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Productivity Impacts of Land Reform in Japan: Some Evidences from Yamagata Prefecture

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Abstract

It has long been believed, without any hard evidence, that the land reform in Japan had a positive impact on productivity in agriculture. The theory of contract, however, tells that the contrary must be the case at least in the short-run: under the land tenancy conditions prevailing in pre-reform Japan, no source of productivity increase can be figured out theoretically. Following a few pioneering studies, we challenge in this paper to this deep-rooted belief empirically by examining rice farming in Yamagata Prefecture. Statistical tests in which the rate of tenancy in the pre-reform period is compared to the rate of increase in land productivity in the post-reform period fail to reject the null hypothesis that the land reform gave no productivity impact.

Introduction

It has been said that the land reform in Japan was most successful among similar attempts during the last half century or so in many non-communist countries in Asia and elsewhere in the world. In fact, it has played a role as an ideal type followed in many other countries where redistributive, or land-to-tillers type, land reform has been an important policy agenda in agriculture [12].

Land reform, if implemented drastically, should have far-reaching impacts in various spheres of rural as well as national economy, and therefore the objectives of the reform could be multi-faceted. Apart from its prime objective of eradicating the poverty of rural poor, many of whom are peasants cultivating tiny land plots under some tenancy contracts, increasing productivity in agriculture is an oft-mentioned reform objective. A source of productivity increase that a redistributive land reform program may realize is the higher efficiency of small farms relative to large farms. As clearly demonstrated by Berry and Cline [1], the redistribution of land from large to small farms could increase agricultural production in developing countries where the size distribution of operational farm land is skewed with the productivity difference between large and small farms. Another possible source of productivity increase is the change of land tenure that always occurs in association with a redistributive land reform program, typically from share-cropping to owner-cultivation. The traditional belief that share-cropping generates sub-optimal efficiency in agricultural production as compared to owner-cultivation (Marshallian inefficiency) has been a strong basis for land reform advocates [3], though recent developments in contract theory have undermined this basis to a large extent [4].

Whether or not land reform programs have productivity impacts, particularly through the change of tenure arrangement of farmers involved, should have a critical implication as to the design of the programs. What lesson does the land reform in Japan give in this respect? Many, or rather, virtually all agricultural economists in Japan have believed that it had indeed a strong positive impact on the productivity in agriculture. The purpose of this paper is to examine this firmly rooted view through a case study of Yamagata Prefecture, following a framework developed by Kawagoe [9]. In view of the fact that the land reform, once blessed as most successful, is responsible to a large extent for the agricultural problem Japanese agriculture has had to face since soon after its implementation that cristalized small-

scale cultivation, such an attempt should be of particular relevance for the developing countries in Asia which have been following a development path similar to the one Japan experienced in the post-war period [8].

A Myth

Japanese land reform was implemented during 1946 to 1950 under the guidance of the General Headquarters of the Allied Power, then occupying Japan after World War II, as one of important reforms aiming at 'democratization' of Japanese society [13]. It was a typical redistributive, land-to-tillers program in which farm lands owned by non-cultivating land owners and owned by cultivating land owners beyond the retention limit were all confiscated by the government and redistributed to the tillers of the lands. As a result, tenant farmers became owner-cultivators, and farm lands under tenancy contracts were converted to owner-operated lands. For the country as a whole, the percentage of tenant and owner-cum-tenant farmers declined from 70% in 1941 to 30% in 1955, and that of farm lands under tenancy contracts from 46% to 9% during the same period [9]. It can be said that the thoroughgoing implementation of the program succeeded to abolish the tenancy system in Japanese agriculture completely.

Our question is whether the land reform had productivity impacts in agriculture. With only a few exceptions, this question has never been addressed seriously in Japan. Rather, its positive impacts on agricultural productivity has been taken for granted as if it is self-evident. As pointed out elsewhere [9], the list of the literature which mention reform's positive productivity impacts, based on casual observation without showing any firm evidence, is virtually endless. For example, asserts Kajii, one of the most renowned agricultural economists in Japan: "the increases in total rice production as well as rice yield per unit of land during the land reform period (and after) were brought about, under the low rice price situation, by farmers' efforts ••• which is nothing but 'the magical power of ownership' that makes sand into gold [5]" (the words in parenthesis are added by the authors). The data presented for supporting this assertion are the total rice production in the country and the national averages of rice yield per 10a for several years before and after the land reform, with no adjustment for technological progresses between the periods, the figures for the post-reform years being higher than those for the pre-reform years.

Why an economist can be so naive in Japan in drawing such a crucial conclusion is an interesting question, which is beyond the scope of this paper. What this example illustrates, however, is that the thesis that the land reform gave significant positive impacts on productivity in agriculture has been so well accepted and pervasive in Japan that no hard evidence has been sought. This means that the thesis is nothing but a myth.

There have been some exceptions of course, though quite limited in number. In an attempt to quantify the economic impacts of the land reform, Kawano [10] reveals that the reform did not give any significant impact on the productive investments in agriculture made by farmers, though their propensity to consume was raised after the reform. An examination of changes in labor productivity in agriculture in relation to changes in the ratio between owner and tenant cultivated areas leads Kaneda [6] to a conclusion that the productivity effects of the reform on labor productivity was insignificant. The most recent attempt in this line by Kawagoe [9] examines the Myth applying three different approaches; 1) comparison of production structure between owner- and tenant-operators based on the data from the Rice Production Cost Surveys, 2) correlation between the degree of incidence of tenancy in the pre-reform period and the rate of increase in rice yield per unit of land in the post-reform period using prefecture level cross-section data, and 3) comparison of rice yield per unit of land between the pre- and post-reform periods using panel data of individual farmers in a village in Tohoku Region. For all the three aspects, he fails to find out any evidence that supports the existence of the productivity impact of the land reform.

The fact that the findings of all the three exceptional quantitative studies stand in sharp contrast to the Myth is not groundless. When considering the possible productivity impacts, two salient features associated with the land reform in Japan must be

recalled. First, the land reform did not change the unit of cultivation: rather, it crystallized the traditional agrarian structure in terms of a unimodal distribution of small-scale family farms with the average size of about 1 ha. This precludes the possibility of productivity increase due to the transfer of farm land from less productive large farms to more productive small farms. Second, the overwhelming majority of tenants in the pre-reform Japan were leaseholders. As far as farmers' production decision in the short-run (one season) is concerned, there can be no theoretical difference between owner- and leasehold-cultivators [4]. With a fixed land rent, it is obvious that the optimum production decision for a leaseholder, *ceteris paribus*, cannot be different from that of an owner operator. This nullifies another possible source of productivity gains in Japanese land reform.

The production decision in the long-run could be different between them, since leaseholders may have less incentive than owner operators to care about the depletion of soil fertility or to improve it in the future. However, Hayami and Otsuka [4] argue that long-term tenancy contracts, as were the cases in pre-reform Japan, check to a great extent such moral hazards from occurring, giving a theoretical background to Kawano's finding that the land reform did not change farmers' investment behavior. The fact that long-term investments in Japanese agriculture, such as land improvement investments, have been borne in large part by the government either as direct investments or as subsidies also gives an empirical support to his finding. Taking it for granted, it is difficult to figure out any other source of productivity gain that Japanese land reform could have brought about. With all this common sense in economics, therefore, it should be surprising if it gave positive productivity impacts.

Empirical Tests

Considering the deep-rooted nature of the Myth, it is worthwhile reinforcing the common-sense view through giving as many statistical supports as possible, from various aspects. We try to do this by adopting the second approach used by Kawagoe [9].

The rationale of his approach is simple but sensible: assume that tenant farmers are less productive, or less efficient, than owner farmers for whatever reasons, then, *ceteris paribus*, the rate of increase in productivity must be higher in areas where the share of tenants in the total number of farmers is higher prior to the land reform. Representing the level of productivity by the level of rice yield per unit of land and using cross-section data at the prefecture level, he estimates the correlation coefficient between the share of tenants in the pre-reform period and the growth rate of rice yield per 10a. Since the correlation is not statistically significant at all, he rejects the assumption of less productive tenants.

A critical assumption of this approach is that there has been no technical change in rice farming, or if any, the rate of change has been uniform for all the prefectures, between the pre- and post-reform periods. Technical changes in rice farming in Japan, however, were significant during and after the land reform period, with the rates of the changes varying across the prefectures. To the extent that the rate of technical changes differs among the prefectures, the power of his test is reduced.

In this paper, while adopting the same framework, we try to control technical changes in rice farming by using cross-section data at levels lower than the prefecture level. Considering the ordinary process of technology diffusion in Japanese agriculture, the rate of technical changes on average at the county or village level in a prefecture must have been far more uniform than across prefectures.

Yamagata Prefecture: As the prefecture for the inter-county-level analysis in this paper, we choose Yamagata Prefecture, and as the counties for the inter-village-level analysis, Akumi and Kita-murayama Counties in the prefecture. This prefecture is uniquely suited to our analysis for various reasons. First, Yamagata has been one of important rice-producing prefectures in Japan, so that the weight of rice farming in agriculture has been quite high; in terms of the ratio of paddy land to total cultivated land, the weight of rice farming in the prefecture was as high as 71% in 1935, as compared to the national average of 50% [11]. This justifies our approach in

that we confine our analysis of identifying the productivity impacts of the land reform to rice farming.

Second, landlordism in the prefecture had been progressive in the course of the pre-war period and the incidence of tenancy was very pervasive just before the land reform (Table 1). It should also be remarked that the variation across cities and counties of the percentage shares of paddy fields under tenancy was large, ranging from 48% to 78% in 1935. This is important for our analysis, since, for the performance of our approach to be better, the incidence of tenancy should be high, with a sufficiently large variation. The same applies to the two sample counties selected for the inter-village-level analysis (Table 2).

More importantly, not only the incidence of tenancy was high but also a wide range of tenancy conditions existed in different parts of the prefecture. Akumi was the county where the Honma family, then the largest landlord in Japan controlling more than 1000 ha of paddy fields, was residing. The Honma had its own agricultural experiment station in which new techniques and improved cultural practices were studied, and made efforts to disseminate developed techniques/practices to its tenants. It also pioneered new institutions for tenants such as written tenancy contract, systematic rent reduction, reserve rice stock for poor crop years, etc. Because of these practices, the Honma was known as a benevolent landlord, in spite of its rate of land rent as high as 50% of the total harvest [7].

In other parts of the prefecture, in contrast, tenants cultivated land under much harsher tenancy conditions, which induced a lot of tenancy disputes between landlords and tenants. In fact, Yamagata Prefecture was one of prefectures where tenancy disputes were most prevalent: the recorded number of tenancy disputes in the prefecture increased from 54 for 1921-25 to 659 for 1926-31, and further to 1,381 for 1932-36 [7]. The most serious dispute, which ended up distressed bloodshed between the tenant group involved in the dispute and the police, occurred in 1930 in Odashima, one of the villages in Kita-murayama County. Should the Myth be of some reality, such a resentful situation for tenants should

Table 1 Percentage of paddy fields under tenancy in Yamagata Prefecture, by city and county, pre-war period

	1890	1900	1910	1920	1930	1935
Prefecture total	37	42	47	50	60	61
Yamagata City	24	29	60	64	79	78
Minami-murayama	32	36	41	41	53	52
Higashi-murayama	60	55	60	60	72	77
Nishi-murayama	61	60	62	63	70	69
Kita-murayama	50	56	62	62	67	65
Mogami	23	32	39	44	61	60
Yonezawa City	44	45	46	50	69	63
Minami-okitama	26	24	30	39	49	48
Higashi-okitama	28	30	40	43	61	61
Nishi-okitama	23	34	45	43	56	54
Higashi-tagawa	45	44	44	50	59	58
Nishi-tagawa	43	46	48	54	63	59
Akumi	46	44	44	50	53	50

Source: Kamagata [7] except for 1935 for which data are from Yamagata Prefecture [15].

Table 2 Percentage of paddy fields under tenancy in two counties of Yamagata Prefecture, by town and village, 1935

Kita-murayama County total	65	Akumi County total	50
Tateoka	83	Matsumine	35
Saigo	64	Kamigoh	35
Ohkura	54	Uchigoh	56
Sodezaki	69	Tazawa	23
Higashine	60	Kitamata	29
Tohgoh	42	Minami-hirata	49
Takasaki	58	Higashi-hirata	50
Yamaguchi	52	Kita-hirata	71
Tamugino	47	Naka-hirata	58
Ohtomi	70	Ueda	58
Odashima	80	Motodate	58
Nagatoro	69	Ichijoh	60
Ohkubo	61	Kannonji	57
Tomimoto	53	Ohsawa	22
Tozawa	71	Nikkoh	21
Ohtakane	61	Nishi-arase	58
Yokoyama	82	Minami-yuza	54
Ohishida	85	Inagawa	37
Kameida	63	Nishi-yuza	55
Hukuhara	73	Yuza	50
Obanazawa	67	Warabioka	52
Miyazawa	60	Takase	43
Tamano	51	Hukura	45
Tokiwa	62		

Source: Kamagata [7].

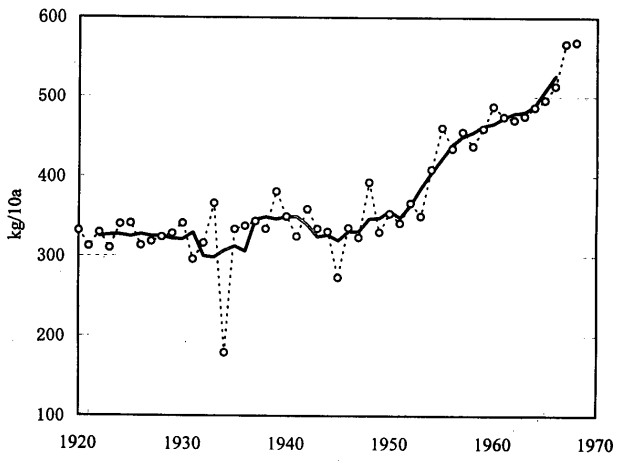
Table 3 Results of analysis regressing the rate of increase in rice yield per 10a between pre- and post-reform periods on the percentage share of land under tenancy in 1935

Data level		Intercept	Slope	Coefficient of determination	Degree of freedom
Yamagata by city and county	#1	1.36 (12.3)	−0.34 (−1.93)	0.21	11
	#2	1.22 (11.2)	−0.27 (−1.54)	0.15	11
Akumi by town and village	#1	1.40 (15.4)	−0.32 (−1.68)	0.12	21
	#2	1.26 (13.8)	−0.20 (−1.07)	0.05	21
Kita-murayama by town and village	#1	1.24 (6.33)	−0.05 (−0.16)	0.00	22
	#2	0.98 (6.76)	0.12 (0.56)	0.01	22

Note: For regression #1, the pre-reform rice yield is the average for 1933, 34, 35, 36, and 37.
For regression #2, the pre-reform rice yield is the average for 1933, 35, 36, and 37.
Figures in parenthesis are t-ratio.

have worked as a strong pressure to increase productivity, once they became owner-farmers emancipated from the so-called 'semi-feudal' bondage.

Data: As the test, we regress the rate of increase in rice yield per 10a between the pre-reform and post-reform periods on the percentage share of paddy fields under tenancy in 1935. The data on the share of paddy fields under tenancy are obtained from Yamagata Prefecture [15]. For the level of rice yield per 10a in the pre-reform period, the five-year average for 1933-1937 is used. As shown in Fig. 1, the rice yield in 1934 was extremely low due to cold damage. The average for 1933-37 excluding 1934, therefore, is used as an alternative base. For the level of rice yield per 10a after the land reform, the average for 1950-54 is adopted. It may be preferable to include 1955, since it was a bumper crop year to demarcate the yield-increasing phase after the land reform. However, we are forced to exclude this year, because the sweeping reformulation of old towns and villages into new cities and towns, carried out in 1954-55, makes it difficult to link the data between the old and new jurisdictions. Original data on rice yields are from Yamagata Prefecture [14].



Source: Yamagata Prefecture [12]

Fig. 1 Rice yield per 10a in Yamagata Prefecture.

Results: The results of regression analysis are summarized in Table 3. For all the three levels and for the two alternative regression equations, the slope coefficients is not statistically significant at the 5% level. The t-ratios of the slope coefficient are relatively large for the inter-county-level equations, but the sign of the coefficient is both negative, which is of course contrary to the prediction derived from the Myth. The correlation between the two variables is

lower for the two counties selected for the inter-village-level analysis, and lowest in particular for Kita-murayama where not only the incidence of tenancy was high but tenancy disputes were most raging. In this statistical attempt, we thus fail to reject the null hypothesis that the land reform, or the conversion of tenants to owner-farmers, had no impact on land productivity.

Concluding Remarks

Taking Yamagata Prefecture as a case, we examined whether the land reform in Japan had a positive impact on the productivity in agriculture. A statistical test revealed no correlation between the incidence of tenancy in the pre-reform period and the land productivity growth in the post-reform period, suggesting solidly that the Japanese land reform had no productivity impact in agriculture, at least in the short-run. Thus, our study adds an evidence to the small backlog of counter-evidences provided by a few studies in the past which challenged to the popular belief in Japan that the land reform *per se* raised the productivity in agriculture through 'the magical power of ownership.'

Such a result is fairly expected if one applies the theory of contract to the case of land reform in Japan. This implies that the proponents of the popular belief, or the Myth, have just missed the development of the contract theory since Coarse [2]. 'The magical power of ownership' exercises its power under certain conditions, but not under the conditions prevailing in Japan at the time of the land reform.

References

[1] Berry, R.A., and W.R. Cline (1979): *Agrarian Structure and Productivity in Developing Countries*. The Johns Hopkins University Press, Baltimore and London.

[2] Coarse, R.H. (1960: The Problem of Social Cost. *J. Law. Econ.* 3(1), 1-44.

[3] Hayami, Y., M.A.R. Quisumbing and L.S. Adriano (1990): *Toward an Alternative Land Reform Paradigm: A Philippine Perspective*. Ateneo de Manila University Press, Manila.

[4] Hayami, Y., and K. Otsuka (1993): *The Economics of Contract Choice: An Agrarian Perspective*. Clarendon Press, Oxford.

[5] Kajii, I. (1979): *Tochi Seisakuto Nougyou* (Land policy and agriculture). Ienohikari Kyoukai, Tokyo, 160.

[6] Kaneda, H. (1980): In *The Occupation of Japan: Economic Policy and Reforms*. Proceedings edited by L. Redford of a symposium sponsored by the MacArthur Memorial, April 13-15, 1978. MacArthur Memorial, Virginia, 133-46.

[7] Kamagata, I. (1953): *Yamagataken Inasakusi* (History of rice farming in Yamagata Prefecture). National Research Institute of Agricultural Economics, Tokyo.

[8] Kawagoe, T. (1993): Land Reform in Post-war Japan. In *The Japanese Experience of Economic Reforms*. J. Teranishi and Y. Kosai eds. Macmillan, London, 178-204.

[9] Kawagoe, T. (1995): Sengo Nihon no Nouchi Kaikaku: Sono Keizaiteki Hyouka (An economic evaluation of post-war land reform in Japan). *Economic Research* 46(3), 249-259.

[10] Kawano, S. (1969): Effects of Land Reform on Consumption and Investment of Farmers. In *Agricultural Economic Growth: Japan's Experience*. K. Ohkawa, B.F. Johnston and H. Kaneda, eds. University of Tokyo Press, Tokyo, 374-397.

[11] Kayo, N. (1983): *Todohuken Nogyo Kiso Toukei* (Basic agricultural statistics by prefecture). Norin Tokei Kyokai, Tokyo.

[12] Ladejinsky, W. (1977): *Agrarian Reform as Unfinished Business* (edited by L.J. Walinsky). Oxford University Press, New York.

[13] Ogura, T. (1968): *Agricultural Development in Modern Japan*. Fuji Publishing, Tokyo.

[14] Yamagata Prefecture (1969): *Yamagataken Niokeru Beisaku Toukei* (Rice statistics in Yamagata Prefecture). Yamagata Prefecture, Yamagata.

[15] Yamagata Prefecture (various issues): *Statistical Yearbook*. Yamagata Prefecture, Yamagata.

農地改革の生産性効果
—山形県の稲作データによる検証—

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摘　要

「わが国の農地改革は農業における生産性を向上させた」とする見解は，統計的な検証を経ることなく，日本の農業関係者の間で素朴にかつ根強く信奉されてきている．しかし，近年経済学の分野で発展が著しい契約の理論によれば，定額小作制が卓越していたわが国の小作制度の下では，農地改革が正の生産性効果を持つことは，少なくとも短期においてはあり得ない．本稿では，既往の数少ないパイオニア的研究に従いつつ，山形県の稲作データを用いて，この見解が経験的に支持されうるか否かを検討した．主要な分析方法として，改革以前の小作地比率を改革後の稲作反収の増加率とを比較する方法をとった．県内市郡別データおよび特に小作地比率が高い二つの郡内の町村別データによる分析によれば，「農地改革は生産性効果を持たなかった」とする帰無仮説を棄却することは出来なかった。