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The Gender Battle within Japanese Families

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Abstract In this study, I examine the allocation mechanism within families by using the collective model. The empirical results suggest that a wife's income proportion affects her budget proportion. This connection exists for food and shows that a wife's income proportion is positively correlated with her preferred share of the food budget but is negatively correlated with a husband's preferred share of the food budget. I also explored the changes in a wife's income proportion and budget proportion between 1989 and 2004 and found that the correlation between the two became larger, suggesting that a wife's distribution power strengthened during this period.

Key words Collective model; Preference; Income proportion; Budget proportion

JEL Classification D11; J12; J16

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I. Introduction

A household is viewed as a single unit in traditional consumer analysis. According to Samuelson (1956), a household maximizes its own unique utility function under its budgetary restrictions. Chiappori (1988, 1992) proposed an alternative approach called a "collective model," which considers that a household includes more than one household member. In this approach, each member has accurate preferences rather than being described as having the same preferences and household resource allocating decisions are "Pareto efficient."

The budget distribution decision within families has been examined for almost three decades by using the collective model. Browning et al. (1994) used the demand equation (clothes) to determine that expenditures on household members' clothing are influenced by the difference in their income. Vermeulen (2006) proposed a discrete-choice model with women's working equations to examine the sharing rule. Zamora (2011) examined the different expenditure patterns between working wife families and non-working wife families. Please see Chiappori et al. (2009) for a survey.

In this paper, I used detailed expenditures based on daily data to examine the following concepts. First, following Hayashi (1995), I examined whether or not the wife's income proportion (the wife's income divided by total household income) affects her budget proportion (the budget for a particular category divided by the total budget) in terms of food. Hayashi examined the intergeneration budget distribution decision; however, I examined couples based on the collective model. The focus is only on the total food budget and no information exists on what a person eats. Food is divided into different categories according to a gender's preference based on data on single households. A

female prefers sweets, vegetables, dairy foods, and seafood. In contrast, a male prefers drinks, alcohol, and eating out. I then used the gender preferences to determine the positive correlation between income proportion and budget proportion by using data from couples. Second, I examined whether or not the correlation changed over time.

My findings are as follows. First, similar to previous studies, relative income between couples affects relative expenditures. Consequently, I determined that a wife's income proportion is positively correlated with her preferred share of the food budget but is negatively correlated with her husband's preferred share of the food budget. For a robustness check, I used clothing and cosmetics. A positive correlation also exists between clothing and cosmetics. Second, I also discovered a change in the correlation between a wife's food budget proportion and her income proportion from 1989 to 2004. This result shows that the correlation was stronger in 2004 than in 1989.

The remaining chapters of this paper are as follows. The next section provides a theoretical framework. Section **III** simply introduces the data. In section **IV**, I used data from single households to estimate the two different food budgets—one for females and one for males—to estimate whether a wife's proportion of the budget on food is positively correlated with her income proportion. A wife's income proportion is positively correlated with her preferred share of the food budget but is negatively correlated with her husband's preferred share of the food budget. In section **V**, I used interaction terms to act as appropriate variables to examine the change in the food budget for females and males from 1989 to 2004 and to explore the change in distribution power. In section **VI**, I examined the correlation between the wife's income proportion and budget proportion by using data on clothing and cosmetics to determine whether we can

achieve a result consistent with that of section **III**. Finally, Section **VII** concludes the paper.

II. Theoretical Framework

Following studies by Chiappori (1988, 1992) and Browning et al. (1994), I focused on a household with two family members (h for husband, w for wife). Each member has his or her specific preference and makes Pareto efficient decisions. I assume that private goods x are weakly separable with public goods Q. Private goods are divided into n categories and j is jth private good.

Chiappori et al. (2009) showed that two-member households maximize the weighted social welfare function subject to the budget constraint. Then, the household consumption decision is described as follows:

$$\max_{x^w, x^h, Q} \mu(y^w, y^h, \boldsymbol{L})\mathbf{U}^w(x^w, Q) + (1 - \mu(y^w, y^h, \boldsymbol{L}))\mathbf{U}^h(x^h, Q), \quad (1)$$

subject to

$$\sum_j^n x_j^w + \sum_j^n x_j^h + Q = y^w + y^h,$$

where $\mu(y^w, y^h, \mathbf{L}) \in (0, 1)$ is a continuous function for the "distribution power." A value of μ close to 1 means that the household member has strong distribution power, and a value of μ close to 0 means that the household member has weak distribution

power. μ is a function of the wife's income y^w, the husband's income y^h, and other factors **L**.

III. Data Description

The data used in this paper are derived from the National Survey of Family Income and Expenditure (NSFIE). The survey is conducted every five years and inspects households' account books. Two household account books exist. One is called "single households," and the relevant survey is conducted in October and November. The other is called "two or more people households," and the relevant survey is conducted from September to November. Both surveys contain detailed information on demographics, households' income, savings, and expenditures.

I used four editions of the NSFIE from 1989, 1994, 1999, and 2004. Because all editions have almost the same items, pooling the data and comparing the changes among these years is possible. I first used single households to estimate the males' and females' food preferences, and then I used household couples with no children to examine the correlation between income proportion and budget proportion. The results show that a wife's income proportion is positively correlated with her preferred share of the food budget but is negatively correlated with a husband's preferred share of the food budget. I also excluded records for which a household failed to complete the entire survey and with missing values for relevant variables.

Table 1 shows the mean and sample statistics of the food categories and observations. Because no remarkable changes occurred in the food budget from 1989 to 2004, I chose the 2004 edition of NSFIE. Table 1 has three aspects to mention. First, the number of

single female households is larger than the number of single male households. Second, the food budget categories for males and females are different. Single females consume relatively more sweets, vegetables, dairy foods, and seafood than males; in contrast, males consume relatively more on eating out and drinks and alcohol. The high value of the sample t-test implies that the mean values of the budget proportions (the budget for each category divided by the total food budget) are statistically different between females and males. To this point, by using Engle curves in section **III**, I show that females and males have different food budget types. Third, the last food category (other) is cereals and meat. No precise information exists on what single persons consume in a restaurant. Because comparing the budget proportion of cereals and meat between males and females is difficult, I defined them in the 'other' food category. Because single males spend a large proportion of their budget on eating out, comparisons with the food they consume at home do not seem appropriate.

IV. Income Proportion and Budget Proportion

A. Food Engel Curve

When following Hayashi (1995) by using the Engel curve, one should take into account that the food budget is an endogenous variable in this estimation because it may correlate to an error term through changing food prices. To address this problem, Hayashi (1995) used household income, capital income, and net financial assets as instrument variables. However, these instrument variables do not satisfy orthogonality (because the Sargan statistic is significant). In this paper, I used total household receipts and stock sales as

instrument variables to meet the condition that independent variables have orthogonality to error terms.

B. Estimation of Food Budget Types Based on Engel Curve

To show that food preference differs between females and males, I used the Engel curve, which regresses "budget shares" on the "log of food expenditure."[1] I assumed that each member has a specific preference function whereas private goods x are weakly separable with public goods Q, and the food Engel curve is as follows:

$$c_j = \boldsymbol{z}'\alpha_j + \beta_j \log(x) + \mathrm{u}_j. \quad (2)$$

Food is divided into seven subcategories, including sweets, eating out, vegetables, dairy foods, drinks and alcohol, seafood, and other. j represents the jth food category, c_j represents the jth food budget proportion, x represents the food budget of the household, $\boldsymbol{z}$ includes age dummies, working dummies, the female dummy, and year dummies,[2] and u_j is the error term. I used the General Method of Moment to estimate food demand equations in six subcategories (sweets, eating out, vegetables, dairy foods, drinks and alcohol, and seafood).

Table 2 shows the estimation results of the demand equations based on the Engel curve. The ages of the households affect the food budget proportions. The age dummies used in the estimation are the ages of the single households and the base category includes households whose ages are less than 20. The budget proportions of sweets, eating out, and drinks and alcohol decrease as age increases. In contrast, the budget proportions for vegetables, dairy foods, and seafood increase as age increases.

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[1] The functional form is from Christensen, Jorgenson and Lau (1975), the almost identical demand system is from Deaton and Muellbauer (1980), and the estimation equation is from Hayashi (1995).

[2] Because I pooled the data from 1989, 1994, 1999, and 2004, adding year dummies is necessary.

Work status also affects the food budget proportions. The base category includes households who do not work. I used four dummies to indicate males and females with full-time or part-time jobs. When one is working full-time or part-time, the budget proportion for eating out is increasing and the proportions of vegetables, dairy foods, and seafood are decreasing.

We move on to analyze males' and females' food preference by using dummies for females (the base category is male). The coefficient for the female dummy for sweets is 4.50, implying that, on average, females spend relatively more by 4.50% on sweets than males. In other words, females like sweets more than males. The same logic shows that females like sweets, vegetables, dairy foods, and seafood more than males, and that males prefer eating out and drinks and alcohol more than females. In the next section, we utilize this result to examine the correlation between income proportion and budget proportion.

The instruments for the food budget (total household receipts and stock sales) passed Hansen's test.

C. Income Proportion and Budget Proportion

The method used to examine the correlation between income proportion and budget proportion is the same as in Hayashi (1995). However, to examine whether a wife's income proportion is positively correlated with her preferred food category and negatively correlated with her husband's preferred food category, the household's (a married couple) Engel curve needs to be shown and a signal needs to be put into the estimation equation. Following Hayashi (1995), I ignored age and working status. The husband's Engel curve is as follows:

$$c_j^h = \alpha_j^h + \beta_j \log(x^h) + \mathrm{u}_j^h, \tag{3}$$

and the wife's Engel curve is

$$c_j^w = \alpha_j^w + \beta_j \log(x^w) + u_j^w, \quad (4)$$

where j is jth food category.

λ represents the wife's true food budget proportion, which is unknown for the data used in this study and has the following form:

$$\lambda = \frac{x^w}{(x^h + x^w)}. \quad (5)$$

Then, the married couple's Engel curve can be written as

$$c_j = \lambda c_j^w + (1-\lambda) c_j^h . \quad (6)$$

The household's (married couples only) proportion of the food budget c_j is the sum of a wife's proportion of the food budget λc_j^w and a husband's proportion of the food budget $(1-\lambda)c_j^h$. Taking the sum of (3) and (4), the couple's Engel curve is expressed as follows:

$$c_j = \alpha_j^h + \beta_j \log(x^h + x^w) + (\alpha_j^w - \alpha_j^h)\ \lambda + \lambda\log(\lambda) + (1-\lambda)\log(1-\lambda) + u_j, \quad (7)$$

where $(x^h + x^w)$ is the household's food budget. As explained in the previous section **B**, $(\alpha_j^w - \alpha_j^h)$ indicate that female dummies somehow show different preferences between males and females in different food subcategories. Because λ is unknown for the data used in this study, I used the wife's income proportion as a signal. In the estimation, the coefficients of the wife's income proportion should be close to the wife's food preferences if the income proportion and the food budget are positively correlated.[3]

Table 3 shows the results of the estimation. The sample used in this estimation is comprised of data on married couples without children from the 1989, 1994, 1999, and

[3] The method used here is from Hayashi (1995). Hayashi (1995) tested demand neutrality between older generations and younger generations.

2004 editions of NSFIE. From this result, we conclude that a wife's working status influences the food budget proportion. I used two dummies to show the working status of wives, which includes full-time jobs and part-time jobs. The base category includes households whose wives do not work. If the wives work, the budget proportions for eating out and drinks and alcohol tend to increase whereas the budget proportions for sweets, vegetables, dairy foods, and seafood tend to decrease.

The food budget proportion is still influenced whether or not the head of the household is female. If the household's head is female, the budget proportions for eating out increase whereas the budget proportions for vegetables and seafood decrease. The log of the food budget in the estimation equation is an endogenous variable, instrumented by total household receipts and stock sales (the over-identification test is accepted).

The significance of a wife's income proportion is notable. A wife's income contains labor income, home-working income, and pension income,[4] and shows that the budget proportion of females' favorite foods (sweets, vegetables, dairy foods, and seafood) increases in accordance with an increase in the wife's income proportion, whereas the budget proportion of males' favorite foods (eating out and drinks and alcohol) decreases. Income proportion and budget proportion are positively correlated.

V. Change in Distribution Power

As previously shown, the income proportion and budget proportion are positively correlated; therefore, I now examine whether the correlation changed from 1989 to 2004.

[4] Because pension income is not separable between wife and husband, I calculated the wife's pension income as a half of the household's pension income. I made another estimate using the sample of households including labor income or home-working income. The coefficient of a wife's income proportion is close to the coefficient of the female dummy in Table 2. The coefficients for sweets, eating out, vegetables, and dairy foods are significant.

If the budget proportion is more closely correlated with the income proportion, then a wife's distribution power strengthens. Otherwise, a wife's distribution power weakens.

A. Change in Budget Proportion of the Food Budget

According to the estimation results shown previously, females' food budget proportion is positively correlated with a wife's income proportion. The strength of the correlation between a wife's food budget and her income proportion may have changed from 1989 to 2004.

Table 4 shows the status of females working from 1989 to 2004. The ratio of females working from 1989 to 2004 increased and more than half of the total wives worked in 2004. Table 5 shows the budget proportions of food from 1989 to 2004. For single females, the budget proportion for eating out increased whereas the budget proportions of vegetables and seafood decreased from 1989 to 2004. For single males, the budget proportion of eating out decreased whereas the budget proportion of vegetables and seafood increased.

We used an indicator to show the change in the budget proportion of the food budget between females and males from 1989 to 2004. The form of the food Engel curve is the same as in section **IV** and the indicators are the interaction terms of the female dummy.

$$c_j = z'_0\alpha_{0j} + \alpha_{fj}z_f + \gamma_{94j}D_{94}z_f + \gamma_{99j}D_{99}z_f + \gamma_{04j}D_{04}z_f + \beta_j\log(x)+\mathrm{u}_j. \quad (8)$$

Food is divided into subcategories including sweets, eating out, vegetables, dairy foods, drinks and alcohol, seafood, and other. j is jth food category, c_j is jth food budget proportion, x is the food budget, z_0 includes the age dummies, the working dummies, and the year dummies, and z_f is a female dummy. D_{94} is the year dummy for 1994,

D_{99} is the year dummy for 1999, and D_{04} is the year dummy for 2004. u_j is the error term and the interaction terms are $D_{94}z_f$, $D_{99}z_f$, and $D_{04}z_f$.

Table 6 shows the results of the change in the proportion of the food budget of females and males from 1989 to 2004. The base year is 1989. Therefore, the coefficient of the female dummy for eating out in 2004 is –9.639＋3.374, which is calculated using (α_f+γ_{04}). The difference in the budget proportion for sweets between females and males decreased from 1994, and there was no change for dairy foods. The differences between females and males decreased for vegetables, eating out, seafood, and drinks and alcohol. In general, a comparison of data from 2004 to 1989 shows that the difference in food budget preferences between males and females weakened.

The instruments for the food budget (total household receipts and stock sales) passed Hansen's test.

B. Change in the Correlation Between Food Budget Proportion and Income Proportion

In married couple households, the correlation between the food budget and the income proportion may have changed from 1989 to 2004. To estimate the change in the correlation between the food budget and the income proportion from 1989 to 2004, I used the couple's Engel curve (7) with the interaction terms of the wife's income proportion.

$$c_j = \alpha_j^h + \beta_j \log(x^h + x^w) + (\alpha_j^w - \alpha_j^h)\lambda + (\gamma_{94j}^w - \gamma_{94j}^h)D_{94}\lambda + (\gamma_{99j}^w - \gamma_{99j}^h)D_{99}\lambda + (\gamma_{04j}^w - \gamma_{04j}^h)D_{04}\lambda + \lambda\log(\lambda) + (1-\lambda)\log(1-\lambda) + u_j, \quad (9)$$

$D_{94}\lambda$, $D_{99}\lambda$, $D_{04}\lambda$ are the interaction terms of the wife's true budget proportion. Where λ, the true budget proportion for a wife, is unknown. Instead, I estimated the wife's

income proportion, D_{94} is the dummy variable for 1994, D_{99} is the dummy variable for 1999, and D_{04} is the dummy variable for 2004.

Table 7 shows the estimation results of the change in correlation between the food budget proportion and the income proportion from 1989 to 2004. The base year is 1989. The closer the correlation between the wife's income proportion and her budget proportion, the closer the coefficients of a wife's income proportion are to the female dummies (gender differences of $(\alpha^w_j - \alpha^h_j)$). The 2004 coefficient of the wife's income proportion for eating out is calculated as –4.339–5.930 (base 1989 coefficient of wife's income proportion plus its 2004 interaction coefficient). For eating out, vegetables, dairy foods, and seafood, the coefficients of a wife's income proportion in 2004 are larger than those of 1989 (Table 7), whereas the different preferences between males and females weakened in 2004 relative to those from 1989 (Table 6). Therefore, the correlation between these budget proportions and the income proportion strengthened. The different preferences in the budget proportion for drinks and alcohol between females and males weakened in 2004 (Table 6), whereas the coefficient of a wife's income proportion in 2004 does not appear significantly larger than that from 1989 (Table 7). In summary, the 2004 food budget proportion for wives is more closely correlated with the income proportion for wives. A wife's distribution power was stronger in 2004 than it was in 1989.

VI. Income Proportion and Budget Proportion—Clothing and Cosmetics

I also used clothing and cosmetics to examine the correlation between the income proportion and the budget proportion. In the NSFIE, clothing is categorized into male

clothing and female clothing. Normally, cosmetics are consumed more by females than males. Because the budget for female clothing and male clothing are separate, the budget for food is not separate in the data. Therefore, estimating the different preferences as in section **IV.B** is not necessary. If the income proportion and the budget proportion are positively correlated, then the wife's income proportion influences her clothing and cosmetic budget proportion. The estimation equation is (7).

Clothing and cosmetics budgets are classified into clothing, cosmetics, and others. Clothing includes formal wear, sweaters, blouses, shirts, and shoes, and the others category includes underwear and socks.

Table 8 reports the estimation results of the previously described model. At first glance, one sees that the working wives' budget proportion of clothing is higher than for those who do not work. In contrast, working wives do not spend as much as non-working wives on cosmetics. Note that a wife's income proportion is significant, and we conclude that the income proportion and the budget proportion are positively correlated. As section **IV** explained, this conclusion implies that the wives' budget proportion for clothing and cosmetics is positively correlated with their income proportions.

VII. Conclusion

The data used in this paper come from four editions of NSFIE. Married couples without children are used as samples to estimate the correlation between the income proportion and the budget proportion and the estimation on the change in correlation. I used the Engel curve to examine whether the income proportion and the budget proportion are positively correlated. My conclusion is consistent with previous results, and the favorite

food and clothing and cosmetics budget proportions for wives increase when their income proportions increase. However, the wife's income proportion is negatively correlated with the husband's preferred share of the food budget.

I also explored the change in the correlation between a wife's food budget proportion and her income proportion from 1989 to 2004. The result shows that the correlation was stronger in 2004 than in 1989.

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Table 1

2004 Budget Proportions by Food Category

	Single female households	Single male households	t test
Observation	2478	1454	
Food category (%)			
Sweets	9.95	4.76	23.1070
Eating out	30.52	56.32	–36.4818
Vegetables	21.71	8.00	35.2646
Drinks and alcohol	8.70	14.80	–20.1970
Dairy foods	5.11	2.46	18.3615
Seafood	9.14	4.23	21.2175
Other	14.86	9.43	17.6610

Notes: Variables are for single households from the 2004 NSFIE edition. Food categories are divided as follows: sweets contain Japanese cakes, candies, Western cakes, and similar; eating out contains cooked food, restaurant food, and general meals; vegetables contain vegetables and fruits; drinks and alcohol contain beverages including alcoholic beverages; dairy foods contain dairy products and eggs; seafood contain fishes and shellfish; and other contains cereals and meat.

Table 2

Estimation Results of Demand Equations (14,706 single households)

	Sweets	Eating out	Vegetables	Dairy foods	Drinks and alcohol	Seafood
Female dummy	4.504***	-8.333***	7.407***	1.074***	-5.608***	1.778***
	(0.208)	(0.648)	(0.365)	(0.143)	(0.369)	(0.263)
Year dummy						
1994	0.499***	-1.140**	0.289	0.120	0.831***	-0.335**
	(0.165)	(0.443)	(0.225)	(0.090)	(0.237)	(0.163)
1999	0.743***	0.251	-1.290***	0.427***	1.519***	-1.021***
	(0.163)	(0.452)	(0.233)	(0.094)	(0.238)	(0.168)
2004	0.828***	3.645***	-2.165***	-0.090	2.159***	-2.678***
	(0.158)	(0.419)	(0.217)	(0.093)	(0.227)	(0.157)
Age dummy						
20 ≤Age ≤29	-6.349***	0.679	4.058***	0.982***	-3.281***	2.113***
	(0.577)	(1.159)	(0.316)	(0.150)	(0.625)	(0.179)
30 ≤Age ≤39	-7.851***	-7.378***	7.355***	1.583***	-2.768***	4.304***
	(0.592)	(1.249)	(0.387)	(0.172)	(0.676)	(0.240)
40 ≤Age ≤49	-8.524***	-14.851***	11.031***	1.873***	-2.865***	7.116***
	(0.598)	(1.334)	(0.447)	(0.184)	(0.709)	(0.290)
50 ≤Age ≤59	-8.612***	-22.521***	15.892***	2.057***	-4.417***	9.718***
	(0.600)	(1.277)	(0.434)	(0.185)	(0.679)	(0.283)
60 ≤Age ≤69	-8.189***	-27.429***	18.760***	2.263***	-5.106***	11.057***
	(0.614)	(1.299)	(0.477)	(0.203)	(0.690)	(0.311)
70 ≤Age	-7.173***	-27.508***	19.451***	2.756***	-5.877***	11.266***
	(0.614)	(1.285)	(0.461)	(0.206)	(0.674)	(0.308)
Single male						
Working full-time	-2.021***	9.457***	-2.282***	-0.888***	0.677	-1.021***
	(0.274)	(0.871)	(0.455)	(0.171)	(0.490)	(0.324)
Working part-time	-0.956**	3.116	-2.707***	-0.211	2.260*	-0.312
	(0.462)	(2.146)	(0.920)	(0.385)	(1.311)	(0.627)
Single female						
Working full-time	0.128	5.461***	-3.680***	-0.576***	0.700**	-1.419***
	(0.233)	(0.600)	(0.331)	(0.134)	(0.282)	(0.236)
Working part-time	0.506	1.667**	-2.047***	-0.158	0.329	-1.259***
	(0.327)	(0.694)	(0.432)	(0.173)	(0.313)	(0.301)
Log food budget	4.318***	44.090***	-12.250***	-4.719***	-2.550*	-7.125***
	(0.785)	(2.534)	(1.536)	(0.479)	(1.335)	(1.038)

Notes: Robustness standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Food budget is an endogenous variable; I used a household's total receipts and stock sales as our instruments.

Hansen J Chi-squared(6) = 6.49807 (p = 0.3698).

Table 3

Income Proportion and Budget Proportion (33,841 couple households)

	Sweets	Eating out	Vegetables	Dairy foods	Drinks and alcohol	Seafood
Wife's income proportion	0.988***	-8.298***	4.652***	0.601***	-0.569**	1.958***
	(0.152)	(0.480)	(0.258)	(0.094)	(0.236)	(0.222)
Year dummy						
1994	0.805***	-0.907***	1.051***	0.005	0.693***	-0.805***
	(0.091)	(0.296)	(0.155)	(0.056)	(0.138)	(0.136)
1999	1.356***	1.620***	-0.807***	0.389***	1.021***	-1.610***
	(0.087)	(0.287)	(0.146)	(0.055)	(0.133)	(0.131)
2004	1.312***	6.286***	-2.033***	-0.132***	1.551***	-4.212***
	(0.075)	(0.248)	(0.134)	(0.051)	(0.124)	(0.118)
Age dummy						
20 ≤Age ≤29	1.731***	19.821***	-8.118***	-0.228**	-1.305***	-7.739***
	(0.166)	(0.529)	(0.230)	(0.089)	(0.216)	(0.187)
30 ≤Age ≤39	0.695***	14.430***	-6.328***	-0.310***	0.560***	-5.403***
	(0.137)	(0.450)	(0.199)	(0.073)	(0.208)	(0.165)
40 ≤Age ≤49	-0.363***	2.520***	-2.256***	-0.222***	1.770***	-0.591***
	(0.140)	(0.473)	(0.224)	(0.078)	(0.237)	(0.199)
50 ≤Age ≤59	-0.739***	-3.562***	0.807***	-0.050	0.409***	1.634***
	(0.089)	(0.292)	(0.152)	(0.052)	(0.140)	(0.131)
60 ≤Age ≤69	-0.369***	-3.056***	1.249***	0.165***	-0.199*	1.230***
	(0.077)	(0.222)	(0.131)	(0.047)	(0.112)	(0.109)
70 ≤Age	0.356***	-0.645**	1.660***	0.387***	-1.031***	0.717***
	(0.105)	(0.295)	(0.175)	(0.067)	(0.140)	(0.144)
Wife working dummy						
Working full-time	-0.698***	7.593***	-4.373***	-0.568***	0.450***	-1.447***
	(0.093)	(0.302)	(0.151)	(0.055)	(0.140)	(0.129)
Working part-time	-0.147*	3.685***	-2.500***	-0.471***	0.646***	-0.938***
	(0.084)	(0.260)	(0.137)	(0.048)	(0.132)	(0.115)
Head is female dummy	0.323	3.607***	-1.277***	-0.193	-0.137	-1.224***
	(0.242)	(0.737)	(0.384)	(0.146)	(0.369)	(0.307)
Log food budget	8.297***	55.250***	-12.415***	-4.589***	-3.006***	-14.408***
	(0.724)	(2.489)	(1.043)	(0.364)	(0.821)	(0.873)

Notes: Robustness errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Food budget is an endogenous variable; we used a household's total receipts and stock sales as our instruments.

Hansen J Chi-squared(6) = 8.78044 (p = 0.1863)

Table 4

Ratio of Wives (non-working and working)

Year	Non-Working		Working		Total
	Observations	Percentage	Observations	Percentage	
1989	2,346	64.84	1,272	35.16	3,618
1994	2,498	58.09	1,802	41.91	4,300
1999	2,389	54.17	2,021	45.83	4,410
2004	2,105	48.66	2,221	51.34	4,326

Note: Variables are from single households in the 1989, 1994, 1999, and 2004 edition NSFIE.

Table 5

Food Budget Proportions from 1989 to 2004

Single female				
Year	1989	1994	1999	2004
Observation	1852	2150	2312	2478
Food category (%)				
Sweets	8.90	10.13	10.09	9.95
Eating out	27.09	28.61	28.65	30.52
Vegetables	22.31	22.82	21.72	21.71
Drinks and alcohol	7.01	7.20	8.08	8.70
Dairy foods	5.16	4.92	5.42	5.11
Seafood	11.48	10.73	10.64	9.14
Other	18.05	15.59	15.40	14.86
Single male				
Year	1989	1994	1999	2004
Observation	1299	1574	1587	1454
Food category (%)				
Sweets	4.64	4.52	4.91	4.76
Eating out	62.71	62.12	60.66	56.32
Vegetables	5.71	5.62	6.05	8.00
Drinks and alcohol	13.71	14.53	14.39	14.80
Dairy foods	2.02	2.11	2.49	2.46
Seafood	3.51	3.63	3.62	4.23
Other	7.70	7.47	7.89	9.43

Notes: Variables are for single households from the 1989, 1994, 1999, and 2004 NSFIE editions. The food category is divided as follows: sweets contain Japanese cakes, candies, Western cakes, and other sweets; eating out contains cooked food, restaurant food, and general meals; vegetables contain vegetables and fruits; drinks and alcohol contain beverages, including alcoholic beverages; dairy foods contain dairy products and eggs; seafood contains fishes and shellfish; and other contains cereals and meat.

Table 6

Results of Change in Proportion of Food Budget

	Sweets	Eating out	Vegetables	Dairy foods	Drinks and alcohol	Seafood
Female dummy	3.885***	-9.639***	7.856***	1.106***	-6.165***	2.711***
	(0.289)	(0.917)	(0.462)	(0.188)	(0.520)	(0.347)
Interaction term 1994	1.117***	0.141	0.588	-0.138	-0.154	-0.775***
	(0.305)	(0.859)	(0.391)	(0.161)	(0.485)	(0.293)
Interaction term 1999	0.793***	0.868	-0.767**	0.013	0.886*	-0.692**
	(0.299)	(0.852)	(0.385)	(0.165)	(0.476)	(0.287)
Interaction term 2004	0.453	3.374***	-1.157***	-0.015	1.053**	-1.820***
	(0.305)	(0.873)	(0.413)	(0.172)	(0.492)	(0.296)

Notes: Robustness errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Other independent variables are as follows: 1994 year dummy, 1999 year dummy, 2004 year dummy, age dummy (20–29, 30–39, 40–49, 50–59, 60–69, and 70–85) of single males and single females, a single male's full-time working dummy and part-time working dummy, a female's full-time working dummy and part-time working dummy, log food budget, and a constant term. Food budget is an endogenous variable, and is instrumented by total household receipts and stock sales.

Hansen J Chi-squared(6) = 6.46863 (p = 0.3728)

Table 7

Estimation Results of Change in Correlation

	Sweets	Eating out	Vegetables	Dairy foods	Drinks and alcohol	Seafood
Wife's income proportion	1.818***	-4.339***	3.444***	0.415**	-0.774*	0.548
	(0.234)	(0.813)	(0.441)	(0.172)	(0.438)	(0.420)
Interaction term 1994	-0.681**	-2.556**	1.271**	-0.101	0.305	0.909*
	(0.317)	(1.011)	(0.571)	(0.209)	(0.543)	(0.509)
Interaction term 1999	-0.836***	-6.011***	1.114**	0.325	1.063**	2.147***
	(0.313)	(1.028)	(0.548)	(0.210)	(0.536)	(0.498)
Interaction term 2004	-1.500***	-5.930***	2.048***	0.412**	-0.472	2.106***
	(0.317)	(1.052)	(0.557)	(0.210)	(0.531)	(0.485)
Log food budget	8.265***	55.083***	-12.365***	-4.579***	-3.000***	-14.347***
	(0.718)	(2.466)	(1.036)	(0.361)	(0.815)	(0.870)

Notes: Robustness errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 Other independent variables are as follows: 1994 year dummy, 1999 year dummy, 2004 year dummy, age dummy (20–29, 30–39, 40–49, 50–59, 60–69, and 70–85) of couples, a wife's full-time working dummy, a wife's part-time working dummy, and a constant term. Log food budget is an endogenous variable and is instrumented by total household receipts and stock sales, and the null hypothesis (instrument variables are exogenous) is then accepted.

Hansen J Chi-squared(6) = 8.7937 (p = 0.1855)

Table 8

Estimation Results—Clothes and Cosmetics

	Wife clothing	Cosmetics
Wife's income proportion	3.171***	2.529***
	(-0.92)	(-0.922)
Year dummy		
1994	-0.744	2.784***
	(0.484)	(0.461)
1999	-0.215	5.402***
	(0.475)	(0.461)
2004	-1.150**	8.710***
Age dummy	(0.507)	(0.510)
20 ≤Age ≤29	-2.091***	2.538***
	(0.761)	(0.810)
30 ≤Age ≤39	-3.241***	4.610***
	(0.717)	(0.789)
40 ≤Age ≤49	-2.049***	1.497*
	(0.769)	(0.824)
50 ≤Age ≤59	0.256	-0.768
	(0.511)	(0.508)
60 ≤Age ≤69	0.006	-0.413
	(0.440)	(0.443)
70 ≤Age	-0.086	-0.250
	(0.606)	(0.630)
Wife working dummy		
Working full-time	1.339**	-1.231**
	(0.557)	(0.575)
Working part-time	1.309***	0.544
	(0.484)	(0.491)
Head is female dummy	-0.814	1.770
	(1.358)	(1.422)
Log food budget	13.786***	3.413**
	(1.466)	(1.613)

Notes: N=32,741. Robustness standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Clothing and cosmetics budget is instrumented by total household receipts and stock sales, and the null hypothesis (instrument variables are exogenous) is then accepted.

Hansen J Chi-squared(2) = .411623 (p = 0.8140).