Bank Health Concerns, Low Interest Rates, and Money Demand: Evidence from the Public Opinion Survey on Household Financial Assets and Liabilities

Hiroshi Fujiki and Etsuro Shioji

This paper uses household survey data that cover the period from 2001 through 2003 to study the cash and deposits demand of households. These data enable us to obtain empirical findings that could not previously be derived through analyses using conventional macroeconomic time-series data. First, for asset demand, we find that the fluctuations in the extensive margin (the decisions on whether or not to hold a financial product) are sometimes more important than the fluctuations in the intensive margin (the decisions on the amounts of the financial product held). Second, we conduct detailed analyses on the causes of fluctuations in the cash demand of individual households. Third, thanks to qualitative questions in our dataset, we manage to distinguish between the fluctuations in asset demand due to low interest rates and those in response to various measures that are aimed at enhancing the safety of household savings. Fourth, we quantify the economic effects of personal financial education.

Keywords: Money demand; Low interest rates; Concern for the soundness of private financial institutions; Micro data; Self-selection bias; Personal financial education; Extensive margin; Intensive margin

JEL Classification: C34, C35, D12, E21, E41, E51

Hiroshi Fujiki: Director and Senior Economist, Institute for Monetary and Economic Studies, Bank of Japan (E-mail: hiroshi.fujiki@boj.or.jp)

Etsuro Shioji: Associate Professor, Graduate School of Economics, Hitotsubashi University (E-mail: shioji@econ.hit-u.ac.jp)

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I. Introduction

This paper uses micro data on households to analyze how concern for the soundness of private financial institutions and low interest rates change cash and deposits demand. This paper uses individual household data from the 2001–03 Public Opinion Survey on Household Financial Assets and Liabilities (hereafter, the POS). The POS asks questions regarding the amount of household financial assets and liabilities, selection of financial products, income and expenditures, perception of the financial environment, life in old age, and household characteristics (such as number of household members, age of the head of the household, and employment conditions of family members). Because the sample changes each year, the POS data are not a panel dataset. However, the POS has utilized the same sampling method over many years. During the period analyzed in this paper, the survey collected responses from more than 4,000 out of the 6,000 household samples each year.

The survey includes several unique qualitative questions regarding changes in behavior under low interest rates and changes in behavior to increase the safety of assets held. Thanks to those unique qualitative questions, we can analyze the extent to which concern for the soundness of private financial institutions and low interest rates influence households' selections of financial products conditional on their characteristics (such as assets outstanding, income, age, and geographical region) and degrees of risk aversion. Another unique feature of the survey data is that they cover the cash outstanding held by the households. The data on cash outstanding help us to verify (or refute) popular public perceptions such as "the amount of household sector 'mattress savings' (funds held at homes in cash) has been rising in recent years."

The motivation behind our study is the decline in the credit multiplier that was observed during the latter half of the 1990s. Some (such as Iida, Harada, and Hamada [2003]) attribute this decline to an increasing household-sector preference toward cash holdings that was prompted by the low interest rate policy and the failures of private-sector financial institutions. Others (such as Kobayashi [2003]) find that in the corporate sector as well uncertainty regarding short-term funding and stock price fluctuations and other concerns for the soundness of private financial institutions, combined with the low interest rate policy, boosted the cash-deposits ratio and reserves-deposit ratio, and thus led to a lower credit multiplier.

These analyses using macro data have three limitations. First, it is not possible to determine the amount of household cash holdings from the Japanese macro data. Second, with the macro data it is not possible to determine whether and to what extent there was a shift in asset demand along the extensive margin: for example, did households that previously held only bank deposits shift funds into postal savings, in response to intensifying concerns for the soundness of private financial institutions? Third, while such shifts in household assets should vary depending on individual household characteristics, with the macro data we cannot take into account such heterogeneity.

To overcome those limitations, this paper utilizes the individual data from the POS. In examining the factors that cause fluctuations in cash and deposits demand, the data not only facilitate analyses of the intensive margin (how much households increase or decrease the amounts of their financial products holdings in reaction to a given change), but also empirically demonstrate the importance of analyzing the extensive margin (changes in the selection of financial products itself, such as the choice to purchase a financial product that the household had not held in the past, or to sell all holdings of a given financial product). Thanks to the richness of this dataset, this paper conducts asset demand analyses on both the extensive and intensive margins on various types of financial assets, and this constitutes one of the main characteristics of the paper. Furthermore, this paper goes beyond just analyzing the behaviors of individual households by aggregating the estimated household behaviors and conducting simulations on the macroeconomic impact for quantitative examinations.

Specifically, our analysis proceeds in two stages. In the first stage, we analyze the determinants of the likelihood of holding a given combination of financial products using a multinomial logit model. This analysis tells us what types of factors are important in asset allocation decisions along the extensive margin. In the second stage, we analyze the factors that shift asset allocation along the intensive margin. That is, conditional on the fact that a household has decided to hold a certain combination of financial products, we analyze how such a household allocates its total funds among those products. Note that as this analysis focuses exclusively on individual households which have chosen a specific combination of financial products for several reasons, the sample comprised solely of such households no longer meets the premise of random sampling. In our analyses, we adopt a method that explicitly addresses this self-selection bias.

Our main analytical findings can be summarized as follows.

(1) It is quantitatively important to include the fluctuations along the extensive margin in considerations. The fluctuations in asset demand along the extensive margin may be larger than those from the intensive margin in some cases.

(2) When household liquidity demand rises in reaction to low interest rates, or as a measure to enhance savings safety, the demands for all kinds of assets aside from cash also change. Moreover, the manner in which each type of asset reacts differs depending on whether the increase in cash demand is a response to low interest rates or a strategy to increase the safety of savings.

(3) Promoting personal financial education increases the demand for risk assets and for assets with low liquidity.

The remainder of this paper is organized as follows. Section II explains the dataset. Section III explicates the model adopted for the empirical analyses, and Section IV presents the findings of those analyses. Section V presents the results of simulations conducted using the findings in Section IV, and considers the significance of the impact of the simulation results from the macroeconomic perspective. Finally, Section VI presents a summary of the entire paper.

II. Data

This section provides an explanation of the POS data.

A. Outline

The POS has been conducted from late June through early July each year since 1953 on households nationwide with at least two members. The survey asks questions regarding the amount of household financial assets and liabilities, selection of financial products, income and expenditures, and perception of the financial environment. Some of the questions change from year to year, because these questions aim to ask about "hot" issues in particular time periods. Since 1963, the POS has used a stratified two-stage random sampling method to first select 400 survey areas and then randomly select 15 households from each area for a total of 6,000 samples. While the data are not panel data, the survey has used the same sampling method over many years. Our analyses here use the survey data from 2001, 2002, and 2003. Out of the 6,000 households surveyed in those years, responses were obtained from 4,158 households, 4,149 households, and 4,234 households in each year, respectively.

The POS provides two kinds of useful information that cannot be obtained from any other data source.

First, it includes many qualitative questions regarding households' perception of the financial environment, which are not available elsewhere. These qualitative questions can be used, for example, to statistically confirm if households that say they "think the private financial institutions they conduct transactions with are suffering from worsening management conditions and may fall into bankruptcy" tend to have a low level of deposits at private financial institutions and a high level of cash outstanding. These kinds of analyses cannot be conducted using macro data.

Second, the survey provides information on cash outstanding together with the breakdown of financial assets outstanding by type of financial product held by a household. The information on cash outstanding facilitates more detailed analyses than those that can be conducted using the average household data derived from the macro money stock statistics.

To begin with, for the years 2001, 2002, and 2003 the macro money stock average amounts outstanding statistics indicate small year-to-year growth in M2+CDs of 2.8 percent, 3.3 percent, and 1.7 percent, respectively. A breakdown, however, reveals that the year-to-year growth in M1 was 8.5 percent, 27.6 percent, and 8.2 percent, while quasi-money decreased by 2.6 percent, 11.6 percent, and 3.6 percent. Moreover, a breakdown of M1 shows that while cash currency in circulation grew by 6.7 percent, 11.2 percent, and 5.3 percent, there were wide fluctuations in deposit money of 9.0 percent, 32.5 percent, and 9.0 percent. So even though the macroeconomic statistics indicate small changes in the sum total of household-sector cash and demand deposits plus time deposits, the figures may still suggest large fluctuations occurring in the breakdown. The POS, which provides detailed figures for the amounts outstanding of household-sector financial assets including both cash and other financial products, provides extremely appropriate data for confirming this point.

Next, thanks to the survey, we analyze the behavior of households which respond that they "do not hold any financial assets aside from cash." While one might doubt the significance of analyzing the behavior of such households, those households are by no means exceptional: the number of such households actually accounted for 16.7 percent (2001), 16.3 percent (2002), and 21.8 percent (2003) of the total sample.

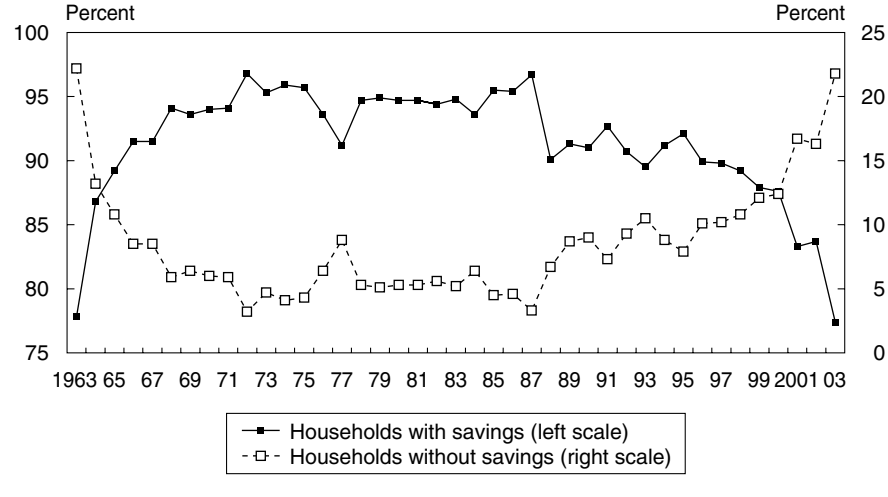
One of the reasons why so many households responded that they "do not hold any financial assets aside from cash" is that the POS does not categorize deposits for industrial and commercial or for agriculture, forestry, and fisheries purposes, or deposits that only remain briefly in bank accounts (such as salary transfers and account transfers) as deposits. Another reason is that this survey only covers financial assets, and does not include land, housing, or other real assets. To consider the nature of this question more closely, in Figure 1 we plot the historical evolution of the percentages of respondents who chose each answer to this same question, going all the way back to 1963. The percentage of households responding that they "do not hold any financial assets aside from cash" varies over time. Most notably, the percentage shows a sudden jump upward since around 2000. This suggests that it is indeed responding to certain economic factors, and that it is important to include such households into the analysis: our dataset enables us to do that.

We now explain the details of the variables used in our analysis in turn, dividing them into continuous variables, qualitative variables, and household characteristics variables.

B. Continuous Variables

First, we use the POS data to investigate the household financial assets outstanding by type of financial product. In detail, the survey asks "Does your household currently

Figure 1 Percentages of Households That Responded "Yes" or "No" to the Question "Does Your Household Currently Have Any Savings?"



Source: Central Council for Financial Services Information, POS time-series data file "Have or Do Not Have Savings" (Question 2).

have any savings?" and those households that answer "yes" are asked to provide the outstanding amounts (to the nearest ¥10,000) of their deposits (both current deposits and time deposits), postal savings (both postal savings current deposits and postal savings time deposits), money trusts and loan trusts, life insurance and postal life insurance, nonlife insurance, personal annuity insurance, bonds, stocks, investment trusts, workers' asset formation savings, and other financial products.[1]

The POS also provides information on the average amount of cash outstanding. Specifically, the survey investigates this by asking the question "In your household, what is the average balance of cash on hand?" (to the nearest ¥10,000).

In the following analyses, we aggregate the household financial products holdings into the four groups, cash; deposits; stocks and bonds (bonds, stocks, investment trusts, and asset formation savings); and insurances (money trusts, loan trusts, life insurance, postal life insurance, nonlife insurance, and personal annuity insurance). Among these four groups, we then conduct analyses on the demand for the individual deposit items: bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. In addition to these, we make use of data regarding annual take-home income over the past year (after-tax employment income, pensions, real estate rental income, interest income, etc.), consumption expenditures, and present total borrowings outstanding. In principle, our analysis is limited to financial assets because the POS does not report the market value of household real estate holdings (and only notes whether or not the respondents own their own homes).

C. Qualitative Variables

The POS incorporates various qualitative questions. These are used in the analyses here for the construction of the following dummy variables.

First, we generated the following dummy variables regarding the household financial product selection criteria. The respondents were asked "Which point does your household emphasize most when selecting a financial product?" and instructed to choose one of the following eight answers: (1) Can expect high yield; (2) Can expect capital gains; (3) The principal is guaranteed; (4) The financial institution handling the product is safe and trustworthy; (5) The product scheme is easy to understand; (6) Can be cashed without difficulty; (7) Can make deposits and withdrawals, even of small amounts, without difficulty; (8) Other.

We generated a *yield-emphasis dummy*, with a value of one, for those households that selected (1) Can expect high yield, or (2) Can expect capital gains. We generated a *safety-emphasis dummy*, with a value of one, for those households that selected (3) The principal is guaranteed, or (4) The financial institution handling the product is safe and trustworthy. Finally, we generated a *liquidity-emphasis dummy*, with a value of one, for those households that selected (6) Can be cashed without difficulty, or (7) Can make deposits and withdrawals, even of small amounts, without difficulty. Because the households could also select responses (5) and (8), the sum of these three dummy variables does not equal one.

1. The data we actually received were rounded off to the three highest digits.

Second, we then used the following question to control the household's preference for risky financial products. The respondents were asked "When selecting financial products, where does your view stand between the following two views concerning risk—the chance to gain high returns and the possibility of losing investment principal" and instructed to indicate if their view is closer to (A) "Will choose a financial product, even without a guarantee of its principal, if there is a chance to get appropriate returns for the risk involved," or closer to (B) "Will not choose a financial product if its principal is not guaranteed."

We generated a *risk-accepter dummy*, with a value of one, for those households that selected "closer to (A)" and a *risk-avoider dummy*, with a value of one, for those households that selected "closer to (B)." Because the households could also select a third response, "cannot say which," the sum of these two dummy variables does not equal one.

Third, we generated a dummy variable regarding the household's concern for the soundness of private financial institutions. The respondents were asked "How much are you interested in the financial conditions of financial institutions and in issues concerning the financial system?" and instructed to select one of the following three answers: (1) Very much; (2) Somewhat; and (3) Not much. Among these, we generated a *concerned dummy*, with a value of one, for those households that selected (1) Very much.

The respondents were then asked "Because some financial institutions have failed in the past few years, what do you think about the financial conditions of the private financial institutions you are dealing with?" and instructed to select one of the following four answers: (1) Not worried because I think their financial conditions are sound; (2) Do not think they will fail, even if their financial conditions have deteriorated somewhat; (3) Worried because their financial conditions might deteriorate and they could fail; and (4) Have nothing to do with the matter because I have no dealings with private financial institutions. Among these, we generated a *worried dummy*, with a value of one, for those households that selected (3) Worried because their financial conditions might deteriorate and they could fail.

Fourth, to measure the extent to which personal financial education has penetrated, the following question was used. The respondents were asked "The deposit insurance system protects deposits of up to ¥10 million in principal, and their interest income, on a per financial institution and per depositor basis. Do you know about this system?" and were instructed to select one of the following three answers: (1) Yes, even know about the details; (2) Have heard or read something about it; and (3) No, do not know anything about it. Among these, we generated a *known dummy*, with a value of one, for those households that selected (1) Yes, even know about the details, and an *unknown dummy*, with a value of one for those households that responded (3) No, do not know anything about it. Because the households could also select response (2), the sum of these two dummy variables does not equal one.

Fifth, we used the following question to study the motivation for holding cash under a low interest rate environment: "Given the current interest rate conditions, what kind of actions has your household taken regarding savings?" The respondents were instructed to select all of the following six answers that apply: (1) To increase dividend and/or interest income as much as possible, switched to financial products expected to yield higher interest and/or return; (2) Switched to short-term (or long-term) financial

products, anticipating changes in interest rates in the foreseeable future; (3) Withdrew savings to spend for consumption, because of smaller-than-expected dividend and/or interest income; (4) Decided to hold on to cash temporarily, refraining from investment in financial products; (5) No particular actions; and (6) Other. We then defined a *high-yield shift dummy*, with a value of one, for those households that selected (1) To increase dividend and/or interest income as much as possible, switched to financial products expected to yield higher interest and/or return, a *term shift dummy*, with a value of one, for those households that responded (2) Switched to short-term (or long-term) financial products, anticipating changes in interest rates in the foreseeable future, and a *cash investment because of low interest rates dummy*, with a value of one, for those households that responded (4) Decided to hold on to cash temporarily, refraining from investment in financial products.

Sixth, to investigate how households secure the safety of their financial products, the respondents were asked "What actions have you taken to enhance the security of your financial assets?" and instructed to select all of the following nine answers that apply: (1) Collected information concerning the safety of financial products; (2) Switched deposits to financial institutions believed to be more financially sound and trustworthy; (3) Switched to products covered by the deposit insurance system; (4) Diversified deposits among multiple financial institutions so that deposits at any one institution do not exceed ¥10 million; (5) Moved the portion of a time deposit or other deposit exceeding ¥10 million to payment and settlement account deposits, such as ordinary deposits, for which the full amount is protected until year-end March 2003, within the same financial institution; (6) Withdrew the portion of deposits exceeding ¥10 million, deposited in a single financial institution, and invested in other types of assets (Japanese government bonds, gold, etc.); (7) Decided to hold on to cash; (8) Have not taken any actions; and (9) Others. Among these, we defined a *deposit switch dummy*, with a value of one, for those households that responded (2) Switched deposits to financial institutions believed to be more financially sound and trustworthy, and a *cash investment for safety dummy*, with a value of one, for those households that responded (7) Decided to hold on to cash.

Finally, households were asked "What type of housing do you live in now?" and those which replied "House or condominium that I purchased myself" or "Housing that I inherited or that was given to me" were defined as homeowner households and given a *homeowner dummy*. Incidentally, the non-homeowner households were defined as those which responded "House owned by parents or other relatives I live with," "Private condominium, apartment house, or individual house for rent," "Public apartment house for rent," "Employer-provided (government, private firm) housing," or "Room for rent, or others."

D. Household Characteristics Variables

The POS also records information about the number of household members, age of the head of the household, job category of the head of the household, state of employment of household members, and household location.

First, for the number of household members, the respondents were asked "How many people are there in your household, including yourself?" and instructed to

specify a number between two and six persons, or to answer "seven or more." For the age of the head of the household, the respondents were given a choice of 20s, 30s, 40s, 50s, 60–64, 65–69, or 70 or older. For the job category of the head of the household, the possible answers were "Agriculture, forestry, and fisheries," "Business proprietor (commerce, industry, or services)," "White-collar worker," "Blue-collar worker," "Manager," "Professional worker," and "Other." Finally, for the state of employment of household members, the options were "No one in the household, including the head, is working," "Only the head of the household is working," "The head of the household and his/her spouse are working," and "Other." Additionally, the survey recorded household location information by geographic region (among nine regions nationwide) and population scale with the following six population scale categories: (1) Japan's 14 largest cities;[2] (2) city with at least 40,000 households; (3) town with 20,000–40,000 households; (4) town with 10,000–20,000 households; (5) town with fewer than 10,000 households; and (6) county area. We generated dummy variables for the answers to each of the characteristics questions. For the question on the job category of the head of the household, however, we only used a dummy for business proprietors (commerce, industry, or services). Also, for analytical convenience, we combined population scale categories (4) and (5) for some parts of the analyses.

III. Models

In this section, we explain the statistical and empirical models used in this paper, after a literature review.

A. Literature Review

This paper aims to analyze a situation where individual households hold either a single type or several (but not necessarily all) types of financial products among all the types that are available. From that perspective, we now need an empirical model that enables us to estimate *conditional* demand functions: they are conditional in the sense that "a household's demand for a given type of financial product is dependent upon what kinds of other financial products it holds." We summarize the previous research incorporating this kind of analysis below.

In the literature, King and Leape (1998) share the same motivation as ours. Their paper uses data on U.S. household financial assets outstanding and estimates discrete and continuous demand functions for each type of financial asset. King and Leape (1998) divide the 11 types of financial products surveyed into four groups. They first derive predictions on the likelihood that a household holds each type of financial product using a probit model. They then estimate demand functions for each of the 11 types of financial products, adding this predicted likelihood as an explanatory variable. In that process, they add an inverse Mill's ratio (described below) from Heckman (1979) as an explanatory variable to eliminate the self-selection bias that

2. The 14 cities are Sapporo, Sendai, Saitama, Chiba, Yokohama, Kawasaki, Nagoya, Kyoto, Osaka, Kobe, Hiroshima, Kita-Kyushu, Fukuoka, and Tokyo (within the 23 wards).

emerges from the fact that the households themselves have selected each of the financial products they are holding.

Their statistical method to eliminate the self-selection bias seems to have room for improvement. When households select which types of financial products they will hold, they should take all the possibilities into consideration and make simultaneous decisions on whether or not to hold each of the different types of financial products. Accordingly, in an attempt to remove the self-selection bias, rather than independently addressing the selection of whether or not to hold each type of product one at a time, the use of a multinomial probit model may be more appropriate. As a practical problem, however, the application of this kind of analysis is difficult because with the multinomial probit model the analytic solution to the probability of making a given selection cannot be derived, even when assuming a multivariate normal distribution for the error term. Thus, it is difficult to obtain the maximum likelihood estimator.

To cope with the self-selection bias in this problem, we adopt the method of Dubin and McFadden (1984). Their method uses a multinomial logit approach to the first stage of the discrete and continuous decision-making problem, which makes the estimation relatively simple even for cases with a large number of selections. While Dubin and McFadden (1984) use this method to estimate an electric power demand function, the same method has already been applied to household financial asset data in several nations. To the best of our knowledge, this method was first applied to the asset selection problem by Amemiya, Saito, and Shimono (1993), who conducted analyses using Japanese data. Among the various models used in that paper, the second model applies the Dubin and McFadden (1984) method to estimate demand functions for bank deposits, bonds, and stocks (assuming that all the households hold some bank deposits). Perraudin and Sørensen (2000) use U.S. micro data and apply the Dubin and McFadden (1984) method to estimate demand functions for liquid assets, stocks, and bonds (assuming that all the households hold some liquid assets), and conduct simulation analyses using the estimation results.

In our paper, following Dubin and McFadden (1984), we assume that a multinomial logit model approximates a household's first-stage selection.[3] With the multinomial logit model, when there are s choices $(0, 1, 2, \ldots, s-1)$ the probability $P(ij)$ that the choice Y_i made by individual i will take the value j can be described by a simple formula. In our analyses, each of the individual "choices" corresponds to a product of decisions on whether or not to hold each of the available types of financial products. For example, when there are two types of products, A and B, because separate decisions can be made on holding or not holding each of these products, there are a total of four $(2 \times 2 = 4)$ possible "choices." We refer to each of these choices as a "product combination" or just "combination" for short.

In the second stage, once a particular "combination" has been selected, decisions are made on how much of each of the products that are included in this "combination"

3. As noted above, with the multinomial probit model, which assumes a multinomial normal distribution for the error term, it is not possible to derive the analytical solution to the probability for each of the alternatives to be chosen. It is thus costly to maximize the likelihood function and seek the maximum likelihood estimator, requiring massive numerical calculations. Thus, the multinomial probit model is not suitable for analyses which, like those in this paper, involve a large number of selections.

will be held, in other words, the conditional demand. It is known that self-selection bias emerges when standard econometric techniques such as the least squares method are used for estimating this conditional demand function. This is because a sample comprised solely of households that have selected a certain combination does not meet the requirement of a random sample of all households. Heckman (1979) considers a discrete continuous decision-making model where the first stage is a binomial selection while the second stage is a choice of a continuous variable. He proposes use of a probit model for the first-stage estimation. From this estimation, the inverse Mill's ratio is computed and added to the second-stage estimation as an explanatory variable to eliminate the self-selection bias. The method employed by Dubin and McFadden (1984) basically follows the same idea, but applies to the case where the first-stage selection is characterized by a multinomial logit model. Like Heckman (1979), they derive additional explanatory variables from the first-stage estimation to eliminate the self-selection bias in the second stage. The number of such variables is equal to the number of choices minus one. We refer to these variables, which jointly play the role of the inverse Mill's ratio in Heckman (1979), as "self-selection bias adjustment terms." By introducing these variables into the second-stage estimation, a two-stage estimation like that of Heckman (1979) becomes possible.

We explain the details of this method below. First, we start with the second-stage choice, that is, the choice of the amount of a particular financial product given that the first-stage decision has already been made. In other words, we explain the choice along the intensive margin conditional on the choice along the extensive margin. Suppose that a household i has selected the j-th combination of products. Suppose also that this combination includes the k-th type of product and that the demand for this product by household i is a function of household characteristics, as shown in equation (1).

$$y(ij)_k^* = X(ij)_k' \beta(j)_k + u(ij)_k. \tag{1}$$

Here $y(ij)_k^*$ is the amount of the k-th product held by household i when it chooses the j-th combination. $X(ij)_k$ denotes a vector of variables that represent household characteristics, $\beta(j)_k$ is the parameter vector to be estimated, and $u(ij)$ is an error term with zero mean and variance of σ^2.

Second, we explain the choice along the extensive margin, in other words, the choice of the product combination. Now let $V(ij)$ be the indirect utility of household i that selects the j-th combination, and normalize the value of the indirect utility derived from the s-th combination as $V(is) = 0$. Here, when household i selects the j-th product combination, it must be the case that it yields the highest indirect utility compared with any other combinations. Thus, equation (2) holds for that household.

$$V(ij) > V(il), l \neq j. \tag{2}$$

Now, let $V(ij)$ be a linear function of the vector of the explanatory variables $X(ij)$.

$$V(ij) = X(ij)' \delta(i) + \nu(ij), \quad j = 1, 2, 3, \ldots, s-1. \tag{3}$$

Additionally, the error term is described by a multinomial logit model, that is to say, $\nu(ij)$ is independent and the distribution function is $\exp[-\exp(\nu)]$.[4]

Equation (3) shows that the households' choices of product combinations are endogenous, dependent on the explanatory variables $X(ij)$. Under such a situation, if a researcher estimates the conditional demand function by applying standard ordinary least square (OLS) methods to equation (1), the researcher obtains biased estimates. The bias appears because the distribution of error term, $u(ij)_k$ in equation (1) conditional upon household i's choice of product set j is not the same as the unconditional distribution of error term $u(ij)_k$. Dubin and McFadden (1984) resolve the bias by including some additional explanatory variables. To apply their method, we need to assume that the conditional expected value of $u(ij)_k$ given the indirect utility of household product holding pattern j, $V(ij)$, should be given by equation (4).

$$E[u(ij)_k|\nu(i1), \nu(i2), \ldots, \nu(is-1)] = \sum_{m=1}^{s-1} R(j)_k(m)(\nu(im) - \gamma), \tag{4}$$

$$\sum_{m=1}^{s-1} R(j)_k(m) = 0,$$

γ = Euler's constant.

In equation (4), $R(j)_k(m)$ are constant terms to be estimated.

In the actual data, $y(ij)_k^*$ is observed when the j-th product combination is selected and the k-th product is included therein. So, using equation (4), the conditional expected value becomes as shown in equation (5).

$$E[y(ij)_k^*|j \text{ chosen}] \tag{5}$$

$$= X(ij)_k'\beta + E[u(ij)_k^*|j \text{ chosen}]$$

$$= X(ij)_k'\beta + \left(\sqrt{6}\,\sigma/\pi\right)\sum_{m=1}^{s-1} R(j)_k(m)(E(\nu(im)|j \text{ chosen}) - \gamma),$$

$$E(\nu(im)|j \text{ chosen}) = \begin{cases} \gamma + \log P(im), & m \neq j \\ \gamma + \log P(im)(P(im)/1 - P(im)), & m = j. \end{cases}$$

Here $P(im)$ shows the probability that household i will select the m-th product combination. Comparing equation (5) and equation (1), one can see that the conditional expected value is the sum of the unconditional expected value and a new term,

4. The multinomial logit model adopts the strong assumption that "the relative probability that a given option will be chosen remains independent and constant, even when other new options are introduced." For example, if the options for traveling between Tokyo and Osaka are the Nozomi bullet train, an All Nippon Airways flight, and a highway bus, since these options reflect the preference for railroad, airplane, and automobile, it is reasonable to assume that additional options may not have much influence. However, if the options for traveling between Tokyo and Osaka are the Nozomi bullet train, an All Nippon Airways flight, and a Japan Airlines flight, the options All Nippon Airways and Japan Airlines are probably not mutually independent. Nevertheless, once this strong assumption is accepted, the multinomial logit model has the merit that the likelihood function is defined in accordance with equation (3), and by maximizing this the volume of computations required to calculate the parameters is within the range that can be processed by a personal computer.

$$\left(\sqrt{6}\,\sigma/\pi\right)\sum_{m=1}^{s-1}R(j)_k(m)(E(\nu(im)|j \text{ chosen}) - \gamma).$$

Like Heckman (1979), this model enables a two-stage estimation. First, a multinomial logit model is used to estimate equation (3), which is then used to determine the estimated value of $P(im)$, which is $\hat{P}(im)$. Then $\hat{P}(im)$ is inserted into equation (5) to compute $E(\nu(im)|j \text{ chosen}) - \gamma$ for each product combination m. Finally, by estimating equation (5) using both $X(ij)_k$ and the estimates of $E(\nu(im)|j \text{ chosen}) - \gamma$ ($m = 1, 2, \ldots, s-1$) as explanatory variables through the least squares method, we can obtain the household conditional asset demand function.

B. Statistical Model in This Paper

In this paper, we first aggregate the financial products held by households into the following four broad groups: cash; deposits; stocks and bonds (bonds, stocks, investment trusts, and asset formation savings); and insurances (money trusts, loan trusts, life insurance, postal life insurance, nonlife insurance, and personal annuity insurance). Among these, all households hold cash, but the other three groups of assets are held by some households and not held by others.

We are also interested in estimating demand for the individual items that belong to the "deposits" group. These are bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. Hereafter, we refer to these as deposit "subgroups." The most natural approach to accomplish this objective would be to estimate a huge multinomial logit model in which households choose whether or not to hold positive amounts of assets that belong to the "stocks and bonds" and the "insurances" groups, and, at the same time, choose whether or not to hold each of the four deposit subgroups. In such a model, however, the number of product combinations that households have to consider would be $4 \times 2^4 = 64$. For some of the product combinations, the sample sizes for the second-stage estimation of the conditional demand function would fall below 100. Meanwhile, the number of self-selection bias adjustment factors would grow extremely large. To avert these problems, our paper adopts the following assumptions regarding the household decision-making process.

First, households determine the allocation of funds to each of the four broad product groups (cash, deposits, stocks and bonds, and insurances). As all households hold cash, they choose from the five product combinations: "cash only," "cash and deposits," "cash, deposits, and stocks and bonds," "cash, deposits, and insurances," and "cash, deposits, stocks and bonds, and insurances." Then for those households that choose an option other than "cash only," they determine the amounts of funds to be held in the form of each of the types of products included in the selected product combination.[5]

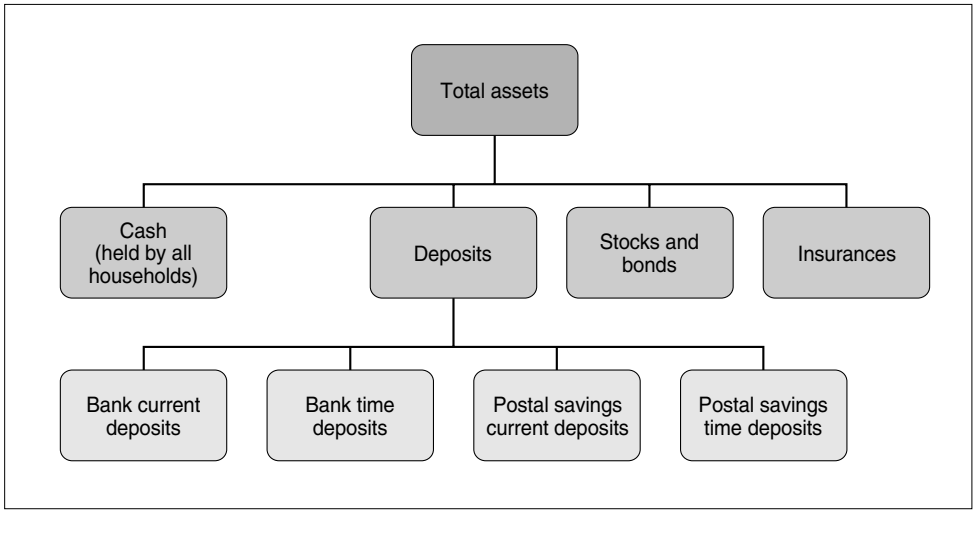
5. The sample included a very small number of households that hold cash and insurances, or cash and stocks and bonds (or cash and insurance and stocks and bonds) without holding any deposits. However, since the numbers of such households are too small to handle as individual samples in estimating the conditional demand function, they are all categorized in the group holding "cash, deposits, and insurances."

Next, given the total amount of deposits, households determine allocations to the four subgroups of deposits. In other words, with the allocation among the four broad groups as a given, decisions are made regarding whether or not to hold each of the deposit subgroups: bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. Then, households choose the amounts of each of those deposit subgroups that they have decided to hold. Since there are 16 possible combinations of the four deposit subgroups, asset demand functions for the four are estimated for each of those 16 combinations. The entire picture of this discrete continuous decision making is depicted in Figure 2.

The theoretical backgrounds for our approach are as follows. First, as for the categorization of assets into groups, as noted for example in Tachibanaki and Tanigawa (1990), these different product groups have different transaction costs. For example, while households can easily adjust their deposits outstanding, they probably only adjust most of their insurance products a few times a year, at most. Furthermore, since stock trading commissions are higher than banking fees, households probably refrain from frequent stock trading. An alternative interpretation, as frequently noted in financial asset analyses, is that products such as stocks and bonds, which have a high price fluctuation risk in comparison with deposits (which are highly liquid), have a different nature from products like insurance, which has a very long-term contract period compared with deposits.

Next, the sequential structure of decision making between the broad group stage and the subgroup stage reflects our assumption that it is possible to separate the selection among the four broad groups from the selection among the subgroups within the deposits group. Specifically, the households first compare financial products in terms of their transaction costs, maturity dates, risk, and other factors to determine the allocation of total funds among the four broad groups, including deposits. Then, those households that have chosen to hold a positive amount of deposits choose their allocations among the four subgroups. In this manner, we assume that the only

Figure 2 Households' Asset Selection Decision-Making



influence from the decision on broad groups comes through the total amount for overall deposits. This assumption is justified if we assume that the part of the household utility function that depends only on the shares of deposit subgroups in overall deposits is separable from the other parts and, at the same time, that the prices of the different deposit subgroups are all equal.[6] This assumption helps keep the calculations from becoming too difficult by preventing the number of options a household faces at the same time from growing too large.

C. Empirical Model in This Paper

We used the 2001, 2002, and 2003 data from the POS to estimate the following function.

$$A_{it} = \alpha + \beta 1 \cdot Z1_{it} + \beta 2 \cdot Z2_{it} + \beta 3 \cdot Z3_{it} + \beta 4 \cdot (Year\ dummy) + u_{it}. \qquad (6)$$

Here the subscript i represents a household and t indicates a period ($t = 2001, 2002, 2003$). For the first-stage estimation, the dependent variable A is a dummy variable indicating whether the household chooses a given combination of financial products. This is estimated using the multinomial logit model, as explained in the previous section. For the second-stage estimation of conditional demand, the dependent variable A represents the *share* of each type of financial product in total assets, rather than its amount itself.

The explanatory variables are divided into three categories. $Z1$ represents the continuous variables, which include either total financial assets for the decisions on broad product groups or total deposits for the decisions on deposit subgroups (both in logarithms), expenditures (in logarithm), and borrowings (as a ratio to total assets). $Z2$ represents the household characteristics variables $Z2$, such as the *age group dummy*, *employment conditions dummy*, *self-employment dummy*, *homeowner dummy*, and *location dummy*. For the second-stage estimation, the self-selection bias adjustment terms are also included. $Z3$ represents the qualitative variables. They include the six dummy variables defined in the previous section, that is, criteria for product selection, risk preference, concern for financial system stability, prevalence of personal financial education, motivation to hold cash under low interest rates, and means of securing the safety of financial products.

We shall consider the data obtained from the survey as a random sample extracted using the same methods over the three years, which allows us to pool the samples from those three years. We control the differences in survey year by introducing a *year dummy* in the regression equation. Note that this dummy absorbs the influences of macro shocks.

Table 1 [1] shows the correlation coefficients among the explanatory variables used in this research, with the *age group dummy* and *location dummy* omitted to save space. This table indicates that none of the correlations among the explanatory variables is high enough to generate a multicollinearity problem. Also, Table 1 [2] presents the

6. This assumption can be justified because throughout our sample period the nominal interest rate, which is the opportunity cost of deposits and savings, was almost zero.

Table 1 Correlation Coefficients among the Explanatory Variables

[1] Correlation Coefficients

	Total assets (logarithm)	Expenditures (logarithm)	Concerned	Worried	Yield-emphasis	Safety-emphasis	Liquidity-emphasis	Risk-acceptor	Risk-avoider
Total assets (logarithm)	1.000								
Expenditures (logarithm)	0.327	1.000							
Concerned	0.135	0.063	1.000						
Worried	–0.002	0.008	0.024	1.000					
Yield-emphasis	0.096	0.043	0.098	0.001	1.000				
Safety-emphasis	0.280	0.097	0.032	–0.002	–0.398	1.000			
Liquidity-emphasis	–0.057	–0.065	–0.081	0.007	–0.237	–0.568	1.000		
Risk-acceptor	0.071	0.044	0.144	–0.023	0.274	–0.148	–0.045	1.000	
Risk-avoider	0.053	0.023	–0.071	0.036	–0.167	0.217	–0.050	–0.388	1.000
Known	0.272	0.151	0.277	–0.022	0.067	0.119	–0.121	0.136	–0.021
Unknown	–0.305	–0.157	–0.096	0.002	–0.025	–0.136	0.075	–0.056	–0.094
High-yield shift	0.181	0.033	0.158	0.011	0.232	–0.018	–0.125	0.177	–0.119
Term shift	0.173	0.049	0.113	0.027	0.038	0.072	–0.077	0.031	–0.009
Cash investment because of low interest rates	0.043	0.022	0.020	0.033	–0.012	–0.014	0.028	0.028	–0.002
Deposit switch	0.161	0.043	0.132	0.020	0.039	0.085	–0.081	0.044	0.025
Cash investment for safety	–0.040	–0.014	0.010	0.038	0.011	–0.059	0.027	0.023	–0.031
Has borrowings	–0.252	–0.062	–0.020	0.007	–0.024	–0.045	–0.008	–0.014	0.008
Number of household members	–0.047	0.222	–0.029	0.018	0.011	–0.020	–0.003	–0.028	0.041

	Known	Unknown	High-yield shift	Term shift	Cash investment because of low interest rates	Deposit switch	Cash investment for safety	Has borrowings
Known	1.000							
Unknown	–0.289	1.000						
High-yield shift	0.141	–0.077	1.000					
Term shift	0.128	–0.086	0.197	1.000				
Cash investment because of low interest rates	0.051	–0.030	–0.039	0.021	1.000			
Deposit switch	0.127	–0.081	0.225	0.196	0.075	1.000		
Cash investment for safety	0.000	0.009	0.006	0.003	0.304	0.003	1.000	
Has borrowings	–0.015	0.022	–0.028	–0.029	–0.013	–0.021	0.014	1.000
Number of household members	–0.071	0.039	–0.034	–0.048	–0.027	–0.017	–0.020	0.055

[2] Cramer's *V*

	Concerned	Worried	Yield-emphasis	Safety-emphasis	Liquidity-emphasis	Risk-acceptor	Risk-avoider
Concerned	1.000						
Worried	0.032	1.000					
Yield-emphasis	0.093	0.017	1.000				
Safety-emphasis	0.040	–0.008	–0.353	1.000			
Liquidity-emphasis	–0.067	0.008	–0.225	–0.519	1.000		
Risk-acceptor	0.134	–0.015	0.254	–0.128	–0.040	1.000	
Risk-avoider	–0.042	0.035	–0.130	0.232	–0.042	–0.347	1.000
Known	0.274	–0.027	0.072	0.134	–0.100	0.136	0.010
Unknown	–0.101	–0.015	–0.037	–0.160	0.051	–0.054	–0.117
High-yield shift	0.143	0.012	0.214	0.006	–0.106	0.168	–0.087
Term shift	0.110	0.032	0.044	0.079	–0.062	0.044	–0.003
Cash investment because of low interest rates	0.025	0.031	–0.002	–0.006	0.019	0.034	0.000
Deposit switch	0.128	0.026	0.039	0.093	–0.061	0.035	0.041
Cash investment for safety	0.007	0.034	0.007	–0.051	0.016	0.019	–0.036

	Known	Unknown	High-yield shift	Term shift	Cash investment because of low interest rates	Deposit switch
Known	1.000					
Unknown	–0.294	1.000				
High-yield shift	0.145	–0.077	1.000			
Term shift	0.134	–0.088	0.183	1.000		
Cash investment because of low interest rates	0.049	–0.036	–0.026	0.024	1.000	
Deposit switch	0.134	–0.090	0.223	0.197	0.077	1.000
Cash investment for safety	0.001	0.012	0.012	–0.005	0.296	0.001

Cramer's *V*, which is a type of correlation coefficient among qualitative variables.[7] This index takes a value between zero and one, with figures closer to one indicating a higher level of association. The index values do not indicate any remarkably high associations among the explanatory variables.

IV. Estimation Results

This section presents the results of our analyses.

A. Selection of Product Combination (Extensive Margin), for Broad Product Groups

First, to analyze the decision along the extensive margin, or the selection of product combination, we use a multinomial logit model to conduct analyses, following equation (6), on the selection from the following five product combinations: "cash"; "cash and deposits"; "cash, deposits, and stocks and bonds"; "cash, deposits, and insurances"; and "cash, deposits, stocks and bonds, and insurances." The estimation results are summarized in Tables 2 and 3.

In this estimation, the total asset holdings amount is treated as a given condition. The households that choose "cash, deposits, and insurances" are used as the benchmark, and the characteristics of the households that selected the other four combinations are calculated in comparison with these benchmark households. Table 2 presents the estimated coefficients in the multinomial logit model in the form of equation (6). On the other hand, Table 3 presents the marginal effects computed from this result, that is, the amount by which the probability of a given product combination changes when an explanatory variable on the right side of the equation changes marginally by one unit.[8]

The marginal effects reported in Table 3 are the gap between the direct effects (of the estimated coefficient on the explanatory variable for the choice under question) and the indirect effect (the change in the left-hand side variable in equation [6] for the other choices taken together, caused by the change in the explanatory variable; this is equal to the weighted average of the estimated coefficients for those choices), multiplied by the probability of choosing a given product combination. Thus, when the indirect effects are sufficiently large, it is possible that the direct effects and the marginal effects have different signs. Also, the size and the standard errors of the marginal effects are evaluated at the sample average of each explanatory variable.[9] We are also interested in how to determine the likelihood of the choice of a particular product combination by a household with certain characteristics that might not necessarily be the same as those of an average household. We now explain the findings presented in Table 2 together with those presented in Table 3.

7. For a definition and explanation of the Cramer's *V*, see Takeuchi (1989, p. 341).
8. Among the explanatory variables, however, those defined as dummy variables take values of only zero or one, so strictly speaking they cannot be changed marginally. Accordingly, the following analyses should be understood as an approximation aimed at gaining useful information.
9. We used the equation presented in Greene (1997, p. 917) for the calculation of the standard error.

Table 2 Selection of Product Combinations for Broad Asset Groups (Multinomial Logit Model), Estimation Results

	Cash only	Cash and deposits	Cash, deposits, and stocks and bonds	Cash, deposits, stocks and bonds, and insurances
Total assets (logarithm)	–2.572***	–0.744***	–0.034	0.808***
Expenditures (logarithm)	1.054***	0.114	0.500***	0.519***
Concerned		–0.105	0.485***	0.560***
Worried		0.020	–0.184*	–0.033
Yield-emphasis		1.175***	1.220***	0.559***
Safety-emphasis		1.010***	0.558**	0.105
Liquidity-emphasis		0.917***	0.206	–0.221
Risk-acceptor	0.654*	–0.077	0.657***	0.613***
Risk-avoider	–0.274	–0.031	–0.346***	–0.246***
Known	–0.063	0.058	0.410***	0.345***
High-yield shift	0.681*	0.172	0.621***	0.534***
Term shift	0.441	0.157	0.196	0.321***
Cash investment because of low interest rates	0.454	–0.118	–0.222	0.022
Cash investment for safety	1.112***	0.251	0.056	–0.380*
Has borrowings	0.025***	0.011	0.026***	0.026***
Number of household members	0.011	–0.130***	–0.106**	–0.018
Head of household in 30s	0.925**	0.056	–0.265	–0.146
Head of household in 40s	0.912*	–0.232	–0.933***	–0.471*
Head of household in 50s	2.094***	0.083	–0.703**	–0.682**
Head of household 60–64	2.681***	0.550**	–0.903***	–1.111***
Head of household 65–69	3.225***	0.550**	–0.998***	–0.928***
Head of household 70 or over	2.385***	0.834***	–0.350	–1.113***
Self-employed	–0.085	–0.172*	–0.731***	–0.637***
Homeowner	–0.367*	–0.038	–0.006	0.136
Unemployed	0.543	0.191	0.209	0.054
Only head of household employed	0.269	0.054	0.223	0.344***
Spouse also employed	0.341	0.033	0.064	0.143
2002 dummy	–0.874***	–0.237***	–0.228**	–0.067
2001 dummy	–0.543**	–0.124	–0.316***	–0.152*
Hokkaido	0.179	0.190	–0.311	–0.261
Tohoku	–0.585	0.263	0.176	0.063
Kanto	–0.003	0.255*	0.302	0.122
Hokuriku	–0.503	0.226	0.335	0.193
Chubu	–0.300	0.179	0.329	0.201
Kinki	0.043	0.373**	0.577**	0.182
Shikoku	–0.455	0.579***	0.502	0.181
Kyushu	–0.589	0.163	0.073	–0.118
City scale 2	–0.234	0.153	–0.282**	–0.011
City scale 3	0.122	0.249*	–0.301*	–0.089
City scale 4	0.438	0.271*	–0.372*	–0.216
City scale 5	–0.279	–0.189	–0.496	–0.652**
City scale 6	–0.102	–0.012	–0.639***	–0.357***
Constant	3.446***	2.177***	–3.905***	–8.727***

Note: Benchmark group holds cash, deposits, and insurances. Number of samples is 7,945. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 3 Selection of Product Combinations for Broad Asset Groups, Estimation Results (Marginal Effects)

	Cash only	Cash and deposits	Cash, deposits, and stocks and bonds	Cash, deposits, and insurances	Cash, deposits, stocks and bonds, and insurances
Total assets (logarithm)	–0.297***	–0.087***	0.015***	0.086***	0.284***
Expenditures (logarithm)	0.092***	–0.038***	0.012*	–0.118***	0.051***
Concerned	–0.021***	–0.047**	0.023***	–0.060***	0.106***
Worried	0.002	0.007	–0.012*	0.007	–0.004
Yield-emphasis	–0.056***	0.127***	0.056***	–0.158***	0.032
Safety-emphasis	–0.031***	0.133***	0.023	–0.087***	–0.038
Liquidity-emphasis	–0.015*	0.139***	0.007	–0.041*	–0.091***
Risk-acceptor	0.047	–0.062***	0.027***	–0.101***	0.089***
Risk-avoider	–0.018	0.018	–0.016**	0.047***	–0.031*
Known	–0.024	–0.012	0.021***	–0.045***	0.060***
High-yield shift	0.048	–0.023	0.023***	–0.109***	0.062***
Term shift	0.033	–0.005	0.001	–0.066**	0.037
Cash investment because of low interest rates	0.054	–0.025	–0.018	–0.010	–0.001
Cash investment for safety	0.131***	0.029	–0.002	–0.031	–0.126***
Has borrowings	0.001***	–0.001	0.001***	–0.005***	0.003***
Number of household members	0.006	–0.017***	–0.005*	0.012**	0.004
Head of household in 30s	0.109**	–0.002	–0.024	–0.025	–0.058
Head of household in 40s	0.131***	–0.020	–0.059***	0.042	–0.095*
Head of household in 50s	0.261***	0.007	–0.054***	–0.016	–0.197***
Head of household 60–64	0.333***	0.083***	–0.070***	–0.025	–0.320***
Head of household 65–69	0.388***	0.064*	–0.085***	–0.065	–0.301***
Head of household 70 or over	0.288***	0.123***	–0.034	–0.044	–0.334***
Self-employed	0.023	0.016	–0.034***	0.095***	–0.100***
Homeowner	–0.045*	–0.004	0.001	0.006	0.041***
Unemployed	0.052	0.010	0.006	–0.047*	–0.021
Only head of household employed	0.015	–0.017	0.005	–0.055***	0.052***
Spouse also employed	0.032	–0.010	–0.002	–0.033	0.014
2002 dummy	–0.088***	–0.009	–0.003	0.067***	0.033*
2001 dummy	–0.050*	0.005	–0.012	0.055***	0.001
Hokkaido	0.028	0.039	–0.020	0.013	–0.060
Tohoku	–0.075	0.046*	0.013	0.000	0.017
Kanto	–0.013	0.027	0.015	–0.035	0.006
Hokuriku	–0.071	0.030	0.020	–0.018	0.038
Chubu	–0.047	0.019	0.019	–0.025	0.035
Kinki	–0.015	0.037	0.030**	–0.057*	0.006
Shikoku	–0.074	0.078***	0.027	–0.046	0.015
Kyushu	–0.066	0.041*	0.011	0.026	–0.012
City scale 2	–0.027	0.031***	–0.019***	0.010	0.004
City scale 3	0.014	0.041***	–0.023**	–0.005	–0.028
City scale 4	0.054	0.044**	–0.028**	–0.006	–0.063**
City scale 5	0.000	0.016	–0.016	0.100*	–0.101*
City scale 6	0.007	0.025	–0.035***	0.056***	–0.054***
Constant	0.672***	0.694***	–0.150***	0.651***	–1.867***

Note: Number of samples is 7,945. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

The second column of Table 2 shows that, compared with the benchmark households, when evaluated at the 1 percent significance level, households with low total assets, and households with borrowings and which hang on to cash for safety have a high probability of selecting "cash only."[10,11]

Looking at the second column of Table 3, when evaluated at the 1 percent significance level, we find that those households with a high probability of selecting "cash only" tend to have low total assets, high expenditures, low concern for the soundness of private financial institutions, and low concern about yield and safety, but they prefer cash investment for safety reasons, have borrowings, and often do not own their own homes.

The third column of Table 2 indicates that in comparison with the benchmark households, when evaluated at the 1 percent significance level, households with low total assets, and those which emphasize yield, safety, and liquidity have a high probability of selecting "cash and deposits." The difference versus the benchmark households is that these households do not hold pensions and other long-term financial assets, so these results are consistent with our prior expectations. Looking at the third column of Table 3, when evaluated at the 1 percent significance level, households with a high probability of selecting "cash and deposits" have low total assets and expenditures, emphasize yield, safety, and liquidity, and are not risk-tolerant.

The fourth column of Table 2 indicates that in comparison with the benchmark households, when evaluated at the 1 percent significance level, households that emphasize yield, are risk-tolerant, seek high profits, are highly concerned about the managerial conditions of financial institutions and about financial system problems, and have debts have a high probability of selecting "cash, deposits, and stocks and bonds." The fourth column of Table 2 indicates that, when evaluated at the 1 percent significance level, households with a high probability of selecting "cash, deposits, and stocks and bonds" have high total assets, are greatly concerned about financial institution management conditions and financial system problems, emphasize yield, accept risk, know about the deposit insurance system, seek high profits, and have debts.

10. We eliminated the dummy variables corresponding to the answers given to the question "Which point does your household emphasize the most when selecting a financial product" from the list of explanatory variables for those households that selected "cash only." Note that, for these variables, the question implicitly presumes that the respondents hold some financial products other than cash. We thus judged that those variables cannot be used to determine the probability of choosing "cash only."

11. An anonymous referee commented that, among the variables used in these analyses, the dummy variables for high-yield shift, term shift, and cash investment for safety may produce an endogeneity bias. Our interpretation is that these variables represent household preferences (more precisely, an interaction between household preferences and macroeconomic conditions), and are therefore exogenous.

    Nevertheless, we conducted the following type of analysis to check for any evidence of an endogeneity bias. First, we implemented probit analyses to obtain predicted values for these dummy variables, using the same variables used in Tables 2, 3, and 4 as explanatory variables. Next, we substituted the predicted values for the observed values of the dummy variables in the analyses in Tables 2, 3, and 4. The results revealed two problems. First, in the probit analysis the values of what corresponds to the R^2 in the regular regressions were not all that high. Second, almost none of the coefficients of these predicted values were significant, and we inferred that this is likely to be because those fitted variables cause multicollinearity with the other explanatory variables. Consequently, we could not discover any useful instrumental variables from the dataset, and concluded that it would be difficult to use econometric methodology to check the endogeneity.

Table 2 does not present the equation (6) estimation results for the probability of selecting "cash, deposits, and insurances" because households that make this choice are used as the benchmark, and thus the coefficients for this choice are all normalized to be zero. Thus the "direct effect" from changing the value of an explanatory variable is zero by construction. However, the indirect effects, the effects on combinations other than "cash, deposits, and insurances," are not zero. Column 5 of Table 3, which reports the marginal effects defined as the differentials between the direct effects and the indirect effects multiplied by appropriate probability factors, indicates that when evaluated at the 1 percent significance level, the benchmark households (which have "cash, deposits, and insurances") have high total assets, low concern regarding managerial conditions of financial institutions, do not emphasize yield or safety, are risk-averse, have little knowledge about the deposit insurance system, and do not seek high profits.

Column 5 of Table 2 indicates that in comparison with the benchmark households, when evaluated at the 1 percent significance level, households with high assets, where only the head of the household is employed, and with other characteristics that are basically the same as those of households selecting "cash, deposits, and stocks and bonds" have a high probability of selecting "cash, deposits, stocks and bonds, and insurances." Here the difference versus the benchmark households lies in the additional holdings of stocks and bonds, so in the sense that these households welcome the risk that comes with holding stocks, these results are also consistent with our prior expectations.

Looking at column 6 of Table 3 we find that, when evaluated at the 1 percent significance level, households with a high probability of selecting "cash, deposits, stocks and bonds, and insurances" have high total assets and expenditures, are concerned about the managerial conditions of financial institutions, do not emphasize liquidity, tolerate risk, are knowledgeable regarding the deposit insurance system, seek high profits, and do not hang on to cash for the sake of safety.

The analyses to this point have used a multinomial logit model to determine how households select from among the five product combination groups: "cash," "cash and deposits," "cash, deposits, and stocks and bonds," "cash, deposits, and insurances," and "cash, deposits, stocks and bonds, and insurances." From the policy perspective, we might be more interested in knowing what kinds of households are likely to hold stocks and bonds, regardless of which other asset groups they are holding. This information can be provided by summing up the marginal effects on all the choices that include stocks and bonds in Table 3. Note that the households which hold stocks and bonds hold either "cash, deposits, and stocks and bonds" or "cash, deposits, stocks and bonds, and insurances." Hence the information can be gained by adding up the marginal effects on these two groups. Similarly, the set of households holding insurances are the union of those selecting "cash, deposits, and insurances" and "cash, deposits, stocks and bonds, and insurances." It should, however, be noted that when calculating the standard error of the sum of those marginal effects, we cannot simply add up the standard errors around them: it is important to take into account the covariances among them.

Table 4 presents those summed marginal effects on holding stocks and bonds, and on holding insurances. The differences between those two are quite noticeable. The probability that households will hold stocks and bonds rises along with emphasis on yield, risk tolerance, knowledge of the deposit insurance system, and emphasis on high profitability. In contrast, the probability of holding insurances declines with greater emphasis on yield, safety, and liquidity factors.

B. Decisions on the Amount of Asset Holding (Intensive Margin), for Broad Product Groups

Based on the multinomial logit model estimations in the previous section, we now analyze how the amount of cash holding is determined out of total assets. This analysis is conducted for each group of households that chose a particular product combination other than "cash only."[12] These are the four types of households selecting the product combinations "cash and deposits," "cash, deposits, and stocks and bonds," "cash, deposits, and insurances" and "cash, deposits, stocks and bonds, and insurances." For each of these, it is technically possible to estimate equation (6) in its original form, but we found that this presented a problem. Theoretically, the left-hand-side variable, which is the ratio of each financial product to the total funds, should be between zero and one. However, when we simply estimated equation (6) and ran simulation exercises, the predicted values did not necessarily lie between zero and one. To avoid this problem, we conducted a logistic transformation of the left-hand side variable prior to estimation. That is to say, for the dependent variables on the left-hand-side of equation (6), rather than using the ratio itself, we converted this into the logarithm of (asset holding ratio)/[1 – (asset holding ratio)].[13]

When the results using this transformation are used for the simulation, while the predicted value of the left-hand-side variable may fluctuate widely, the predicted values after transforming them back into the asset holding ratios always fall between zero and one. For the case of a single explanatory variable, the logistically transformed equation (6) takes the following functional form.

$$\ln\left(\frac{A_i}{1-A_i}\right) = \alpha + \beta Z_i + u_i. \tag{7}$$

We then use the following relation to consider the marginal effect of Z on the dependent variable A.

$$A_i = \frac{\exp(\alpha + \beta Z_i + u_i)}{1 + \exp(\alpha + \beta Z_i + u_i)}. \tag{8}$$

12. By definition, the conditional cash demand for households selecting "cash only" equals their total assets, so these households are excluded from the analysis.
13. This problem is not resolved, for example, by using the amount itself or its logarithmic value in place of the ratio on the left-hand side of the equation. This is because in that case the possibility that the predictive value of the holdings amount may exceed the total assets cannot be eliminated.

Table 4 Selection of Product Combinations for Broad Asset Groups, Estimation Results (Aggregated Marginal Effects)

	Stocks and bonds	Insurances
Total assets (logarithm)	0.299***	0.369***
Expenditures (logarithm)	0.063***	–0.067***
Concerned	0.129***	0.046*
Worried	–0.016	0.003
Yield-emphasis	0.088***	–0.127***
Safety-emphasis	–0.015	–0.125***
Liquidity-emphasis	–0.084***	–0.131***
Risk-acceptor	0.116***	–0.012
Risk-avoider	–0.046***	0.022
Known	0.080***	0.015
High-yield shift	0.084***	–0.047
Term shift	0.038	–0.029
Cash investment because of low interest rates	–0.019	–0.011
Cash investment for safety	–0.128	–0.157
Has borrowings	0.004***	–0.002***
Number of household members	–0.001	0.016**
Head of household in 30s	–0.082	–0.083
Head of household in 40s	–0.154	–0.053
Head of household in 50s	–0.251	–0.213
Head of household 60–64	–0.390	–0.345
Head of household 65–69	–0.386	–0.366
Head of household 70 or over	–0.368	–0.378
Self-employed	–0.134***	–0.006
Homeowner	0.042	0.047
Unemployed	–0.016	–0.068*
Only head of household employed	0.057***	–0.003
Spouse also employed	0.012	–0.019
2002 dummy	0.030	0.099***
2001 dummy	–0.011	0.056***
Hokkaido	–0.080	–0.047
Tohoku	0.030	0.017
Kanto	0.021	–0.029
Hokuriku	0.059	0.020
Chubu	0.054	0.010
Kinki	0.036	–0.052
Shikoku	0.042	–0.031
Kyushu	–0.002	0.014
City scale 2	–0.014	0.014
City scale 3	–0.050	–0.032
City scale 4	–0.091	–0.069
City scale 5	–0.116*	–0.001
City scale 6	–0.089***	0.002
Constant	–2.017***	–1.216***

Note: Number of samples is 7,945. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Therefore

$$\frac{\partial A_i}{\partial Z_i} = \frac{\beta \exp(\alpha + \beta Z_i + u_i)}{\{1 + \exp(\alpha + \beta Z_i + u_i)\}^2} = \beta A_i(1 - A_i). \tag{9}$$

Thus, the effects of marginal effect of parameter β on A_i should be $\beta A_i(1 - A_i)$ rather than β. Because $A_i(1 - A_i)$ takes a value between zero and one, the marginal effect is smaller than the apparent parameter β.

We first estimated the cash conditional demand functions for each of the four types of households, and the estimation results are presented in columns 2–5 of Table 5. In column 6, we also presented the estimation results under the restriction that the coefficients of all the types must be equal, except for the constant terms and the coefficients on total assets and on the self-selection adjustment terms. The estimates for those unrestricted parameters are not reported here to save space. By comparing columns 2 through 5, we can see that for most of the explanatory variables the influence changes depending on what other types of products are held. As a common characteristic of each column, when evaluated at the 1 percent significance level, there is a strong tendency for households to hold cash because of low total assets, low interest rates, or for reasons of asset safety.[14]

The finding that cash holdings increase in response to low interest rates are as would be expected from the theory. It is interesting to observe that, even after controlling for the effect of low interest rates, the percentage of assets held as cash increases when safety concerns are higher.

Table 6 analyzes the factors that determine the ratio of deposits to total financial assets. The table is organized in the same way as Table 5.[15] Columns 2–5 indicate that, for many variables, their effects vary greatly depending on what kind of other assets are being held. We observe a tendency that for households which increase their cash holdings because of low interest rates, deposits tend to decrease.

C. Selection of Product Combinations (Extensive Margin), for Deposit Subgroups

Our analyses thus far have addressed the household selection of holding patterns among the five broad product groups, "cash," "cash and deposits," "cash, deposits, and stocks and bonds," "cash, deposits, and insurances," and "cash, deposits, stocks and bonds, and insurances" as well as the amounts of each of those product groups held.

These analyses help us understand the mechanism of how households decide their cash holdings. But they are not sufficient to understand the effects of shifts in asset demand within the "deposits" category, such as a shift from bank deposits to postal

14. Columns 2–4 indicate that households classified as risk-averse have low cash demand. To us, this was an unexpected finding. This might be because the group of households that responded to this question with the answer "cannot say which" (the households that were adopted as the standard) probably included many households with little interest in the issue of selecting financial products (we expect such households to have a strong cash orientation). Alternatively, those households responding that they "will not choose a financial product if its principal is not guaranteed" have a strong preference for government-guaranteed products such as postal savings, and may implement their investments using these as close safe asset substitutes for cash.
15. By construction, the estimated values in column 2 of Table 6 are the same as those in column 2 of Table 5, except that the signs are reversed.

Table 5 Decisions on the Amount of Asset Holdings, for Broad Asset Groups (Logistic Model), Estimation Results (Cash/Total Financial Assets)

Dependent variable = cash/total financial assets	Cash and deposits	Cash, deposits, and insurances	Cash, deposits, and stocks and bonds	Cash, deposits, stocks and bonds, and insurances	With restrictions
2001 dummy	–0.054	–0.018	0.025	0.183***	–0.006
2002 dummy	–0.041	–0.123***	0.228**	0.045	–0.081***
Cash and deposits adjustment term	–0.167**	0.168	–1.219**	–0.503**	0.090***
Cash, deposits, and stocks and bonds adjustment term	–0.548	0.092	1.020**	2.010***	–0.001
Cash, deposits, and insurances adjustment term	1.507**	–0.383	–0.308**	–2.931***	0.000
Cash, deposits, stocks and bonds, and insurances adjustment term	–0.620**	0.071	0.360	0.185**	–0.067***
Total assets (logarithm)	–0.802***	–0.746***	–0.365**	–0.509***	–0.756***
Expenditures (logarithm)	0.368***	0.096**	–0.184**	–0.074**	0.131***
Concerned	0.450***	0.042	0.443***	–0.153**	0.105***
Worried	–0.005	–0.031	0.124**	0.029	–0.025**
Yield-emphasis	0.006	0.168**	–0.577**	–0.612***	0.074**
Safety-emphasis	–0.239**	0.133**	–0.517**	–0.383***	0.003
Liquidity-emphasis	–0.169**	0.198**	–0.431**	–0.238**	0.049
Risk-acceptor	0.246**	0.028	–0.238**	–0.267***	–0.027
Risk-avoider	–0.241***	–0.092**	–0.130**	0.077**	–0.114***
Known	0.172**	–0.026	–0.233**	–0.211***	–0.008
High-yield shift	0.222**	–0.176**	–0.089	–0.142**	0.043**
Term shift	0.228**	0.149**	–0.184**	–0.004	0.088***
Cash investment because of low interest rates	0.351***	0.473***	0.687***	0.654***	0.489***
Cash investment for safety	0.765***	0.503***	1.176***	0.546***	0.691***
Has borrowings	0.007**	0.001	0.007**	–0.013**	0.004**
Number of household members	–0.004	0.030**	0.102***	0.074***	0.021***
Head of household in 30s	–0.228**	–0.016	0.171	0.437***	0.012
Head of household in 40s	–0.201**	0.140**	0.678***	0.694***	0.068
Head of household in 50s	0.036	0.413***	0.679***	0.726***	0.316***
Head of household 60–64	0.061	0.445***	0.233	0.752***	0.353***
Head of household 65–69	0.169	0.412**	0.354**	0.821***	0.363***
Head of household 70 or over	0.086	0.386**	0.185	0.607***	0.366***
Self-employed	0.079	0.125**	0.729***	0.512***	0.194***
Homeowner	–0.053	0.033	0.059	0.000	–0.002
Unemployed	–0.102**	0.193***	–0.292**	–0.191***	0.017
Only head of household employed	0.042	0.053	–0.107	–0.045	0.031
Spouse also employed	0.096**	0.091**	–0.372***	0.002	0.027
Hokkaido	0.457***	–0.258***	0.045	0.085	–0.008
Tohoku	0.130**	–0.113**	0.122	–0.085	0.004
Kanto	0.439***	0.001	0.233**	–0.091**	0.128***
Hokuriku	0.510***	–0.310***	–0.059	–0.139**	–0.030
Chubu	0.333***	–0.124**	0.158	–0.172**	0.016
Kinki	0.496***	–0.003	0.178	–0.298***	0.128***
Shikoku	0.612***	–0.267**	–0.139	–0.395***	0.016
Kyushu	0.257**	–0.106**	0.384**	–0.026	0.048**
City scale 2	–0.189**	0.076**	–0.009	0.132**	0.006
City scale 3	–0.203**	–0.083**	–0.222**	0.180***	–0.051**
City scale 4	–0.329***	0.041	0.005	0.208***	–0.011
City scale 5	–0.029	–0.044	0.140	–0.380**	–0.173**
City scale 6	–0.219**	–0.038	0.041	0.277***	–0.052**
Constant	–0.759**	–0.269	0.256	–0.835	–0.212**
Number of samples	1,378	2,835	574	2,151	6,938

Note: *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.03. Accordingly, the coefficient must be set at 0.03 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

Table 6 Decisions on the Amount of Asset Holdings, for Broad Asset Groups (Logistic Model), Estimation Results (Deposits/Total Financial Assets)

Dependent variable = deposits/total financial assets	Cash and deposits	Cash, deposits, and insurances	Cash, deposits, and stocks and bonds	Cash, deposits, stocks and bonds, and insurances	With restrictions
2001 dummy	0.054	–0.177***	–0.159**	0.012	–0.127***
2002 dummy	0.041	–0.079**	–0.070	–0.032	–0.182***
Cash and deposits adjustment term	0.167**	–0.625**	0.115	–0.635**	1.264***
Cash, deposits, and stocks and bonds adjustment term	0.548	–0.041	1.988**	2.746***	–0.525***
Cash, deposits, and insurances adjustment term	–1.507**	0.506	–0.592**	–0.065	–0.156***
Cash, deposits, stocks and bonds, and insurances adjustment term	0.620**	1.408***	–0.531	–0.510***	–0.836***
Total assets (logarithm)	0.802***	0.681***	0.095	–0.147**	–0.158***
Expenditures (logarithm)	–0.368***	0.224***	–0.346**	–0.347***	–0.100***
Concerned	–0.450***	0.276***	–0.665***	–0.293***	–0.259***
Worried	0.005	0.008	0.169**	0.060**	0.054**
Yield-emphasis	–0.006	0.006	–0.557**	–0.503***	0.368***
Safety-emphasis	0.239**	–0.174**	0.290	0.004	0.551***
Liquidity-emphasis	0.169**	–0.429***	0.156	0.023	0.431***
Risk-acceptor	–0.246**	0.179**	–0.605***	–0.445***	–0.357***
Risk-avoider	0.241***	–0.052	0.367***	0.365***	0.195***
Known	–0.172**	0.263***	–0.084	–0.144***	0.013
High-yield shift	–0.222**	0.282***	–0.670***	–0.321***	–0.095***
Term shift	–0.228**	0.307***	–0.085	–0.126**	0.009
Cash investment because of low interest rates	–0.351***	–0.207***	–0.143	–0.080**	–0.249***
Cash investment for safety	–0.765***	–0.243**	–0.503**	0.228**	–0.002
Has borrowings	–0.007**	0.011**	–0.036***	–0.035***	–0.009***
Number of household members	0.004	–0.064***	0.036	0.006	–0.092***
Head of household in 30s	0.228**	–0.533***	–0.397**	–0.360**	–0.200***
Head of household in 40s	0.201**	–0.893***	–0.335	–0.550***	–0.568***
Head of household in 50s	–0.036	–0.949***	–0.122	–0.251**	–0.287***
Head of household 60–64	–0.061	–0.926***	–0.056	–0.064	0.093**
Head of household 65–69	–0.169	–0.910***	0.019	–0.118	0.027
Head of household 70 or over	–0.086	–0.663***	–0.694**	–0.016	0.360***
Self-employed	–0.079	–0.365***	0.624**	0.407***	–0.074**
Homeowner	0.053	0.018	0.165**	0.105**	0.043**
Unemployed	0.102**	0.015	–0.032	–0.099**	0.090**
Only head of household employed	–0.042	0.118**	–0.473***	–0.292***	–0.086***
Spouse also employed	–0.096**	–0.115**	–0.138**	–0.170***	–0.110***
Hokkaido	–0.457***	–0.280***	–0.396**	0.186**	–0.087**
Tohoku	–0.130**	–0.143**	–0.522**	–0.134**	–0.011
Kanto	–0.439***	0.077**	–0.592***	–0.145**	–0.025
Hokuriku	–0.510***	–0.051	–0.285**	–0.203**	–0.121**
Chubu	–0.333***	0.154**	–0.572***	–0.026	0.026
Kinki	–0.496***	–0.078	–0.638**	–0.213**	–0.051**
Shikoku	–0.612***	–0.124	–0.839***	–0.251**	0.022
Kyushu	–0.257**	–0.046	–0.148	–0.004	–0.004
City scale 2	0.189**	0.055	0.297**	0.001	0.130***
City scale 3	0.203**	–0.065	0.310**	0.150**	0.210***
City scale 4	0.329***	0.040	0.569***	0.181**	0.360***
City scale 5	0.029	–0.046	0.607**	0.736***	0.157**
City scale 6	0.219**	0.077	0.475**	0.216***	0.156***
Constant	0.759**	–3.980***	4.966**	5.181***	2.251***
Number of samples	1,378	2,699	533	2,099	6,709

Note: *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.12. Accordingly, the coefficient must be set at 0.12 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

savings deposits due to heightened concern for the soundness of private financial institutions. Accordingly, among those households selecting the product combinations "cash and deposits," "cash, deposits, and stocks and bonds," "cash, deposits, and insurances" and "cash, deposits, stocks and bonds, and insurances," we conduct a second-stage analysis. That is, we analyze how the demand is determined among the deposits subgroups, namely, bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits.

There are 15 possible combinations of those four types of deposit subgroups.[16] We adopt those households holding all four deposit subgroups as the benchmark households, and then use a multinomial logit model to determine the characteristics of the households with the remaining 14 combinations in comparison with the benchmark households. The findings are presented in Tables 7 and 8. Tables 9 and 10 report the marginal effect, that is, the amount by which the probability that a given deposit combination is selected changes when an explanatory variable on the right side of the equation changes marginally by one unit. A total of 15 kinds of results are reported, because the marginal effect calculations can also be conducted for the benchmark group. The method used to calculate the standard error is the same as that in Table 3.

Finally, Table 11 calculates the sum of the marginal effects for several patterns. To begin with, by aggregating the marginal effects on the probability of combinations including bank current deposits, the second column calculates the marginal effect of each explanatory variable on the probability of holding bank current deposits (regardless of what other types of deposits are being held). Similar calculations are conducted in columns 3 through 5 on bank time deposits, postal savings current deposits, and postal savings time deposits, respectively. Column 6 aggregates the probability of adopting deposit combinations that include either bank current deposits or bank time deposits to estimate the marginal effect on the probability of holding bank deposits of any type. In the same way, columns 7 through 9 calculate the probabilities of holding postal savings deposits (of any type), current deposits, and time deposits.

In the following paragraphs, we focus on the effects of household characteristics, and investigate the marginal effects and their sums in greater detail. We start with some notable findings from Tables 9 and 10.

First we consider the influence of the *deposit switch* and *cash investment for safety* dummies. These variables are valuable information sources that indicate what kinds of fund shifts are actually occurring under financial system anxiety.

The *deposit switch dummy* is negative at the 1 percent significance level for households holding "bank current deposits and bank time deposits," and negative at the 10 percent significance level for households holding "bank current deposits, bank time deposits, and postal savings current deposits," but positive at the 1 percent significance level for households holding postal savings current deposits or "bank current deposits and postal savings time deposits." As shown in Table 11, for the sum of the marginal effects, *deposit switch* is negative at the 5 percent significance

16. The number of holding combinations is $2^4 = 16$, but households that do not hold any of the four types of deposits are classified as "cash only" and are therefore automatically excluded from the analysis.

Table 7 Selection of Product Combinations, for Deposit Subgroups (Multinomial Logit Model), Estimation Results (1 of 2)

Asset holding combinations	Postal savings time deposits	Postal savings current deposits	Bank time deposits	Bank current deposits	Bank time deposits and postal savings time deposits	Postal savings current deposits and postal savings time deposits	Bank current deposits and postal savings time deposits
Explanatory variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Total assets (logarithm)	–1.235***	–1.750***	–1.299***	–1.636***	–0.444***	–0.992***	–0.824***
Expenditures (logarithm)	–0.165	–0.391**	–0.185	0.123	–0.391***	–0.472***	–0.322***
Concerned	0.225	0.049	0.745***	0.416*	0.245	–0.343	–0.226
Worried	–0.365**	0.134	–0.288**	–0.282***	0.101	–0.544***	0.103
Yield-emphasis	0.602	0.358	0.393	0.503*	0.113	0.039	–0.063
Safety-emphasis	0.920**	0.420	0.309	0.003	0.292	0.238	–0.265
Liquidity-emphasis	0.696	0.176	0.274	0.200	0.088	0.204	–0.258
Risk-acceptor	–0.261	–0.405	–0.105	–0.150	–0.251	–0.213	0.173
Risk-avoider	–0.023	–0.446**	–0.152	–0.374***	0.004	0.300	0.328*
Known	–0.169	–0.607***	0.267*	0.144	0.165	0.214	0.054
Unknown	0.144	0.250	0.068	0.374**	–0.172	0.658***	–0.241
High-yield shift	–0.145	–0.196	–0.156	–0.078	–0.027	–0.001	–0.208
Term shift	–0.632**	–0.916**	–0.496**	–0.903***	–0.043	–0.626	–0.382*
Cash investment because of low interest rates	–0.080	0.602*	–0.464	0.066	–0.203	–0.327	–0.126
Deposit switch	0.243	0.680***	–0.171	0.030	0.014	–0.334	0.548***
Cash investment for safety	0.776*	0.405	0.573	0.764***	0.212	0.442	0.060
Has borrowings	–0.004	–0.001	0.014	0.002	–0.007	–0.181***	–0.022
Number of household members	–0.006	–0.060	0.060	–0.079	0.144***	–0.081	–0.013
Head of household in 30s	–1.532*	–1.981***	–1.483*	–1.952***	–1.379*	–0.893	–1.775***
Head of household in 40s	–1.576*	–1.738**	–1.446*	–2.033***	–1.477*	–1.377	–2.040***
Head of household in 50s	–1.086	–1.645*	–1.213	–1.510**	–1.028	–0.384	–1.880***
Head of household 60–64	–0.548	–1.090	–0.859	–1.428*	–1.083	–1.216	–1.902***
Head of household 65–69	–0.526	–1.392	–1.263	–1.425*	–0.997	–0.618	–2.230***
Head of household 70 or over	–0.663	–1.115	–1.158	–1.749***	–0.917	–0.414	–2.409***
Self-employed	–0.703***	–0.089	0.275*	–0.074	–0.011	–0.685**	0.070
Homeowner	–0.236	–0.138	0.054	–0.323**	0.022	–0.034	–0.035
Unemployed	0.579***	0.072	0.569***	0.208	0.204	0.617*	0.303
Only head of household employed	0.276	0.116	0.189	0.087	0.262*	0.453	0.544***
Spouse also employed	0.567***	–0.157	0.616***	0.313*	0.240	0.519*	0.359*
2002 dummy	–0.410**	–0.688***	–0.608***	–0.657***	–0.553***	–0.047	–0.373***
2001 dummy	0.202	–0.707***	0.218	–0.361***	0.340***	0.480**	0.011
Hokkaido	0.450	0.228	–0.944***	0.189	–0.186	0.978*	0.330
Tohoku	0.071	–0.081	–0.107	0.202	0.042	0.696	0.311
Kanto	0.341	–0.003	0.021	0.238	–0.100	0.448	0.400
Hokuriku	–0.192	–0.604	–0.021	0.184	–0.305	–0.209	0.016
Chubu	0.271	–0.059	0.003	0.134	–0.109	0.989**	0.547*
Kinki	0.285	0.027	–0.126	0.017	–0.211	0.494	0.402
Shikoku	–0.318	–0.305	0.090	0.334	0.033	0.081	0.658
Kyushu	0.714**	0.662*	0.309	0.524**	–0.040	1.037**	0.305
City scale 2	0.163	–0.357	–0.009	–0.014	0.111	–0.063	0.179
City scale 3	0.209	–0.312	0.318	0.014	0.283	–0.915**	0.143
City scale 4–5	–0.044	–0.180	0.024	–0.055	–0.250	–0.241	–0.045
City scale 6	0.291	–0.485*	0.197	0.003	0.006	–0.254	0.028
Constant	7.157***	13.070***	8.744***	10.791***	5.261***	6.876***	7.324***

Note: Benchmark group holds all deposit subgroups bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. Number of samples is 6,709. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 8 Selection of Product Combinations, for Deposit Subgroups (Multinomial Logit Model), Estimation Results (2 of 2)

Asset holding combinations	Bank time deposits and postal savings current deposits	Bank current deposits and postal savings current deposits	Bank current deposits and bank time deposits	Bank time deposits, postal savings current deposits, and postal savings time deposits	Bank current deposits, postal savings current deposits, and postal savings time deposits	Bank current deposits, bank time deposits, and postal savings time deposits	Bank current deposits, bank time deposits, and postal savings current deposits
Explanatory variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Total assets (logarithm)	–0.905***	–1.052***	–0.851***	–0.165	–0.730***	–0.115**	–0.583***
Expenditures (logarithm)	0.006	–0.031	0.205**	–0.591***	–0.020	–0.023	–0.054
Concerned	0.000	0.344	0.668***	0.105	0.231	0.227	0.343
Worried	–0.431	0.061	–0.278***	–0.206	0.037	–0.067	–0.194
Yield-emphasis	0.388	0.378	0.485*	–0.274	0.156	0.345	0.188
Safety-emphasis	0.776	–0.023	0.278	0.046	0.122	0.248	0.013
Liquidity-emphasis	1.146	0.199	0.692***	–0.182	–0.154	0.092	0.198
Risk-acceptor	–1.498**	–0.082	0.192	0.046	–0.517	–0.244	0.039
Risk-avoider	–0.424*	–0.253*	0.003	0.145	0.079	0.142	–0.205
Known	0.287	0.036	0.266***	0.002	0.029	0.089	0.105
Unknown	–0.379	0.144	0.148	0.277	0.213	0.097	–0.319
High-yield shift	–0.237	–0.223	–0.070	0.248	0.043	0.141	–0.168
Term shift	–1.439***	–0.815***	–0.330**	–0.513	–0.051	–0.213	–0.367*
Cash investment because of low interest rates	0.056	0.452**	0.083	–0.225	0.827***	–0.083	–0.077
Deposit switch	0.390	–0.063	–0.400***	0.007	0.000	–0.021	–0.331*
Cash investment for safety	0.050	0.486	0.510*	–0.101	–0.647	–0.130	0.233
Has borrowings	–0.005	–0.002	–0.009	0.042*	0.007	0.004	–0.010
Number of household members	–0.045	–0.011	–0.005	–0.067	0.005	0.089***	0.016
Head of household in 30s	–2.249**	–1.634**	–1.906***	–0.980	–1.029	–1.978***	–0.801
Head of household in 40s	–2.114**	–2.200***	–2.349***	–1.349	–1.870**	–2.118***	–1.300
Head of household in 50s	–2.056*	–1.485*	–1.814***	–0.532	–1.597*	–1.719**	–0.981
Head of household 60–64	–1.655	–1.597**	–1.984***	–0.742	–1.440	–1.719**	–0.845
Head of household 65–69	–1.544	–2.252***	–2.100***	–1.447	–2.189***	–1.885***	–1.049
Head of household 70 or over	–1.349	–1.896***	–2.494***	–0.789	–1.982**	–1.970***	–1.033
Self-employed	–0.221	0.028	0.292**	0.007	–1.220***	0.007	0.150
Homeowner	0.055	–0.434***	–0.035	–0.127	–0.080	0.091	–0.243
Unemployed	0.016	0.391*	0.401***	–0.014	–0.101	–0.073	0.001
Only head of household employed	0.096	0.302	0.094	–0.040	–0.179	0.246*	0.107
Spouse also employed	0.744**	0.276	0.274*	–0.048	–0.079	0.313***	0.346*
2002 dummy	–0.432	–0.509***	–0.226*	–0.569***	–0.177	–0.162	–0.026
2001 dummy	0.051	–0.358***	–0.070	–0.045	–0.003	0.233*	0.022
Hokkaido	1.674	0.088	–0.262	0.356	–0.115	0.022	–0.329
Tohoku	1.837*	0.181	0.315	0.935*	0.009	0.376	0.235
Kanto	1.589	0.010	0.323	0.608	0.085	0.344*	–0.009
Hokuriku	1.210	–0.257	0.443	0.274	–0.076	–0.084	–0.658*
Chubu	2.189**	0.038	0.404*	0.640	–0.222	0.128	–0.058
Kinki	2.333***	–0.001	0.057	0.702	0.165	–0.071	–0.305
Shikoku	2.211*	0.130	0.277	1.161*	–0.025	0.561*	–0.070
Kyushu	2.143**	0.068	0.416*	1.193***	0.209	0.260	–0.016
City scale 2	–0.365	0.111	0.222	–0.369	0.148	0.209	0.010
City scale 3	–0.839*	–0.141	0.251	0.451	0.380	0.232	–0.005
City scale 4–5	–1.940***	–0.121	0.167	0.209	–0.011	–0.043	–0.285
City scale 6	–0.244	–0.110	0.083	–0.300	–0.023	0.030	0.199
Constant	3.147	8.138***	5.055***	3.274*	4.989***	1.384	4.313***

Note: Benchmark group holds all deposit subgroups bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. Number of samples is 6,709. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 9 Selection of Product Combinations, for Deposit Subgroups (Multinomial Logit Model), Marginal Effects (1 of 2)

Asset holding combinations	Marginal effects						
	Postal savings time deposits	Postal savings current deposits	Bank time deposits	Bank current deposits	Bank time deposits and postal savings time deposits	Postal savings current deposits and postal savings time deposits	Bank current deposits and postal savings time deposits
Explanatory variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Total assets (logarithm)	–0.020***	–0.024***	–0.039***	–0.094***	0.027***	–0.006	–0.006*
Expenditures (logarithm)	–0.003	–0.007*	–0.007	0.020***	–0.033***	–0.008	–0.012**
Concerned	–0.002	–0.005	0.031***	0.015	–0.002	–0.012	–0.023*
Worried	–0.009	0.006	–0.012	–0.017*	0.022***	–0.009	0.010
Yield-emphasis	0.013	0.002	0.009	0.025	–0.015	–0.004	–0.015
Safety-emphasis	0.028*	0.006	0.009	–0.016	0.013	0.001	–0.020
Liquidity-emphasis	0.019	0.000	0.005	0.001	–0.011	0.000	–0.021
Risk-acceptor	–0.005	–0.007	0.000	–0.004	–0.015	–0.002	0.014
Risk-avoider	0.001	–0.009**	–0.007	–0.033***	0.005	0.007	0.018**
Known	–0.010	–0.016***	0.011	0.005	0.008	0.003	–0.002
Unknown	0.003	0.004	0.000	0.031***	–0.025*	0.012	–0.015
High-yield shift	–0.003	–0.003	–0.007	–0.003	0.003	0.001	–0.007
Term shift	–0.010	–0.013	–0.008	–0.053***	0.035***	–0.005	0.000
Cash investment because of low interest rates	–0.003	0.014*	–0.030*	0.006	–0.022	–0.007	–0.006
Deposit switch	0.010	0.016***	–0.009	0.006	0.005	–0.006	0.028***
Cash investment for safety	0.019	0.004	0.021	0.052***	–0.004	0.004	–0.009
Has borrowings	0.000	0.000	0.001	0.001	0.000	–0.004	–0.001
Number of household members	–0.001	–0.002	0.003	–0.010***	0.013***	–0.002	–0.001
Head of household in 30s	–0.007	–0.015	–0.009	–0.060**	–0.003	0.009	–0.020
Head of household in 40s	–0.001	–0.004	0.007	–0.048*	0.008	0.004	–0.023
Head of household in 50s	0.004	–0.011	–0.002	–0.032	0.017	0.016	–0.033*
Head of household 60–64	0.023	0.002	0.020	–0.027	0.008	–0.001	–0.035*
Head of household 65–69	0.029	–0.002	0.004	–0.011	0.034	0.014	–0.044**
Head of household 70 or over	0.025	0.005	0.012	–0.040	0.045	0.019	–0.051**
Self-employed	–0.025***	–0.001	0.020***	–0.004	0.002	–0.013	0.005
Homeowner	–0.006	–0.001	0.009	–0.024**	0.011	0.001	0.002
Unemployed	0.014*	–0.003	0.025*	0.002	0.001	0.009	0.005
Only head of household employed	0.004	–0.001	0.002	–0.007	0.011	0.006	0.018*
Spouse also employed	0.011	–0.010	0.023**	0.006	–0.002	0.005	0.005
2002 dummy	–0.003	–0.009*	–0.019**	–0.034***	–0.025**	0.006	–0.003
2001 dummy	0.007	–0.017***	0.013*	–0.038***	0.034***	0.010	0.000
Hokkaido	0.017	0.006	–0.060***	0.021	–0.018	0.020	0.017
Tohoku	–0.005	–0.007	–0.020	0.000	–0.016	0.010	0.005
Kanto	0.006	–0.004	–0.010	0.007	–0.029*	0.006	0.011
Hokuriku	–0.006	–0.013	0.001	0.022	–0.029	–0.004	0.002
Chubu	0.004	–0.005	–0.010	–0.002	–0.028	0.017	0.019
Kinki	0.009	0.000	–0.011	–0.003	–0.027	0.009	0.017
Shikoku	–0.020	–0.012	–0.008	0.012	–0.019	–0.003	0.021
Kyushu	0.016	0.009	0.001	0.024	–0.035*	0.015	0.001
City scale 2	0.004	–0.010*	–0.005	–0.008	0.005	–0.003	0.005
City scale 3	0.004	–0.010	0.014	–0.009	0.019	–0.021	0.002
City scale 4–5	0.001	–0.002	0.006	0.002	–0.018	–0.003	0.001
City scale 6	0.010	–0.012*	0.012	–0.001	–0.001	–0.006	0.001
Constant	0.076	0.185***	0.236	0.572***	0.017	0.036	0.106**

Note: Number of samples is 6,709. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 10 Selection of Product Combinations, for Deposit Subgroups (Multinomial Logit Model), Marginal Effects (2 of 2)

Asset holding combinations	Marginal effects							
	Bank time deposits and postal savings current deposits	Bank current deposits and postal savings current deposits	Bank current deposits and bank time deposits	Bank time deposits, postal savings current deposits, and postal savings time deposits	Bank current deposits, postal savings current deposits, and postal savings time deposits	Bank current deposits, bank time deposits, and postal savings time deposits	Bank current deposits, bank time deposits, and postal savings current deposits	Bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits
Explanatory variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Total assets (logarithm)	–0.003	–0.024***	–0.018***	0.011***	–0.001	0.072***	0.006	0.118***
Expenditures (logarithm)	0.001	0.003	0.033***	–0.010***	0.002	0.007	0.001	0.013
Concerned	–0.003	0.005	0.047***	–0.003	–0.001	–0.005	0.004	–0.045**
Worried	–0.004	0.011	–0.020**	–0.002	0.005	0.005	–0.005	0.018
Yield-emphasis	0.002	0.008	0.027	–0.011	–0.004	0.011	–0.004	–0.043
Safety-emphasis	0.008	–0.013	0.013	–0.002	–0.002	0.010	–0.008	–0.028
Liquidity-emphasis	0.013	0.000	0.059***	–0.007	–0.013	–0.012	0.000	–0.032
Risk-acceptor	–0.018	0.002	0.036**	0.003	–0.015	–0.016	0.008	0.019
Risk-avoider	–0.005	–0.014*	0.006	0.004	0.005	0.023**	–0.009	0.008
Known	0.003	–0.004	0.021**	–0.002	–0.002	0.000	0.001	–0.015
Unknown	–0.006	0.005	0.010	0.004	0.005	0.004	–0.021*	–0.011
High-yield shift	–0.002	–0.011	–0.002	0.006	0.003	0.024*	–0.006	0.009
Term shift	–0.014	–0.029*	0.005	–0.003	0.012	0.020	0.000	0.063***
Cash investment because of low interest rates	0.001	0.030***	0.009	–0.005	0.030***	–0.011	–0.005	–0.001
Deposit switch	0.006	–0.002	–0.044***	0.001	0.001	0.001	–0.017*	0.005
Cash investment for safety	–0.003	0.016	0.031	–0.007	–0.033*	–0.047	–0.001	–0.042
Has borrowings	0.000	0.000	–0.001	0.001*	0.000	0.001	0.000	0.001
Number of household members	–0.001	–0.002	–0.002	–0.002	0.000	0.009**	0.000	–0.003
Head of household in 30s	–0.012	–0.019	–0.065*	0.007	0.012	–0.077*	0.030	0.228**
Head of household in 40s	–0.007	–0.043**	–0.093***	0.004	–0.011	–0.069	0.014	0.263***
Head of household in 50s	–0.011	–0.020	–0.073**	0.013	–0.015	–0.065	0.011	0.201*
Head of household 60–64	–0.006	–0.029	–0.097***	0.008	–0.010	–0.069	0.017	0.196*
Head of household 65–69	–0.003	–0.062***	–0.092***	–0.003	–0.032	–0.070	0.015	0.222*
Head of household 70 or over	0.000	–0.037	–0.135***	0.011	–0.023	–0.077*	0.017	0.227**
Self-employed	–0.002	0.004	0.038***	0.001	–0.044***	0.005	0.010	0.005
Homeowner	0.002	–0.024***	0.005	–0.001	0.000	0.021*	–0.009	0.014
Unemployed	–0.002	0.013	0.025	–0.004	–0.011	–0.033*	–0.010	–0.032*
Only head of household employed	–0.001	0.010	–0.007	–0.004	–0.012	0.011	–0.003	–0.027
Spouse also employed	0.006	0.001	0.002	–0.006	–0.012	0.007	0.005	–0.043***
2002 dummy	–0.001	–0.013	0.011	–0.005	0.005	0.019*	0.016**	0.054***
2001 dummy	0.001	–0.025***	–0.010	–0.001	–0.001	0.027**	0.001	–0.002
Hokkaido	0.022	0.007	–0.029	0.007	–0.003	0.005	–0.017	0.003
Tohoku	0.021	–0.001	0.014	0.015	–0.007	0.022	0.002	–0.034
Kanto	0.019	–0.011	0.018	0.009	–0.003	0.021	–0.010	–0.029
Hokuriku	0.016	–0.015	0.056***	0.006	–0.002	–0.006	–0.034*	0.005
Chubu	0.027	–0.008	0.030	0.010	–0.014	–0.003	–0.012	–0.026
Kinki	0.030*	–0.003	0.002	0.013	0.004	–0.014	–0.019	–0.007
Shikoku	0.026	–0.006	0.007	0.019	–0.009	0.043	–0.016	–0.036
Kyushu	0.024	–0.015	0.015	0.018*	–0.003	–0.004	–0.017	–0.049*
City scale 2	–0.006	0.003	0.018	–0.009	0.003	0.017	–0.003	–0.011
City scale 3	–0.012	–0.016	0.018	0.007	0.010	0.016	–0.006	–0.017
City scale 4–5	–0.024*	–0.003	0.028*	0.006	0.002	0.004	–0.012	0.013
City scale 6	–0.003	–0.008	0.008	–0.006	–0.001	0.002	0.010	–0.003
Constant	–0.026	0.203***	–0.005	–0.036	–0.004	–0.459***	–0.043	–0.860***

Note: Number of samples is 6,709. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 11 Selection of Product Combinations, for Deposit Subgroups (Multinomial Logit Model), Estimation Results (Sum of the Marginal Effects)

Asset holding combinations	Marginal effects							
	Bank current deposits	Bank time deposits	Postal savings current deposits	Postal savings time deposits	Bank current deposits and bank time deposits	Postal savings current deposits and postal savings time deposits	Bank current deposits and postal savings current deposits	Bank time deposits and postal savings time deposits
Explanatory variables	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Total assets (logarithm)	0.054	0.175***	0.077*	0.195***	0.050	0.151*	0.032	0.142
Expenditures (logarithm)	0.068***	0.005	–0.005	–0.044*	0.019	–0.046	0.043*	–0.016
Concerned	–0.003	0.024	–0.061*	–0.094***	0.019	–0.093*	–0.027	–0.015
Worried	0.008	0.003	0.021	0.041*	0.013	0.049	–0.001	0.000
Yield-emphasis	0.005	–0.024	–0.054	–0.069	–0.011	–0.060	–0.006	–0.035
Safety-emphasis	–0.064*	0.016	–0.037	0.001	–0.035	–0.006	–0.050	0.023
Liquidity-emphasis	–0.018	0.014	–0.039	–0.078*	–0.018	–0.065	–0.013	–0.001
Risk-acceptor	0.044	0.017	–0.010	–0.018	0.014	–0.032	0.020	0.009
Risk-avoider	0.004	0.026	–0.013	0.071***	0.001	0.034	0.001	0.056
Known	0.003	0.026	–0.033**	–0.021	0.023	–0.037	–0.010	0.015
Unknown	0.007	–0.046*	–0.007	–0.023	–0.019	–0.041	0.022	–0.040
High-yield shift	0.006	0.024	–0.004	0.035	0.006	0.011	0.007	0.017
Term shift	0.017	0.099***	0.011	0.112***	0.027	0.056	–0.017	0.095
Cash investment because of low interest rates	0.052*	–0.064**	0.058*	–0.025	–0.004	0.015	0.056*	–0.050
Deposit switch	–0.022	–0.053**	0.004	0.044	–0.020	0.047	–0.005	–0.020
Cash investment for safety	–0.034	–0.052	–0.062	–0.119***	–0.027	–0.103*	–0.036	–0.071
Has borrowings	0.002	0.003	–0.001	–0.001	0.003	–0.001	–0.001	–0.001
Number of household members	–0.009	0.018**	–0.011*	0.014	0.005	0.009	–0.015**	0.013
Head of household in 30s	0.028	0.100	0.241***	0.149	0.012	0.134	0.018	0.094
Head of household in 40s	–0.011	0.127	0.219*	0.174	0.001	0.134	–0.015	0.095
Head of household in 50s	–0.027	0.090	0.185*	0.138	–0.010	0.107	–0.019	0.063
Head of household 60–64	–0.053	0.078	0.177*	0.120	–0.023	0.104	–0.051	0.054
Head of household 65–69	–0.073	0.107	0.150	0.151	–0.042	0.099	–0.066	0.075
Head of household 70 or over	–0.118	0.101	0.220*	0.177	–0.050	0.163	–0.083	0.072
Self-employed	0.019	0.078***	–0.041	–0.064*	0.039	–0.054	0.003	0.002
Homeowner	–0.014	0.052***	–0.018	0.042**	0.006	0.010	–0.014	0.049
Unemployed	–0.040	–0.030	–0.040	–0.049	–0.020	–0.051	–0.040	–0.012
Only head of household employed	–0.018	–0.018	–0.032	0.008	–0.009	0.013	–0.017	–0.002
Spouse also employed	–0.029	–0.007	–0.053**	–0.034	–0.007	–0.031	–0.033	0.003
2002 dummy	0.056*	0.050*	0.053**	0.048*	0.006	0.042	0.047	0.055
2001 dummy	–0.047**	0.063***	–0.035	0.074***	0.000	0.034	–0.055*	0.079
Hokkaido	0.004	–0.085*	0.046	0.049	–0.043	0.067	0.060	–0.034
Tohoku	0.001	0.004	0.000	–0.010	0.001	0.006	0.041	0.007
Kanto	0.003	–0.011	–0.024	–0.008	–0.008	–0.015	0.032	0.008
Hokuriku	0.028	0.015	–0.040	–0.032	0.023	–0.078	0.034	0.006
Chubu	–0.016	–0.012	–0.010	–0.020	–0.016	–0.018	0.033	0.015
Kinki	–0.023	–0.034	0.027	0.005	–0.018	0.012	0.029	0.006
Shikoku	0.017	0.016	–0.036	–0.004	0.034	–0.011	0.047	0.006
Kyushu	–0.048	–0.046	–0.017	–0.041	–0.040	–0.040	0.018	–0.017
City scale 2	0.024	0.006	–0.036*	0.011	0.009	–0.005	–0.003	0.015
City scale 3	–0.002	0.039	–0.064	0.021	0.026	–0.023	–0.037	0.034
City scale 4–5	0.036	0.002	–0.025	0.005	0.005	–0.037	0.011	0.004
City scale 6	0.006	0.018	–0.029	–0.005	0.007	–0.018	–0.021	0.021
Constant	–0.489	–1.175***	–0.544*	–1.123***	–0.298	–0.803	–0.329	–0.961

Note: Number of samples is 6,709. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

level only for bank time deposits. An interpretation is that, in many cases, "deposit switching" actually means a shift from bank time deposits to postal savings. This interpretation is also supported by the simulation results that we examine later on.

For the *cash investment for safety dummy*, Tables 9 and 10 indicate that it is positive for bank current deposits (at the 1 percent significance level) and is negative for "bank current deposits, postal savings current deposits, and postal savings time deposits" (at the 10 percent significance level). Table 11 shows that for the aggregated marginal effects, *cash investment for safety* is negative for postal savings time deposits (at the 1 percent significance level), and for "postal savings current deposits and postal savings time deposits" (at the 10 percent significance level). Combined with the above findings regarding *deposit switching*, this suggests that the households increasing their cash investment for safety cannot think of any good safe investments other than bank deposits and have chosen to shift their assets into cash.

Next, consider the *cash investment because of low interest rates dummy*. As shown in Tables 9 and 10, it is positive for postal savings current deposits (at the 10 percent significance level), for "bank current deposits and postal savings current deposits" (at the 1 percent significance level), and for "bank current deposits, postal savings current deposits, and postal savings time deposits" (at the 1 percent significance level). On the other hand, this dummy is negative for bank time deposits (at the 10 percent significance level). These findings suggest that, overall, households increasing cash investment for this reason tend to be those which hold current deposits, without holding any bank time deposits. A similar tendency is observed from Table 11, where we find that the *cash investment because of low interest rates dummy* is positive for households holding bank current deposits or postal savings current deposits, or both.

Third, reviewing the households whose responses indicated extremely high interest in managerial conditions of financial institutions and financial system problems (the households where the value of the *concerned dummy* is one), Tables 9 and 10 show that when evaluated at the 1 percent significance level, they are highly likely to hold bank time deposits or "bank current deposits and bank time deposits." Conversely, at the 5 percent significance level, there is a low probability that these *concerned* households hold all the four types of deposits. This may be interpreted as suggesting that when households are concerned about financial problems they gain more information and consequently their psychological barriers regarding bank time deposits are dispelled. However, the possibility that this indicates a reverse causal relationship, whereby those households that hold bank time deposits which may no longer be protected after the "payoff" (the removal of blanket guarantee of deposits) are the households with the greatest concern, cannot be denied. Moving on to Table 11, we find that households with a *concerned dummy* value of one have a declining probability of holding postal savings current deposits, postal savings time deposits, or both.

Fourth, reviewing the households which responded that they "even know about the details" of the deposit insurance system (the households where the value of the *known dummy* is one), Tables 9 and 10 show that at the 5 percent significance level there is a high likelihood that these households hold "bank current deposits and bank time deposits," and that at the 1 percent significance level there is a low likelihood that these households hold postal savings current deposits. Because knowledge of the "payoff" is

linked to awareness of the risks associated with holding bank time deposits, these findings may seem counterintuitive. However, if this variable is viewed, as it has been so far, as a proxy variable for the extent of personal financial education, the findings become easy to understand. That is, they may indicate a relationship whereby households begin to consider holding products other than the bank current deposits and postal savings as they gain a greater understanding of diverse financial products. From Table 11, we find that households with a *known dummy* value of one have a declining probability of holding postal savings current deposits at the 5 percent significance level. However, as noted above, this correlation may indicate a reverse causal relationship.

Finally, we consider the influence of the *worried dummy* using Tables 9 and 10. Households which responded that they are "worried" about the financial conditions of their private financial institutions have a declining probability of holding bank current deposits (at the 10 percent significance level) or "bank current deposits and bank time deposits" (at the 5 percent significance level). These findings may be interpreted as indicating that *worried* households refrain from saving at only private financial institutions. When evaluated at the 1 percent significance level, the *worried* households show a high probability of holding "bank time deposits and postal savings time deposits." This may indicate that these households are addressing their concerns by increasing the weight of their postal savings time deposits. Regarding this point, the fifth column of Table 11 indicates that the *worried* households actually are increasing their postal savings time deposits in various forms.

D. Decision on the Amount of Asset Holding (Intensive Margin), for Deposit Subgroups

Based on the multinomial logit model estimations in the previous section, we now analyze the decision-making whereby households, which have decided to hold some kind of deposits, determine the amounts of holding for each of the deposit subgroups that belong to the combination they have chosen from among the 15 possible combinations.

In this analysis, which uses the OLS method, we take the total amount of deposits as a given and calculate the component ratios for each deposit subgroup following equation (6). First, we estimate the demand functions for each deposit subgroup under the 15 different deposit combinations. The simulation results presented later on are based on these estimation results. We conduct the analyses after a logistic transformation of the ratios on the left-hand side of the equation to ensure that the predicted value of the ratio of each type of deposit to the total amount of deposits in the simulation always falls between zero and one.

Table 12 presents the estimation results for the ratio of bank current deposits to the total amount of deposits. The symbols ○××○ on the top line of columns 2–8 in Table 12 are a shorthand indicating whether or not the households hold (○) or do not hold (×) a particular type of deposit, presented in the order of bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. For example, the results for those households that have selected the combination of bank current deposits and postal savings time deposits are reported in the second column of the table. Out of the eight deposit combinations that include bank

Table 12 Decision on the Amount of Asset Holdings, for Deposit Subgroups (Logistic Model), Estimation Results (Bank Current Deposits/Total Savings)

Dependent variable = bank current deposits/total savings	○××○	○×○×	○×○○	○○××	○○×○	○○○×	○○○○	With restriction
Adjustment term ×××○	–10.904**	1.398	4.104	–4.928*	–1.124	–0.676	–2.605	–3.321***
Adjustment term ××○×	2.541	1.259	6.412	0.090	–2.010	1.819	1.157	1.196*
Adjustment term ××○○	4.817	–0.882	4.060	3.882**	3.345	1.881	0.104	1.241
Adjustment term ×○××	3.352	2.282	–4.077	–0.554	–0.042	–8.465**	1.766	–0.243
Adjustment term ×○×○	3.338	3.173	–5.720	2.802	1.858	–1.660	–1.061	0.252
Adjustment term ×○○×	2.329	–2.755	4.857	1.620	–0.657	–0.582	0.601	0.534
Adjustment term ×○○○	–7.233	3.269	–0.662	1.423	–6.869**	–9.766**	3.400	–1.008
Adjustment term ○×××	0.746	–4.406*	3.503	2.903	4.886**	2.669	–3.269*	–0.050
Adjustment term ○××○	0.402	–0.629	1.891	–4.582	4.477	–2.130	–2.247	0.281***
Adjustment term ○×○×	–2.957	0.030	4.168	0.500	–3.519	11.626***	2.421	0.632***
Adjustment term ○×○○	5.410	–0.934	1.684	–1.376	–1.433	–4.710	0.121	0.105**
Adjustment term ○○××	–5.333	0.267	–5.680	1.735***	2.373	2.534	1.684	0.309***
Adjustment term ○○×○	–1.724	–3.316	–17.868***	5.643**	0.743	–1.400	2.845	–0.045
Adjustment term ○○○×	8.330	–0.574	3.949	–11.544**	–5.511	0.371	–5.054	0.219***
2001 dummy	–0.054	0.130	–0.835	–0.265	0.140	0.683	–0.221	–0.294***
2002 dummy	–0.030	0.521	–2.364***	–0.021	0.126	–1.267**	–0.372	–0.098
Total assets (logarithm)	–0.331	0.587	–2.848***	0.173	–0.011	0.290	0.420	–0.137*
Expenditures (logarithm)	–0.277	–0.304	–0.084	0.641**	0.369	0.966*	0.196	0.163***
Concerned	–0.270	–0.387	–0.672	0.664**	–0.326	–0.198	0.232	0.035
Worried	0.152	0.090	–0.245	–0.035	0.127	0.425	0.089	0.026
Yield-emphasis	0.232	–0.352	–0.910	0.961***	–0.397	0.434	0.265	0.116
Safety-emphasis	–0.410	0.115	–1.147	0.428	–0.525	–0.740	0.048	0.072
Liquidity-emphasis	–0.221	–0.147	–1.221	0.903**	–0.468	0.284	0.176	–0.264**
Risk-acceptor	–0.260	0.203	–0.937	0.211	0.112	0.114	–0.133	–0.004
Risk-avoider	–0.492	0.190	–0.883*	0.171	0.337	–0.575	0.029	0.044
Known	0.208	0.115	–0.722*	0.386**	0.071	–0.463*	0.011	–0.134**
Unknown	–0.499	–0.276	0.785	0.897***	0.327	0.133	0.327	0.059
High-yield shift	–0.934**	0.161	–0.820*	0.403**	–0.030	–0.234	0.160	–0.124**
Term shift	0.659	0.325	–0.518	0.101	0.546**	–0.014	0.013	0.050
Cash investment because of low interest rates	–0.589	0.241	2.795**	0.709*	0.123	1.505**	0.334	0.469***
Deposit switch for safety	0.074	–0.168	0.697	–0.802**	0.320	–0.233	–0.205	–0.131**
Cash investment for safety	–0.263	0.137	1.052	0.153	0.089	0.640	–0.093	0.056
Has borrowings	–0.021	0.019	0.012	0.001	–0.018	–0.058	0.043**	0.004
Number of household members	0.146	–0.028	–0.533**	0.082	–0.010	–0.227	0.049	–0.002
Head of household in 30s	0.680	1.308*	2.419	–1.545**	–1.049	0.707	0.734	0.008
Head of household in 40s	–0.055	1.115	1.309	–1.429**	–0.229	–0.032	0.638	–0.283*
Head of household in 50s	–0.563	1.291*	1.220	–0.594	–0.841	0.250	0.844	–0.156
Head of household 60–64	–0.223	1.467*	1.852	–1.420**	–1.060	–0.199	0.625	–0.303*
Head of household 65–69	–0.207	1.433	1.613	–1.083	–0.415	–0.029	0.288	–0.381**
Head of household 70 or over	–0.398	1.410	1.502	–1.527*	–1.135	–0.186	0.639	–0.359*
Self-employed	–0.433	–0.088	–2.784	0.351	0.118	0.278	0.170	0.106
Homeowner	0.443	0.281	–0.883	0.446*	0.467*	–0.561	0.448**	0.090
Unemployed	–0.983	–0.149	0.209	–0.045	0.247	–0.105	–0.056	–0.102
Only head of household employed	–0.832	0.393	–0.307	0.000	0.107	–0.193	0.156	0.095
Spouse also employed	–0.453	0.152	–0.496	–0.202	–0.033	–0.503	0.045	0.007
Hokkaido	–0.223	–0.764	1.153	–0.313	0.107	0.554	0.162	–0.090
Tohoku	0.727	–0.125	–0.786	0.730*	–0.116	–0.550	0.470	0.206
Kanto	–0.420	–0.510	–0.726	0.731**	0.293	–0.555	0.404	0.066
Hokuriku	–1.050	–1.177	–0.799	1.681**	0.674	0.310	0.625	0.018
Chubu	–0.103	–0.267	–0.711	0.999**	0.432	–0.216	0.302	0.230*
Kinki	–0.506	–0.106	0.916	0.385	–0.017	–0.536	0.232	–0.024
Shikoku	0.857	–0.663	–1.749	0.763	–0.014	–0.857	0.589	0.160
Kyushu	–0.490	–0.329	0.415	0.637	0.078	–0.766	0.364	0.037
City scale 2	–0.080	–0.058	–0.966**	0.119	0.308*	0.089	0.049	–0.036
City scale 3	–0.311	0.161	–1.125*	–0.203	–0.070	–1.342**	0.168	–0.211**
City scale 4–5	–1.127	–0.008	–1.490*	0.391	0.070	–0.620	0.333	–0.243**
City scale 6	–0.077	–0.071	–0.799	–0.655***	–0.138	–0.307	–0.216	–0.226***
Constant	2.226	–2.903	11.208	–9.450***	–3.543	–4.246	–7.350	–1.040
Number of samples	320	448	246	789	829	369	1,132	4,133

Note: The notation "adjustment term ○×○×" means the self-selection adjustment term indicating the product selection type in the order bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits, and indicates whether or not the households hold (○) or do not hold (×) each particular asset. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.10. Accordingly, the coefficient must be set at 0.10 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

current deposits, for the subgroup which contains "bank current deposits only" the ratio of bank current deposits to total deposits is one by definition, and thus this subgroup has to be excluded from the analysis. Accordingly, the findings for the seven remaining subgroups are presented in columns 2–8. In this table, the top of column 9 is marked "with restrictions," and the results in this column correspond to the estimation that restricts the parameters to be identical across the households which chose any of the seven subgroups.

The first column of Table 12 lists the explanatory variables used for the regression analysis. Among these explanatory variables, the notation "adjustment term ○×○×" means the self-selection adjustment term that corresponds to a particular deposit combination: again, they are in the order of bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits, indicating whether or not the households hold (○) or do not hold (×) each type of deposit.

Table 12 indicates that the self-selection adjustment term is statistically significant in several cases, confirming the appropriateness of the analytical method adopted here. However, we do not find an explanatory variable that is significant for every single subgroup.

Table 13 uses the same notation adopted in Table 12 to present the findings for the ratio of bank time deposits to the total amount of deposits. Similarly, Table 14 uses the same notation adopted in Table 12 to present the findings for the ratio of postal savings current deposits to the total amount of deposits. Finally, Table 15 uses the same notation adopted in Table 12 to present the findings for the ratio of postal savings time deposits to the total amount of deposits. In these tables as well, the self-selection adjustment term is statistically significant in several cases, but none of the individual explanatory variables is significant throughout the subgroups. In other words, the influence of each explanatory variable varies depending on which other types of deposits are held.

Table 13 Decision on the Amount of Asset Holdings, for Deposit Subgroups (Logistic Model), Estimation Results (Bank Time Deposits/Total Savings)

Dependent variable = bank time deposits/total savings	×○×○	×○○×	×○○○	○○××	○○×○	○○○×	○○○○	With restriction
Adjustment term ×××○	2.694	–4.978	2.087	4.928*	–0.008	1.633	0.493	1.056
Adjustment term ××○×	–3.980	–4.711	8.208	–0.090	–1.139	–1.001	–0.506	–0.307
Adjustment term ××○○	–0.094	–10.703	–3.730	–3.882**	–0.665	–3.052	3.446**	–0.168
Adjustment term ×○××	–3.038	3.115	–2.276	0.554	0.059	2.893	2.346	0.044
Adjustment term ×○×○	0.608	–6.531	–7.890	–2.802	1.007	–0.929	4.477	0.283***
Adjustment term ×○○×	1.036	1.667	5.325	–1.620	1.667	4.924	–1.177	0.443***
Adjustment term ×○○○	–4.749*	8.100	2.972	–1.423	1.075	2.955	2.379	0.082**
Adjustment term ○×××	0.029	6.523	0.433	–2.903	–0.278	–2.267	1.777	–0.284
Adjustment term ○××○	0.261	21.391	–31.753***	4.582	–0.502	3.807	–2.771	–0.181
Adjustment term ○×○×	4.450	–10.518	12.426	–0.500	–1.010	–14.936***	–0.900	–0.451
Adjustment term ○×○○	2.372	–24.341	5.662	1.376	–1.712	–3.427	–4.682**	–0.989
Adjustment term ○○××	–3.059	21.113	6.863	–1.735***	0.675	8.893	–2.146	0.477***
Adjustment term ○○×○	1.130	10.540	–10.753	–5.643**	–0.399	1.272	1.017	0.034
Adjustment term ○○○×	–0.198	–19.525	5.929	11.544**	2.978	–0.710	–4.703	0.102**
2001 dummy	–0.045	0.520	–0.383	0.265	–0.135	0.298	–0.210	0.132*
2002 dummy	0.035	0.865	–1.486	0.021	0.122	1.082**	0.375	0.006
Total assets (logarithm)	0.795**	1.159	1.061	–0.173	–0.067	0.606	0.849***	0.204***
Expenditures (logarithm)	0.067	1.176	0.291	–0.641**	–0.136	0.361	–0.353	0.028
Concerned	–0.276	0.358	1.564	–0.664**	0.459*	0.307	–0.163	0.179*
Worried	0.287	–1.402	–1.010	0.035	–0.370*	–0.669*	–0.063	–0.083
Yield-emphasis	–0.247	–0.602	0.510	–0.961***	0.466	0.248	–0.513*	–0.166*
Safety-emphasis	–0.270	–0.249	1.350	–0.428	0.530*	1.154*	–0.187	0.005
Liquidity-emphasis	–0.484	1.559	1.969	–0.903**	0.586*	1.247*	–0.670**	0.129
Risk-acceptor	–0.331	1.852	–0.988	–0.211	0.068	0.457	–0.226	0.110
Risk-avoider	–0.109	0.837	–2.215**	–0.171	–0.194	0.627	0.216	–0.036
Known	–0.003	1.880	–1.323**	–0.386**	0.102	0.594**	–0.001	0.053
Unknown	–0.040	–0.820	0.920	–0.897***	–0.360	–0.155	0.174	0.089*
High-yield shift	–0.329	0.862	0.642	–0.403**	0.005	0.269	0.151	–0.057
Term shift	0.396	0.124	–1.558	–0.101	–0.051	0.425	0.195	0.025
Cash investment because of low interest rates	0.485	–2.175	3.101**	–0.709*	–0.316	–1.520**	–0.723**	–0.192
Deposit switch for safety	0.061	0.818	–2.366***	0.802**	–0.291	–0.101	0.366	–0.029
Cash investment for safety	–0.435	0.076	–1.910	–0.153	0.034	–0.095	–0.147	–0.115
Has borrowings	–0.041*	–0.022	0.171	–0.001	–0.007	0.023	0.011	–0.004
Number of household members	0.074	–0.268	–0.413	–0.082	0.051	0.107	0.061	0.019
Head of household in 30s	1.085	–3.839	4.186	1.545**	–0.429	–1.567	4.001***	–0.069
Head of household in 40s	0.536	–1.390	3.164	1.429**	–0.489	–0.141	4.871***	–0.021
Head of household in 50s	0.327	–3.053	4.759	0.594	–0.238	–1.202	4.991***	–0.015
Head of household 60–64	0.470	–2.928	5.388	1.420**	–0.231	–0.732	4.950***	0.124
Head of household 65–69	0.525	–1.436	3.642	1.083	0.026	0.070	5.462***	0.199
Head of household 70 or over	0.762	–4.962	5.471	1.527*	0.018	–1.157	5.688***	0.113
Self-employed	–0.443	4.425	–0.396	–0.351	0.207	0.810	0.179	0.142
Homeowner	–0.265	0.609	–2.243***	–0.446*	–0.101	0.731*	0.210	–0.074
Unemployed	–0.302	–1.125	–1.411	0.045	–0.009	0.393	–0.021	0.040
Only head of household employed	0.062	–0.490	–2.476**	0.000	0.021	0.124	–0.149	–0.055
Spouse also employed	–0.055	1.066	–1.797	0.202	0.113	0.288	–0.192	0.036
Hokkaido	0.557	2.614	–1.233	0.313	–0.146	–0.250	0.277	0.078
Tohoku	–0.182	3.028	0.357	–0.730*	0.065	1.019*	–0.048	0.031
Kanto	–0.375	4.199	–1.027	–0.731**	0.046	1.131*	–0.312	–0.062
Hokuriku	–0.315	6.448	0.896	–1.681**	0.015	1.736	–0.234	–0.011
Chubu	–0.351	5.690	–1.293	–0.999**	0.246	1.329*	–0.194	–0.012
Kinki	–0.259	4.633	0.146	–0.385	0.026	1.312**	–0.194	–0.066
Shikoku	–0.730	6.972	–0.324	–0.763	–0.043	1.122	–0.290	–0.089
Kyushu	–0.848**	2.696	1.916	–0.637	0.140	1.007	–0.119	–0.059
City scale 2	0.206	0.487	–1.603	–0.119	–0.190	–0.040	–0.127	0.065
City scale 3	–0.376	0.448	0.225	0.203	–0.189	0.606	–0.011	0.040
City scale 4–5	–0.398	–1.732	0.965	–0.391	–0.250	0.907	0.196	0.098
City scale 6	0.129	0.433	–1.047	0.655***	0.135	0.420	0.038	0.185***
Constant	–5.622*	–18.042	–19.776	9.450***	1.468	–7.201	–10.746**	–2.172***
Number of samples	706	88	134	789	829	369	1,132	4,047

Note: The notation "adjustment term ○×○×" means the self-selection adjustment term indicating the product selection type in the order bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits, and indicates whether or not the households hold (○) or do not hold (×) each particular asset. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.10. Accordingly, the coefficient must be set at 0.10 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

Table 14 Decision on the Amount of Asset Holdings, for Deposit Subgroups (Logistic Model), Estimation Results (Postal Savings Current Deposits/Total Savings)

Dependent variable = postal savings current deposits/total savings	××○○	×○○×	×○○○	○×○×	○×○○	○○○×	○○○○	With restriction
Adjustment term ×××○	–4.770	4.978	2.069	–1.398	6.182	–5.153	1.543	–0.431
Adjustment term ××○×	10.727	4.711	–2.439	–1.259	–2.259	0.616	–0.117	0.045
Adjustment term ××○○	4.977	10.703	4.449	0.882	–4.467	0.110	–3.687**	0.323***
Adjustment term ×○××	–0.190	–3.115	–20.803**	–2.282	0.971	7.097*	–0.835	–0.865
Adjustment term ×○×○	6.136	6.531	–3.539	–3.173	1.591	–0.690	–1.568	–0.574
Adjustment term ×○○×	7.629	–1.667	5.792	2.755	–9.388	–7.796*	3.446	0.129***
Adjustment term ×○○○	0.565	–8.100	–0.208	–3.269	9.709*	14.452***	–2.076	–0.025
Adjustment term ○×××	5.601	–6.523	12.145	4.406*	–0.428	–1.981	–2.774	0.547
Adjustment term ○××○	–21.030	–21.391	21.952**	0.629	7.633	1.476	0.817	0.980
Adjustment term ○×○×	–15.041	10.518	–15.454**	–0.030	–6.042	6.270	1.209	0.448***
Adjustment term ○×○○	17.190	24.341	–14.663*	0.934	–0.129	9.079**	0.738	0.100**
Adjustment term ○○××	–0.223	–21.113	21.089*	–0.267	–5.940	–14.567**	4.927**	–1.311
Adjustment term ○○×○	–11.671	–10.540	5.900	3.316	5.177	1.990	–0.458	0.831
Adjustment term ○○○×	–6.902	19.525	–25.224	0.574	–1.059	0.611	–0.467	–0.033
2001 dummy	0.777	–0.520	0.675	–0.130	–0.468	–1.120*	–0.222	–0.307***
2002 dummy	0.782	–0.865	–0.801	–0.521	0.912	–0.193	–0.394	–0.194*
Total assets (logarithm)	–1.838	–1.159	0.311	–0.587	0.781	–1.085*	–0.760**	–0.238*
Expenditures (logarithm)	–1.780	–1.176	1.493	0.304	–1.121	–1.658**	0.309	–0.119
Concerned	–1.531	–0.358	–1.638	0.387	–0.778	–0.030	0.283	–0.330**
Worried	–1.793	1.402	–0.357	–0.090	0.442	0.582	–0.036	0.168**
Yield-emphasis	0.122	0.602	0.026	0.352	–0.541	–1.361**	0.576*	0.011
Safety-emphasis	1.817	0.249	–0.745	–0.115	0.106	–1.071*	0.348	–0.055
Liquidity-emphasis	1.048	–1.559	0.958	0.147	–1.169	–2.452***	0.921***	–0.028
Risk-acceptor	–1.625	–1.852	2.392**	–0.203	0.521	–0.190	–0.025	–0.051
Risk-avoider	0.613	–0.837	1.811**	–0.190	0.857*	0.052	–0.152	–0.057
Known	0.679	–1.880	0.300	–0.115	–0.233	–0.180	0.132	–0.101
Unknown	3.311	0.820	1.003	0.276	0.140	0.069	–0.012	–0.156*
High-yield shift	0.849	–0.862	0.017	–0.161	0.327	–0.424	–0.285*	–0.090
Term shift	–1.768	–0.124	0.515	–0.325	0.813	–0.967*	–0.230	–0.018
Cash investment because of low interest rates	–0.159	2.175	–0.642	–0.241	–0.949	0.163	0.362	0.244*
Deposit switch for safety	–2.028	–0.818	1.490*	0.168	1.088	0.595	–0.156	0.280
Cash investment for safety	–0.090	–0.076	1.836	–0.137	–0.180	–0.889	0.780**	–0.010
Has borrowings	–0.774	0.022	–0.130	–0.019	0.027	0.045	–0.006	–0.007
Number of household members	–0.551	0.268	–0.482	0.028	0.074	0.063	–0.011	–0.390
Head of household in 30s	5.722	3.839	–2.401	–1.308*	–0.045	0.686	–3.254**	–0.359
Head of household in 40s	4.673	1.390	–0.276	–1.115	0.139	–0.326	–3.614**	–0.390
Head of household in 50s	7.067	3.053	–0.710	–1.291*	–0.086	0.837	–3.702***	–0.682**
Head of household 60–64	2.884	2.928	–3.337	–1.467*	–0.190	0.627	–3.801***	–0.515
Head of household 65–69	8.950	1.436	–0.365	–1.433	–0.488	–1.368	–3.722***	–0.309
Head of household 70 or over	10.227	4.962	–3.404	–1.410	0.182	0.646	–4.001***	–0.053
Self-employed	–4.893	–4.425	1.022	0.088	–0.169	–0.763	0.173	0.038
Homeowner	1.174	–0.609	1.411*	–0.281	0.318	–0.175	0.231	–0.148
Unemployed	–0.075	1.125	0.924	0.149	–0.724	–0.406	0.224	0.022
Only head of household employed	–0.631	0.490	0.543	–0.393	–0.522	0.190	0.183	–0.031
Spouse also employed	–0.404	–1.066	–0.425	–0.152	–0.454	0.208	0.301	0.285
Hokkaido	3.206	–2.614	4.995**	0.764	0.587	–0.644	–0.077	–0.023
Tohoku	2.153	–3.028	2.426	0.125	0.174	–0.751	0.225	0.022
Kanto	0.284	–4.199	3.846*	0.510	0.314	–0.693	0.289	–0.161
Hokuriku	–1.202	–6.448	5.072*	1.177	–1.056	–2.924**	0.472	0.036
Chubu	2.831	–5.690	5.119**	0.267	–0.055	–1.470**	0.452	–0.002
Kinki	2.171	–4.633	3.451	0.106	–0.108	–1.365**	0.388	0.072
Shikoku	0.045	–6.972	4.536	0.663	0.315	0.370	0.034	–0.060
Kyushu	3.460	–2.696	2.738	0.329	0.133	–0.572	0.200	0.017
City scale 2	–1.546	–0.487	0.750	0.058	0.281	–0.397	0.267	0.000
City scale 3	–4.403	–0.448	–0.415	–0.161	1.789***	0.779	0.143	–0.026
City scale 4–5	–1.784	1.732	2.107	0.008	0.899	–0.333	0.116	–0.058
City scale 6	–1.231	–0.433	–0.333	0.071	0.340	–0.533*	0.118	0.800
Constant	–8.257	18.042	–12.233	2.903	–0.380	11.329*	5.077	0.000***
Number of samples	137	88	134	448	246	369	1,132	2,554

Note: The notation "adjustment term ○×○×" means the self-selection adjustment term indicating the product selection type in the order bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits, and indicates whether or not the households hold (○) or do not hold (×) each particular asset. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.10. Accordingly, the coefficient must be set at 0.10 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

Table 15 Decision on the Amount of Asset Holdings, for Deposit Subgroups (Logistic Model), Estimation Results (Postal Savings Time Deposits/Total Savings)

Dependent variable = postal savings time deposits/total savings	××○○	×○×○	×○○○	○××○	○×○○	○○×○	○○○○	With restriction
Adjustment term ×××○	4.770	–2.694	1.289	10.904**	–9.470	–0.810	1.123	–0.531
Adjustment term ××○×	–10.727	3.980	–7.150	–2.541	–3.602	3.676*	0.418	1.229
Adjustment term ××○○	–4.977	0.094	–0.484	–4.817	0.845	–3.379	–1.590	0.197***
Adjustment term ×○××	0.190	3.038	11.168	–3.352	4.177	0.713	–2.815	0.362
Adjustment term ×○×○	–6.136	–0.608	11.228	–3.338	2.309	–2.177	0.687	–0.003
Adjustment term ×○○×	–7.629	–1.036	–11.679*	–2.329	1.451	–0.614	1.057	–0.524
Adjustment term ×○○○	–0.565	4.749*	–2.473	7.233	–5.893	4.231	–6.539***	–0.109**
Adjustment term ○×××	–5.601	–0.029	–2.583	–0.746	–2.576	–2.947	1.887	1.663**
Adjustment term ○××○	21.030	–0.261	22.136**	–0.402	–5.555	–1.903	3.639	0.220***
Adjustment term ○×○×	15.041	–4.450	–6.039	2.957	0.674	3.733	–3.554	–1.214
Adjustment term ○×○○	–17.190	–2.372	3.478	–5.410	–1.604	2.977	1.688	–0.011
Adjustment term ○○××	0.223	3.059	–11.571	5.333	8.541	–4.682*	–0.436	–1.055
Adjustment term ○○×○	11.671	–1.130	12.663	1.724	11.474*	–0.033	–2.584	–0.205***
Adjustment term ○○○×	6.902	0.198	–6.111	–8.330	–1.803	2.563	8.216*	0.316
2001 dummy	–0.777	0.045	–0.590	0.054	1.082	–0.061	0.196	0.205***
2002 dummy	–0.782	–0.035	1.993*	0.030	1.434*	–0.217	0.417	0.058
Total assets (logarithm)	1.838	–0.795**	–1.675	0.331	1.645	0.059	–1.138***	–0.374***
Expenditures (logarithm)	1.780	–0.067	–0.919	0.277	0.692	–0.300	–0.093	–0.178**
Concerned	1.531	0.276	–0.588	0.270	1.064	–0.291	–0.057	–0.166
Worried	1.793	–0.287	1.081	–0.152	–0.211	0.391*	0.024	0.069
Yield-emphasis	–0.122	0.247	0.227	–0.232	1.225	–0.324	0.153	–0.176
Safety-emphasis	–1.817	0.270	–0.439	0.410	0.732	–0.311	0.205	–0.072
Liquidity-emphasis	–1.048	0.484	–2.121	0.221	1.760	–0.597	0.218	–0.261*
Risk-acceptor	1.625	0.331	0.130	0.260	0.491	–0.281	0.060	–0.063
Risk-avoider	–0.613	0.109	2.142**	0.492	0.108	–0.108	–0.233	0.009
Known	–0.679	0.003	1.205**	–0.208	0.833**	–0.188	0.142	–0.002
Unknown	–3.311	0.040	–0.267	0.499	–0.841	–0.064	–0.606**	0.120*
High-yield shift	–0.849	0.329	–0.221	0.934**	0.446	0.036	–0.337**	–0.168**
Term shift	1.768	–0.396	1.203	–0.659	–0.434	–0.393	–0.021	–0.267**
Cash investment because of low interest rates	0.159	–0.485	–2.687**	0.589	–2.025	0.288	–0.207	0.108
Deposit switch for safety	2.028	–0.061	1.851**	–0.074	–1.265	0.191	–0.108	0.105
Cash investment for safety	0.090	0.435	0.819	0.263	–0.573	–0.167	0.511	–0.010
Has borrowings	0.774	0.041*	–0.125	0.021	–0.035	0.030	–0.048**	–0.020
Number of household members	0.551	–0.074	0.675	–0.146	0.401	–0.033	0.036	–0.114
Head of household in 30s	–5.722	–1.085	–4.718*	–0.680	–2.297	1.215*	–2.537*	0.097
Head of household in 40s	–4.673	–0.536	–4.675*	0.055	–1.593	0.706	–2.872*	0.128
Head of household in 50s	–7.067	–0.327	–5.336*	0.563	–1.016	0.912	–2.923**	0.127
Head of household 60–64	–2.884	–0.470	–4.861	0.223	–1.712	1.205*	–2.619*	0.159
Head of household 65–69	–8.950	–0.525	–4.993*	0.207	–1.143	0.313	–2.400*	0.192
Head of household 70 or over	–10.227	–0.762	–5.482	0.398	–1.698	1.077	–2.838*	–0.026
Self-employed	4.893	0.443	–0.611	0.433	2.848	–0.206	–0.127	–0.046
Homeowner	–1.174	0.265	1.983***	–0.443	0.637	–0.229	–0.359*	0.098
Unemployed	0.075	0.302	1.248	0.983	0.450	–0.489	0.144	0.117
Only head of household employed	0.631	–0.062	2.423***	0.832	0.734	–0.077	0.199	0.058
Spouse also employed	0.404	0.055	1.987*	0.453	0.894	–0.129	0.410	–0.092
Hokkaido	–3.206	–0.557	–0.480	0.223	–1.334	–0.159	–0.549	–0.248**
Tohoku	–2.153	0.182	–0.723	–0.727	0.678	–0.207	–0.518*	–0.042
Kanto	–0.284	0.375	0.340	0.420	0.428	–0.447	–0.314	–0.091
Hokuriku	1.202	0.315	–2.093	1.050	1.427	–0.948*	–0.644	–0.143
Chubu	–2.831	0.351	–0.400	0.103	0.782	–0.830**	–0.327	–0.028
Kinki	–2.171	0.259	–1.065	0.506	–0.630	–0.350	–0.483	–0.040
Shikoku	–0.045	0.730	–0.479	–0.857	1.645	0.018	–0.450	–0.009
Kyushu	–3.460	0.848**	–1.988	0.490	–0.458	–0.633	–0.319	–0.050
City scale 2	1.546	–0.206	1.691	0.080	0.633	0.001	0.106	0.051
City scale 3	4.403	0.376	0.951	0.311	–0.297	0.338	–0.114	0.066
City scale 4–5	1.784	0.398	–1.176	1.127	0.598	0.109	–0.668**	–0.020
City scale 6	1.231	–0.129	1.011	0.077	0.416	0.048	0.259	2.989***
Constant	8.257	5.622*	24.181*	–2.226	–8.329	–0.266	12.397***	0.000***
Number of samples	137	706	134	320	246	829	1,132	3,504

Note: The notation "adjustment term ○×○×" means the self-selection adjustment term indicating the product selection type in the order bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits, and indicates whether or not the households hold (○) or do not hold (×) each particular asset. *, **, and *** show significance at the 10 percent, 5 percent, and 1 percent levels, respectively. In the analysis with restrictions, the average marginal effect exerted by the dependent variable after the logistic transformation on the original values before the transformation was 0.10. Accordingly, the coefficient must be set at 0.10 times to evaluate the marginal effects from the explanatory variables on the right-hand side of the equation on the ratio before the logistic transformation in terms of the average changes at the margin.

V. Simulations

In Section IV, we conducted rigorous model analyses on household decisions on cash, bank current deposits, bank time deposits, postal savings current deposits, and postal savings time deposits. However, using only the results presented in Section IV it is difficult to infer the sizes of macroeconomic consequences, for example, the amount by which total household sector cash demand rises because of heightened concern for the soundness of private financial institutions. In particular, these results do not indicate how much the fluctuations along the extensive margin contribute to the fluctuations in the amount of total demand, or show the contribution from the fluctuations along the intensive margin.

Accordingly, we now attempt to clarify those kinds of aggregate numerical effects using simulation analyses. Specifically, we estimate the influence on the total demand for a financial product from greater effectiveness of personal financial education, from concern for the soundness of private financial institutions, and from low interest rates, and for cash to gauge the influence on the overall economy. The estimations use the findings regarding the selection of product combination groups and amounts, and regarding the selection of deposit subgroups and amounts, and the simulations are conducted for each of them.

A. Simulations for Broad Product Groups

Table 16 presents the simulation results regarding the decisions on cash and deposits. This table considers the influence of the following four kinds of changes in the dummy variables on the amount of cash as well as deposits outstanding.

First, we consider what happens under a hypothetical situation where all households responded that they "even know about the details" of the deposit insurance system (i.e., when all households are given a value of one for this *known dummy*, as opposed to the 26 percent of households that responded this way in the actual data). Second, we consider what happens if all households responded to the question regarding the soundness of their private financial institutions that they are "worried because their financial condition might deteriorate and they could fail" (i.e., when all households are given the value of one for this *worried dummy*, as opposed to the 28 percent that actually gave this response). Third, we consider what happens if all households responded to the question regarding their savings actions under low interest rate conditions that they "decided to hold on to cash temporarily, refraining from investment in financial products" (i.e., when all households are given a value of one for this *cash investment because of low interest rates dummy*, as opposed to the 6 percent of households that actually gave this response). Fourth, we consider what happens if all households responded to the question "what actions have you taken to enhance the security of your financial assets (choose all that apply)" with the answer "decided to hold on to cash" (i.e., when all households are given a value of one for this *cash investment for safety dummy*, as opposed to the 4 percent of households that actually gave this response).

In Table 16, the row marked "actual performance" presents the average amounts of the cash and deposits holdings calculated from the actual data. The row marked "base

Table 16 Simulation Results for Cash and Deposits (Decisions for Broad Asset Groups)

	Results of variable change		Cash	Deposits
Variable changed	Actual performance (¥10,000)		32.8	789.9
	Base projection (¥10,000)		19.5	1,090.4
Knowledge of deposit insurance	Divergence from base projection (percent)	Projection 1	1.8	0.4
		Projection 2	–4.0	0.6
		Projection 3	–3.3	0.8
Worry	Divergence from base projection (percent)	Projection 1	–1.4	–0.1
		Projection 2	1.8	0.6
		Projection 3	0.1	0.5
Cash investment because of low interest rates	Divergence from base projection (percent)	Projection 1	2.5	–0.5
		Projection 2	53.6	–2.3
		Projection 3	54.1	–2.8
Cash investment for safety	Divergence from base projection (percent)	Projection 1	14.3	0.9
		Projection 2	77.5	–0.2
		Projection 3	97.7	0.1

Note: Base projection shows the predictive value using the model. Projection 1 shows the predictive value when the conditional demand function is fixed and the holding probability is changed. Projection 2 shows the predictive value when the holding probability is fixed and the conditional demand function is changed. Projection 3 shows the predictive value when both the conditional demand function and the holding probability are changed.

projection" presents the average amounts of each household's cash and deposits demand predicted from the model estimated in the previous section. We take these as the benchmark and then conduct three counter-factual simulations. Under projection 1, we assume that the conditional demand functions are unchanged, and see what happens to the amount of demand when only the probabilities of choosing various asset combinations are changed (when changes are made only along the extensive margin). Under projection 2, the probabilities remain fixed and only the conditional demand functions are changed (changes are made only along the intensive margin). Finally, projection 3 presents the total changes when the probabilities and the conditional demand functions are both changed. The number of observations was 7,951, but because outliers were excluded from the calculations, Table 16 shows the percentage deviation from the actual performance for the base projection calculated as the average of the predicted values for 7,945 households.

The simulation for cash in the fourth column of Table 16 indicates, first, that if knowledge regarding the deposit insurance system spreads, under projection 1 (if the conditional demand is fixed), the cash demand will increase slightly from the changes in the probabilities alone, that is, a shift to cash will occur. Under projection 2 (if the probabilities are fixed) the cash demand will, on the contrary, decline. The former effect is consistent with the view that the spread of knowledge regarding the deposit insurance system causes awareness of the risks associated with bank time deposits, resulting in a decline in deposits. The latter effect is consistent with the view that if personal financial education is promoted then households are unlikely to leave their assets idle in the form of cash.

Note that the changes along the extensive and intensive margins have the opposite signs. Such a fact cannot be uncovered when working solely with aggregated data.

Projection 3, which combines changes along the extensive and intensive margins, indicates that on average the spread of knowledge regarding the deposit insurance system pushes down household cash holdings outstanding by 3.3 percent (¥6,400). In other words, the effect along the intensive margin is the stronger of the two. According to the POS implemented between June 27 and July 7, 2003, the average cash holdings outstanding per household were ¥360,000, so this ¥6,400 decline would constitute, on average, a decline in household cash holdings on the order of 1.8 percent.

Incidentally, if we mechanically multiply this ¥360,000 per household by the 49,260,791 households in Japan (including single-person households) according to the 2003 Basic Resident Register, the total amount of cash held by all households is estimated at approximately ¥17 trillion. According to the money stock statistics as of the end of June 2003, the total amount of cash currency in the entire economy was ¥68 trillion, so the household sector share of cash currency using the ¥17 trillion estimates derived from the POS is about one-fourth. Therefore, if hypothetically the cash holdings outstanding of all economic entities other than households were constant, and using the money stock statistics for the cash currency base, the spread of knowledge regarding the deposit insurance system would be projected to result in a macro decline in cash holdings of about 1.8/4 = 0.45 percent. Multiplying this amount by the opportunity costs of alternative assets provides an estimate of the benefits from the spread of personal financial education, in the sense that these opportunity costs would be saved.

Looking at the simulation for cash, conducted in this same manner, in Table 16, first we note that while the influence from *worry* is small under projection 3 at just 0.1 percent (an increase of about ¥200 per household or 0.01 percent using the money stock statistics for the cash currency base), the predictions under projection 1 and projection 2 have opposite signs and thus partially cancel each other out. Next, we discover that the influences from *cash investment because of low interest rates* (54.1 percent or an average of ¥106,000 per household under projection 3; a 7.4 percent rise using the money stock statistics cash currency base) and from *cash investment for safety* (97.7 percent, or an average of ¥191,000 per household under projection 3; a 13.2 percent rise using the money stock statistics cash currency base) promote a very large increase in cash holdings.[17]

In practical terms, it is difficult to believe that the cash preference of all households in the entire economy would rise to such a great extent, so we view these estimations as the maximum possible increase in liquidity demand from the household sector.[18]

17. Many respondents probably interpreted the nuance of these questions regarding cash holding as asking if they have held back on investing a *portion* of their funds in financial products other than cash and held this for cash holding instead. In fact, looking at the data, those households assigned a *cash investment because of low interest rates dummy* value of one (718 households) hold ¥8.34 million in deposits, on average (compared with an average of ¥6.44 million among those households with a dummy value of zero [10,811 households]), and those households assigned a *cash investment for safety dummy* value of one (436 households) hold ¥6.44 million in deposits, on average (compared with an average of ¥6.56 million among those households with a dummy value of zero [11,092 households]). Thus, it is not true that the households assigned dummy values of one for these questions hold zero assets aside from cash. For this reason, even if we hypothetically assume that all households are assigned values of one for both of these dummies, the predictive values for holdings of financial products aside from cash do not necessarily become zero.

18. In a model with multiple equilibria in the spirit of, for example, Diamond and Dybvig (1983), the demand for cash could change discontinuously when the economy shifts from an equilibrium without a bank run to an equilibrium

The simulation results for deposits, which are presented in column 5 of Table 16, show an average increase per household of 0.8 percent (¥85,000) from the spread of knowledge concerning the deposit insurance system (the *known* dummy), an average increase per household of 0.5 percent (¥50,000) from *worry*, an average decrease per household of 2.8 percent (¥304,000) from *cash investment because of low interest rates*, and an average increase per household of 0.1 percent (¥9,000) from *cash investment for safety*.

These estimations reveal that *cash investment because of low interest rates* may exert a large impact on deposit demand. Conversely, they show that even if household cash preference dramatically increased because of the *cash investment for safety* factor, the total impact on overall deposits would not be all that great. These findings also suggest that a funds shift from cash to deposits might occur if the formation of expectations were reversed via expectations of rising interest rates among those households which have given up on investment in financial products under the low interest rate environment and are boosting their cash preference for the time being. At the same time, the findings indicate that if concern for the future eases and households no longer feel a need to hold their assets in cash for safety, the funds might shift from cash to financial products, but the households might choose financial products other than deposits. This may suggest an increase in the holdings of stocks and bonds. Regardless, we must be cautious in making any interpretations, since our findings on deposits include postal savings and do not quantify the influence on individual financial products.

The analyses so far have carefully examined changes along the extensive and intensive margins as separate items, but one may argue that in actual policy decision-making the only important thing is the total effect when these two are added together. Nevertheless, note that the variables that exert a significant influence are sometimes different between the two margins. Accordingly, the same policy aimed at increasing the holdings of a particular kind of financial product may have different effects depending on the initial conditions, such as the amount of that product held by the households at the time such a policy is implemented. For example, in cases where the product is held by almost no households at the initial point, there is a great deal of room for the policymakers to exert influence at the extensive margin. However, in cases where the product is already held by almost all households from the beginning, policymakers should target those variables that are effective in moving the asset demand along the intensive margin. Consequently, careful analyses that give consideration to individual household characteristics and product distribution conditions are required to implement a policy to encourage the holding of a particular financial product.

with a bank run. If the data used in this study only reflect the behavior of households in the equilibrium without a bank run, our cash simulation based on the changes in the *worry dummy* only captures the effects of concern for the soundness of private financial institutions in the equilibrium without a bank run. If the concern for the soundness of private financial institutions affects very strongly the demand for cash in the equilibrium with a bank run, as documented by the surges in the demand for cash in Japan during the financial panic of 1927, the simulation in this paper might underestimate the effects. The same limitation applies to the simulation of the *deposit switch dummy*. We thank Kunio Okina for suggesting this point.

B. Simulations for Deposit Subgroups

Next, we present the findings of similar simulations for deposit subgroups. Here, in addition to the four types of simulations conducted above for the broad product groups, we also examine the influence from the *deposit switch dummy* assigned to those households that responded to the question about actions taken to enhance the security of financial assets with the answer "switched deposits to financial institutions believed to be more financially sound and trustworthy" (the influence when all households are given this *deposit switch dummy*, with a value of one, as opposed to the 13 percent that actually gave this response). The analytical findings are summarized in Table 17.

First, we find that, on average, the effect from the prevalence of knowledge regarding deposit insurance decreases the demand for bank current deposits (by an average of ¥18,000 per household, which constitutes a decline of 1.1 percent from the benchmark deposits outstanding) and increases the demand for bank time deposits (by an average of ¥129,000 per household, which constitutes an increase of 4.2 percent from the benchmark deposits outstanding).[19]

Table 17 Simulation Results for Bank Current Deposits, Bank Time Deposits, Postal Savings Current Deposits, and Postal Savings Time Deposits (Decisions for Deposit Subgroups)

	Results of variable change		Bank current deposits	Bank time deposits	Postal savings current deposits	Postal savings time deposits
Variable changed	Actual performance (¥10,000)		215.0	409.0	68.3	243.2
	Base projection (¥10,000)		199.1	410.6	104.6	317.8
Knowledge of deposit insurance	Divergence from base projection (percent)	Projection 1	–0.9	3.1	–5.6	–2.6
		Projection 2	–0.1	1.0	0.3	1.0
		Projection 3	–1.1	4.2	–5.6	–1.7
Worry	Divergence from base projection (percent)	Projection 1	–1.3	–2.5	2.5	2.7
		Projection 2	4.4	–2.9	0.6	0.4
		Projection 3	3.1	–5.1	2.9	2.9
Deposit switching	Divergence from base projection (percent)	Projection 1	–3.2	–6.9	6.4	7.2
		Projection 2	–2.2	1.9	2.2	–0.9
		Projection 3	–4.8	–5.0	8.3	6.2
Cash investment because of low interest rates	Divergence from base projection (percent)	Projection 1	3.7	–5.9	18.4	2.3
		Projection 2	15.9	–10.4	7.9	–5.2
		Projection 3	19.8	–16.5	21.4	–2.4
Cash investment for safety	Divergence from base projection (percent)	Projection 1	6.6	4.4	–14.8	–8.9
		Projection 2	2.1	–4.1	31.5	11.1
		Projection 3	9.1	0.2	12.4	1.6

Note: Base projection shows the predictive value using the model. Projection 1 shows the predictive value when the conditional demand function is fixed and the holding probability is changed. Projection 2 shows the predictive value when the holding probability is fixed and the conditional demand function is changed. Projection 3 shows the predictive value when both the conditional demand function and the holding probability are changed.

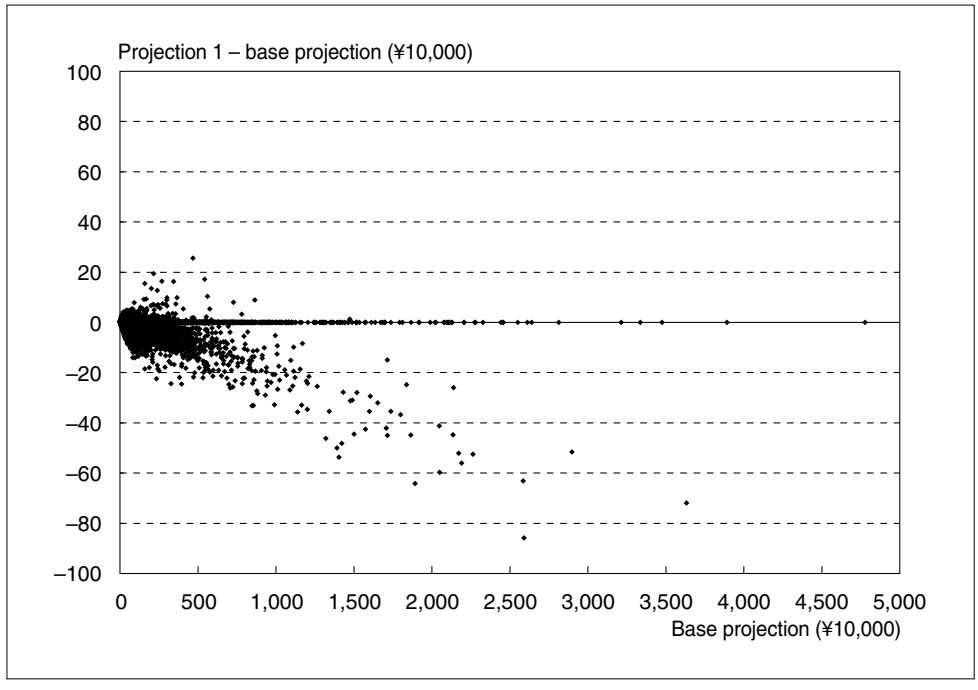
19. We chose not to convert and evaluate these changes in household demand on a money stock statistics basis due to the large error involved, as follows. According to the 2003 POS, average household bank current deposits outstanding are ¥2.39 million (with a holding probability of 76.7 percent). Simply multiplying this figure by the number of households results in estimated bank current deposits for the entire household sector of about ¥69 trillion, which covers about 42 percent of the bank current deposits held by individuals according to the

These findings show that the spread of knowledge regarding the deposit insurance system may increase bank deposits by promoting understanding of deposit insurance more than it reduces bank time deposits from greater recognition of the associated risks.

Table 17 presents in detail the predicted change in household bank current deposits from the spread of information regarding the deposit insurance system. Under projection 1, which shows the influence via the extensive margin, average household bank current deposits decline by 0.9 percent (from ¥1.991 million to ¥1.973 million). Figure 3 plots the results for each household. This figure shows that for most households, by far, the divergence from the base projection (shown by the scale on the vertical axis) is negative.

Under projection 2, which shows the influence via the intensive margin, the average bank current deposits remain essentially unchanged (declining by 0.1 percent, from

Figure 3 Simulation on Bank Current Deposits: Influence from the Spread of Knowledge Regarding the Deposit Insurance System on Bank Current Deposits (Divergence between Projection 1 and the Base Projection)



money stock statistics for the same period. Similarly, according to the 2003 POS average household bank time deposits outstanding are ¥3.82 million (with a holding probability of 52.8 percent). Simply multiplying this by the number of households results in estimated bank time deposits for the entire household sector of about ¥76 trillion, which covers about 30 percent of the bank time deposits held by individuals according to the money stock statistics for the same period. Together with the household cash holding amounts estimated in the previous chapter based on the 2003 POS, the amount of M2+CDs believed to be held by individuals becomes ¥164 trillion, which covers about 38 percent of all M2+CDs for that same period. The reasons for the differentials among these estimates include the fact that under the money stock statistics, individual deposits of a business nature are considered as individual deposits as long as they are held in the individual's name; the sample representativeness of the POS; and the various definitions of savings.

¥1.991 million to ¥1.988 million). Figure 4 plots the results for each household. This figure shows that while the average effect is nearly zero, there is substantial difference among households, with some showing increases and others showing declines. While many households show a positive differential versus the base projection, this is offset by a smaller number of households that have a greater negative differential versus the base projection, rendering the overall effect near zero. The figure reveals substantial qualitative differences in the household reaction compared with the plot in Figure 3.

Under projection 3, which combines the predicted changes along the extensive margin with those along the intensive margin, average household bank current deposits decline by 0.1 percent (from ¥1.991 million to ¥1.970 million). Figure 5 plots the results for each household, and this diagram is similar to Figure 3, which plots the changes along the extensive margin. This result indicates that the effect at the extensive margin, which could not be analyzed with macro data, is quantitatively important.

Changing the *worry dummy* increases bank current deposits (by 3.1 percent compared with the benchmark), decreases bank time deposits (by 5.1 percent compared with the benchmark), and increases postal savings current deposits and postal savings time deposits (both by 2.9 percent compared with the benchmark).

Changing the *deposit switch dummy* decreases bank current deposits and bank time deposits (by 4.8 percent and 5.0 percent compared with the benchmark, respectively) and increases postal savings current deposits and postal savings time deposits (by

Figure 4 Simulation on Bank Current Deposits: Influence from the Spread of Knowledge Regarding the Deposit Insurance System on Bank Current Deposits (Divergence between Projection 2 and the Base Projection)

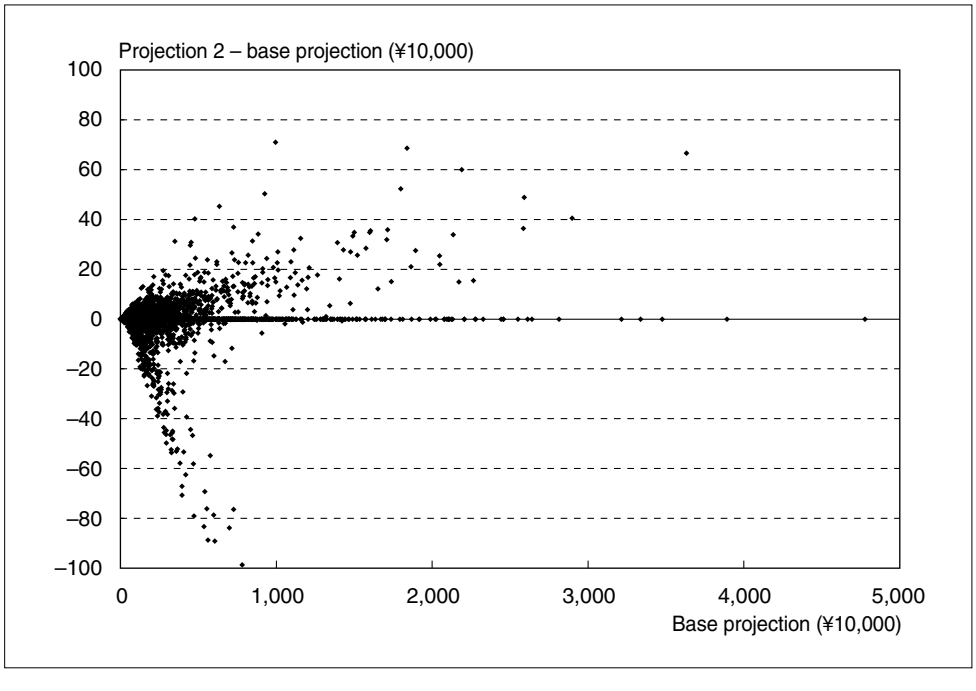
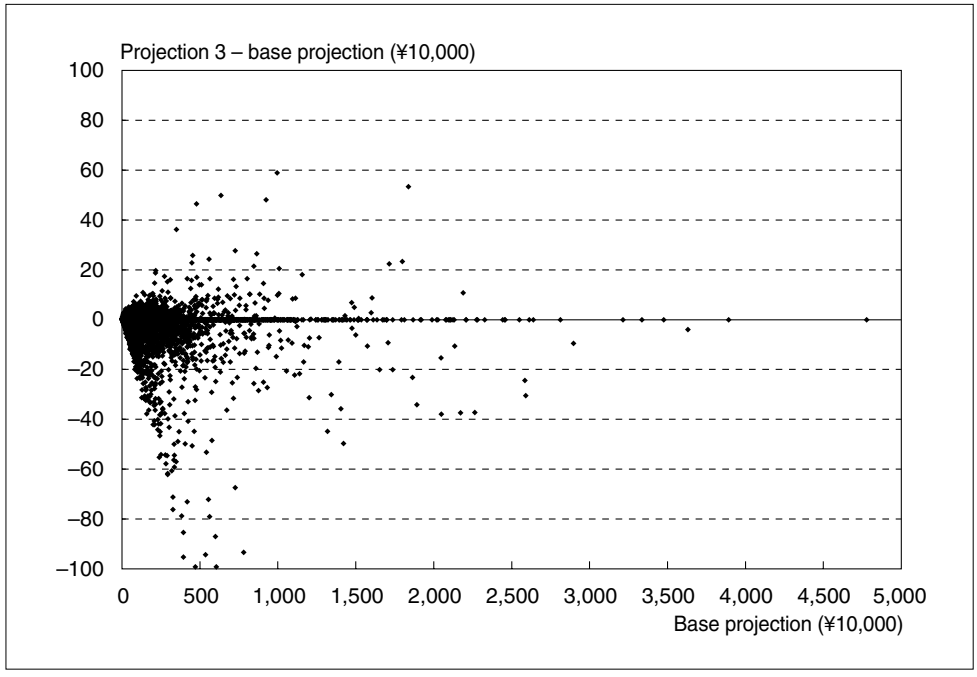


Figure 5 Simulation on Bank Current Deposits: Influence from the Spread of Knowledge Regarding the Deposit Insurance System on Bank Current Deposits (Divergence between Projection 3 and the Base Projection)



8.3 percent and 6.2 percent compared with the benchmark, respectively). These findings indicate that for many households, the financial institution which they trust enough to switch their deposits is the post office.

Changing the *cash investment because of low interest rates dummy* increases both bank current deposits and postal savings current deposits (by 19.8 percent and 21.4 percent compared with the benchmark, respectively), showing that liquid assets increase when cash holding increases because of low interest rates. This indicates that from the perspective of asset investment, bank current deposits and postal savings current deposits have a stronger complementary relationship with cash than time deposits do, which can be a useful result for future research. While bank time deposits and postal savings time deposits are both declining, the decline in the former (16.5 percent compared with the benchmark) is far greater than that in the latter (2.4 percent compared with the benchmark).

Changing the *cash investment for safety dummy* increases both bank current deposits and postal savings current deposits (by 9.1 percent and 12.4 percent compared with the benchmark, respectively), but results in almost no changes in time deposits. In short, when households emphasize safety and increase cash holding, at the same time as they increase cash holdings, they also increase their postal savings current deposits, as well as their bank current deposits.

For some of the simulation results presented so far, we are also interested in the results of reverse simulations estimating what might occur if concern for the soundness

of private financial institutions diminished. To investigate this, we conduct reverse simulations for the *worry*, *deposit switch*, *cash investment because of low interest rates* and *cash investment for safety* dummies.

Specifically, we examine the influences when the *worry dummy* (which has a value of one for 28 percent of the households) is changed to zero for all households, when the *cash investment because of low interest rates dummy* (which has a value of one for 6 percent of the households) is changed to zero for all households, when the *cash investment for safety dummy* (which has a value of one for 4 percent of the households) is changed to zero for all households, and when the *deposit switch dummy* (which has a value of one for 13 percent of the households) is changed to zero for all households.

The results of these reverse simulations are summarized in Table 18. In almost all cases, since fewer than 50 percent of the households begin with a dummy variable value of one, the magnitude of the effects decreases in absolute values and the signs are reversed.

C. Combined Simulations

The simulations so far have been conducted separately for the decisions on broad asset groups and on subgroups of deposits. Moreover, the latter simulations have taken the total amount of deposits as a given and then projected the fluctuations among each of the deposit items. However, it goes without saying that if changes to a certain variable result in changes in the total amount of deposits, then the individual

Table 18 Simulation Results for Bank Current Deposits, Bank Time Deposits, Postal Savings Current Deposits, and Postal Savings Time Deposits (Decisions for Deposit Subgroups; Reverse Simulation)

	Results of variable change		Bank current deposits	Bank time deposits	Postal savings current deposits	Postal savings time deposits
Variable changed	Actual performance (¥10,000)		215.0	409.0	68.3	243.2
	Base projection (¥10,000)		390.3	491.8	104.6	445.9
Worry	Divergence from base projection (percent)	Projection 1	0.5	0.8	–1.0	–0.9
		Projection 2	–1.6	0.9	–0.2	–0.1
		Projection 3	–1.1	1.9	–1.2	–1.1
Deposit switching	Divergence from base projection (percent)	Projection 1	0.6	1.6	–1.2	–1.8
		Projection 2	0.5	–0.7	–0.6	0.3
		Projection 3	1.3	0.9	–1.9	–1.5
Cash investment because of low interest rates	Divergence from base projection (percent)	Projection 1	–0.4	0.5	–1.0	–0.2
		Projection 2	–1.5	1.1	–0.6	0.5
		Projection 3	–1.9	1.5	–2.0	0.3
Cash investment for safety	Divergence from base projection (percent)	Projection 1	–0.3	–0.2	0.7	0.4
		Projection 2	–0.1	0.2	–1.3	–0.5
		Projection 3	–0.4	0.0	–0.8	–0.1

Note: Base projection shows the predictive value using the model. Projection 1 shows the predictive value when the conditional demand function is fixed and the holding probability is changed. Projection 2 shows the predictive value when the holding probability is fixed and the conditional demand function is changed. Projection 3 shows the predictive value when both the conditional demand function and the holding probability are changed.

deposit items will also be influenced by this. Thus, strictly speaking, the two decisions should be handled as if they are determined in a sequential manner. We therefore seek to estimate the total effect on deposit items from change in a certain variable by conducting a combined simulation of the two decisions, by taking into consideration the predicted change in the total amount of deposits from the decision on broad asset groups in conducting the simulation on individual deposit subgroups. The results are summarized in Table 19. Here, the "actual performance" values are lower than those presented in Table 17, simply because this analysis takes households that do not hold deposits into consideration.

In comparison with Table 17, the deviation between the base projection and the actual performance in Table 19 is far greater. This is presumably because a nonlinear transformation (logistic transformation) is conducted on the ratios at each stage. For that reason, the findings here should be regarded as for the purpose of reference only. Nevertheless, when the deviation from the base projection is evaluated for projection 3, we find that the results are almost the same as those under the above simulation covering only the decision on individual deposit items.

Table 19 *Combined* Simulation Results for Bank Current Deposits, Bank Time Deposits, Postal Savings Current Deposits, and Postal Savings Time Deposits (When Decisions on Broad Asset Groups and Deposit Subgroups Are Jointly Implemented)

	Results of variable change		Bank current deposits	Bank time deposits	Postal savings current deposits	Postal savings time deposits
Variable changed	Actual performance (¥10,000)		181.5	345.3	57.7	205.3
	Base projection (¥10,000)		233.9	488.9	117.7	360.0
Knowledge of deposit insurance	Divergence from base projection (percent)	Projection 1	–0.6	3.3	–4.8	–2.1
		Projection 2	0.3	1.6	1.4	2.0
		Projection 3	–0.6	4.8	–4.1	–0.5
Worry	Divergence from base projection (percent)	Projection 1	–1.2	–2.3	1.7	2.4
		Projection 2	5.2	–2.5	1.0	1.2
		Projection 3	4.0	–4.5	2.5	3.3
Deposit switching	Divergence from base projection (percent)	Projection 1	–3.2	–6.2	5.6	7.0
		Projection 2	–2.2	2.1	2.0	–1.0
		Projection 3	–4.9	–4.1	7.3	6.0
Cash investment because of low interest rates	Divergence from base projection (percent)	Projection 1	2.9	–5.8	16.7	2.1
		Projection 2	13.8	–13.0	5.9	–7.8
		Projection 3	16.6	–18.9	17.4	–5.2
Cash investment for safety	Divergence from base projection (percent)	Projection 1	6.4	5.6	–14.0	–7.8
		Projection 2	1.8	–4.1	33.5	11.7
		Projection 3	7.8	0.7	15.0	3.0

Note: Base projection shows the predictive value using the model. Projection 1 shows the predictive value when the conditional demand function is fixed and the holding probability is changed. Projection 2 shows the predictive value when the holding probability is fixed and the conditional demand function is changed. Projection 3 shows the predictive value when both the conditional demand function and the holding probability are changed.

VI. Conclusions

Thanks to the characteristics of our micro dataset, this paper has obtained many quantitative conclusions regarding household cash and deposit demands that would be difficult to learn from analyses using macroeconomic time-series data.

First, we successfully demonstrated the importance of the extensive margin in asset demand. For example, our simulation findings showed that for the decrease in the demand for bank time deposits resulting from a heightened motivation for deposit switching due to a stronger safety orientation, the extensive margin (deposit withdrawals) is far more important than the intensive margin (Table 17).

Second, we conducted detailed analyses regarding the causes of fluctuations in cash demand, using individual household data.

Third, we took advantage of the many qualitative questions in the survey to successfully estimate the asset demand fluctuations distinguishing between fluctuations in asset demand because of low interest rates and fluctuations in asset demand resulting from measures households take to increase the safety of their savings. It would be difficult to make such distinctions using only macro data.

These findings indicate that when the demand for cash rises because of low interest rates, the demand for both bank current deposits and postal savings current deposits rises while the demand for bank time deposits declines and the demand for postal savings time deposits also declines slightly. On the other hand, the findings show that when the demand for cash rises as a measure to enhance the safety of savings, the demand for bank current deposits and postal savings current deposits rises simultaneously.

Fourth, we quantified the economic effects from promoting personal financial education. We found that the survey question concerning knowledge of the deposit insurance system can be viewed as a proxy variable for the extent of personal financial education, and that changing the value of this variable has a great effect on overall asset demand.

When interpreting the findings presented in this paper, we must pay attention to the limitations of the data used. For example, for the household characteristics, the survey does not provide data on several variables that are controlled under conventional research, such as educational attainment and the value of housing, land and other real assets. Another important point to remember is that single-person households are excluded from the survey. The assumption of two-stage decision-making in this paper also reflects the limitations of the data in terms of the size and the periods over which the same questions are asked continuously. While we must remain aware of these various limitations, future efforts to carefully apply the methods adopted in this paper to aggregate individual household decisions should make it possible to quantify the overall effect of personal financial education, that is, to quantify the policy effect. The kind of analyses we have pursued here should contribute to the further development of research in this field, which has primarily focused on the aggregate asset demand function so far.

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