THE DETERMINANTS OF FARM EXIT IN JAPAN:
SOME EMPIRICAL FINDINGS

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Summary
An econometric model that describes an individual household's decision to move out of agriculture as a function of land use and socioeconomic factors is developed. Two versions of the model are estimated for total farm households and farm households by holding. The overall fit for the model ranges from 0.51 to 0.78. The number of workplace per capita, industrial output per capita, proximity to an urban area, public works expenditure and geographical differences are significant in describing farm exit. Thus, regional industrial activities and government's expenditure on public works affect individual's decision to move out of agriculture. With regard to holdings, results suggest that transfer of land use right for agricultural purposes is mainly among the mediumholder households.

Key words: farm exit, land use right transfer, scale expansion

INTRODUCTION
The shift of labor to non-agricultural pursuits in Japan occurred as far back as the early 1920s (Dovring2). The trend, however, deviated in the 1940s that resulted in population pressure on the farmland and favored the land reform of 1949. According to Mitsuhashi12) and many other authors, the land reform established owner farming systems and restricted transfer of land, and ultimately protected the right of tenant farmers. In contrast, the land reform had increased the number of small-scale farmers who can hardly adjust to the current imperatives.

Having perceived the difficulties embodied in the tenant-protected Agricultural Law of 1949, the government enacted the Agricultural Land Use Promotion Law in 1980 to stimulate land market in the rural areas. However, the traditional le system* and its attendant attachment to farmland by the farm family resulted in the emergence of large non-commercial or hobby farmersb. Apart from holding land as a hedge against future adversaries, the farm family perceives farmland under the le system as perpetuity of family name, family property and family business. Nevertheless, following Sjaastad15) that migration occurs when the present value of benefits exceed associated costs, economic prosperity is expected to erode social values and traditions associated with the le system.
Some of these weaknesses are manifested in the following behavior: the quest for city life, hesitation of young heirs to succession, and unwillingness of young girls to become wives in the farm household. Coupled with the declining contribution of agriculture to the farm family income—mainly among holders of farmland up to 1 hectare—the uncommitted smallholder successors are gradually giving way to somewhat large-scale viable operators. These full-time farmers expand their operation mainly through renting in of land, since all households are inherently attached to their farmland.

The current partial liberalization of the rice market and other deregulations require the cost-effectiveness and reorientation of the Japanese farmer in order to fit these challenges. Scale expansion is one of the methods that can raise cost-effectiveness, hence raising the international competitiveness of the farmer.

Although Waswo describes the incentives that promote post-War farm exit for those at the other end of holdings, the object of this paper is to analyze farm exit, which is one of the contributors to scale expansion, through a cross-section model. This paper is organized as follows. The conceptual framework, model, and data are described in Sections 2 and 3, respectively. The overall regression results and estimation results by holding are reported with discussions in Section 4. Section 5 contains summary and conclusions.

**CONCEPTUAL FRAMEWORK**

The present analysis assumes that households are utility maximizers who choose between traded and nontraded goods. The traded goods are the market values and nontraded goods, nonmarket values, are those provided by the state and local governments. These nonmarket values are in turn expected to influence behavior because of structural differences in resource endowment and policy implementation. On the other hand, the Japanese society imputes high reservation value to farmland since farmland remains the chief raison d'être of the household under the le system. Also, the generation of farmers that witnessed or experienced the pre-War tenant system will remain obdurate to changes concerning land tenure. Therefore, the decision to quit agriculture is largely motivated by internal and external variables.

The internal variables pertain to the farm household’s perception of agriculture and the le system. For example, households with large holdings are more inclined to remain in agriculture than otherwise. In the same respect, a highly educated household will quit agriculture if the parents cannot continue farming. This particular household will be willing to lease out his farmland at a lower reservation rental rate or put it under the care of a farmer than other households with lesser holdings.

The external variables relate to regional current land use and regional development policies. For example, preservation of agricultural land as a measure of an environmental resource will ultimately bar the conversion of land with development potential in the urban fringes. On the other hand, developmental ambitions that allow large tracts of farmland to be converted to other uses have two effects on farm exit—the direct loss of land through
sales and the multiplier effect generated by attracting commuter-workers. On the whole, the general economic well-being of a region is expected to depress farm exit as households tend to maximize their income and retain their farmland.

MODEL AND DATA

According to Evans migration occurs due to disequilibrium or interregional differences. Perhaps the basic question here is to ascertain that the local labor market is in equilibrium. The Japanese economy had a study growth toward the mid-and late 1980s with an average unemployment rate of 2.1%. The period selected for this investigation, 1985-1990, is justified because the late 1980s marked a period of steady economic growth, enormous investment in labor-saving devices, highest farm exit since 1965 (an annual average from 1950 to 1990 was 9.2%), and influx of immigrant workers. As noted above, however, individual households may be indifferent to move out of agriculture mainly due to the le system. Indeed, the equilibrium approach is assumed throughout this study.

The factors affecting farm exit can be broadly categorized into 5 groups. 1. General development variables are overall standard of living per capita, per capita income, and urbanization that measures off-farm job market opportunities and encroachment on agricultural land. 2. Land use variables contain public expenditure on agricultural development and social welfare, and agricultural output. These variables measure technical progress and importance of agriculture in a particular region. 3. Industrialization variables that measure industrial activities in a particular region. Following Graves these are expected to capture employment variability among the regions. 4. Human capital variables such as expenditure on education per capita, proportion of the population that completed more than 9 years of schooling, and proportion of the population that is aged above 65 years in agriculture. This follows Shaw that industries that are declining contain older individuals because of their high cost of migration. In the Japanese context it may account for the number of people who had made a U-Turn in agriculture. 5. Dummy variables that quantify structural differences between the regions.

These 5 categories are included in the following single-equation farm exit model:

\[ FM_{nj} = f(X_1, X_2, X_3, X_4, X_5) \]

Where:

- \( FM \) = Farm household \( n \) in region \( j \) difference between 1985 and 1990 (later household group \( n \) by holding in region \( j \))
- \( X_1 \) = Vector of living standard variables
- \( X_2 \) = Vector of land use variables
- \( X_3 \) = Vector of industrial variables
- \( X_4 \) = Vector of human capital variables
- \( X_5 \) = Vector of intercept and slope dummy variables

The data employed in the analyses below were obtained from 2 main sources. The majority of data on agricultural variables were from government publications, while the data on important economic indicators were from a private data base publication. Table 1
presents the sources and definitions of variables used in estimation of the farm exit model, while descriptive statistics of the dependent variables are presented in Appendix 1.

Data for the dependent variable, farm exit, is the net out-migration of farm households from agriculture between 1985 and 1990. Since farm exit enters the regression as the dependent variable, it would be desirable to express farm exit less households which lost land to uses other than agriculture. Despite availability of data on conversion of land to other uses, it is difficult to differentiate the category of farm households who quit agriculture through land use transfer and conversion of farmland to other uses. That is to say, a farm household can sell his land and move out of agriculture or give away part of his holding to other uses but continue to farm the rest of his land. However, this weakness is expected to be captured by urbanization and other related variables. The intercept variables divide the sample set on the basis of geographic location to account for weather, transportation, resource endowment and cultural differences. Also, the percentage of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSD</td>
<td>Normalized cumulated standard of living/capita</td>
<td>MR</td>
</tr>
<tr>
<td>GAO</td>
<td>Normalized gross agricultural output/capita</td>
<td>MR</td>
</tr>
<tr>
<td>JSO</td>
<td>Normalized distribution of workshops/capita</td>
<td>MR</td>
</tr>
<tr>
<td>PIC</td>
<td>Normalized prefectural per capita income</td>
<td>MR</td>
</tr>
<tr>
<td>PWE</td>
<td>Normalized public works expenditure/capita</td>
<td>MR</td>
</tr>
<tr>
<td>IDO</td>
<td>Normalized industrial output/capita</td>
<td>MR</td>
</tr>
<tr>
<td>PAD</td>
<td>Normalized ratio of paddy to agricultural land</td>
<td>MAFF</td>
</tr>
<tr>
<td>DID</td>
<td>Normalized percentage of rural communities</td>
<td>MAFF</td>
</tr>
<tr>
<td>LR</td>
<td>Normalized land rental rate per hectare</td>
<td>MAFF</td>
</tr>
<tr>
<td>EDU</td>
<td>Normalized expenditure on education/capita</td>
<td>MR</td>
</tr>
<tr>
<td>SHS</td>
<td>Normalized percentage of population that completed more than 9 years of education</td>
<td>SBMCA</td>
</tr>
<tr>
<td>AGE</td>
<td>Normalized proportion of the population that is aged above 65 years in agriculture.</td>
<td>MAFF</td>
</tr>
<tr>
<td>TOH</td>
<td>Dummy variable for Tohoku agricultural region</td>
<td></td>
</tr>
<tr>
<td>KAN</td>
<td>Dummy variable for Kanto agricultural region</td>
<td></td>
</tr>
<tr>
<td>HOK</td>
<td>Dummy variable for Hokuriku agricultural region</td>
<td></td>
</tr>
<tr>
<td>TOK</td>
<td>Dummy variable for Tokai agricultural region</td>
<td></td>
</tr>
<tr>
<td>KIN</td>
<td>Dummy variable for Kinki agricultural region</td>
<td></td>
</tr>
<tr>
<td>CHU</td>
<td>Dummy variable for Chugoku agricultural region</td>
<td></td>
</tr>
<tr>
<td>SHI</td>
<td>Dummy variable for Shikoku agricultural region</td>
<td></td>
</tr>
</tbody>
</table>


Note: Normalization is to national averages, land rent used in the analysis corresponds to paddy field rental rates. DID is the acronym for densely inhabited districts, a district within a municipality where population is 5,000 and more persons. The data 'DID', however, are the percentage of rural communities located nearest to a DID that require 30 minutes by principal means of transport, e.g., bus.
paddy field to total agricultural land is included to capture topographic and other physical features.

Before an explanation of the analyses can proceed, a small amount of background on the Japanese system of regional, local governance, and agricultural demarcation is required. Japan is divided into 47 locally elected regional government called Ken (43), Fu (2), Do (1), and To (1). These are often referred to collectively as prefectures (see Map 1). The prefectures are subdivided into Cities (Shi), Towns (Machi) and Villages (Mura). Large cities are sometimes further divided into Ku (wards). The country is divided into 9 agricultural regions, namely Hokkaido, Tohoku, Hokuriku, Kanto-Tosan, Tokai, Kinki, Chugoku, Shikoku, Kyushu, and Okinawa (see Map 1).

Each of the above administrative divisions is nominally self-governing but has little autonomy— for example, virtually all local tax rates are set at the national level. Indeed, tax, employment and price variables are omitted because the analysis is cross-sectional and these variables are considered to be in equilibrium. The analysis includes only 44 prefectures. The following prefectures are not included: Hokkaido, where farmers own larger holdings than other parts of the country; Okinawa, which is far off the main islands; and Tokyo, an outlier, is considered to be a non-agricultural region due to excessively large indicators. All the independent variables are normalized to national averages.

**EMPIRICAL RESULTS**

A linear in logarithms function for the farm exit model was estimated. The reliance on census data set with high correlation among the variables resulted in the omission of several variables. Some of the variables listed in Table 1 were omitted due to high correlation, while others were not statistically significant. A variable was retained in the final specification if the standard error of the coefficient was not exceptionally high. In addition, the use of in logarithms means that the estimated coefficients can be interpreted as elasticities. These elasticities indicate the percentage changes in farm exit as a result of percentage change in each of the retained explanatory variables.

To capture the differences, such as traditional, cultural, and geographic specific dummy variables (1 equal to a specific agricultural region and zero otherwise) are introduced. In all, there are 7 agriculture regions for the area under consideration. To avoid singularity, the Kyushu agricultural dummy was not included in the estimation because of a constant term. The estimation was carried out in two steps. First, the total farm exit was regressed on the explanatory variables and the dummy variables listed in Table 1. Second, farm exit by holding was estimated for holding categories that showed sufficient positive differences or out-migration. The estimation results are presented in Table 2.

**Combined Model**

The farm exit model containing observation of the total farm exit between 1985 and
MAP 1. Agricultural and Prefectural Divisions of Japan

I. Hokkaido agricultural region
   (1) Hokkaido Prefecture

II. Tohoku agricultural region
   (2) Aomori Prefecture
   (3) Iwate Prefecture
   (4) Miyagi Prefecture
   (5) Akita Prefecture
   (6) Yamagata Prefecture
   (7) Fukushima Prefecture

III. Hokuriku agricultural region
   (8) Niigata Prefecture
   (9) Toyama Prefecture
   (10) Ishikawa Prefecture
   (11) Fukui Prefecture

IV. Kanto-Tosan agricultural region
   (12) Ibaraki Prefecture
   (13) Tochigi Prefecture
   (14) Gunma Prefecture
   (15) Saitama Prefecture
   (16) Chiba Prefecture
   (17) Tokyo Prefecture
   (18) Kanagawa Prefecture
   (19) Yamanashi Prefecture
   (20) Nagano Prefecture
   (21) Gunma Prefecture
   (22) Shizuoka Prefecture
   (23) Aichi Prefecture
   (24) Mie Prefecture
   (25) Shiga Prefecture
   (26) Kyoto Prefecture
   (27) Osaka Prefecture
   (28) Hyogo Prefecture
   (29) Nara Prefecture
   (30) Wakayama Prefecture
   (31) Tottori Prefecture
   (32) Shimane Prefecture
   (33) Okayama Prefecture
   (34) Hiroshima Prefecture
   (35) Yamaguchi Prefecture

VII. Chugoku agricultural region
   (36) Tottori Prefecture
   (37) Shimane Prefecture
   (38) Okayama Prefecture
   (39) Hiroshima Prefecture
   (40) Yamaguchi Prefecture

VII. Shikoku agricultural region
   (36) Tokushima Prefecture
   (37) Kagawa Prefecture
   (38) Ehime Prefecture
   (39) Kochi Prefecture

VII. Kyushu agricultural region
   (40) Fukuoka Prefecture
   (41) Saga Prefecture
   (42) Nagasaki Prefecture
   (43) Kumamoto Prefecture
   (44) Oita Prefecture
   (45) Miyazaki Prefecture
   (46) Kagoshima Prefecture

IX. Okinawa agricultural region
   (47) Okinawa Prefecture
1990 was estimated as presented in Table 2. The best specification proved to be the linear in logarithms. The model explained 51 percent of the variation in total farm exit within the period under investigation. The estimated coefficients on number of workplace per capita, industrial output, proximity of rural areas to an urbanized center within a 30-minute drive, and dummy variables for Tohoku and Hokuriku agricultural regions were statistically significant. As one would expect, public expenditure entered the regression with the correct sign but was not significant at any appreciable level (20%). The negative sign supports the hypothesis that land improvement and subsidy to agriculture retain people in agriculture.

The coefficient on DID, the proxy to urbanization, was highly significant with a positive sign. First, farm families can easily locate off-farm jobs when they quit farming. Second, farmlands in the urban fringes are lost to other uses, particularly real estate development. In contrast, industrial output per capita leads to retention of farmers due to job security in large industrial firms. In this regard, the head of household can easily commute to work that guarantees his lifetime employment. In the short run, a household head who locates far away from home can only farm the land with the help of his parents and spouse commonly known as the ‘SAN CHAN NOGYO’ (this means farming by the three dear ones). In the long run, depending on the size of his holding, he may either quit work to become a full-time farmer or lease out his holding and consequently move out of agriculture.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Empirical Estimates of the Japanese Farm Exit Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Observations</td>
</tr>
<tr>
<td>Coefficient</td>
<td>Estimate</td>
</tr>
<tr>
<td>Intercept</td>
<td>7.627</td>
</tr>
<tr>
<td>GSD</td>
<td>0.912</td>
</tr>
<tr>
<td>GAO</td>
<td>1.078</td>
</tr>
<tr>
<td>JSI</td>
<td>-1.291</td>
</tr>
<tr>
<td>PIC</td>
<td>0.293</td>
</tr>
<tr>
<td>DID</td>
<td>0.537</td>
</tr>
<tr>
<td>LR</td>
<td>-5.355</td>
</tr>
<tr>
<td>EDU</td>
<td>0.282</td>
</tr>
<tr>
<td>AGE</td>
<td>-0.549</td>
</tr>
<tr>
<td>TOH</td>
<td>-0.386</td>
</tr>
<tr>
<td>KAN</td>
<td>-0.767</td>
</tr>
<tr>
<td>HOK</td>
<td>-0.234</td>
</tr>
<tr>
<td>TOK</td>
<td>-0.310</td>
</tr>
<tr>
<td>KIN</td>
<td>-0.283</td>
</tr>
<tr>
<td>CHU</td>
<td>-0.305</td>
</tr>
<tr>
<td>SHI</td>
<td>-0.31</td>
</tr>
<tr>
<td>Number of observations</td>
<td>44</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.51</td>
</tr>
<tr>
<td>Sum of Square errors</td>
<td>0.31</td>
</tr>
</tbody>
</table>
An active land market in the rural area is expected to raise the opportunity cost of idle land. The resultant effect will be transfer of land use right to the more productive full-time farmer. From the supply point of view, increase in farm exit should depress land rental rates as observed in the Tokai, Kinki and Chugoku agricultural regions in 1990. During the same period 41% of the prefectures had land rental rates which were above the national average with a coefficient of variation of 30%. Nevertheless, the land rental rate variable, LR, did not enter the regression because the coefficient estimated was not significantly different from zero. This result suggests that the lessees may be considered as caretakers for the lessors.

The human capital variables were also dropped from the final regression because they were simply insignificant. This is due to the high level of education in the farm household that lowers the cost of migration and enhances mobility of labor between agricultural and non-agricultural pursuits. The paddy to total land ratio was also found to be insignificant in the final regression. The coefficients on all the 7 regional dummy variables were negative. These results suggest that the tendency of farm households to quit agriculture in Kyushu is higher compared with any of the 7 agricultural regions. The coefficients on Tohoku and Hokuriku agricultural regions were highly statistically significant at the 1% level. This is because of larger holdings in these regions. In addition, farmers in these regions migrate every year during the winter for ‘Dekasegi’, but return home at the beginning of the growing season.

**Farm Exit by Holding**

The Land Use Promotion Law of 1980 aims to reduce the risk that increases farmland transaction costs, and to promote land market in the rural areas. Between 1985 and 1990, 12.3% of farm households moved out of agriculture. With regard to category, the highest quit of 65% was recorded among holders of 0.3-0.5 hectares and the lowest quit of 6% was among holders of 2.0-2.5 hectares. On the whole, 68% of households owned between 0.3 and 2.0 hectares in 1990 compared with 92% in 1985. Although there may be shifts among the categories, which are difficult to estimate, the highest increase of 282% in farm household number was recorded among households in the exceptional category*. Households with higher holdings such as 3-4 hectares, 4-5 hectares, and greater than 5 hectares showed slight increases presumably because of viability of the farm business.

The farm exit model, Equation 1, was re-estimated with the dependent variable as different category of holdings. This analysis is an attempt to disaggregate the results of the combined model presented above. The number of observations of households used for the 0.3-0.5 hectare-category was lower because of in-migration in 5 prefectures. In the same way, the models were estimated using the linear in logarithms functions.

The coefficient estimates on the holding-specific variables varied from category to category with the 0.5-1.0 hectare-category being seen as a partial transition. Apart from this category of holding, all models of the other 3 categories explained more than 70% of the variation in farm exit. These results also show that the individual categories in the
aggregate model had a different implicit response to the independent variables.

**Households with 0.3–0.5 Hectares.** In this model the human capital variables entered the regression but were not statistically significant. Apart from the highly statistically significant coefficient on the number of offices or workplaces per capita, JSO, this model resembles the combined model in all respects (Table 2). This follows from the previous discussion that it accounted for about 65% of the entire farm exit within the period under investigation. As a result, all the explanations for the combined model apply to households in this category. However, the estimated adjusted coefficient of determination was 0.74.

**Households with 0.5–1.0 hectares.** The estimated coefficients of the model for this category differed from the last two models discussed (Table 2). The coefficients on the industrial variables were found to be negative but were insignificant. Perhaps the most obvious difference was the absence of DID and the entering of land rental rate, LR, into the regression. The estimated coefficient on DID was found to be insignificant, while the coefficient on land rental rates was negative and significant at the 5% level. These results suggest that farm households in this category are inherently attached to their farmlands than others. This farm household also represents the intermediary holders who will stick to their land because their scale suits self-cultivation. They are mainly engaged in cultivation of high income elastic crops in vinyl-houses. This category may be considered to be the optimum holding for the majority of part-time farmers.

The Tohoku agricultural region's coefficient was negative and significant at the 1% level. Tokai and Shikoku agricultural regions entered the regression with positive signs but were not statistically significant. The overall fit for this model was slight above the combined model with an adjusted coefficient of determination of 0.53.

**Households with 1.0–1.5 Hectares.** The coefficient estimates for this model have the expected signs except gross agricultural output per capita, GAO. The coefficient on the general standard of living index, GSD, was negative and statistically significant at the 5% level. This supports the hypothesis that as people become wealthy, farmland becomes a hedge against future adversaries. The coefficient on the gross agricultural output was positive and highly statistically significant at the 1% level. This shows the unfavorable conditions that prevail among this category of farm households. This result is further confirmed by the coefficient on the land rental rates.

The agriculture regional adjustment variables for Kinki and Shikoku were negative and highly statistically significant at the 5 and 1% levels, respectively. Two others, Hokuriki and Tokai regions also entered the regression but were insignificant. This model showed the best fit with an adjusted coefficient of determination of 0.78.

**Households with 1.5–2.0 hectares.** The coefficient estimates for this model are similar to the model for the 1.0–1.5 hectare-category. The coefficient on the public works expenditure per capita was negative as observed for the other models but statistically significant at the 5% level. The modest reason for this could be that self-cultivation is favored because of improvement in irrigation and subsurface drainage systems. With these
Improvements in place, part-time farming is enhanced because adjacent plots are independent and the farm household can plan his farm activities to suit his convenience. As observed above, the coefficient on the LR was positive but significant at only 20% level. That is to say, farm households in these two categories may be more willing to rent out their farmland at attractive rental rates than others.

Perhaps the most significant results from this model were the appearance of the human capital variables. The two variables, despite being statistically significant at the 20% level, carried their correct signs. As one would expect, education is to encourage farm exit, while communities with high proportion of population above the age of 65 have the opposite effect. Other features of this model are the positive coefficient estimate on Tohoku, Hokuriku and Chugoku agricultural regions. The estimated model was robust with an adjusted coefficient of determination of 0.76.

**SUMMARY AND CONCLUSIONS**

As stated early on, the main purpose of this paper was to examine important variables that affect farm exit and land use transfer. The significant and explanatory factors that influence farm exit are development, agricultural, industrial, and geographic. The results show that distribution of offices or workplaces, industrial capacity, and proximity to an urbanized area promote farm exit. The effect of proximity to an urbanized area is twofold. First, farm households can easily locate off-farm job and consequently quit farming. On the other hand, farmland is lost to encroachment of urbanization with no significant effect on agricultural land use transfer. The results show that conversion of farmland to other uses is mainly in the 0.3-0.5 hectare-category, but farm families holding 0.5-1.0 hectares may be indifferent to policies to encourage farm exit. Public works expenditure results in retention of farm households in agriculture due to its resultant influence on self-cultivation.

Land rental rate, education and age were found to be insignificant in the combined model. The significant aspect of these results is that lessees can be regarded as caretakers of the land. The negative sign found on the geographical dummies signifies that households in these regions are more inherently attached to farm land than their counterparts in Kyushu.

Turning to the holding regressions, the results are consistent with the combined model. However, there are discernible results from these regressions. The two distinctives of these results are the farm households in the 1.0-1.5 and 1.5-2.0 hectare-category. The later category, for example, shows that as income increases—mainly from non-agricultural pursuits—these households are inclined to exit agriculture. The results also show that these households are somewhat responsive to land rental rates. The lessees’ preferences for these plots are likely to be high due to large contiguous fields and lower transaction cost. As for government’s programs for cost-effectiveness, scale expansion should be aimed at the mediumholder-category. Besides, this is a valuable lesson for other Southeast Asian countries with high economic growth rates and a protected agricultural sector.
THE DETERMINANTS OF FARM EXIT IN JAPAN: SOME EMPIRICAL FINDINGS

Endnotes

a For detailed description of the le system see, for example, Fukutake (1978, 28-30).
b A noncommercial farm household or a self-supply farm household is a farming household mainly engaged in agricultural production for its use or sales of agricultural products is at least ¥150,000, but less than ¥500,000. Perhaps the unprecedented increase in their number could be due to the ever appreciation of the Yen to the dollar and abundant cheap supply of farm products from overseas.
c There are two basic laws, the Mountain and Village Act of 1965 and Agricultural Promotion Areas Act of 1969, which prohibit conversion of farmland to other uses. (Agricultural Law 429 and 345, respectively)
e Exceptional farm households are those farmers engaged in agriculture without land cultivation, such as beeculture, sericulture and poultry; and those which farmed less than 0.1 hectares in East Japan and 0.05 hectares in West Japan with an annual agricultural income of more than ¥100,000.

APPENDIX

Table A1 Descriptive Statistics of the Dependent Variables

<table>
<thead>
<tr>
<th>(household)</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
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<tbody>
<tr>
<td>Total</td>
<td>11,649</td>
<td>5,625</td>
<td>4,734</td>
<td>31,194</td>
</tr>
<tr>
<td>0.3-0.5ha</td>
<td>26,945</td>
<td>13,476</td>
<td>10,805</td>
<td>63,270</td>
</tr>
<tr>
<td>0.5-1ha</td>
<td>2,153</td>
<td>2,889</td>
<td>-7,196</td>
<td>7,029</td>
</tr>
<tr>
<td>1-1.5ha</td>
<td>1,558</td>
<td>977</td>
<td>140</td>
<td>4,581</td>
</tr>
<tr>
<td>15-2ha</td>
<td>714</td>
<td>654</td>
<td>10</td>
<td>3,197</td>
</tr>
</tbody>
</table>


REFERENCES

日本における離農を決断する農家の行動基準について
-------------離農決意関数の計測-------------

ベン・ニヤマディ，下村 義人
（食糧生産経営学研究室）

要  旨

農場整備による土地利用条件の変化を，一般経済及び社会環境の変化などを要因に取り入れた計量モデルとして，離農決意関数を計測した。計測は２通り行った。一つは全農家を対象として計測したもので，もう一つは規模別に計測を行ったものである。決定係数の範囲は０.５１から０.７８となった。一人当たりの事業所，一人当たりの工業製造品年間出荷額，都市近郊，公共事業費，地域格差の要因より，農家の離農がかなり進んでいることが計測された。また，離農を決断し，農家が意思決定を行う判断基準としての重要な要因は，地域経済活動制度および地域農業への公共投資額等であった。

さらに，耕作を目的とする農地の権利移動は中規模農家へと行われており，地域農業の担い手としては，これらの層に期待されることが明かとなった。