4841564
N	154	44	44	44	44	154	44	44	44	44

Result

	horticultural_crop_value	horticultural_crop_value (1953)	horticultural_crop_value (1954)	horticultural_crop_value (1955)	horticultural_crop_value (1956)	livestock_value	livestock_value (1953)	livestock_value (1954)	livestock_value (1955)	livestock_value (1956)
after_reform	4646947***	637979.1	2671437**	4926859**	5415184**	2.74e+07***	1.28e+07***	1.28e+07**	2.40e+07***	3.19e+07***
	(1410207)	(474884.1)	(991503.7)	(1901319)	(2348230)	(6762346)	(4091109)	(5222746)	(6510905)	(7429283)
after_tenant_area_change	647.8904**	160.5143**	257.185	753.6509*	1138.216**	2372.474**	618.0004	1656.067**	2891.55**	3077.557**
	(262.9587)	(61.32668)	(177.0798)	(363.4441)	(438.5109)	(892.1735)	(542.5956)	(623.5277)	(1031.518)	(1128.794)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.3954844	0.5241751	0.4734333	0.6924006	0.7328509	0.581189	0.7385233	0.7277741	0.7624913	0.7842766
N	154	44	44	44	44	154	44	44	44	44

Ln Result

	ln_total_value	ln_total_value (1953)	ln_total_value (1954)	ln_total_value (1955)	ln_total_value (1956)	ln_rice_total_value	ln_rice_total_value (1953)	ln_rice_total_value (1954)	ln_rice_total_value (1955)	ln_rice_total_value (1956)
after_reform	.7726796***	.307432***	.2459267***	.4675975***	.571586***	.8792307***	.3765168***	.2627443***	.4847848***	.5094684***
	(.0345719)	(.0306892)	(.0519085)	(.0405045)	(.0676413)	(.0255681)	(.0184575)	(.035731)	(.0351272)	(.0429961)
after_tenant_area_change	4.16e-06	8.21e-06**	-1.97e-06	-3.29e-07	1.69e-06	-2.60e-06	6.25e-06***	-.0000114**	-.0000131***	-2.09e-06
	(3.87e-06)	(2.94e-06)	(5.35e-06)	(4.66e-06)	(6.34e-06)	(2.71e-06)	(1.99e-06)	(4.48e-06)	(4.34e-06)	(3.93e-06)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.7289537	0.9598608	0.7864314	0.9489629	0.9455587	0.7312347	0.9853665	0.7473815	0.9146412	0.9657968
N	154	44	44	44	44	147	42	42	42	42

Ln Result

	ln_common_crop_ex_rice_value	ln_common_crop_ex_rice_value (1953)	ln_common_crop_ex_rice_value (1954)	ln_common_crop_ex_rice_value (1955)	ln_common_crop_ex_rice_value (1956)	ln_special_crop_value	ln_special_crop_value (1953)	ln_special_crop_value (1954)	ln_special_crop_value (1955)	ln_special_crop_value (1956)
after_reform	.7260609***	.0476628	.2281613**	.4124172***	.5301231***	.460493**	.0614688	-.3995987	.0048327	.1843442
	(.0938104)	(.0970289)	(.0873192)	(.0819098)	(.1222348)	(.1893621)	(.3685838)	(.3709205)	(.3871386)	(.3530578)
after_tenant_area_change	6.48e-06	.0000161*	7.22e-06	.0000126	.0000174	.0000283	.0000298	.0000552	.0000473	.0000231
	(9.00e-06)	(8.44e-06)	(7.90e-06)	(8.83e-06)	(.0000116)	(.0000184)	(.0000339)	(.000033)	(.0000341)	(.0000352)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.6220981	0.3229732	0.5693207	0.7935653	0.8244311	0.3320174	0.1304166	0.1400363	0.1985167	0.1737101
N	154	44	44	44	44	154	44	44	44	44

Ln Result

	ln_horticultural_crop_value	ln_horticultural_crop_value (1953)	ln_horticultural_crop_value (1954)	ln_horticultural_crop_value (1955)	ln_horticultural_crop_value (1956)	ln_livestock_value	ln_livestock_value (1953)	ln_livestock_value (1954)	ln_livestock_value (1955)	ln_livestock_value (1956)
after_reform	.4803975***	.0594357	.2348209***	.3779604***	.3818754***	.8460795***	.3324351***	.2828382*	.6249594***	.7291973***
	(.0648284)	(.0391027)	(.0574823)	(.0639577)	(.0772488)	(.0712833)	(.0387801)	(.1638593)	(.0723023)	(.0765718)
after_tenant_area_change	-4.81e-06	3.19e-06	-4.61e-06	3.63e-06	.0000141*	.000012*	4.17e-06	.0000228	.0000166**	.0000158*
	(5.46e-06)	(3.38e-06)	(5.16e-06)	(6.55e-06)	(7.64e-06)	(6.74e-06)	(7.18e-06)	(.000015)	(7.75e-06)	(7.63e-06)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.5020094	0.387745	0.6625052	0.8508961	0.8503145	0.6629116	0.8800974	0.5965795	0.9285164	0.9390197
N	154	44	44	44	44	154	44	44	44	44

Placebo Test Result

	total_value	total_value (1952)	total_value (1953)	total_value (1954)	total_value (1955)	total_value (1956)	rice_total_value	rice_total_value (1952)	rice_total_value (1953)	rice_total_value (1954)	rice_total_value (1955)	rice_total_value (1956)
after_fake_reform_1952	1.02e+08***	3.25e+07***	8.05e+07***	7.59e+07***	1.16e+08***	1.33e+08***	4.09e+07***	1.85e+07***	3.64e+07***	3.83e+07**	5.25e+07**	4.66e+07***
	(2.87e+07)	(9765243)	(2.50e+07)	(2.32e+07)	(3.55e+07)	(3.68e+07)	(1.41e+07)	(6477318)	(1.21e+07)	(1.43e+07)	(1.89e+07)	(1.49e+07)
after_fake_tenant_area_change	20461***	9600.474***	22329.75***	14143.24***	22527.82***	27620.43***	12505.87***	7251.409***	16157.91***	8411.337***	12068.2**	16041.03***
	(5902.846)	(2161.869)	(5424.311)	(4734.958)	(7356.891)	(7627.185)	(2846.862)	(1283.443)	(2532.699)	(2954.232)	(3801.589)	(2873.561)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.5921469	0.8574643	0.820324	0.8070575	0.8078909	0.8437569	0.6060569	0.8179059	0.8154803	0.6858806	0.7091488	0.811306
N	154	44	44	44	44	44	154	44	44	44	44	44

Placebo Test Ln Result

	total_value	total_value (1952)	total_value (1953)	total_value (1954)	total_value (1955)	total_value (1956)	rice_total_value	rice_total_value (1952)	rice_total_value (1953)	rice_total_value (1954)	rice_total_value (1955)	rice_total_value (1956)
after_fake_reform_1952	.8803245***	.3641796***	.6716116***	.6101062***	.8317771***	.9357656***	1.032981***	.6354763***	1.011993***	.8982206***	1.120261***	1.144945***
	(.0351914)	(.0376768)	(.0375595)	(.0606607)	(.0548795)	(.0637962)	(.0272502)	(.0276926)	(.0212591)	(.0202759)	(.0358386)	(.0412041)
after_fake_tenant_area_change	4.92e-06	8.45e-06**	.0000167***	6.48e-06	8.12e-06	.0000101*	-3.35e-07	2.58e-06	8.83e-06***	-8.81e-06**	-.0000106**	4.87e-07
	(3.96e-06)	(3.41e-06)	(3.37e-06)	(5.62e-06)	(5.39e-06)	(5.81e-06)	(2.81e-06)	(2.56e-06)	(2.80e-06)	(3.17e-06)	(4.08e-06)	(4.37e-06)
Regional fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R2	0.7904553	0.964129	0.9849895	0.9568985	0.978012	0.9812275	0.8715896	0.9844444	0.9945792	0.9875919	0.9860351	0.9923819
N	154	44	44	44	44	44	147	42	42	42	42	42

Limitation

- Measurement Error: Tenant area data is calculated from registered contracts, but only 70% of area registered (compared to a 1949 survey).
- Endogenous: The different affected levels by the land reform in different regions are not random. Some factors that determine both the affected levels and agriculture output will cause estimation bias.