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Abstract

There are many empirical studies of supply-side data for the video games industry. This paper, on the contrary, highlights the household side, estimating demand equations for video games. Using the "total households" data of the Family Income and Expenditure Survey, which includes one-person households and households engaged in agriculture, forestry and fishery, estimation results show that a household's income factor has a positive effect on its share of expenditure on video games. It is also verified that households with more young persons tend to spend more on video games even when their total expenditure level is equal. These results imply the significance of studies explicitly incorporating information on households.

JEL classification: D12; L82

Keywords: Video game industry; demand system; household survey; Japan

1. Introduction

The video game industry is an exceptional one among cultural industries, in which Japanese firms and products have demonstrated strong international competitiveness for more than 20 years.[1] At the outset, its competitiveness was determined by Nintendo's remarkable console "Family Computer (Famicon)" and the many attractive software titles for it.[2] After that, various game consoles represented by Nintendo's "Game Boy" and "Super Famicon" and Sony Computer Entertainment's (SCE) "Play Station" and "Play Station 2" have stimulated and developed markets in Japan and overseas including the United States and countries in Europe.

Besides its cultural aspects, in economic terms, the video game industry has continuously earned a large excess of exports over imports, and the Japanese government has begun to consider video games as one of the most promising fields of "content industry", which is expected to play an important role in the Japanese economy and cultural status of the next generation.[3] In May 2004, the government enacted a Law concerning Promotion of Creation, Protection and Exploitation of Content, which is considered the fundamental law for the content industry. About the same time, the government—especially the Ministry of Economy, Trade and Industry, the Ministry of Internal Affairs and Communications,[4] and the Agency for

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[1] In this paper, the term "video game" means home video games, excluding arcade video games, although Japanese firms and products have also played prominent roles in the arcade video game industry for a long time.

[2] The "Family Computer" was released in July 1983 in Japan. In the US, the console first debuted as the "Advanced Video System (AVS)" in January 1984, but received almost no reaction from buyers. Then, it was redesigned and reintroduced as "Nintendo Entertainment System (NES)" in June 1985. The Famicon began to sell amazingly well in Japan immediately after release, while the NES had to develop its market gradually with great efforts in the early period in the US (Sheff, 1993; Sheff and Eddy, 1999).

[3] In recent policy debates in Japan, industries concerned with creating and distributing content products such as publication (including Japanese cartoons, known as *manga*), newspapers, broadcasting and movies (including Japanese animation, known as *anime*), music and video games, is often treated collectively as the "content industry".

[4] The English name of the "*Soumu-Shou*" was changed from the "Ministry of Public Management, Home Affairs, Posts and Telecommunications" to the "Ministry of Internal Affairs and Communications" on September, 2004.

Cultural Affairs—have begun to plan and implement a series of concrete measures concerning the content industry. Further, mainly because it has grown rapidly over a relatively short period, the video game industry has often been paid special attention as a subject of industry study.[5]

Many empirical studies on the video game industry, such as examining network effects, have been conducted (e.g., Shintaku and Ikuine (1999), Matsumura, Kurimoto and Kobayashi (2000), each chapter in Shintaku, Tanaka and Yanagawa (eds.) (2003), Shankar and Bayus (2003), and Clements and Ohashi (2004)). However, these studies have been based on supply-side data; e.g., the number of released titles of software, the number of each title's sales, the aggregate number of software sales for each game console, installed bases of each console, and prices of consoles. In the market, however, as well as firms as developers/suppliers, households also exist and play important roles as consumers/purchasers. Despite using time-series data in their analyses, previous studies have not explicitly dealt with household information such as changes in their status and characteristics.

This paper, on the contrary, studies the video game industry by highlighting the households' side. Specifically, I estimate the demand equation for video games under an established specification in economics. This new approach enables us to examine empirically whether and how far household's income factor and demographic characteristics affect video game demand.

This paper uses the Family Income and Expenditure Survey (FIES) published by the Statistics Bureau, Ministry of Internal Affairs and Communications as the dataset for the household sector. As explained in the next section, the survey has several clear advantages: (1) it is one of the Designated Statistics established by the Statistics Law,[6] which means it has relatively high credibility; (2) it is continuously conducted, not once only or every several years; and further, (3) data on "total households" including one-person households and the households

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[5] See surveys and analyses in Shintaku, Tanaka and Yanagawa (eds.) (2003), and Aoyama and Izushi (2003). The Small and Medium Enterprise Agency (2004) also mentions and analyzes the video game industry (pp. 69–73).

[6] The Designated Statistics are the most authoritative and official surveys in Japan. For the statistics, the Statistics Law clearly declares the protection of privacy of the respondents, and the government's ability to impose on respondents an obligation to report.

engaged in agriculture, forestry and fishery have been published since 2000. This paper uses the "total households" data for 47 cities with prefectural governments' time series data for its estimations.

The remainder of the paper is organized as follows. Section 2 describes the background to this paper's adoption of the FIES, and characteristics of the survey and surveyed data. Section 3 presents the specification of the demand equation, and data correspondences of variables in the estimations. Section 4 provides the estimation results, and Section 5 is the conclusion.

2. Household Surveys in Japan

There are several official and inclusive statistics on the household sector in Japan. First, the System of National Accounts (SNA), published by the Economic and Social Research Institute, Cabinet Office, can be considered as the largest set of macro-scale statistics. In the SNA, information on households' disposable income and final consumption expenditure are available. Furthermore, in supporting tables, the composition of final consumption expenditure of households classified by 12 purposes is presented. As one of the 12 divisions, "recreation and culture" is presented, and video game expenditure is contained in this division. However, accounts more detailed than the 12 divisions are not provided in the statistics, and hence we cannot directly observe video game expenditure in the SNA.

Next, as a more detailed large-scale survey, there is the National Survey of Family Income and Expenditure (NSFIE) by the Statistics Bureau, Ministry of Internal Affairs and Communications. It is one of the Designated Statistics, has large randomly selected sample (about 55,000 two-or-more-person households, and about 5,000 one-person households), and thus is considered to provide the most detailed and reliable statistics for households in Japan. In the NSFIE, video game expenditure is presented as the sole item in the 1994 (8th) and 1999 (9th, the latest) survey. Moreover, the NSFIE presents more detailed cross-tabulations of the results than the FIES described below. For instance, by the cross-tabulation of two-or-more-person

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households' monthly expenditure by commodities and family composition,[7] we can observe that households having children at elementary school tend to spend more on video games. Furthermore, from the cross-tabulation of one-person households' monthly expenditure by commodities, gender and age group,[8] we observe that males tend to spend more on video games than females, and younger persons more than older ones, on average.

However, unfortunately, there are heavy disadvantages in the NSFIE for this paper's analysis. First, the NSFIE is conducted only every five years, and thus information on years between surveys, and years after the latest survey, cannot be observed. As a result, in the NSFIE, video game expenditure can be observed only in two years, 1994 and 1999. It also means that the NSFIE does not provide sufficient information to examine household behavior in recent years. Second, and more important, in each survey year, the NSFIE surveys only the expenditures for the three months from September to November for two-or-more-person households, and for the two months from October to November for one-person households. This means that the survey not only cannot provide information for yearly expenditure, but also does not cover households' expenditure behavior in Japanese bonus months, year-end and new-year season, end of the fiscal year, and the summer vacation season of most Japanese schools. This point is considered to be serious, in particular, for a dataset used to examine video game expenditure.

On the other hand, the FIES, also published by the Statistics Bureau, Ministry of Internal Affairs and Communications, is continuously surveyed in every month, and thus it has no limitation on survey years and months, although its sample size is only about 9000 households in total, smaller than the NSFIE.[9] Moreover, the FIES is also one of the Designated Statistics as well as the NSFIE, and sample households are randomly selected based on the region districts of

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[7] 1999 NSFIE, II Expenditure on Commodities, Two or More Person Households, Japan, Table 5.

[8] 1999 NSFIE, II Expenditure on Commodities, One-Person Households, Table 6.

[9] One-sixth of the surveyed households (one-third of the one-person households) are replaced per every month, and thus within six months (three months in one-person households), all sample households are replaced. Therefore, if we can obtain the micro dataset of the FIES, the possible periods of analysis of the same households is six months (three months for one-person households) at most, and hence we cannot conduct longitudinal analysis across years.

the Population Census, which means it has relatively high credibility. Furthermore, for a long time, the FIES covered only two-or-more-person households excluding those engaged in agriculture, forestry and fishery, but in recent years it has been extended, and since 2000, the data incorporating one-person households and households engaged in agriculture, forestry and fishery have begun to be published as "total households". In particular, the inclusion of one-person households is a very important extension for examining video game expenditure. In the FIES, since 1995, video game expenditure has been presented as an individual item separated from "toys", and in the data of total households, since the beginning (2000), the video game expenditure also can be separately observed. Considering these advantages, this paper uses the data of the total households in the FIES.

However, the results of the FIES, in particular the individual commodity level, probably suffer from more measurement error compared with the NSFIE because of the smaller sample size, and the variation of the published cross-tabulations of the result is more limited than the NSFIE. Then, and this is in the case of both the FIES and the NSFIE, the minimum division of expenditure is "video games", comprising all software, hardware, and related items, and we cannot distinguish more detailed components. Furthermore, in both surveys, the item of "pocket money (of which, detailed uses unknown)" [*kozukai* (*sito-fumei*)] is presented, and some video game expenditure may be included in this item.[10,11]

Finally, for time-series demand analysis, data on prices of consumption goods are usually required. For them, this paper mainly uses the Consumer Price Index (CPI) published by the Statistics Bureau, Ministry of Internal Affairs and Communications. The statistics provide the

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[10] However, in the survey design, of the "pocket money" (*kozukai*) distributed in the household, the part for which a questionnaire respondent can specify the type of expenditure is recorded in the family account book as the specified item. That is, at least, all pocket money is not automatically allocated into the item "pocket money (of which, detailed uses unknown)".

[11] To be more accurate, the NSFIE includes the subsurvey named as the Private Income Survey, which surveys income and expenditure of pocket money per person in two-or-more-person households. However, its sample size is small (e.g., 673 households sampled in the 1999 survey), and it is conducted only for one month for each household. Moreover, no result more detailed than "recreation goods" is presented in the subsurvey, and thus we cannot observe video game expenditure by using it.

general price index of consumption goods (*sougou*), and furthermore, as one of the components of the general index, the price index of "video games" began to be published separately after 1995.

However, to be exact, the CPI surveys the price of a representative item from each category, and then applies it to the whole category's price. For the "video games" component of the CPI, it should be noted that the price of only a specific game console has been surveyed.[12] Although this does not have a visible effect on the general index of the CPI because its weight is small,[13] it could be problematic for an analysis highlighting video game expenditure as in this paper. However, if, for instance, we try to make an index including software, first, the weights of hardware and software have to be calculated, and then a brand or attributes of representative software title have to be determined for survey. The procedure seems to be difficult to implement. Moreover, under present circumstances, it appears that price data for "video games" more suitable than the CPI cannot be found or constructed (especially by region). Therefore, this paper first obtains estimates by applying the CPI "video games" data, and then avoids using the price data under an additional assumption, as a possible alternative analysis.

3. Model Specification

By estimating the demand equation for video games, we can examine whether and how the demand is affected by various factors such as household's income factor and demographic characteristics. For the demand equation, following Deaton and Paxson (1998), this paper fundamentally applies the following specification:[14]

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[12] The specific console surveyed is sometimes changed according to popularity. However, since July 2000, the surveyed console has been the Play Station 2, and this paper uses annual data since 2000. Therefore, the changeover of surveyed console itself has only limited effects on the price index within this paper's analysis. The situation is the same with the Retail Price Survey described below.

[13] The general (and grouped) index of the CPI is aggregated by the price indices by item by the Laspeyres' formula, and for the weights assigned to items, the yearly average of the expenditure per household in the FIES in the base year is used.

[14] For the specification, see also Lanjouw and Ravallion (1995), and Deaton (1997) pp. 231–234.

$$w_g = \alpha + \beta \ln(x/n) + \theta \ln n + \sum_{k=1}^{K-1} \eta_k (n_k / n) + u \qquad (1)$$

where w_g is the share of the video game expenditure to total expenditure ($= x_g/x$), x_g is the video game expenditure per household, x is the total expenditure per household, n is the number of persons per household, n_k is the number of persons in demographic group k of the household segmented by K groups in total, u is an error term, and α, β, θ and η_k are parameters to be estimated.

Deaton and Paxson (1998) estimated, for the expenditure share of households for food in several countries, a formula that was mainly comprised of the logarithm of the total expenditure per capita, based on the Engel Curve's concept and specification by Working (1943) and Leser (1963), and the logarithm of the number of persons in households examining the household scale effects, and the household demographic composition described by the ratios. This paper, as a basis, applies the formula by replacing its food expenditure with video game expenditure.

However, because Deaton and Paxson's (1998) analysis was done by cross-section data, the formula did not include the price effects. Thus, this paper extends it for the time dimension, i.e., incorporating the price effects as follows and further adding year dummies for other yearly fluctuations in line with Asano's (1997) approach.

$$w_g = \alpha + \beta \ln((x/p)/n) + \theta \ln n + \sum_{k=1}^{K-1} \eta_k (n_k / n) + \gamma_1 \ln(p_g) + \gamma_2 \ln(p_{others})$$
$$+ \, year\, dummies + u \qquad (2)$$

where p is the general price, p_g is the price of video games, p_{others} is the aggregated price of goods other than video games, and γ_1 and γ_2 are parameters.

This specification can also be considered as the simple version of the Almost Ideal Demand (AID) System of Deaton and Muellbauer (1980b) (see also Deaton and Muellbauer 1980a, p.75), which is one of the most popular and widely accepted demand models.[15] In estimation using the

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[15] The AID system is described as follows (i, j and l are indices of goods).

AID system, usually goods are classified into a number of groups, and then all parameters in the system are estimated. This paper, however, adopts the simple specification as far as possible, which supposes only two goods groups—video games and others—and estimates the equation only for video game demand (i.e., dropping the other equation), mainly because the sample size for the estimation is not so large, and the concern of this paper is focused on examining only video game expenditure.

Moreover, if additionally applying the homogeneity of degree zero in prices in the equation (2), the condition

$$\gamma_1 + \gamma_2 = 0 \ \text{(homogeneity)}$$

is required. This paper estimates equation (2) both applying and not applying the condition *a priori*.

When parameter $\beta > 0$, the good is a luxury, while when $\beta < 0$, it is a necessity. Then, the total expenditure elasticity is described as $1 + \beta / w_g$, which varies with the value of w_g. However, at least, in the case of $\beta > 0$, we can easily see that the expenditure elasticity is more than one in any w_g (>0), and it means that the good is not only a luxury (i.e., noninferior) but also guaranteed to have positive elasticity to total expenditure; i.e., the demand for the good positively responds to the income factor, in all ranges of w_g.

As its dataset, this paper uses the data for 47 prefectural capital cities, following Asano's (1997) approach.[16] The estimation period is for four years from 2000 to 2003 using annual data.

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \ln(x/P), \quad \text{where} \ \log P = \alpha_0 + \sum_l \alpha_l \log p_l + 1/2 \cdot \sum_l \sum_j \gamma_{lj} \log p_l p_j$$

In the estimation, the price index *P* is often replaced by simpler form. Because this paper supposes only two groups of goods and the weight of video games is small, the general price *p* in the equation (2), applied the Laspeyres general price index, can be interpreted as the further approximating form of one of the Moschini's (1995) modified Stone indices, $\log P^C = \sum_i w_i^0 \log p_i$.

[16] Asano (1997) estimated the AID system under 10 consumption goods groups plus leisure consumption, mainly using 12 years of annual data for two-or-more-person and workers' households in the 47 prefectural capital cities of the FIES. For previous studies on the AID system estimations in Japan, see also Sasaki (1996), Maki (1998) and Movshuk (2003).

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The reason for using annual data in this paper is that the "total households" series of the FIES provides only quarterly or annual data, not monthly data, and furthermore, of the quarterly data, expenditure data by item (including video game expenditure) are not published for the 47 prefectural capital cities and thus are not available for this paper's analysis.

For video game expenditure x_g and total expenditure x, the FIES data are applied. As stated above, in the FIES, the data of "total households" including one-person households and households engaged in agriculture, forestry and fishery has begun to be published since 2000, and we can observe the video game expenditure in the data. Considering much importance of data covering one-person households for examining video game expenditure, this paper conducts analysis using the data for "total households" from 2000.

As prices p, p_g and p_{others}, the CPI data are applied in principle (the base year is 2000). However, in the CPI, the price index by item including "video games" is published only for all Japan and for the Ku area of Tokyo, not the other 46 prefectural capital cities. Meanwhile, in the Retail Price Survey by the Statistics Bureau, Ministry of Internal Affairs and Communications, which is the base survey for the CPI, the retail prices (not price indices, prices directly) for each item are published by all prefectural capital cities. Therefore, this paper calculates the price data of "video games" for prefectural capital cities, by multiplying the CPI "video games" by the ratio of regions of retail prices of the Retail Price Survey. The Retail Price Survey provides only regional data (i.e., no data for all Japan), and hence the ratio between the price indices and retail prices of the Ku area of Tokyo is applied as the only possible reference point.

For general price p, this paper uses the "general index, excluding imputed rent" of the CPI. The reason for using the index excluding imputed rent is that the imputed rent is not included in the FIES as expenditure. Because the general index by 47 prefectural capital cities is available in the CPI, this paper directly uses it as p. Next, for p_{others}, it is conceptually defined as the aggregated price of goods other than "video games", but in reality, visible changes do not occur whether excluding the piece of "video games" from components of the general price index, or not. Therefore, this paper simply uses the "general index, excluding imputed rent" for p_{others} as well as p (i.e., $p = p_{others}$).

For households' demographic characteristics, the households' size n can be observed by the FIFS. As its components n_k, from the FIFS data, this paper adopts the number of persons under

18 (n_1), persons 18–64 (n_2), and persons 65 or more (n_3), and in the estimation the n_3 is dropped. This segmentation is mainly caused by data limitations; that is, in the data by item and by prefectural capital cities in the FIES, more detailed information for household segmentation is not available. If other data sources can be incorporated in future research, the application of other (and more) segmentation, or even other households' characteristics could be valuable.

In consequence, the specification to be estimated is written as follows.

$$
\begin{aligned}
w_g = {} & \alpha + \beta \ln\big((x/p)/n\big) + \theta \ln n + \eta_1(n_1/n) + \eta_2(n_2/n) + \gamma_1 \ln(p_g) + \gamma_2 \ln(p) \\
& + year\, dummies + u
\end{aligned}
\tag{3}
$$

However, as stated in the previous section, the applicability of the CPI for "video games" for p_g could be insufficient, because the CPI for "video games" is constructed using the price of a specific game console. Therefore, this paper additionally estimates the case assuming that the prices of video games have no clear regional differences, instead of using the CPI for "video games". This assumption recognizes that video games and their related products are usually released at the same suggested retail price everywhere in Japan at the same time, and most of them can also be bought easily through online markets on the Internet. Under this assumption, there are no clear differences in video game prices by region, and as a result, the term of video game prices $\ln(p_g)$ can be included in the year dummies. In that case, the estimation equation is rewritten as

$$
\begin{aligned}
w_g = {} & \alpha + \beta \ln\big((x/p)/n\big) + \theta \ln n + \eta_1(n_1/n) + \eta_2(n_2/n) + \gamma_2 \ln(p) \\
& + year\, dummies + u.
\end{aligned}
\tag{4}
$$

Although equation (4) can be derived on both cases—applying and not applying *a priori* the homogeneity $\gamma_1 + \gamma_2 = 0$ to equation (3)—in the applying case, we can consider that the γ_1 is also determined by the estimation of equation (4).

The definitions and descriptive statistics of variables are summarized in Table 1. The sample size for estimation is 188 (47 regions times 4 years). Besides these variables, as year dummies, the D01 for 2001, the D02 for 2002, and the D03 for 2003 are used in the estimation (the dummy for 2000 is dropped).

4. Estimated Video Game Demand

The estimation results are presented in Table 2. Each case of applying and not applying the homogeneity to equation (3) is shown as [I] and [II], respectively, and the result of equation (4) is shown as [III]. All cases are estimated by weighted least squares, which uses the distribution of the number of households by region and year as the weight. However, the data item for "distribution of households" presented in the FIES is a relative value for all Japan in each survey year. Therefore, this paper adjusts it by the yearly changes of the total number of households, using "the number of households based on the Basic Resident Register (on March 31 in each year)" published by the Local Administration Bureau, Ministry of Internal Affairs and Communications, and applies the adjusted distributions as region-year weights for estimation.[17]

In all cases, the logarithm of the real total expenditure per capita shows a significantly positive effect on the share of video games in households' expenditure. The estimated coefficients β indicate the relationship that the increase (decrease) of 10 percent on real expenditure per capita yields approximately 0.00016 increase (decrease) of the expenditure share of video games. The amount of estimated β seems to be valid, considering that the weighted average of w_g (using households' region-year distribution as weights) is 0.00098. Moreover, the positive β means that the expenditure elasticity of video games is more than one (i.e., luxury),[18] and furthermore, it guarantees that the demand for video games positively responds to the households' income factor in any w_g.

For households' demographic characteristics, the logarithm of the number of persons in the households presenting the household scale effects does not show any significant results in all cases, while households' composition—i.e., the proportions of young persons (under 18) and

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[17] Deaton and Paxson (1998) additionally conducted Instrumental Variable estimates using the logarithm of per capita income as the instrument for $\ln(x/n)$, to address the possibility of bias by the random measurement errors in $\ln(x/n)$. Although I also conducted Instrument Variable estimates like this, the results were not so different from those of weighted least squares, and thus this paper provides only the result of weighted least squares.

[18] The expenditure elasticity $1 + \beta/w_g$ is evaluated as about 2.6 on the (weighted) average of w_g, 0.00098.

persons 18–64—both show significantly positive effects on the expenditure share of video games. The amounts of estimated coefficients η_1 and η_2 seem to be valid, considering that the weighted averages of n_1/n and n_2/n are 0.1823 and 0.6257, respectively. Moreover, we can see the relationship that $\eta_1 > \eta_2$. Because, by definition, $n_1/n + n_2/n + n_3/n = 1$, the result indicates that households with more young persons (elder persons) tend to spend more (less) on video games even when their total expenditure level is equal.[19]

Because this analysis uses total video game expenditure, to obtain strict correspondence, it is necessary to break it down to a more detailed level, such as individual game consoles. However, generally speaking, these results imply the possibility that specifications on many previous studies such as Shintaku, Tanaka and Yanagawa (eds.) (2003), Shankar and Bayus (2003) and Clements and Ohashi (2004), using time-series data without explicitly dealing with information on households' situations and variations, are insufficient.

For the prices terms, significant results are not shown in all cases. The result indicates that, basically, there is no evidence for the video game's price (or its price relative to the general price) having an effect on video game demand. On these estimates, however, it is also possible that the incompleteness of the data on video game prices affects the results, or the results might change if more groups of goods and more disaggregated price terms were assumed. Meanwhile, the estimation [III], which does not use the data of video game price p_g, presents similar results for household's income factor and demographic characteristics, and hence we can consider that relatively robust estimates are obtained for these two factors.[20]

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[19] It should be also noted here that the dependent variable in this paper's analysis is defined as the expenditure share per household, and hence the specification indirectly means that the aggregated total of video game expenditure in the economy varies with the number of households.

[20] Furthermore, if estimating the formula by dropping the term $\ln(p)$ on the [III], the results for other terms are almost unchanged. The formula can be considered as the case applying the homogeneity, and assuming that the prices of video games relative to general prices in each year are the same (as a result, the term $\ln(p_g/p)$ is included in year dummies).

5. Conclusion

This paper estimated the demand equations for video games, using the "total households" data of the Family Income and Expenditure Survey. The estimation results showed that, first, real total expenditure per capita has a significantly positive effect on a household's expenditure share of video games. The result indicates that a household's income factor has a positive effect on the demand for video games. Next, regarding household's demographic characteristics, it is also verified that households with more young persons tend to spend more on video games even when their total expenditure level is equal. These results imply the possibility that, at least, specifications of many previous studies, using time-series data without explicitly considering information about households, are insufficient.

As stated in the beginning, the video game industry is considered one of the most promising fields in the "content industry", which is expected to play an important role in future. However, in reality, the domestic market size in Japan continues to shrink after peaking in 1997, and its international competitiveness seems to be becoming so severe that it allows no optimism for the future compared with the last 20 years.[21] For the decline of the domestic market, various factors other than those addressed in this paper could also be supposed. For example, we might mention the possibility of a tendency for slowing technological innovation in both hardware and software, the stagnation of generation and development of new and creative ideas, the rapid progression and diffusion of other high-tech and digital goods such as the Internet and mobile phones, and shifts in children's playtime tastes and habits. Because the impacts of these issues are considered to be largely concerned with household situations and their decisions under budget and various other constraints, information on households can be expected to play a crucial role for examining these impacts.

Although this paper could not address these deeper matters mainly because of data limitations, these issues could be examined in further research by cultivating more analysis using household information. Further, it would be also worthwhile to apply more sophisticated

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[21] Meanwhile, the possibility cannot be denied that policy debates and expectations for policies have grown (at least partly) because concerns for the future have been increasing.

models and estimation methods, subject to obtaining more and richer datasets such as micro data (and preferably for longer periods). However, this paper has shown the importance of studies incorporating information on households.

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Table 1. Variable Definitions and Descriptive Statistics

Variables	Definitions		Mean	Median	S. D.
x	Yearly amount of total living expenditures per household	yen	3191670	3174758	316373
x_g	Yearly amount of video game expenditures per household	yen	2892	2591	1698
p	Consumer price index of general, excluding imputed rent	2000=1	0.9863	0.9870	0.0104
p_g	Consumer price index of video games	2000=1	0.8368	0.8578	0.1499
n	Number of persons per household	persons	2.4672	2.4650	0.2431
n_1	Number of persons under 18	persons	0.4892	0.4950	0.1008
n_2	Number of persons 18-64	persons	1.5000	1.4800	0.1549

Table 2. Estimated Demand Equations

Dependent Variable: w_g

	[I]		[II]		[III]	
Constant	-0.02711	**	-0.02631	**	-0.02560	**
	(-5.184)		(-5.003)		(-4.917)	
$\ln((x/p)/n)$	0.00162	**	0.00157	**	0.00154	**
	(4.390)		(4.251)		(4.183)	
$\ln(n)$	-0.00023		-0.00041		-0.00040	
	(-0.381)		(-0.670)		(-0.656)	
n_1/n	0.00784	**	0.00823	**	0.00786	**
	(4.505)		(4.667)		(4.566)	
n_2/n	0.00648	**	0.00639	**	0.00607	**
	(4.115)		(4.062)		(3.947)	
$\ln(p_g/p)$	-0.00407		-		-	
	(-1.229)					
$\ln(p_g)$	-		-0.00326		-	
			(-0.970)			
$\ln(p)$	-		0.01443		0.01275	
			(1.652)		(1.490)	
D01	-0.00013		-0.00001		0.00010	
	(-1.203)		(-0.062)		(1.019)	
D02	-0.00102		-0.00060		0.00030	
	(-1.164)		(-0.636)		(1.699)	
D03	-0.00198		-0.00138		0.00004	
	(-1.414)		(-0.936)		(0.170)	
S. E.	0.00050		0.00050		0.00050	

Notes: $w_g = x_g/x$
Weighted Least Squares. t-values in parentheses.
** Significant at 1% level.