Are Japanese bureaucrats politically stronger than farmers?: The political economy of Japan's rice set-aside program

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Abstract

The purpose of this paper is to examine the political process of bureaucrats' seemingly discretionary allocations among prefectures in Japan's rice set-aside program. Some hypotheses and a model are proposed and then these are empirically tested. Two major findings of this study are as follows:

Firstly, it is suggested that the bureaucrats' discretionary allocation tends to be revised in response to political pressure. Consequently, allocations among prefectures tend to be inversely proportionate to the degree of political pressures. Moreover, such pressures can be explained by the expected income from rice-production and the share of part-time farmers, who are the majority in Japanese rural society and politically powerful.

Secondly, among various factors which are publicly announced as those used in the calculation of allocation, it is suggested that those which may naturally reflect the market mechanism remain influential even after revision. Similarly, the factors which are contrary to the market mechanism, such as the share of full-time professional farmers, become less influential.

Key words: Rice set-aside program, Bureaucrats' discretion, Uneven allocations, Public choice, Political actors

JEL classification: Q180, H890

Introduction

It is often pointed out that Japanese bureaucrats have substantial influence in the process of political decision-making compared with those in the US. The field of farm policies is no exception. The bureaucrats in the Ministry of Agriculture, Forestry and Fisheries are said not only to wield broad discretionary powers in the implementation of farm policies, but also to often take a leading role among political actors, such as politicians and interest groups, in the determination of basic farm policy directions.

Over-production and huge gluts of agricultural products have troubled policy makers in developed countries over the last three decades. If the balance of supply and demand, and consequently the prices, of these overly produced commodities were at the mercy of the market, the reduction of farmers' income caused by the decrease of their prices would be unacceptable in the political process. Consequently, governments in many developed countries have intervened in the market and introduced supply-control policies such as market isolation and production quotas. Thus, it is not uncommon that these governments also carry out direct interventions such as set-aside programs for crops.

However, what is unique in the rice set-aside program in Japan is that the amount of set-aside acreage for each prefecture is allocated at bureaucrats' discretion and imposed as an inescapable duty[1]. Furthermore, these allocations are unevenly assigned among prefectures. For example, among prefectures, the ratio of set-aside acreage to the amount of total acreage of paddy fields varies from a maximum of over 50% to a minimum of less than 10%. This uneven allocation is calculated by bureaucrats instead of the market, taking account of several factors following desirable policy directions, such as low cost and high quality production.

The purpose of this paper is to examine the political process of this bureaucrats'

[1] In addition to this duty of set-aside acreage, new developments and enlargements of paddy fields have also been so stringently prohibited.

discretionary allocation in the rice set-aside program, focusing on the different stages of allocation among prefectures, from a viewpoint of public choice and to analyze the interdependence among political actors behind this allocation.

Although there have been a large number of studies concerning farm policies by the approach of public choice in the U.S., it is quite rare in Japan. One of exception, Fujimoto et al. (1983), examined the relationship between budgets for agriculture and the number and the position of politicians elected from rural constituencies. However, little study with regard to regulations has been carried out.

On the other hand, the rice set-aside program itself has been examined in a huge number of studies by Japanese agricultural economists. Yet, most of these studies were conducted under the preconception that a compulsory set-aside program is imposed on each farmer by a top-down decision-making system and farmers are suffering from this imposition. In these studies, the set-aside program has been regarded as if it were a policy in a totalitarian regime. In support of this notion, a national target for set-aside acreage has almost been accomplished. Most farmers faithfully abide by the regulations and detailed prescriptions of the government.

However, this paper reevaluates the widely preconceived notion of top-down decision making by seemingly all-powerful Japanese bureaucrats in set-aside allocations. The unevenness of allocation among prefectures is focused on as an important factor in this reevaluation.

Overview of the program and behaviors of political actors

Overview of the program

The allocation system of the rice set-aside program in Japan appears, in short, as a top-down decision making system by bureaucrats. The set-aside acreage assigned by the national government to each prefecture is similarly allocated to each village by officers in prefectural governments. Such allocations are also uneven among villages. Just as

local government officers allocate to villages, so village officers allocate to each hamlet. Thus, this process profoundly influences the allocation among hamlets and eventually the allocation among farmers.

Within an amount of set-aside acreage assigned to a hamlet, each farmer is allowed, as a rule, to adjust the assigned acreage by negotiating with neighboring farmers. Nevertheless, in reality, the leader of the hamlet assigns the set-aside acreage of each farmer proportionate to the size of each farm as a top-down impost.

It should be noted that, unlike set-aside programs in other countries, the subsidies to the farmers are not sufficient to compensate the income loss[2] caused by the reduction of rice production. Although farmers must, on the surface, follow the request of the hamlet's leader, they realize that the acceptance of an allocation results in net income loss and they have a justified grievance against this program. One of the most decisive factors which oblige farmers to fulfill a top-down impost of set-aside acreage, in spite of their unwillingness and their free-riding incentives, is commonly said to be the effect of mutual surveillance among farmers which a rural small community inherently possess. Since farmers do not want to be regarded as an uncooperative in a relatively closed and fixed community, they usually undertake their duty, albeit reluctantly.

Although farmers rarely utter grievances directly to government and take no radical resistive action such as anti-set-aside rallies or demonstrations, some of them occasionally direct bitter complaints about the allocation to the hamlet's leader at community meetings. Naturally, such complaints are transmitted from these leaders to local governments' officers and eventually to bureaucrats. They also may be transmitted from village agricultural cooperatives to prefectural federations of cooperatives and sometimes to politicians elected from their prefectures through lobbying.

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[2] Until ten years ago, the rice price had been directly controlled by government. Recently, such a stringent control of the price has been abolished. Nevertheless, still now the rice price is artificially sustained at the level higher than that at the supposed market equilibrium due to indirect price control by the set-aside program. Income loss is considerably large partly because of this artificial rice price support and partly because of low levels of other crops' prices and yields.

Consequently, it is reasonable to suppose that the political process transmits farmers' grievances, and ends up placing political pressure on bureaucrats[3].

How set-aside acreage is allocated among prefectures

As mentioned before, unevenness among prefectures is a remarkable feature of this seemingly discretionary allocation. Why have such uneven allocations of set-aside acreage among prefectures been intentionally generated and continued? What methods have been adopted by bureaucrats to calculate and allocate uneven set-aside acreages among prefectures? First of all, these questions are to be clarified prior to the analysis

Overall, the political process of determining allocations is not entirely transparent. Although most of the factors used in calculating set-aside acreage in each prefecture are made public, the formula for calculating these factors is not officially disclosed. Concrete data sources are also rarely disclosed. It can only be inferred by a statistic analysis as to which factors are prioritized and which are emasculated in the political process.

Table 1 shows such publicly disclosed factors. It can be observed that these factors adopted as variables in the calculation have gradually altered. It is also suggested that the formula of calculation has been becoming more intricate whenever the program entered a new phase.

Before we analyze the political meanings of these factors, two helpful aspects

[3] It is crucial in analyzing behaviors of bureaucrats from a viewpoint of public choice whether those bureaucrats, i.e. high-ranking officials in government are political appointees or not. If they are politically appointed, behaviors of them tend to be significantly affected by the policy direction of the ruling party and to become similar to those of politicians belonging to that party. That is, the behaviors of bureaucrats can be supposed to follow the re-election-maximizing principle. However, Japanese bureaucrats are not political appointees. In usual cases, it is reasonable to suppose that Japanese bureaucrats can be relatively resistant to political pressures and have an unshakable stance for their own policies' independency even under such pressures, compared with those in the U.S.

should be pointed out. To consider these two aspects will enable us to clarify backgrounds of each factor.

Firstly, it should be noted that these adopted factors were incorporated into the calculation formula not merely for the purpose of smooth and acceptable allocations. Bureaucrats intentionally introduced these factors in an attempt to implement programs represented by slogans aiming at a future vision of Japanese agriculture. For example, in the 1980s, the world market of agricultural products, especially grains, became glutted with developed countries' overproduction and export subsidies. As a result, the competition between exporting countries and importing countries became severe, so the Japanese government attempted to strengthen the competitiveness of Japanese agriculture by lowering costs of crops such as rice and wheat. This is why the factor representing the productivity of rice growing was intentionally introduced into the calculation formula. Furthermore, in this case, the change was officially disclosed, even often enthusiastically spread around in order to accelerate a nation-wide competitiveness strengthening campaign involving village offices, agricultural cooperatives and leaders of farmers.

In this sense, unevenness itself may often have a significant and positive meaning as a policy message from government to farmers, regional officers and others concerned. Uneven allocations play a guiding role to regional agriculture. For instance, if the allocation of set-aside acreage in a certain region is heavy, it can be interpreted that bureaucrats attempt to lead that region from rice mono-culture to diversified agriculture[4].

Secondly, it is helpful for understanding political meanings of each factor to consider to what extent each factor reflects the market mechanism. Although, bureaucrats attempt to artificially and intentionally introduce these factors, it is hard for

[4] Of course, unevenness may also often be formed as a passive meaning. For example, if soil condition of a region shows inadequateness in drainage and the region is considered to be unsuitable for upland crops, the allocation to that region may be reduced.

them to resist the natural tendency of the market mechanism. A factor which reflects the tendency of the market mechanism to some extent is expected to be relatively easily accepted by farmers and regions because that factor represents farmers' rational economic behaviors to some extent. On the other hand, a factor that has little relationship to or is contradictory to the market mechanism is unpalatable to farmers and regions.

Although this allocation system, as a whole, appears to be an anti-market-mechanism, each factor used in the calculation formula does not necessarily have an anti-market disposition. On the contrary, most factors can be considered to represent parts of an economic tendency revealed in a supply and demand schedule. For example, the rate of *Jishu-ryutsu-mai* (high quality rice) is regarded to represent a factor of the demand under recent consumers' preference towards high quality rice. On the other hand, "the crops production targets in each prefecture" is a future vision of crop production in each prefecture made by bureaucrats. Since these targets were calculated taking into consideration several sub-factors, such as the condition of drainage and yields, these are regarded as factors affecting a supply curve.

The "Share of full-time professional farmers" factor listed in Table 1 is a key factor to examine political meanings of this seemingly bureaucratic discretionary allocation, from the viewpoint of bureaucrats' national program objectives and from that of the relationship to the market mechanism. This factor was introduced for the purpose of focusing farm policy on full-time professional farmers.[5] The bureaucrats' intention itself sounded valid concern as their promotional campaign was enthusiastic.

However, the political feasibility of achieving this policy change seems to be low.

[5] In that time, part-time farmers in suburban areas were not only rich as a meaning of income flow from off-farm earning but also becoming rich as a meaning of asset because the price of land that they possess skyrocketed. Nonetheless, the farm policy had indiscriminately supported par-time farmers as well as full-time professional farmers. Consequently, this policy stance was scathingly criticized by newspapers and popular media-commentators. Therefore, a policy change from indiscriminate protection to targeted protection was urgently required.

Interest groups, especially agricultural cooperatives, are reluctant to promote this policy direction because the majority of farmers in Japanese rural society are part-time farmers. Politicians also hesitate to support this policy direction and in some cases, even oppose it, because it would disgruntle the majority of voters in their rural constituencies. Consequently, bureaucrats were the sloe advocates for this factor.

From the viewpoint of the relationship to the market mechanism, an attempt to introduce this factor is incompatible with a natural tendency under a freer market in the context of Japanese rural society. Most part-time farmers can obtain a sufficient amount of income by their off-farm earnings, so price-cuts of agricultural products do not cause them suffer severe problems, while full-time farmers suffer greatly. Thus, the most vulnerable class to market competition, especially in rice production, is full-time farmers. If bureaucrats attempt to introduce the “share of full-time farmers” factor, they would be required to overcome the resistance derived from the natural tendency of the market mechanism.

Behaviors of interest groups and bureaucrats

As previously mentioned, it is suspected that farmers’ grievances against compulsory set-aside duty are transmitted from village level to government level, and political pressure is in turn placed on bureaucrats. The next question to be clarified is how the political pressure is formed and how bureaucrats respond to this pressure.

It is widely observed not only in Japan but also in other developed countries that farmers as an interest group show an outstanding solidarity and exert political power to advocate for themselves. In usual cases, such political power would be exerted against other groups including the industry sector, consumer groups and tax payers. However, in this case, political power is exerted within agricultural sector, among regions.

It is commonly preconceived among general people in Japan, even among researchers, that the allocation among prefectures in the rice set-aside program is a

typical case in which the political power of bureaucrats' discretion is decisive. Indeed, bureaucrats in the ministry of Agriculture, Forestry, and Fisheries in Japan are relatively powerful among other political actors, compared with the ones in the U.S.

Nevertheless, in this study, it is our starting point that such bureaucratic discretionary decision-making may not be so uncompromising. It may also be doubtful that bureaucrats' discretion could overwhelmingly suppress political pressures. It is dubious whether allocation among prefectures would be determined one-sidedly in a top-down way. It is reasonable to suppose that political pressures generated from farmers' grievances against insufficient compensation have had an influence on bureaucrats' allocations to a considerable extent, under a normal democracy.

In addition to grievances against the program itself, feelings of injustice about the allocation among prefectures aggravate the political situation. Since an initial draft of allocations based on bureaucrats' discretion is calculated, taking into consideration priorities in their policy direction, unevenness of allocations among regions do not necessarily accord with unevenness of the degree of acceptance among regions[6]. Farmers' grievances derived from their subjective utility loss vary from farmer to farmer[7]. Such uneven farmers' grievances aggregate to uneven regional political pressure. Unevenness of farmers' subjective grievances and consequently regional political pressure are often magnified by uneven allocation. This magnified unevenness ferments feelings of injustice towards other prefectures' allocation[8].

There are two routes by which farmers' grievances are transmitted in a bottom-up

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[6] For example, a prefecture to which lighter burden of set-aside acreage is allocated may show stronger political pressure, requiring much lighter burden, if farmers' subjective utility loss in the prefecture is extremely high.

[7] An income loss of a farmer can be objectively estimated by calculation if he has a scrupulously taken book-keeping. However, a subjective utility loss does not necessarily equal to it. For instance, part-time farmers feel heavy burden to convert to other crops growing from conventional rice growing, as explained later in detail.

[8] The existence of these unfair feelings is becoming officially acknowledged, according to the report of the advisory council, *Seisan-chousei-kenkyukai* (the Council of the rice set-aside program) (2002).

manner: one through official route from a village office to a local government, and the other is via cooperatives. For officers in a local government, a low set-aside allocation in their region is preferable because it would be easier to implement. For directors in a prefectural federation of agricultural cooperatives, smaller allocations are also desirable because they would face less remonstrance from farmers. Regional and prefectural officers thus attempt to put political pressures on bureaucrats in unison. These political actors[9] may behave as if they constitute a united interest group representing a prefecture. As a result, bureaucrats face uneven political pressures among prefectures.

Hypotheses, models and methodology of analysis

Hypotheses

As mentioned previously, it seems that the allocation among prefectures is determined simply by the bureaucrats' discretion instead of the market. However, this paper hypothesizes that such decision-making at bureaucrats' discretion would not completely disregard the remonstrance of farmers. It is also assumed that the draft of the allocation would be revised, considering the degree of grievances.

Under this basic hypothesis, the following two concrete hypotheses are presented and empirically tested.

Hypothesis 1: Bureaucrats revise the initial draft of their discretionary allocations among prefectures in the direction approximately inversely proportionate to the degree of political pressure caused by farmers' grievances. Bureaucrats attempt to equalize the risk of the failure to achieve the assigned acreage in each prefecture. Moreover, the degree of political pressure is explained by two variables: the level of expected income

[9] Politicians elected from the region may sometimes play a role to assist such political movements from a sense of the so-called pork barrel action. But they do not lead such a movement. Their role is merely supplementary.

from rice production and the share of part-time farmers. In Japanese rural society, part-time farmers are the majority, while full-time professional farmers are the minority.

Hypothesis 2: Among the factors which are publicly announced to be used in calculating the allocation, those which reflect potential incentives derived from the market, such as low cost of production, tend to retain their considerable explanatory power even after the allocation is revised by incorporating farmers' grievances through a political process. Meanwhile, those which are not advocated by political actors other than bureaucrats and do not reflect potential incentives from the market are relatively emasculated after such a revision.

Hypothesis 1, especially the last part that the degree of political pressure is explained by two variables, the level of expected income from rice production and the share of part-time farmers, is explained in detail as follows:

The cost of rice production varies among regions. The price of rice also varies among regions, reflecting difference of quality. Reflecting these differences, farmers' income losses also vary from region to region[10]. Most Japanese farmers operate as a family farm. The principle of behaviors is not profit-maximizing but income-maximizing. Thus, expected income is the most suitable index for representing damage cause by set-aside programs[11]. Although subjective utility loss for a farmer cannot necessarily be equivalent to this objective income loss, it can approximately represent the relative relationship among regions if we compare them within the same farmers' categories, such as the part-time farmer class.

The point here is another variable, that is, the share of part-time farmers. Part-time farmers feel relatively heavy burden if they convert to new crops from conventional rice growing because of the increase of labor input and new investments of machines. Even

[10] Speaking accurately, income loss of rice production plus other converted crops' income plus subsidies is net income loss.
[11] Correctly speaking, this is only true under the assumption that subsidies and income from converted crops are the same. This assumption roughly holds on true.

in the case of fallowing, weeding is a laborious job on a hot and humid sunny day. Under rice cultivation, irrigated water covering paddies can prevent weeds. Furthermore, part-time farmers are accustomed to growing rice. It is easy for them to continue growing rice with routinely practiced, less laborious and low risk methods. Although they have sufficient income from off-farm earnings, income from growing rice is fairly attractive extra-revenue, mainly because it is not laborious. By contrast, for full-time professional farmers, the burden of conversion from rice to other crops is relatively lighter, although they also feel reluctance to set up new crops. The reason is that they can start such a relatively large amount of acreage with adequate labor power that returns on new investments are meaningful. Consequently, the grievances of part-time farmers relating to set-aside programs tend to be larger than those of full-time farmers.

Furthermore, the grievances of part-time farmers tend to be more overtly voiced from a political viewpoint. In Japanese rural society, part-time farmers are the majority, while full-time professional farmers are the minority. Since the decision making in agricultural cooperatives follows the one-member one-vote principle, the majority of rural society, that is, part-time farmers, can control the political orientation of agricultural cooperatives. Politicians also advocate the opinions of part-time farmers rather than those of full-time farmers because they are the majority of voters. Thus, part-time farmers are expected to be more politically influential than full-time farmers. It is reasonable to suppose that in a region where the share of part-time farmers is larger, the degree of grievances of farmers and political pressure of the region as a whole is stronger.

Model

In order to verify the validity of the hypotheses, a model and a multiple-regression were constructed as follows:

Hypothesis 1 was tested using a model consisting of the two explanatory variables

representing farmer's grievances and political pressure.

$PP_i = (EI_i, PF_i)$

$DSA_i = f(PP_i) = F(EI_i, PF_i)$

PP_i : Political pressure of i prefecture to bureaucrats

DSA_i: The degree of the burden of set-aside assignment imposed on i prefecture by the government

EI_i: The average expected income per day from rice production in i prefecture

PF_i: The share of households with part-time farmers in all households conducting agricultural activities in i prefecture

Expected signs are as follows:

$\partial DSA_i / \partial EI_i < 0$

$\partial DSA_i / \partial PF_i < 0$

Here, suppose that stronger political pressure in a certain prefecture makes bureaucrats revise and reduce its allocation to a larger extent. Consequently, it is expected that the degree of burden of set-aside assignment among prefectures is inversely proportionate to the level of average expected income and the share of households with part-time farmers.

Hypothesis 2 was tested by a multiple-regression consisting of the three explanatory variables. These variables were selected from the list of factors which are made public to be used in the formula of calculating allocations, as shown in Table 1. Since variables included in this multiple-regression are selected from the list above, they cannot cover all factors used in allocation calculations. Moreover, the purpose of analyzing this regression is not to verify the validity of explanatory variables, but to find

out the reduction of explanatory power of each variable, in order to detect the emasculation of factors. Therefore, this regression should not be called a 'model'.

$DSA_I = G$（$COST_i$, $QUALITY_i$, FTF_i）

$COST_i$: The average cost per bag (60kg) of rice in i prefecture[12]

$QUALITY_i$: The share of *Jishu-ryutsu-mai* (high quality rice) in total amount of distributed rice in i prefecture

FTF_i: The share of households with full-time professional farmers in all households conducting agricultural activities in i prefecture

Expected signs are as follows:

$\partial DSA_i / \partial COST_i > 0$

$\partial DSA_i / \partial QUALITY_i < 0$

$\partial DSA_I / \partial FTF_i < 0$

This conceptual model and regression need to be converted to empirical ones. To this end, functional form was considered. Theoretically, the effects of two variables in the model should be multiplied by the degree of political pressure. In this sense, double-log form seemed to be appropriate. With regard to the regression related to bureaucrats' seemingly discretionary allocation formula, there was no theoretical ground to adopt such a double-log form. However, the same functional form was adopted for the latter regression, considering that the consistency of functional forms enables us to compare appropriately.

[12] In Table 1, there is merely the name of factor, "Productivity" mentioned. No concrete data can be specified from this abstract notion. But, in this paper, we interpret this notion as a meaning of cost and the data related to cost was adopted as one of the selected explanatory variables.

$$Log(DSA_i) = \alpha_0 + \alpha_1 Log(EI_i) + \alpha_2 Log(PF_i)$$

$$Log(DSA_i) = \beta_0 + \beta_1 Log(COST_i) + \beta_2 Log(QUALITY_i) + \beta_3 Log(FTF_i)$$

In order to confirm the validity of the selection of functional form by theoretical considerations, the RESET tests and the White hetero-skedasticity tests were carried out. With regard to the political pressure model, the results of the RESET tests showed that the possibility of existing errors was highly rejected. Other functional forms such as linear and semi-log type were also tested. There was no other form which shows remarkably better performance than double-log form. The functional form adopted by theoretical considerations was empirically confirmed to be valid. The results of the White tests showed that, in every year except for 1980, the possibility of existing hetero-skedasticity was rejected. This fact also indirectly suggests the validity of the selection of functional form. As for 1980, the result relating to t-statistics using the White hetero-skedasticity consistent covariance was also juxtaposed with the results from normal estimation[13].

With regard to the regression related to bureaucrats' seemingly discretionary allocation formula[14], the results of the White tests showed that the possibility of existing hetero-skedasticity was significantly suspected in 1984 and 1988. Consequently, as similarly as the case of the political pressure model, the results of these two years relating to t-statistics using White hetero-skedasticity consistent covariance were shown to be parallel.

Estimation method and data

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[13] According to Davidson and McKinnon (1993), results of this estimation method become unstable when the number of sample is not so large. In that case, adoption of this method instead of conventional estimation does not necessarily warrants us to improvement of the estimation. Hence, here, both results were shown,

[14] To discuss absolute values of the results of the RESET tests relating to this regression is inherently meaningless because not all conceivable factors are incorporated into the regression.

The estimation method adopted on two regressions is principally OLS. But as mentioned before, in some cases where hetero-skedasticity was observed, White hetero-skedasticity consistent covariance was employed. Estimation tests were conducted by a cross-prefecture multiple regression over twenty-two years. Data were collected from official statistics and government-published data on the rice set-aside program ("*Suiden-riyou Saihen-taisaku Jisseki-chousa Kekkahyou*" [Surveys of the situation of the implementation of the rice set-aside program] (1980-2001)).

With regard to explanatory variables, PF and FTF, the data from statistics of the Agricultural Census (1975-2000) were employed. The data related to EI and COST were calculated from statistics of the "Surveys of Rice Production Cost" (1975-2001). The data of QUALITY were obtained from the "*Beika ni Kansuru Shiryo*" [documents relating to rice price] (1979-2001) released from the Food Agency. As for PF, extremely small farms, which were operated for the purpose of hobby farming, were excluded. As for FTF, full-time but elderly farmers, i.e. over sixty, were excluded. As for COST, since the data in years when severe cold weather damaged the yield of rice were abnormal, the data in such years were replaced by those in normal years.

In determining a dependent variable, there were several data constraints. The rice set-aside program started in 1971, however, the data in the first decade are not available. Therefore the observation period is from 1980 to 2001. The degree of set-aside allocation was represented by the figures of set-aside acreage divided by total acreage of paddy fields. This figure was extremely high in Tokyo, Osaka and Kanagawa prefectures because land conversion to non-farm use from farm use has rapidly progressed due to urbanization in these areas. Therefore, these prefectures were excluded from the sample.

Results

The table 2 shows the results of the political pressure model. Signs of all explanatory variables in each year are consistent with theoretically expected ones. Moreover, the values of adjusted R square are more than 0.6 from 1988 to 1993. These levels are judged to be a considerably good performance, considering average scores of cross-section analyses. All figures of t-statistics of the two explanatory variables are also highly significant. Overall, hypothesis 1 was empirically supported.

Consequently, these suggest that bureaucrats consider the balance of farmers' grievances against the set-aside program among regions and tend to revise the allocation of set-aside acreage in inverse proportion to the degree of farmers' grievances. Thus, political pressure can be succinctly explained by two variables: expected income, which represents a loss of rent, and thereby the degree of grievance; and the share of part-time farmers, which represents a majority of farmers who tend to express their complaints.

If we take a look at time-series figures in detail, a further discovery can be found. From 1978 to 1986, the scores of adjusted R square had not been high, while, in the middle part of the observation period, they had been adequately high. Then after 1994, they have gradually been decreasing. This fact can be well explained by the policy change which happened during this period. This will be explained in detail in the next section.

Table 3 shows the results of the multiple regressions consisting of several selected factors which are made public to be used in bureaucrats' seemingly discretionary allocation formula. According to these results, some explanatory variables in some years were insignificant or showed the wrong sign. In particular, FTF showed the worst statistical performance. Signs consistently contradicted expected ones and these wrong signs and the figures of coefficients were highly significant. Since this explanatory variable is one of the factors rarely advocated by political actors, except for bureaucrats, and its features are contrary to the market mechanism, hypothesis 2 was empirically supported.

On the other hand, COST showed good statistical performance. Signs are the same

as the expected ones and the scores of all coefficients were significant at 10% level; the scores of 80% of them were significant at 1% level. The slogan, “low cost production”, which had been promoted during the 1980s and until now, was surely realized in bureaucrats’ seemingly discretionary allocations. The crucial reason is suspected to be inherently in accordance with the market mechanism.

QUALITY showed a relatively fuzzy disposition between that of the variable, COST, and that of the variable, FTF.

In short, Table 3 suggests that, among various factors which are publicly announced as those used in the calculation of allocations, those which naturally reflect the normal market situation are influential even after being revised in the political process, while those, the features of which are contrary to the market mechanism, are suspected to become less influential after political revision. In particular, it is suggested that the latter factors, such as the share of full-time professional farmers, may be emasculated in the political process, irrespective of bureaucrats’ initial intention.

Discussion

Change of the model’s explanatory power

The change of the model’s explanatory power, which was typically observed in time-series change of scores of the adjusted R square, can be well explained by the policy change during this period.

At the beginning of this program, the ratio of set-aside acreage to production area was not so large. Therefore, farmers’ grievances themselves might not have been so serious. Furthermore, bureaucrats had taken a relatively high-handed stance towards prefectures in order to fulfill the targeted reduction. As a result, it is likely that the explanatory power of the model is not so high under a combination of lower political pressure and bureaucrats’ stronger inclination for discretionary decision-making.

However, in the middle of the observation period, government had to force farmers

to accept higher levels of set-aside acreage because of an accumulated glut of rice. In order to achieve this high targeted set-aside acreage, government changed the stance towards lending their ears to farmers' complaints at regional level. This might have played a role in collecting information about the acceptability of each region. It is convincing that the explanatory power of the model shows highest performance during this middle part of the period. In other words, this middle part of the period is a typical age when the political situation which is depicted by the model can actually be observed.

The explanatory power of the model decreased again during the last part of the observation period. The reason may be inferred that government changed the basic direction of allocation from an artificial and intentional policy-oriented principle to a market-oriented principle.

Bureaucrats' behaviors as rational individuals

One of the points of this study is that, even though bureaucrats in Japanese ministries are not political appointees, it is suggested that the allocation of the rice set-aside program by bureaucrats' discretion can be revised by political pressure. Therefore, the incentives that force bureaucrats to accept such political pressure should be clarified.

Among the principles of bureaucrats' behaviors which have been explained in previous studies in the field of public choice, the budget-maximizing principle presented by Niskanen (1971) is one of the most plausible and widely accepted. However, this theory cannot apply to this case of set-aside programs because it is not a matter of budget but one of regulation[15]. On the other hand, as Downs (1967) and Chant

[15] Regulation theories, such as the conceptual model by Peltzman (1976), seem to be applicable. Nevertheless, it is difficult because the model assumes that government as a policy maker and bureaucrats as those in charge of its implementation are aimed at maximizing the probability of being re-elected. This means that bureaucrats are political appointees. This is not suitable for the case of Japanese bureaucrats who are not

and Acheson (1972) pointed out, prestige is one of the important incentives for bureaucrats' behaviors. According to Breton and Wintrobe (1982), many other studies concerned with incentives of bureaucrats' behaviors mentioned that career promotion is also an important incentive.

Prestige and promotion may explain why bureaucrats in charge of rice set-aside programs accept political pressures relatively easily even though they are not political appointees. To insist on promoting a future Japanese agricultural vision may contribute to their career and prestige, of course. However, it would bring more serious damage to their prestige and an individual's career if such insistence incurred strong resistance to uneven discretionary allocation from some prefectures and eventually resulted in a fatal deadlock or the like.

On one side, to continue to chant slogans which support publicly disclosed factors used in the allocation calculating formula, and on the other side, to reconcile with political pressure, is a wise strategy for bureaucrats to maintain their prestige and the possibility of individuals' career promotions. Since how to weight these factors in the calculation formula is not transparent, bureaucrats can take advantage of this lack of transparency to achieve both program and political objectives: chanting slogans in order to promote future visions, and reconciling with political pressure by lessening the weights of strongly opposed factors in the calculation.

Additionally, it should be noted that, in a sense, such behaviors should not be one-sidedly criticized as a political distortion. As mentioned above, indeed, such revision may often cause undesirable and inefficient resource allocation. However, bureaucrats inherently have a limited volume of information related to farmers' subjective utility loss. To take note of farmers' grievances is, from a political viewpoint, an improvement in bureaucrats' attitude, compared with that in some decades ago. As textbooks of public economics often mention, government, if it attempts to replace the market, intrinsically has insufficient information. This feature causes so called

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political appointees.

government failure. In a sense, the fact that farmers' grievances are transmitted to bureaucrats in a bottom-up manner is appreciated as a complement to the supply information to bureaucrats and government in order to prevent government failure. It may also be said in the political science context that bureaucrats should positively and willingly take note of farmers' grievances, aside from problems in the economic context, as explained in the next sub-section.

Market, bureaucrats and political intervention

In regions where full-time farmers are densely concentrated, the burden of set-aside acreage is heavy, while it is lighter in regions where part-time farmers are concentrated. This may surprisingly suggest that policies favoring full-time professional farmers and reducing support for part-time farmers are completely emasculated. The next question is why such a paradoxical phenomenon happens.

Discretionary allocations carried out by bureaucrats instead of the market place importance on optimal resource allocation. However, discretionary allocations may pay little attention to fair income distribution. The degree of farmers' grievances can be regarded as representing the possible loss of farmers' utility. Therefore, the imbalance of political pressure among prefectures can be interpreted as a result of unfair redistribution caused by the allocation by bureaucrats. As Peltzman (1976) pointed out, because of the dominance of political pressure for redistribution on the regulatory process, it is difficult and unrealistic for the allocation of set-aside acreage among prefectures to be determined only by the discretionary judgments of bureaucrats who mainly consider optimal resource allocation, not fair income distribution.

The discretionary allocation carried out by bureaucrats inherently has a possibility of "government failure" because the information which bureaucrats can obtain and utilize is insufficient for achieving optimal resource allocation compared to the market. In this sense, it is difficult for bureaucrats to optimally implement the discretionary

allocation, substituting for the market mechanism. Furthermore, with regard to fairness of income distribution, inadequate information may be provided to bureaucrats because farmers' subjective utility loss cannot be revealed in statistic data or any other officially published information. On the other hand, the principle of farmer behavior depends upon income distribution. Political pressure also derives mainly from unfairness of income distribution. When bureaucrats face political pressures from some regions, they may not be able to persuade protesters and may find it difficult to resist such claims.

If we judge this outcome from a viewpoint of political science, it may be significant to some extent because top-down decision making was tempered by a bottom-up process, incorporating farmers' opinions into allocations among regions. In addition to this, such opinions accurately represent the majority of rural society. However, if looked at from an economic viewpoint, it can be said to be irrational. This is because efficient low cost farming by full-time farmers are relatively strongly restricted, while rich but inefficient part-time farmers are suffering less income loss and are more supported by government policy.

The policy implication from this study is clear. In the past, Japanese bureaucrats have been powerful and played a major role among political actors. This rice set-aside program and discretionary allocation among prefectures might have been established under this tradition. However, in a society where democracy has matured, such top-down decision making might have become unacceptable, faced with grievances of voters and political pressures. These political pressures may include helpful information which contributes to improvement in the fairness of income distribution. However, on the other hand, they may cause irrational resource allocation.

The lesson from the experience in the rice set-aside program suggests that bureaucrats' discretionary allocation could not efficiently replace the market mechanism. The complementary political process may also be inadequate and make the allocation more perverse. An alternative method is to incorporate the market mechanism, step by step.

Concluding remarks

The two major findings of this study are as follows:

Firstly, it was suggested that the bureaucrats' discretionary allocation tends to be revised in response to political pressure. Consequently, allocations among prefectures tend to be inversely proportionate to the degree of political pressures. Moreover, such pressures can be explained by the expected income from rice-production and the share of part-time farmers, who are the majority in Japanese rural society and politically powerful.

Secondly, among various factors which are publicly announced as those used in the calculation of allocation, it was suggested that those which may naturally reflect the market mechanism remain influential even after revision. Similarly, the factors which are contrary to the market mechanism, such as the share of full-time professional farmers, become less influential.

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Table 1 List of Factors Used in the Calculation of Allocations

Phase	Major factors to be incorporated into the calculation
Phase 1 (1971-1975)	1. Proportionate to the past production 2. Proportionate to the past amount to be purchased by government 3. The crop production targets in each prefecture*
Phase 2 (1978-1986)	1. The crop production targets 2. Share of *Jishu-Ryutsu-mai* (high quality rice) 3. Specification index to promoted crops 4. Ratio of well-drained paddy 5. Frequency of suffering from natural disasters such as cold whether and flood 6. Share of the paddies in urbanized areas 7. Share of enlarged and improved paddy plots equipped with drainage facilities
Phase 3 (1987-1992)	Six factors on the list above from 2 to7 plus 1. Productivity 2. Share of full-time farmers 3. Dependency of agriculture on rice production
Phase 4 (1993-1995)	Reduced acreage of set-aside was calculated by factors as follows: 1. Productivity 2. Share of full-time farmers 3. Dependency of agriculture on rice production 4. Willingness of the return to rice production
Phase 5 (1996-1997)	Increased acreage was calculated by factors as follows: 1. Proportionate to the past acreage of paddy 2. Share of full-time farmers 3. Share of *Jishu-Ryutsu-mai* (high quality rice)
Phase 6 (1998-1999)	Increased acreage was calculated by factors as follows: 1. Proportionate to the past acreage of paddy
Phase 7 (2000-)	Increased acreage was calculated by factors as follows: 1. Amount of the stock of *Jishu-Ryutsu-mai* (high quality rice) 2. Dependency of rice production on the rice purchased by government (low quality rice)

Source: Ministry of Agriculture, "*Seisan-chosei no genjou to kadai*" [The present situation and problems of the rice set-aside program], 2002.

Note*: The crop production targets in each prefecture are an estimation of future crop production in each prefecture made by bureaucrats, calculated taking account of several sub-factors, such as the condition of drainage and yields.

Table 2 Result of Estimation (The Political Pressure Model)

Fiscal Year	Expected income per day from rice production (EI)	Share of households with part-time farmers (PF)	Adjusted R square R^{-2}
1980	-0.363852***(-3.00255)	-1.002532***(-5.77202)	0.503765
1981	-0.251741**(-2.57040)	-0.859714***(-5.16702)	0.443716
1982	-0.184163*(-1.86839)	-0.867369***(-4.89194)	0.402766
1983	-0.236255**(-2.41409)	-0.825965***(-4.47391)	0.433857
1984	-0.294446***(-2.90368)	-0.898810***(-4.68543)	0.473509
1985	-0.364873***(-3.411453)	-0.910321***(-4.64972)	0.503296
1986	-0.319392***(-3.30278)	-0.957067***(-5.06892)	0.517103
1987	-0.248964***(-3.56378)	-0.778303***(-5.76498)	0.577108
1988	-0.213605***(-3.65822)	-0.789413***(-6.03306)	0.601293
1989	-0.227878***(-3.90512)	-0.762154***(-5.99149)	0.633393
1990	-0.211456***(-3.67650)	-0.704900***(-5.40015)	0.610086
1991	-0.201192***(-4.01013)	-0.683793***(-5.19517)	0.634754
1992	-0.250787***(-3.95489)	-0.641582***(-4.17073)	0.605816
1993	-0.317816***(-4.22996)	-0.739775***(-4.47477)	0.652930
1994	-0.322426**(-2.53246)	-1.115280***(-4.22778)	0.502611
1995	-0.347100***(-2.91654)	-0.993991***(-5.29453)	0.542807
1996	-0.303561***(-3.15725)	-0.881055***(-6.13591)	0.588032
1997	-0.299818***(-3.08345)	-0.859529***(-5.69315)	0.581906
1998	-0.175921***(-2.84252)	-0.651020***(-5.63132)	0.565174
1999	-0.183496***(-3.16990)	-0.604000***(-5.15015)	0.565639
2000	-0.182533***(-3.47584)	-0.583132***(-5.03141)	0.573908
2001	-0.143168***(-3.06659)	-0.516459***(-5.10857)	0.540680

Note: 1) Figures in the first and second columns are the scores of parameter coefficients. Those in parentheses are scores of t-statistics.

2) *P<0.1, **P<0.05 and ***P<0.01

Table 3 Result of Estimation (Regressions Relating to Bureaucrats' Discretion)

Fiscal year	Share of households with full- time farmers (FTF)	Average cost per bag of rice (COST)	Share of *Jishu- ryutsu- mai* (High quality rice) (JISHU)	Adjusted R Square (R^2)
1980	0.10353(1.42346)	0.49015**(2.54991)	-0.14620**(-2.36458)	0.319883
1981	0.06347(0.92714)	0.49110* (1.82013)	-0.13948**(-2.50822)	0.233590
1982	0.06685(1.03292)	0.52976**(2.65238)	-0.11905**(-2.10339)	0.296930
1983	0.09894(1.48625)	0.66166***(3.08470)	-0.14607**(-2.51483)	0.357808
1984	0.15233**(2.46090)	1.06927***(4.81020)	-0.15546***(-3.02321)	0.492769
	**(2.10653)	**(5.05181)	**(-2.68382)	
1985	0.10389(1.49822)	0.66808***(3.51768)	-0.19554***(-3.50770)	0.410533
1986	0.14011**(2.13317)	1.11849***(4.63530)	-0.14939***(-2.86602)	0.498465
1987	0.12383**(2.52331)	0.79062***(5.09708)	-0.09852**(-2.49713)	0.510986
1988	0.08896*(1.69799)	0.70547***(3.41447)	-0.12913**(-2.50536)	0.378622
	(1.49682)	***(3.85892)	*(-1.86693)	
1989	0.17634***(3.88629)	1.02499***(5.61896)	-0.29165**(-2.15429)	0.487166
1990	0.14211***(3.41031)	0.70068***(4.97968)	-0.14433**(-2.68288)	0.577618
1991	0.07639 (1.62473)	0.33884**(2.45223)	-0.26155***(-3.48585)	0.365581
1992	0.08941*(1.95487)	0.81918***(4.86336)	-0.29334***(-3.67120)	0.498842
1993	0.16841***(3.19447)	0.93959***(4.36878)	-0.98989 (-1.11960)	0.379464
1994	0.32378***(4.70731)	1.55627***(5.34282)	-0.32353**(-2.53926)	0.566989
1995	0.19951***(3.40856)	1.12118***(3.99142)	-0.34262**(-2.17628)	0.424676
1996	0.14880***(3.40450)	0.99551***(5.15642)	-0.27649**(-2.17636)	0.507915
1997	0.17312***(3.52664)	0.89649***(4.53426)	-0.13040 (-1.14917)	0.431648
1998	0.13678***(3.31782)	0.77235***(4.41765)	-0.09809 (-0.28284)	0.452057
1999	0.12527***(3.12786)	0.69758***(4.61436)	0.04182 (0.16902)	0.417774
2000	0.16717***(4.18409)	0.92626***(6.15059)	0.30184 (0.99480)	0.520145
2001	0.12702***(3.78763)	0.67454***(5.20378)	0.04703 (0.23939)	0.468927

Note: 1) Figures in the first and second columns are the scores of parameters' coefficients. Those in parentheses are scores of t-statistics.

2) *P<0.1, **P<0.05 and ***P<0.01

3) Figures on lower lines in 1984 and 1988 are t-statistics calculated from White hetero-skedasticity consistent covariance.

4) Shaded figures showed different signs from the theoretically expected ones.