

The expenditure on children in Japan[†]

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Abstract

This study estimates average expenditures on children by families in Japan on the basis of the rich information about household expenditures and demographics obtained from the Family Income and Expenditure Survey. We show that the total expenditure on the first child accumulated from birth through age 18 is approximately 16.5 million yen based on 2004–2008 data. Average per child expenditure (accumulated over the same age period) in a household with two children is reduced to about 11 million yen, suggesting partly that there are economies of scale in child rearing activities and that families with two children have less money to spend on each child. The share of child rearing expenditure in total consumption appears to have been steadily increasing since mid-1980s.

1 Introduction

Japan is facing a demographic crisis due to declining fertility rates coupled with rising longevity. While fewer than three workers currently support a retiree in Japan, this ratio is projected to drop to two workers for every aged dependent by 2025. Although Japan's has been successful thus far in maintaining a relatively generous social security system, maintaining this system will be increasingly difficult, given the inevitable shrinking of the working population. The solution to Japan's aging crisis appears to be straightforward but not easy to implement: increase the participation of women and the elderly in the workforce; reform the pension system; raise taxes to pay for the cost of social security; and encourage society to be more supportive of child rearing in order to boost fertility.

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This study focuses on the last of these issues, namely ways to provide greater support for child rearing, by attempting to estimate the average family expenditure on children in Japan. Based on the perception that the cost of child rearing is a key factor in a married couple's decision to have a baby (at least from the viewpoint of economics), there have been several recent attempts to examine expenditures on children, including Rosenbaum and Ruhm (2007) for the United States, Bargain and Donni (2010) for France, Bargain, Donni, and Gbakou for Ireland (2010), and Menon and Perali (2009) for Italy. Among others, the U.S. Department of Agriculture has provided annual figures on expenditures on children since 1960,¹ and its child rearing expense estimates are often used in determining state child support guidelines and child care payments. Despite the importance of this issue for a country experiencing a decline in fertility, there are few empirical studies investigating how much parents in Japan spend on their children. A few studies using equivalence scales to examine child rearing costs in Japan do exist (see Suruga, 1993, and Oyama, 2006), but they focus only on a relatively short period in the past and the estimates are likely to be too outdated to provide a reliable assessment of the present situation.²

The present study seeks to address this dearth of research by estimating the average expenditure on children by families in Japan over the past quarter of a century, using the rich information on household expenditures and demographics available from the *Family Income and Expenditure Survey (FIES)*. Instead of using equivalence scales, which, although widely used in the literature, rest on debatable assumptions, this study tries to calculate average child rearing expenditure by individual household members, taking into account their age, sex, and several other attributes, in order to arrive at average household child rearing expenditures. The results of our simple regression analysis indicate that average total cumulative expenditure (excluding housing expenses) for the first child from birth through age 18 was approximately 16.5 million yen in the period 2004–2008. Furthermore, when there are two or more children in a household, the average expenditure per child is substantially lower; for example, in households with two children, it was approximately 11

¹ See Lino (2001, 2010) for a description of U.S. Department of Agriculture estimates of expenditures on children.

² Suruga (1993) used aggregate data from the *1984 National Survey of Family Income and Expenditure*. Even Oyama's (2006) study, which is much more recent, only covers the period up to 1999, using data from the *Japanese Panel Survey on Consumers*. Finally, using micro-level data from the *2003 Family Income and Expenditure Survey*, Cabinet Office (2005) estimated the total cost of rearing a child (arriving at a figure of 13 million yen), but this is not a rigorous academic study.

million yen, partly reflecting economies of scale in child rearing activity. Note that there is no significant gender-based difference in the total child rearing expenditure. Further, the estimated average total expenditure per child shows a clear upward trend not only in absolute terms but also relative to what parents spend on themselves.

The rest of the paper is organized as follows. The next section describes the dataset and empirical strategy used. Section 3 presents the results of a preliminary estimation obtained by simply applying the methodology employed here to the total consumption expenditure by individual households; in addition, the section highlights a few problems that need to be addressed to make the estimates more reliable. Section 4 then reports the main estimates of the expenditure on children for the period 2004–2008. Next, Section 5 considers historical trends in child rearing costs in Japan since the mid-1980s. Finally, Section 6 concludes.

2 Data and Methodology

2.1 Data Source

To estimate the expenditure on children in an average Japanese household, the household-level data from the *Family Income and Expenditure Survey (FIES)* from the mid-1980s is used. The *FIES* provides detailed monthly information on household income and expenditure, and household members' characteristics (sex, age, relationship to the household head, etc.) for a nationally representative sample of 8,000–9,000 households. The monthly data is compiled from a diary collected twice a month, and each household is surveyed for six months before being replaced.

Another source of detailed household expenditure data for Japan is the *National Survey of Family Income and Expenditure (NSFIE)*, which is implemented every five years and covers a larger sample of more than 50,000 households. However, the *NSFIE* data are not suitable for the purpose of the analysis here, since the survey period is only from September to November and the data may therefore be highly susceptible to expenditure seasonality.³

The analysis in this study focuses on observations for households of two or more persons

³ For example, school tuition fees, which are typically paid in March or April, the turn of the fiscal year in Japan, are not picked up by the *NSFIE*.

(with/without children). Moreover, in order to ensure a sufficiently large number of observations is available for the regression analysis, which employs an exceptionally large number of independent variables, expenditure patterns for three selected five-year intervals (instead of each year), namely 1984–1988, 1994–1998, and 2004–2008 are examined. The number of observations for each of the three intervals is approximately 480,000 ($8,000 \times 12 \times 5 = 480,000$). In order to improve the estimates, the sample will be restricted to households without large remittance expenditures,⁴ since remittances are expenses for relatives who live away from the household head and cannot be assigned to a specific family member listed in the *FIES*.⁵ Even after the exclusion of households with large remittances, there are more than 440,000 observations for each interval.

In addition to the total of households' monthly consumption expenditure, expenditure on the following 10 broad categories of consumption is examined: (1) food; (2) housing; (3) fuel, light, and water charges; (4) furniture and household utensils; (5) clothes and footwear; (6) medical care; (7) transportation and communication; (8) education; (9) culture and recreation; and (10) other consumption expenditures. Summary statistics of the key variables are shown in Table 1.

Given that the aim of the study is to examine expenditure on children, the central explanatory variables of the analysis are those concerning household demographic structure. Specifically, the analysis starts with a comparison of the expenditure patterns of married couples without children and married couples with at least one child to examine the effects that having a child or children on the consumption behavior of a couple. In the sample of households without large remittances, roughly two-thirds of households have at least one child, while the share of households with children has been declining in recent years. In addition to the presence/absence of children, the analysis in this study employs information on the age and sex of all household members (and not only the household head) – something that has not been done in earlier studies. Figure 1 shows the age-sex pyramid of the population included in the dataset (the observations in the three five-year intervals aggregated together) as well as the pyramid for each of the five-year intervals.

⁴ Households are excluded from the restricted sample if their average monthly remittances are more than 25,000 yen. This level is set based on the finding (from a survey by the National Federation of University Co-operative Associations) that more than 95% of college students who receive remittances from their parents receive more than 30,000 yen a month.

⁵ A household in the *FIES* is composed of a household head and his or her family members. Relatives, living-in business employees, and household maids are considered as household members if they share living expenses. Accordingly, family members living in a separate house or lodgers maintaining a separate budget are excluded from households surveyed in the *FIES*.

Unfortunately, the age-sex pyramids based on the *FIES* data appear not to follow the pattern for the national population as a whole; that is, young adults seem to be underrepresented in the age-sex pyramids based on the *FIES* data. The reason is the way that household members are defined in the *FIES*, i.e., children are counted as household members only when they live with the household head. However, thanks to the large sample size of the *FIES*, it is possible to obtain a sufficiently large number of observations for all age-sex brackets, including for young adults. The changing demographics resulting from the aging of the Japanese population are well mirrored in the changing shape of the *FIES* pyramids.

2.2 Methodology

Household expenditures are made either on shared goods, such as housing, or on individually consumed goods, such as food, and it is usually impossible to directly observe expenditures on behalf of a specific household member, for example, a child. Therefore, it is necessary to use an indirect approach to assign household expenditures to a specific household member and to estimate household expenditure on children. A relatively widely used approach is the marginal cost method, which measures expenditures on children as the difference in expenses between families with children and *equivalent* families without children. However, there is no generally accepted equivalency measure in the economics literature, and it is known that estimates vary substantially depending on the choice of equivalency measure. In addition, the marginal cost method does not allow for the possibility that parents change expenditure on themselves after a child is added to the household.

Given this, this study aims to simply calculate, through multiple linear regressions, the average expenditure on a household member of a specific age, sex, and other attributes. More concretely, adopting the method developed by Mankiw and Wail (1989) to examine the impact of demographic changes on the U.S. housing market, consumption expenditure by a household is modeled as an additive function of the expenditure on its members:

$$C(i; j, t) = \sum_{k=1}^{N_j} c(i; k, j, t), \quad (1)$$

where $c(i; k, j, t)$ is the consumption expenditure (on category i goods/services) on the k th member in

household j during year t , and N_j is the total number of persons in household j . Expenditure on each individual is considered to be a function of age, sex, and household structure (or family type). Each age-sex combination is allowed to have its own expenditure parameter. The age-sex combination parameters differ depending on whether the individual has at least one child (if the individual is an adult) and whether the child is the firstborn child (if the individual is a child). Therefore, category i goods/services expenditure on an individual household member is given by

$$\begin{aligned}
c(i; k, j, t) = & \sum_{\substack{\text{female} \\ \text{sex}=\text{male}}} \sum_{\substack{\text{85over} \\ \text{age}=20}} \sum_{\substack{\text{yes} \\ \text{child}=\text{no}}} \alpha_p(i; \text{sex}, \text{age}, \text{child}, t) D_p(\text{sex}, \text{age}, \text{child}, k, j, t) \\
& + \sum_{\substack{\text{female} \\ \text{sex}=\text{male}}} \sum_{\substack{\text{23} \\ \text{age}=0}} \sum_{\substack{\text{no} \\ \text{first}=\text{yes}}} \alpha_c(i; \text{sex}, \text{age}, \text{first}, t) D_c(\text{sex}, \text{age}, \text{first}, k, j, t),
\end{aligned} \tag{2}$$

where $D_p(\text{sex}, \text{age}_0, \text{child} / \text{nochild}, k, j, t) = 1$ if the individual (k, j, t) is the head of the household or its spouse, who is aged age_0 , and has at least one child/no children. $D_c(\text{sex}_1, \text{age}_1, \text{first} / \text{nofirst}, k, j, t) = 1$ if the individual (k, j, t) is a household head's dependent child, whose sex is sex_1 , whose age is age_1 , and who is the firstborn (or eldest) child in the household. The parameter $\alpha_p(i; \text{sex}_0, \text{age}_0, \text{child} / \text{nochild}, t)$ indicates the category i goods/services expenditure on a household head/spouse of age age_0 , with at least one child/without children at time t . $\alpha_c(i; \text{sex}_0, \text{age}_0, \text{first} / \text{nofirst}, t)$ is the expenditure on a son/daughter of age age_0 that is the firstborn child/non-firstborn child in the family. Combining (1) and (2) gives the equation for expenditure on category i goods/services by household j at time t :

$$\begin{aligned}
C(i; j, t) = & \sum_{\substack{\text{female} \\ \text{sex}=\text{male}}} \sum_{\substack{\text{85over} \\ \text{age}=20}} \sum_{\substack{\text{yes} \\ \text{child}=\text{no}}} \alpha_p(i; \text{sex}, \text{age}, \text{child}, t) \sum_{k=1}^{N_j} D_p(\text{sex}, \text{age}, \text{child}, k, j, t) \\
& + \sum_{\substack{\text{female} \\ \text{sex}=\text{male}}} \sum_{\substack{\text{23} \\ \text{age}=0}} \sum_{\substack{\text{no} \\ \text{first}=\text{yes}}} \alpha_c(i; \text{sex}, \text{age}, \text{first}, t) \sum_{k=1}^{N_j} D_c(\text{sex}, \text{age}, \text{first}, k, j, t),
\end{aligned} \tag{3}$$

In the next section, equation (3) is estimated for a preliminary analysis to obtain $\alpha_p()$ s and $\alpha_c()$ s for the total consumption expenditure by an individual household in the sample from the 2004–2008 *FIES*. As the regression does not include variables such as income and assets, key items in standard theories of consumption, the estimated $\hat{\alpha}()$ s cannot be taken as structural parameters. Instead, they should be understood as effective calculations of average expenditures on goods/services i at time t on a household member of a specified age, sex, and other attributes (i.e., with/without children for the household head and his/her spouse, and first/non-first for children).

It is additionally assumed that $\alpha_p(i; sex, age, first, t)$ and $\alpha_c(i; sex, age, first, t)$ vary with the month, reflecting consumption seasonality, but are constant over the years in the five-year interval from 2004 to 2008, since economic growth (and inflation) were roughly zero in that period. Based on these assumptions, the average annual expenditure on goods/services i for the period on an individual of a specified age, sex, and other attributes can be calculated as

$$\begin{aligned} C(i, sex_0, age_0, child_0) &= \sum_{month=1}^{12} \hat{\alpha}_p(i; sex_0, age_0, child_0, month) \text{ for parents, and} \\ C(i, sex_1, age_1, first_1) &= \sum_{month=1}^{12} \hat{\alpha}_c(i; sex_1, age_1, first_1, month) \text{ for children.} \end{aligned} \quad (4)$$

If we were interested in consumption expenditures over some specific age interval in the course of a person's life, say from age a_0 to a_1 , the average consumption over the period could be calculated as

$$C(i, sex_1, a_0, a_1, first_1) = \sum_{age=a_0}^{a_1} C(i, sex_1, age, first_1) = \sum_{age=a_0}^{a_1} \sum_{month=1}^{12} \hat{\alpha}_c(i; sex_1, age, first_1, month) \quad (5)$$

As the aim of this study is to estimate the expenditure on child rearing in a typical household in Japan, (5) is calculated over the age interval from birth through age 18. Although expenditure on children often continues beyond the age of 18, the estimation here focuses on expenditures up until this age. The reason is that expenditures on children aged 19 and older differ considerably across households and, more crucially, the *FIES* definition of household members, which excludes children living separately from their parents, makes it impossible to estimate expenditures on such household members, since children aged 19 and over often start to live separately to attend college. Therefore, although the following sections also report the expenditure on college-aged children (i.e., aged 19 to 23), these estimates should be treated with caution.⁶ In addition, for reference, the average expenditure by parents on themselves is reported to gain a sense of the relative magnitude of child rearing expenditures. Such estimates are also useful for examining how the consumption behavior of the household head and his/her spouse are affected by having children.

3 Tentative Application to Total Consumption Expenditure

To illustrate the methodology introduced above, this section presents a simple application to total consumption expenditure by an individual household (in the sample period 2004–2008). Although

⁶ The expenditure estimate for the age interval from 19 to 23 is likely to be an underestimate, since it does not include the large expenditure on children who live away from their parents to go to college.

this simple application is useful for revealing several interesting facts about household expenditure on children in Japan, it also turns out that there are a number of aspects that need to be improved to obtain more reliable estimates.

3.1 *Preliminary Findings*

The results of the simple application of the methodology, i.e., equations (5) and (4), to total consumption expenditure are shown in Table 2 and Figure 2, respectively. Beginning with Table 2.1 and Figure 2.1, the results reveal a number of interesting facts about child rearing expenditure in Japan. First, there are hardly any gender-based differences in the expenditure on children. Annual expenditure per child (for the first child) is slightly less than 1 million yen for children up to their early teens and 1.5 million yen for children of high school age. Total expenditure on the firstborn child from birth through age 18 is around 19 million yen. Second, when there are two or more children in a household, the increases in expenditure due to the second or later children are much smaller than that for the first child. The average expenditure per child (cumulated over the age interval from birth through age 18) in households with two children falls to approximately 11 million yen, suggesting partly that there are economies of scale in child rearing activities and that families with two children have less money to spend on each child. Third, consumption expenditure by the household head and the spouse in households with at least one child is substantially lower than in households without children.

Given that remittances, which fall into the “other consumption expenditure” category, represent an expenditure on those living outside the household, and therefore cannot be assigned to a specific household member listed in the *FIES* household questionnaire, expenditures were re-estimated after removing remittances from household consumption (Table 2.2 and Figure 2.2). While the estimate of the total expenditure on the first child (cumulated from birth through age 18) decreases to around 17 million yen, and the rise in expenditure on a middle-aged childless wife (observed in Figure 2.1) disappears in Figure 2.2, the overall patterns in the expenditure on children are not very different from those found in the first regression, before excluding remittances.

3.2 Problems Found in the Estimates on Subcategories

Although the findings above suggest that the methodology employed for estimating the expenditure on each household member is useful, the estimates need to be treated with caution. Space constraints mean that it is not possible to discuss the reasons here in full, but essentially some flaws emerge when the same methodology is applied to the subcategories of consumption. In theory, exactly the same results should be obtained for average per capita expenditure (on a household member of a specific age, sex, and other attributes) regardless of whether total expenditure or the sum of the estimates for the subcategories are used. Therefore, similar regressions were performed for the 10 broad subcategories and these show that at least for a few items, the estimates contain obvious biases. They include the following:

1. housing expenses are estimated to decrease as household members become older (see Figure 3.1);
2. educational expenses for a female parent with at least one child are estimated to be negative, probably causing an overestimation of the cost of education for children (see Figure 3.2); and
3. the estimates of other consumption expenditures on children become large negative values; moreover, the estimates for this category appear to be considerably affected by remittances (see Figures 3.3 and 3.4).

The problem regarding housing expenses probably arises because the *FIES* does not regard mortgage repayments by homeowners as housing expenditure. The counterintuitive estimates indicate not only that housing expenditure by homeowners is not well captured, but also that estimating housing expenditure is difficult, as it is strongly affected by the behavior of homebuyers. The second problem regarding the education category probably indicates the presence of multicollinearity due to the large number of independent variables. As education expenses by adults without children appear to be almost zero, better estimates can probably be obtained by restricting education expenses by parents to be also zero. A similar multicollinearity underlies the third issue concerning “other consumption expenditures” and, unlike the multicollinearity regarding education expenses, presents a much more substantial problem for the analysis in this study. More specifically, the “other consumption” category contains remittances, which make up a sizable share but which

represent consumption expenditures on somebody (including relatives) not included in the FIES households, and therefore the methodology employed here cannot (and should not) allocate such expenditure to reported members in the *FIES* households. In a nutshell, the information available from the *FIES* household questionnaires is insufficient to identify the number of children in each household, especially when the household makes large remittances, which may or may not be for a child (or children) aged 19 or older and living separately, e.g., to attend college.

3.3 Remedies

In order to overcome the problems discussed above, the following strategy is adopted in the subsequent sections. First, to ensure that any of the problems described in the previous section are avoided, the expenditure on children in each subcategory is first estimated and the total is then calculated as the sum of the category estimates. Second, given the difficulties in dealing with remittances, only observations on households without large monthly remittances are used, as already noted in the data section. Excluding observations on households with large monthly remittances not only avoids the problem of how to assign remittances to a specific member in a household, but also mitigates the problems resulting from the incomplete coverage of household members in the *FIES*. Third, given the problems regarding housing expenditure and remittances mentioned above, expenditure on children is calculated excluding these two subcategories.⁷ Fourth, given the multicollinearity observed for education expenditures and other consumption expenditures, zero restrictions are imposed on some of the parameters to reduce the number of independent variables. More specifically, it is presumed that education expenses are for dependent children (from birth through age 23) and that other consumption expenditures are for adult members in each household.⁸

⁷ A possible criticism is that the exclusion of housing expenses may result in considerable underestimation of total child rearing costs. Lino and Carlson (2010), for example, report that, in the United States, housing expenses are usually the largest expense on children parents incur. However, their definition of housing expenses is much broader than the one employed here and includes utilities as well as house furnishings and equipment. Therefore, excluding housing expenses here does not necessarily greatly underestimate total child rearing costs, and calculation of imputed rent, which would be necessary to estimate the housing costs of homeowner households, is beyond the scope of this short article.

⁸ Other consumption expenditures in the *FIES* consist of miscellaneous expenditures (such as personal care goods/services and tobacco), pocket money (details of the use of which are unknown), social expenses, and remittances.

4 Estimates by Consumption Category

This section presents the estimates of the expenditure on children following the procedure discussed in the previous section; that is, the expenditure on children for each consumption category is estimated and the total is then calculated as the sum of the category estimates.

4.1 *Food* (Figure 4.1 and Table 3)

Notwithstanding the finding in the previous section that there appear to be no differences in the total expenditure on male and female children, when age-consumption profiles for individual consumption categories are examined, differences in expenditures on boys and girls can be observed. As for food expenditure, this is greater for boys than for girls and the gender gap in consumption becomes most evident during adolescence. The increase in food expenditure due to a second or later child is less than half of that due to the first child. Food expenditure on parents appears to decrease substantially, especially during the first half of their child rearing period.

4.2 *Fuel, Light, and Water Charges* (Figure 4.2 and Table 3)

Fuel, light, and water charges related to child rearing increase as a child grows older, although expenditure on such charges is smaller than such expenditure on parents. The increase in expenditure on charges due to a second or later child is approximately half of that due to the first child, again suggesting economies of scale in child rearing.

4.3 *Furniture and Household Utensils* (Figure 4.3 and Table 3)

Increases in expenditure on furniture and household utensils due to having a child appear to be small, except in the short period immediately after the birth of the first child. Those due to a second or later child are almost negligible.

4.4 *Clothes and Footwear* (Figure 4.4 and Table 3)

Clothing is the category in which the gender gap in consumption is the most prominent. In line with expectations, clothing expenditure on girls is significantly higher than that on boys. Households

economize on clothing expenses for a second or later child, although it appears that they will invariably incur higher clothing expenditures for girls during their adolescence. The gender gap in clothing consumption also holds good for parental couples. Mothers typically spend more on clothes and footwear than their spouse, although they spend less than comparable childless wives.

4.5 *Medical Care* (Figure 4.5 and Table 3)

Annual medical care expenditures are high in the year that a baby is born,⁹ decrease rapidly during early childhood, and fall to nearly zero at the end of adolescence. While medical expenses in the birth year are essentially the same for first-born and later children and therefore look unavoidable, medical expenses in subsequent years are lower for the second or later children. In line with expectations, medical care expenses on parents, especially females, increase gradually as they become older, especially from around the mid-50s, and generally continue to rise throughout.

4.6 *Transportation and Communication* (Figure 4.6 and Table 3)

Transportation and communication expenditures on children, especially prior to adolescence, look small relative to such expenditures on the parents. There are neither economies of scale nor a gender gap for this consumption category.

4.7 *Education* (Figure 4.7 and Table 3)

Annual household expenditure on education, which is assumed to be assignable only to children, appears to have two peaks, one around preschool years and one around high school years.¹⁰ The latter peak, around high school years (for the first child), exceeds 500,000 yen, and is the largest item in child rearing expenditure. Contrary to expectation, educational expenses for boys and girls are not visibly different. While the expenses for the second or later child follow a similar age profile with two peaks, they are smaller than those for the first child, probably reflecting economies of

⁹ The estimate for annual medical expenditures for a baby under the age of 1, i.e., 120,000 yen, does not include the expenses for delivery, which are said to be at least 500,000 yen, as a baby born during the six month survey is not counted as a family member in the *FIES*.

¹⁰ The sharp decline in education expenditures after the high school years reflect the fact that a sizable share of college students room in separate houses, and that the *FIES* does not capture the expenditures for dependent relatives who live away from their parents.

scale or the fact that parents spend more on educating an only child.

4.8 *Culture and Recreation* (Figure 4.8 and Table 3)

Culture and recreation expenditures have a single peak around the elementary school years, which is in contrast with expenditures for education. As a child reaches its teens and educational costs start to increase, parents probably save on culture and recreation expenses in order to provide their child with a satisfactory education. Increases in household expenditure on culture and recreation due to a second or later child are less than one-third of the increase due to the first child. Expenses on culture and recreation by parents on themselves decrease substantially during the first half of their child rearing period.

4.9 *Other Consumption* (Figure 4.9 and Table 3)

The age-consumption profiles for other consumption expenditures (excluding remittances), which are assumed to be assignable only to parents, differ greatly between fathers and mothers. Other consumption expenditures for fathers look broadly constant, except for a fall after retirement age, whereas those for mothers continue increasing until they reach retirement age. In addition, “other expenditures” by men are noticeably reduced when they have at least one child, although those by women remain unchanged.

4.10 *Total Consumption Expenditures* (Figure 5 and Table 3)

Total consumption expenditure on a child can now be calculated as the sum of the estimates for the nine consumption categories above. First, irrespective of gender, the total expenditure on the first child cumulated over the period from birth through age 18 is about 16.5 million yen. While this estimate appears more or less comparable with that reported in Table 2.2 for total consumption excluding remittances, it should be noted that the corrected estimate here does not include housing expenses, so that the overall expenditure is actually greater than that reported in Table 2.2. On the other hand, the estimate of the cumulative expenditure on a second or later child of roughly 5.6 million yen is larger now than that in the preliminary estimate, suggesting that the economies of

scale in child rearing appear to have been exaggerated in the preliminary estimates. Although expenditures on boys and girls turn out to be significantly different for most of the subcategories, the total expenditure appears to be approximately the same for both, thus supporting the finding in the preliminary regression.

5 Estimates for the Past Quarter of a Century

While the previous sections provide some indications of child rearing expenses in recent years, the estimates say little about trends in the (relative) cost of bringing up children in Japan. Therefore, the same methodology is applied to the other two five-year intervals mentioned at the outset, i.e., 1984–1988 and 1994–1998. In addition, the shares of the different consumption categories in the total expenditure on children, as well as total family expenditure on children relative to the estimated consumption expenditure by parents (cumulated over the age interval from 23 to 64), are calculated.

Comparing the results for the three five-year intervals clearly illustrates an upward trend in the expenditure on children (Table 4). Cumulative expenditure (excluding housing and remittances) for the first child increased 1.8-fold in absolute terms, from 9.2 million yen in the mid-1980s to the current 16.6 million yen. When there is more than one child in a household, the increase in child expenditure is slightly more modest, 1.6-fold, suggesting that there may be a trend for parents to choose to have only one child on which they can concentrate household resources.

Focusing on the composition of expenditures, there has been relatively little change during the period, with education, food, and culture and recreation being the three major components of child rearing expenditures, accounting for more than 70% of the total. Although the share of education expenditure appears to have increased at the expense of expenditure on culture and recreation in recent years, the shares of expenditure categories – including those that make up only a small share – look relatively stable. Therefore, except for the sharp increase in education expenditure, the observed increase in overall expenditure on children appears to be the result not of an increase in a specific subcategory but of a general increase in all subcategories.

The increasing burden of expenditures on children looks even more serious when they are

examined relative to the estimated expenditure by parents on themselves. In the case of households with one child, the ratio of child rearing expenditure to the parents' expenditure on themselves increased from 9% in 1984–1988 to 16% in 2004–2008. Meanwhile, for two children households, the ratio increased from 13% to 21%, and for three children households from 18% to 27%. These increases in the ratio mean that while expenditures on children increased drastically, parents were forced to curtail expenditure on themselves. Comparing consumption expenditure on themselves by adult couples with and without children (see the column labeled “(b)/(a)” in the row showing the consumption by an adult couple in Table 4) provides further indication that, in more recent years, parental couples have reduced expenditure on themselves relative to couples without a child. Although the results obtained here by themselves do not allow a definite conclusion, they suggest that an important factor underlying Japan's declining birthrate is the increasing cost of child rearing both in absolute terms and as a share in household expenditure.

6 Conclusion

This study attempted to estimate the average expenditure on children by families in Japan – an issue of considerable pertinence given the country's declining birthrate. On the basis of rich information on household expenditure and demographics obtained from the *FIES*, several regressions were performed to assign household expenditures to a specific member of each household.

Calculating total child rearing expenditure as the sum of the estimates for individual consumption subcategories, it was found that, for the period 2004–2008, total expenditure on the first child (excluding housing expenses and remittances) cumulated from birth through age 18 came to about 16.5 million yen. When there are two or more children in a household, the expenditure increase due to a second or later child is much smaller than that due to the first child, suggesting economies of scale in child rearing. While expenditures on boys and girls differ significantly when examined on a subcategory basis, there is little gender-based difference in the total expenditure on a child. Estimates of the expenditure on children show a clear upward trend, not only in absolute terms, but also relative to the expenditure by parents on themselves. Parents, especially fathers, appear to have been forced to more and more curtail their own expenses (relative to childless adult

males) in recent years, indicating that the burden of child rearing in Japan is increasing.

The findings obtained in this study have numerous policy implications. For example, the large and rapidly increase in child rearing costs suggest that there is a need for child rearing support, given Japan's very low birthrate. The estimate of child rearing expenditures obtained here could be used to determine child allowances. Several of the findings regarding the items and timing of child rearing expenses, such as the heavy medical costs around childbirth and the costs of education during high school years, may be useful in locating problem areas on which child-support programs need to focus.¹¹ The observed economies of scale in child rearing suggest that the government should design programs to target second and later children, rather than treating all children (including only children) equally, to make the programs more effective as a countermeasure to the falling birthrate. The estimates of expenditure on children in this study are experimental and several important items are not included, such as housing costs, costs related to childbirth, parental expenses on children after age 19, including college education costs, and the indirect costs involved in child rearing. This means that further studies on these and related issues in the context of evidence-based policy are all the more necessary.

¹¹ Although the Japanese government took a step in the direction of lowering child rearing costs in 2010 by introducing child allowances and waiving/subsidizing tuition for high schools, the policy decision was not necessarily based on empirical evidence on the expenses of bringing up children and little more than a year later the government decided to scrap the child allowance again due to budget constraints.

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Table 1: Sample Statistics by Type of Household and Period

	All Observations			1984-1988 Observations			1994-1998 Observations			2004-2008 Observations		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
All Households												
Number of Household Members	1,426,885	3.37	1.25	479,191	3.65	1.28	476,231	3.34	1.25	471,463	3.11	1.16
Age of the Husband	1,426,885	51.3	14.0	479,191	47.6	12.7	476,231	51.2	13.6	471,463	55.1	14.6
Age of the Wife	1,308,063	48.1	13.4	443,299	44.2	11.9	439,710	48.1	13.1	425,054	52.3	14.0
Annual Income of the Previous Year	1,426,885	6,365.7	4,121.6	479,191	5,499.5	3,417.4	476,231	7,285.4	4,731.8	471,463	6,317.2	3,912.4
Monthly Wage of the Household Head	1,017,369	358.0	359.8	327,050	346.3	310.3	349,065	400.6	397.9	341,254	325.6	358.7
Monthly Consumption Expenditures (Total)	1,426,885	299.1	250.3	479,191	274.0	210.6	476,231	326.5	277.7	471,463	296.9	255.3
Monthly Consumption Exp. (excl. Hous. & Remit.)	1,426,885	272.8	223.2	479,191	253.6	196.2	476,231	295.3	246.0	471,463	269.5	222.9
Food	1,426,885	72.4	33.1	479,191	72.2	31.7	476,231	76.9	35.2	471,463	68.0	31.7
Housing	1,426,885	17.5	77.6	479,191	13.2	40.9	476,231	20.5	89.5	471,463	18.9	91.8
Fuel, Light, and Water	1,426,885	19.7	12.6	479,191	16.9	11.5	476,231	20.4	12.7	471,463	21.9	13.1
Furniture and Household Utensils	1,426,885	11.2	34.9	479,191	11.5	37.9	476,231	12.3	38.8	471,463	9.7	26.6
Clothing and Footwear	1,426,885	17.5	36.3	479,191	19.7	39.5	476,231	19.6	40.5	471,463	13.0	27.0
Medical Care	1,426,885	10.0	26.6	479,191	7.1	20.2	476,231	10.3	26.8	471,463	12.6	31.5
Transportation and Communication	1,426,885	31.7	108.7	479,191	24.9	85.9	476,231	32.7	120.2	471,463	37.5	116.6
Education	1,426,885	12.6	55.8	479,191	11.0	42.4	476,231	14.4	65.7	471,463	12.3	56.8
Culture and Recreation	1,426,885	28.8	52.4	479,191	24.5	49.0	476,231	31.7	56.5	471,463	30.4	51.2
Other Consumption Expenditures	1,426,885	77.8	133.0	479,191	73.0	111.1	476,231	87.7	149.5	471,463	72.7	135.0
Other Consumption Exp. (excl. Remittances)	1,426,885	69.0	115.2	479,191	65.7	98.3	476,231	77.0	128.9	471,463	64.3	116.1
Households without Large Remittances												
Number of Household Members	1,337,427	3.39	1.26	449,599	3.68	1.29	443,797	3.36	1.26	444,031	3.11	1.17
Age of the Husband	1,337,427	51.2	14.3	449,599	47.4	13.0	443,797	51.1	13.9	444,031	55.2	14.9
Age of the Wife	1,222,339	48.0	13.8	414,858	43.9	12.2	408,399	48.0	13.4	399,082	52.4	14.3
Annual Income of the Previous Year	1,337,427	6,168.7	3,935.7	449,599	5,344.9	3,267.7	443,797	7,044.5	4,517.8	444,031	6,127.6	3,740.2
Monthly Wage of the Household Head	951,466	344.2	346.5	306,584	335.9	299.9	324,977	384.0	381.8	319,905	311.7	346.6
Monthly Consumption Expenditures (Total)	1,337,427	284.8	232.1	449,599	262.5	197.1	443,797	309.1	255.6	444,031	283.0	237.8
Monthly Consumption Exp. (excl. Hous. & Remit.)	1,337,427	266.8	216.7	449,599	248.8	190.9	443,797	288.1	237.4	444,031	263.7	217.6
Food	1,337,427	71.9	33.0	449,599	72.0	31.6	443,797	76.3	35.1	444,031	67.4	31.5
Housing	1,337,427	17.7	77.0	449,599	13.3	40.9	443,797	20.7	88.6	444,031	19.1	91.1
Fuel, Light, and Water	1,337,427	19.6	12.5	449,599	16.8	11.3	443,797	20.3	12.6	444,031	21.7	13.0
Furniture and Household Utensils	1,337,427	10.9	34.3	449,599	11.2	37.2	443,797	12.0	38.5	444,031	9.5	25.8
Clothing and Footwear	1,337,427	16.8	34.0	449,599	19.0	37.4	443,797	18.8	37.2	444,031	12.6	25.6
Medical Care	1,337,427	9.9	26.6	449,599	7.0	19.9	443,797	10.2	26.8	444,031	12.5	31.5
Transportation and Communication	1,337,427	30.6	106.7	449,599	24.2	84.7	443,797	31.5	118.0	444,031	36.2	114.2
Education	1,337,427	12.0	51.2	449,599	10.7	38.6	443,797	13.6	57.9	444,031	11.7	54.9
Culture and Recreation	1,337,427	28.3	51.3	449,599	24.0	47.8	443,797	31.1	55.0	444,031	29.8	50.5
Other Consumption Expenditures	1,337,427	67.1	112.1	449,599	64.2	95.9	443,797	74.6	125.0	444,031	62.6	113.3
Other Consumption Exp. (excl. Remittances)	1,337,427	66.8	111.9	449,599	63.9	95.6	443,797	74.3	124.9	444,031	62.3	113.2
Households With at Least One Child and Without Large Remittances												
Number of Household Members	844,220	3.93	1.01	288,570	3.98	0.91	293,196	3.98	1.07	262,454	3.80	1.03
Age of the Husband	844,220	46.6	12.0	288,570	43.6	10.3	293,196	46.8	11.6	262,454	49.5	13.2
Age of the Wife	785,900	43.2	11.2	279,043	40.5	9.8	271,839	43.4	11.0	235,018	46.1	12.2
Annual Income of the Previous Year	844,220	6,627.5	3,987.2	288,570	5,525.2	3,145.8	293,196	7,631.9	4,556.4	262,454	6,717.4	3,820.1
Monthly Wage of the Household Head	641,036	399.2	352.0	213,778	365.2	304.2	224,227	446.0	386.1	203,031	383.3	353.8
Monthly Consumption Expenditures (Total)	844,220	302.4	231.1	288,570	275.2	193.7	293,196	330.0	254.7	262,454	301.5	237.4
Monthly Consumption Exp. (excl. Hous. & Remit.)	844,220	284.2	218.7	288,570	260.8	188.1	293,196	309.2	240.7	262,454	281.9	221.2
Food	844,220	77.2	33.5	288,570	75.8	30.5	293,196	82.9	36.0	262,454	72.2	32.8
Housing	844,220	17.9	69.2	288,570	14.0	39.4	293,196	20.5	78.1	262,454	19.3	82.8
Fuel, Light, and Water	844,220	20.7	12.9	288,570	17.0	11.0	293,196	21.8	13.3	262,454	23.3	13.6
Furniture and Household Utensils	844,220	11.3	35.3	288,570	11.6	38.0	293,196	12.5	40.0	262,454	9.7	25.2
Clothing and Footwear	844,220	18.4	35.0	288,570	20.2	37.2	293,196	20.6	38.3	262,454	14.0	27.2
Medical Care	844,220	9.6	25.0	288,570	7.0	19.0	293,196	10.2	26.2	262,454	11.7	28.9
Transportation and Communication	844,220	33.3	113.4	288,570	25.6	88.8	293,196	34.3	126.1	262,454	40.6	121.7
Education	844,220	18.0	62.2	288,570	14.1	44.0	293,196	20.4	69.6	262,454	19.6	69.8
Culture and Recreation	844,220	29.6	49.1	288,570	25.2	46.5	293,196	32.7	52.2	262,454	30.9	47.9
Other Consumption Expenditures	844,220	66.5	101.8	288,570	64.6	86.9	293,196	74.0	114.3	262,454	60.2	101.5
Other Consumption Exp. (excl. Remittances)	844,220	66.2	101.6	288,570	64.2	86.6	293,196	73.8	114.2	262,454	59.9	101.4

Note: The unit for the value for incomes and consumption expenditures is 1,000 yen.

Table 2: Cumulated Consumption Expenditure (Based on 2004-2008 FIES Observations)

Age	Son		Daughter		Husband (Father)		Wife (Mother)	
	1st Child	Others	1st Child	Others	Without Children	With at Least One Child	Without Children	With at Least One Child
7.2.1 Consumption Expenditure (Total)								
0-18	18,856 (1,042)	3,315 (222)	19,012 (1,043)	3,605 (224)				
19-23	4,300 (262)	1,174 (160)	4,608 (260)	1,397 (149)				
23-43					36,989 (999)	23,896 (805)	30,606 (928)	23,674 (1,304)
44-64					39,207 (593)	29,676 (484)	42,133 (606)	42,292 (911)
Statistical Significance of the Differences								
	1st Child vs. Other Children		Son vs. Daughter		With vs. Without Children		Husband vs. Wife	
	(Son)	(Daughter)	(1st Child)	(Others)	(Husband)	(Wife)	(Without Ch.)	(With Ch.)
0-18	***	***						
19-23	***	***	*					
23-43					***	***	(***/**)	(/)
44-64					***		(***/)	(***/***)
Number of Observations			471,463					
Adjusted R-squared			0.601					
7.2.2 Consumption Expenditure Excluding Remittances								
0-18	16,878 (995)	4,690 (212)	17,049 (997)	4,936 (214)				
19-23	3,937 (250)	1,880 (153)	3,989 (249)	2,062 (143)				
23-43					37,107 (955)	23,011 (769)	30,274 (886)	24,931 (1246)
44-64					35,948 (567)	27,311 (463)	37,269 (579)	41,602 (871)
Statistical Significance of the Differences								
	1st Child vs. Other Children		Son vs. Daughter		With vs. Without Children		Husband vs. Wife	
	(Son)	(Daughter)	(1st Child)	(Others)	(Husband)	(Wife)	(Without Ch.)	(With Ch.)
0-18	***	***						
19-23	***	***						
23-43					***	***	(***/***)	(/***)
44-64					***	***	(/*)	(***/***)
Number of Observations			471,463					
Adjusted R-squared			0.607					

Note: Parameters are estimated by OLS.

Table 3 (continued): Cumulated Consumption Expenditure by Category (Based on 2004-2008 FIES data)

(Unit: 1,000 yen)

	Daughter				Statistical Significance of the Differences							
	Son	Others	1st child	Others	Husband (Father) Without Children	With at Least One Child	Wife (Mother) Without Children	With at Least One Child	1st Child vs. Other Children (Son) (Daughter)	Son vs. Daughter (1st child) (Others)	With vs. Without a Child (Husband) (Wife)	Husband vs. Wife (Without Ch. (With Ch.))
(6) Transport & Communication	Number of Observations=				Adjusted R-square=							
13-18	1,250	430	1,235	235	5,973	4,763	5,180	4,834			**	(/) (/)
19-23	626	433	531	367	4,992	3,881	4,911	5,407			***	(/) (/)
23-43												(/) (/)
44-64												(/) (/)
(7) Education	Number of Observations=				Adjusted R-square=							
0-18	4,622	2,043	4,586	2,105					***	***	***	(/) (/)
19-23	1,576	907	1,449	668					***	***	***	(/) (/)
(8) Culture & Recreation	Number of Observations=				Adjusted R-square=							
0-18	2,524	417	2,854	611	3,969	2,507	3,834	1,028	***	***	***	(/) (/)
19-23	129	-70	235	110	3,354	3,220	4,231	3,884	***	**	***	(/) (/)
23-43												(/) (/)
44-64												(/) (/)
(9) Other Consumption ex. Remitt.	Number of Observations=				Adjusted R-square=							
23-43				444,102	7,752	6,596	5,350	5,375			**	(/) (/)
44-64					8,306	7,035	10,268	10,598			***	(/) (/)
Total Consumption Expenditures (=(1)+(2)+(3)+(4)+(5)+(6)+(7)+(8)+(9))												
0-18	16,547	5,620	16,593	5,595	31,706	22,020	25,443	19,784				(/) (/)
19-23	3,787	2,182	3,721	2,033	31,087	25,957	34,729	35,718				(/) (/)
23-43												(/) (/)
44-64												(/) (/)

Notes: Estimation is by OLS. The coefficient estimates give the predicted average consumption expenditures by age, sex, etc. Estimates reported in this table are calculated as sums of the estimated parameters over the respective age ranges. ***, **, and * denote that the null hypothesis is rejected at the 1, 5, and 10 percent significance level, respectively. Total consumption expenditure is the sum of the nine categories and therefore does not include housing expenditure and remittances.

Table 4: Families' Consumption Expenditure per Child (From Age 0 to 18): 2004-2008, 1994-1998, and 1984-1988

(Unit: 1,000 yen)

Per Child by Category	2004-2008			1994-1998			1984-1988		
	One Child (Male & Female Average) Value	Two Children (Male & Female Average) Value	Three Children (Male & Female Average) Value	One Child (Male & Female Average) Value	Two Children (Male & Female Average) Value	Three Children (Male & Female Average) Value	One Child (Male & Female Average) Value	Two Children (Male & Female Average) Value	Three Children (Male & Female Average) Value
Food	4,707	3,213	2,715	4,189	3,100	2,738	2,689	2,197	2,033
Fuel, Light, and Water	964	725	645	921	690	613	840	587	503
Furniture, etc.	366	228	182	4	26	33	-110	-50	-30
Clothing, etc.	1,204	665	486	436	278	226	559	282	189
Medical Care	792	530	442	669	499	443	383	292	262
Transp. & Commun.	1,242	787	636	1,352	720	510	605	273	162
Education	4,604	3,339	2,917	3,947	3,115	2,837	2,189	1,902	1,806
Culture & Recreation	2,689	1,602	1,239	2,783	1,692	1,328	2,040	1,247	983
Per Child Total	16,570	11,089	9,262	14,300	10,121	8,727	9,195	6,730	5,908
Family Total Exp. on Children (Relative to Parental Couple Exp.)	16,570 16%	22,178 21%	27,785 27%	14,300 12%	20,241 17%	26,182 22%	9,195 9%	13,459 13%	17,724 18%
(C1)	Couple without Children (Sum of Hus. & Wife) Value (a)	Parental Couple (Sum of Hus. & Wife) Value (b)	(b)/(a)	Couple without Children (Sum of Hus. & Wife) Value (a)	Parental Couple (Sum of Hus. & Wife) Value (b)	(b)/(a)	Couple without Children (Sum of Hus. & Wife) Value (a)	Parental Couple (Sum of Hus. & Wife) Value (b)	(b)/(a)
Cons. by an Adult Couple (Aged 23 to 64)	122,965	103,480	84%	131,126	116,394	89%	107,548	100,685	94%
Annual Income (Aged 23 to 64)	274,384	260,394	95%	285,311	277,274	97%	201,200	206,355	103%
Household Head Wages (Aged 23 to 64)	188,659	207,449	110%	203,265	225,089	111%	159,105	173,216	109%

Notes: Total consumption expenditure in this table is the sum of the eight categories above (from food to culture & recreation) and therefore does not include housing expenditure and remittances.

Figure 1: Number of Individual Observations in the *FIES* by Sex and Age

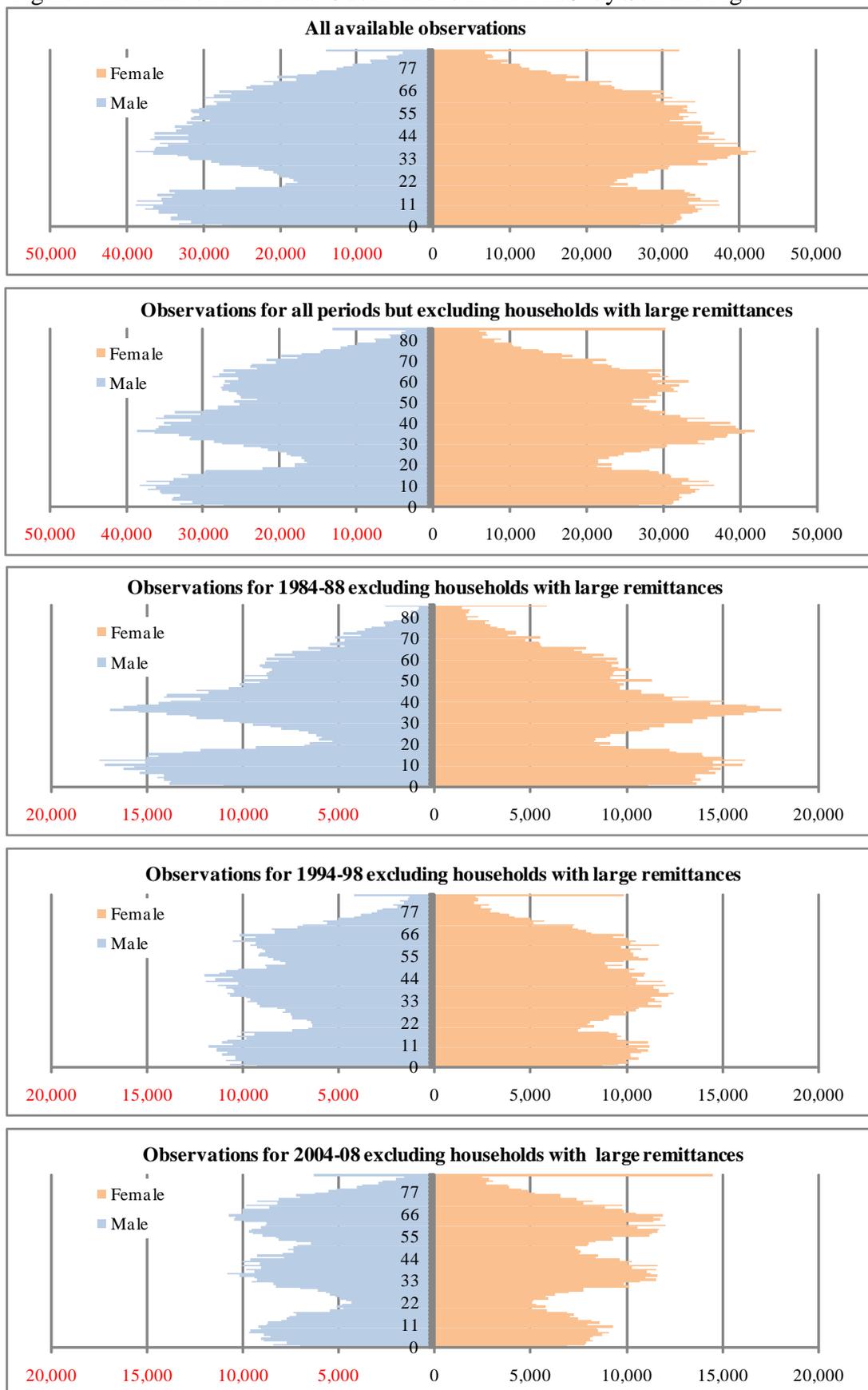
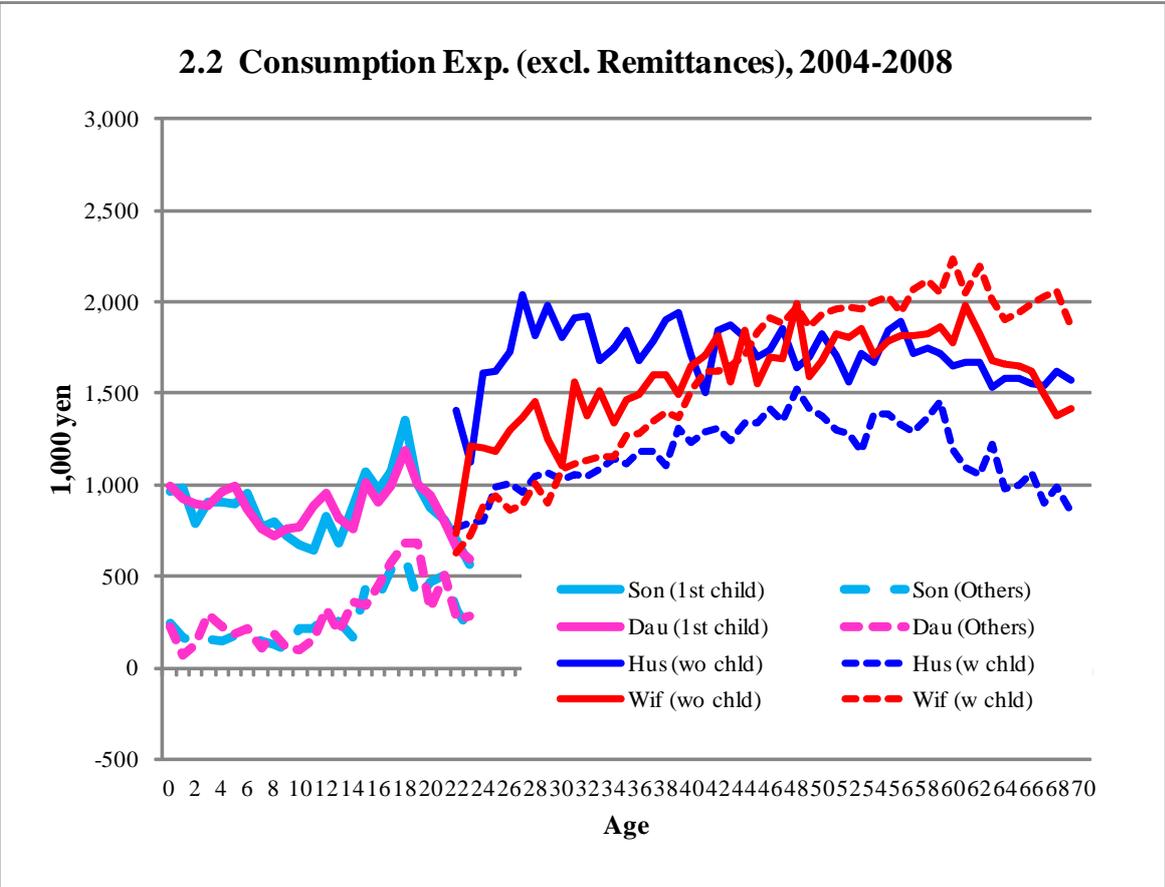
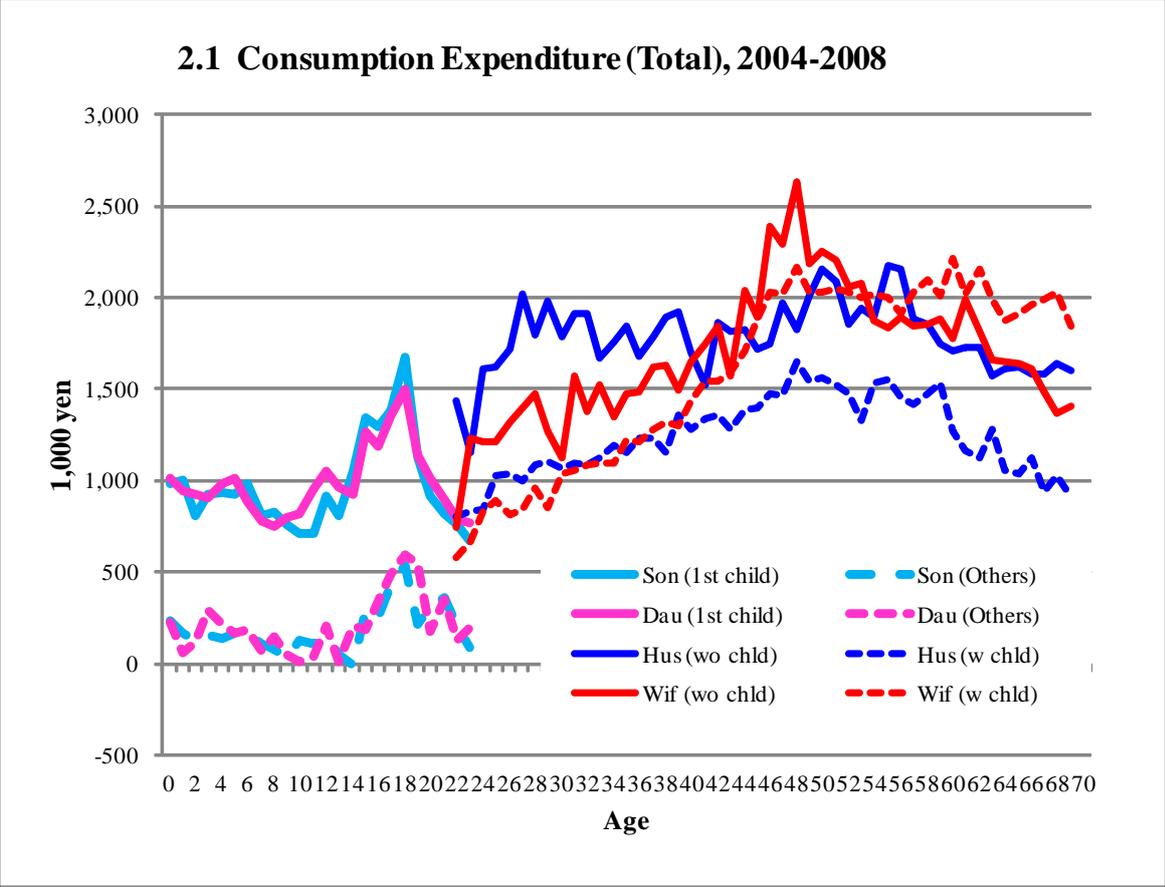


Figure 2: Annual Consumption by Sex, Age, Etc., Calculated from the Estimates



Note: Average consumption expenditures by age are calculated using OLS estimated parameters.

Figure 3: A Few Examples of Problematic Estimates

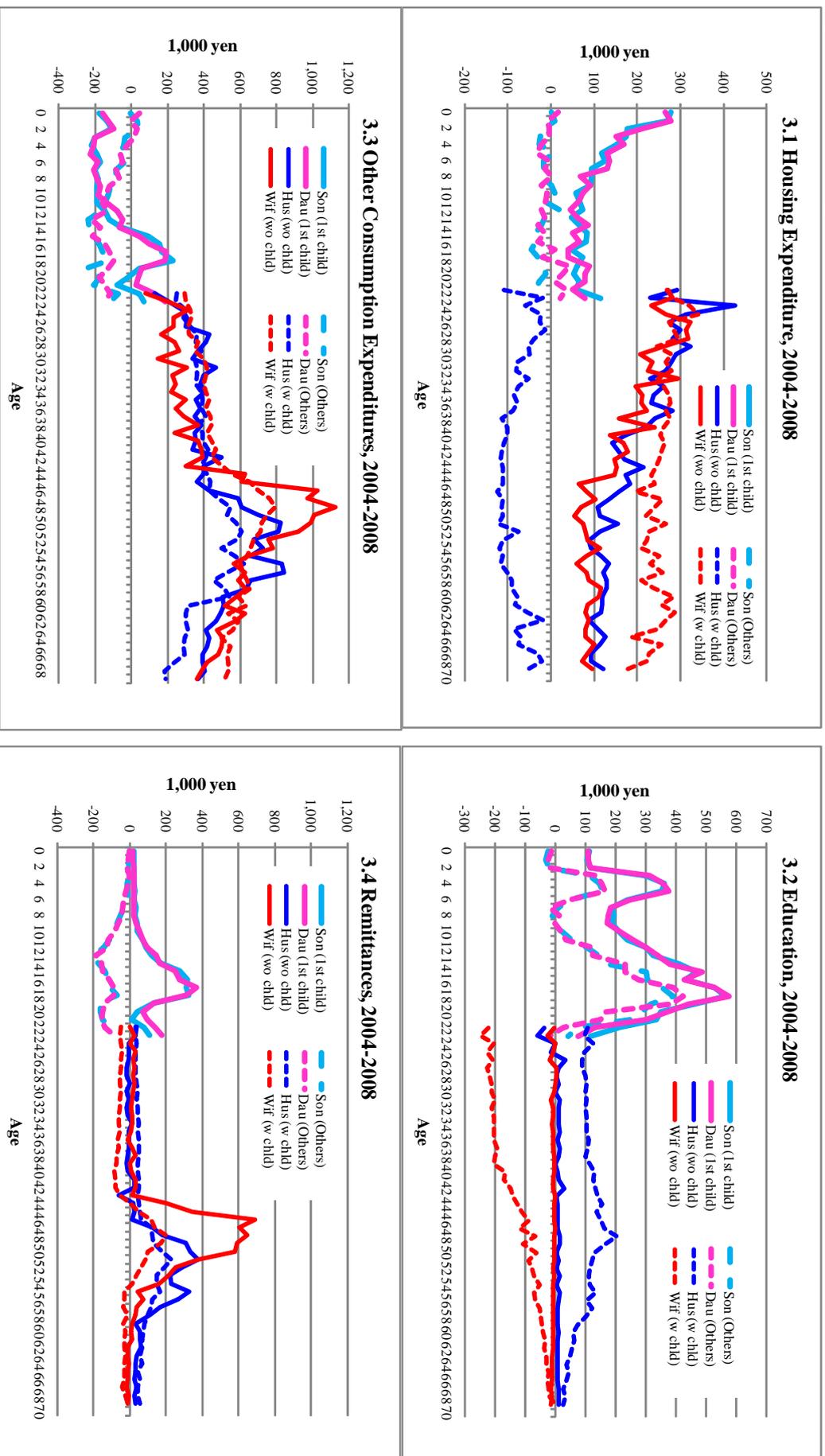


Figure 4: Annual Consumption by Category (2004-2008) Calculated from the OLS Estimates

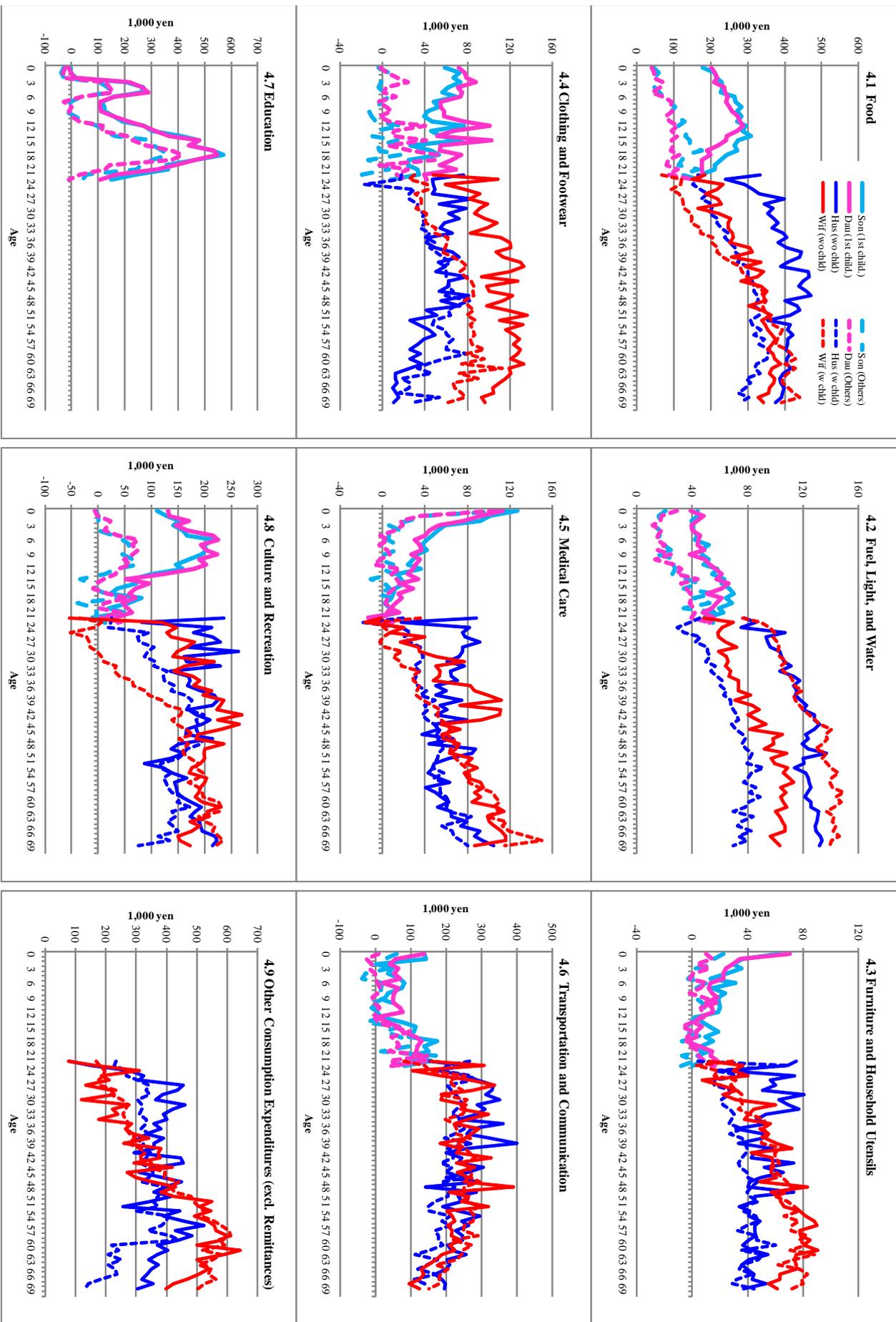
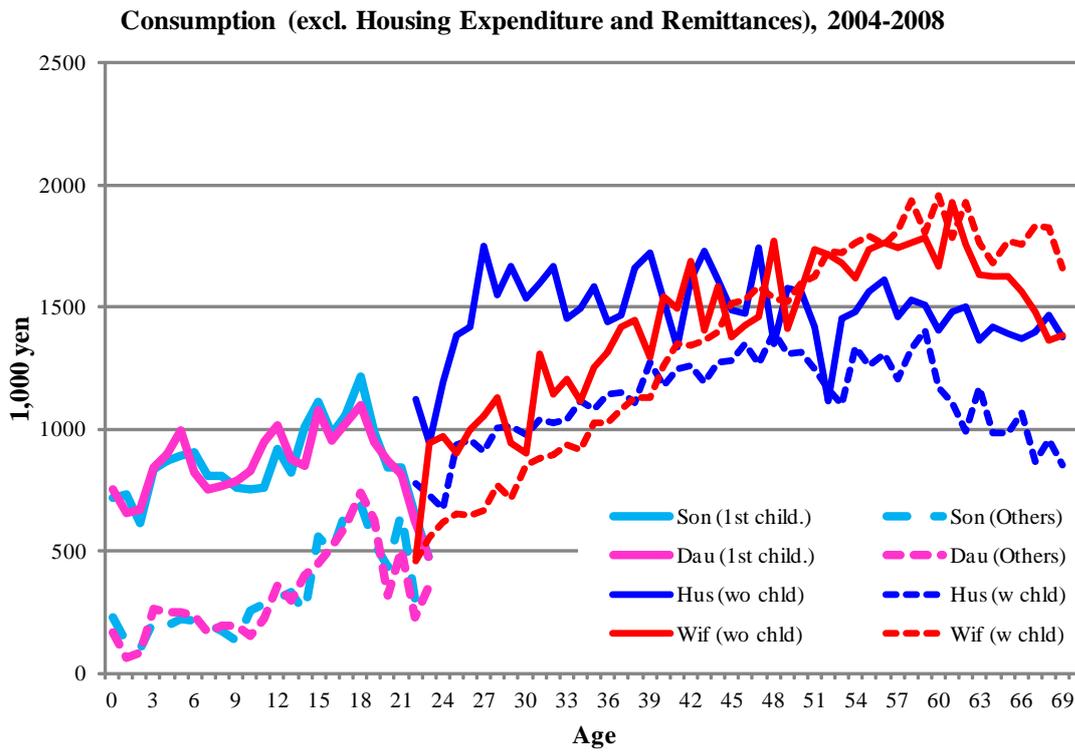


Figure 5: Annual Consumption Calculated as the Sum of Individual Categories



Note: Average consumption (by age, sex, ...) is calculated as the sum of the eight estimated consumption categories.