Filling Gaps in Japanese Historical Demography:
Marriage, Fertility, and Households in Nineteenth-Century Rural Japan

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Introduction

This study estimates fertility levels and nuptiality patterns among peasants in nineteenth-century Japan and assesses the relationships of those levels and patterns to household organization and regional economic development. Despite much recent work in the field of historical demography in Japan, at least two gaps remain. First, we have no clear picture of population development on the eve of industrialization in Japan. Second, we do not understand how regional variation in the demographic patterns may be related to differing types of household organizations.

Previous studies of population development at the macro level suggested that a sustainable trend of population growth was established in the nineteenth century, particularly after 1840 (Hayami 1983). However, because there are no population records at the national level for the quarter century between the last Tokugawa population survey in 1846 and the first Meiji census of 1872, the contention that moderate population growth in farming villages went hand in hand with the economic development in that period has received very little critical scrutiny. While studies based on local population records are suggestive, they cannot provide the needed overview.

Socio-anthropological studies have long been emphasizing the existence of two different household systems in Japan—the extended family system in the northeast and the conjugal family system in the southwest (Takei 1971, Naito 1973). More recent studies in historical demography have further proposed three different patterns of marriage and household system (northeast, central, and southwest) which were prevalent until the end of the nineteenth century (Hayami 2002, Hayami and Kurosu 2001). Early marriage with low fertility in multi-generational households was the pattern in the northeast. In the central region the pattern was late marriage and moderate fertility in simple households. Late marriage, very high fertility, and complex households were characteristic of the southwest. While the proposal put forward in these studies is intriguing, the hypothesis has never been

put to the test. How differing nuptiality practices and fertility levels may be related to type of household organization and to the socioeconomic status of a household as well as to local economic conditions are avenues of inquiry that remain to be examined.

In an attempt to fill these gaps of understanding in Japanese historical demography, this study uses large cross-sectional data sets from two regions: 35 villages of Tama in southern Kanto (west of Tokyo) and 54 villages of Echizen in Hokuriku, facing the Sea of Japan. I make three analyses. First, I examine regional trend of population referencing to Meiji statistics. Second, I compare the types of household organizations in the two regions and examine the characteristics of each type. Third, I estimate nuptiality and fertility by using the singulate mean age at marriage (SMAM) and the own-children method of estimating fertility. In each of the three analyses, I compare socioeconomic differentials within each region.

For contemporary populations that lack reliable statistics, the own-children method of fertility estimation is widely used. Its value and utility when applied to historical populations in Europe and Japan has recently been demonstrated (Breschi and De Santis 1997; Breschi, Kurosu, and Oris 2003). Japanese historical demography can avail itself of cross-sectional data (i.e., single-year population registers and household registers) that have been largely ignored in favor of studying the household cycles and individual life-courses that can be teased out of longitudinal data. When subjected to appropriate methods of analysis, cross-sectional data can provide good estimates. Such data also facilitate study of economic differentials between kinds of households, which cannot be ascertained by studies based on only a few local villages. Putting together the results obtained from a large cross-sectional data set by applying the own-children method of fertility estimation with those derived from longitudinal and village-based data sets by other methods opens the possibility of linking household organization and population dynamics on the eve of Japanese industrialization.

Fertility, nuptiality, and household in pre-industrial Japan

Both demographic behaviors and household organizations are known to have varied widely from region to region in pre-industrial Japan. Scholars seeking to understand the variations have been applying models and explanations that evolved from studies of European populations, particularly Hajnal's marriage pattern and family formation rules

(1965, 1982). Some studies argue that the marriage pattern in pre-industrial Japan is but a variation of the "western European marriage pattern" because age at first marriage in Tokugawa Japan was relatively high and fluctuated in relation to short-term economic stress (Hanley and Yamamura 1977: 248; Wolf and Hanley 1985). Other studies maintain that the Japanese pre-industrial marriage pattern was unique and adhered to neither the western European marriage pattern nor the eastern European one (Cornell 1987, Saito 1992). They maintain that the celibacy rate in Japan was much lower than the levels in pre-industrial Europe though age at marriage in Japan was relatively high compared to other Asian countries such as China and India.

The nuptiality and fertility of Tokugawa peasants have been studied mainly using longitudinal data for the period from the 1650s until the early 1870s taken from the local population registers, the Shumon Aratame Cho (SAC).[1] These studies suggest that marriage among Tokugawa peasants was early (female age at marriage ranged between 16 and 25) and universal, unlike the western European pattern of a relatively late age at marriage and a high celibacy rate (Hajnal 1953, 1965). However, these studies have found significant regional variations in the nuptiality patterns of Japanese peasants. Studies based on SAC and Meiji statistics suggest that females in western Japan were older at their first marriage than those in northeastern Japan, implying that the marriage pattern in northeastern Tokugawa Japan may have adhered more closely to the eastern European marriage pattern, as argued by Hajnal (Kurosu, Tsuya, and Hamano 1999). However, the frequency of divorce and remarriage among Tokugawa peasants must be taken into account in any analysis of the system (Kurosu 2004).

The levels and patterns of fertility, like those of nuptiality, are also diverse. While studies are still inconclusive, some points of agreement among scholars have emerged. First, the fertility level among Tokugawa peasants was quite low. The total marital fertility rate (TMFR) averaged for 17 regions is 4.63 per woman and is only 43% of the level of Hutterites (Hayami and Kito 1991: 284-285). Natural fertility levels were generally low in Tokugawa Japan (Saito 1992, Tomobe 1991).[2] The low fertility level is attributed most

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[1] See the list of nuptiality and fertility studies in pre-industrial Japan in Hayami and Kito 1991, Table 6-2; Kito 1991, Table 1; and Kurosu 2002; see Cornell and Hayami 1986 for SAC data.

[2] Tomobe estimates that the natural fertility level in Japanese villages was 20% lower than that in England and the English rate was lower than those of other European populations (1991).

often to extensive use of infanticide and induced abortion (e.g., Hanley 1977, Smith 1977, Saito 1992).[3] The second point of agreement about Tokugawa fertility is that the regional variation was quite large. In the period from about 1675 to 1871 the total marital fertility rate (TMFR) (ages 20-49) by region varied from 2.04 to 6.54 (Hayami and Kito 1991: Table 6-4).[4] The range of variation can be attributed to regional differences in health, labor intensity, lactation, and sexual behavioral customs as well as differences in infant mortality and the reliability of the registration data (Hayami and Kito 1991: 285).

The ideal and prevalent family form in agricultural villages in pre-industrial Japan was the patrilineal stem family, in which a son (most commonly, an eldest son) continued to live with his parents after marriage, bringing his bride into his parents' household (Aruga 1982, Otake 1982, Saito 1998). In actual practice, household organization, that is, household structure and composition as well as succession pattern and its timing, varied greatly by region. Nakane (1967) identified areas characterized by eldest-son succession, areas characterized by youngest-son succession, and areas where succession was independent of birth order. Anthropological studies have classified stem family orientations in pre-industrial Japan as the northeastern type (*tohoku-gata*) and conjugal orientations as the southwestern type (s*einan-gata*) (Takei 1971, Naito 1973). In analyzing how household organization may affect demographic behavior, it is important to understand that Japanese families, regardless of the number of types, differ from similarly named European family types (Saito 2002, Cornell 1987).

The type of household had a profound effect on reproduction. [5] For instance, in the Japanese stem family system, the timing of marriage of the inheriting children as well as the timing of departure from the household of non-inheriting children via marriage or adoption was tightly controlled (Cornell 1987, Kurosu 1996, Smith 1977). Having a

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[3] A recent study found a strong family size limitation via infanticide that was both sex-specific and birth-order-specific in two northeastern villages of Japan, 1716-1870 (Tsuya and Kurosu 1999).

[4] In a recent study, a fishing village in the southwesternmost island of Kyushu in the period 1802-21 had one of the highest fertility levels in all of Japan (a TMFR of 7.2), although it was still lower than those in European communities of the same time (Tsuya 2001).

[5] Wang Feng, Satomi Kurosu, and Michel Oris treat this issue as a central theme of a chapter in a manuscript prepared for the forthcoming volume on fertility studies of the Eurasia Project (*Prudence and Pressure*, edited by George Alter, Noriko O. Tsuya, and Wang Feng).

surviving child was of great importance for family perpetuation, but the number of children was also restricted. As Goody noted, "there is a knife edge between having too few heirs for comfort and producing too many claimants for restricted resources (1973: 7)." The optimum size of offspring or household composition differed by the level and type of regional economic development (Hayami 2002). It should be noted that the stem family organization did not uncritically welcome high fertility. Rather, each member of the family occupied a position whose restrictions and privileges in matters of reproduction and access to resources were clearly understood by all members.

Data and the setting

This study is part of a larger project investigating regional variation in marriage, fertility, and household in eight regions of Japan in the nineteenth century. I focus on two regions, using a cross-sectional data set from each region. The first set is drawn from the household register compiled in Tama, Musashi Province in December 1870 (the Commoners' Household Register of Hinojuku Village Groups). The register enumerates 10,211 entries on individuals residing in 1870 in 35 villages located west of central Tokyo, in territory that has since been engulfed by Hino and Tama cities. In 1870 it was mainly agricultural land---rice paddies and dry land given over to sericulture in an area where the silk industry was developing. The second data set is drawn from the Shumon-ninbetsu Aratame Cho (SAC: religious investigation) of Echizen Province (current Fukui prefecture). It includes 54 village years (complete annual records of 54 single years in various villages). The years occurred between 1857 and 1871 (1857-58, 1861-5, 1867-1871). I use all 54 village years in the general analysis but limit my use of the own-children method to those years in which the sample size is large enough to bear the estimation (1857, 1862-63, 1865, 1869). These villages too were agricultural. Echizen was a stronghold of *Jodo-shinshu*, a popular Buddhist sect whose devotees were perceived as being more fervent than members of other sects. There are 10,118 individual entries in this second data set. Although the registers from which these two data sets are derived were compiled for different purposes, both registers annotate information crucial for this study: relationship to household head, age, sex, and the latest life-course events (such as marriage, adoption, service). They also provide indicators of economic and social standing of household---landholdings, status in village (e.g., village officials), or distinction between landholders and landless. The general

demographic characteristics are listed in Appendix I.

Sericulture and spinning developed in Tama and the surrounding area in the eighteenth century and the area gradually became connected with the larger markets (Yasuzawa 1972: 194-208). Economic status, however, is measured by the size of landholdings.[6] In Tama, where life centered on agricultural activities, landholding was the basis for political and economic control by the governors (Yasuzawa 1972: 18). The pattern of landholding also reveals the economic distribution shaping the lives of peasants in the village organization. Integrated aspects of village lives surrounding agriculture are reported even at the end of the Tokugawa period when commercial products and a commercial economy were developing (Yasuzawa 1972: 210).

The landholdings are expressed in measures of rice (*koku*) or in rice equivalents where other crops are grown. They represent the yield of rice paddies, dry land, and mountainous lands the household owns within and outside the village. One *koku* equals approximately five bushels or a measure of volume equivalent to 180 liters. The three statuses—low, middle, and high—are classified "below 2 *koku*," "2-10 *koku*," and "10 *koku* or more." In general, households with small or no landholdings are considered tenantry. Independent farmers (owner-tenant and owner-farmers) with substantial landholdings form the central composition of the villages. Those who own large shares are the landlord group and take turns serving as village officers.

The villages of Echizen in the nineteenth century were farming villages for the most part. Not all villages in Echizen recorded the size of household landholdings. However, most did distinguish the landed from the landless. The SAC listed households as landed (*honbyakusho*) or landless (*mizunomi* or *mutaka*). While the ideal would be greater detail, this simple distinction has proved useful in studies of migration (Fruin 1980) and households (Tsubouchi 1992) in the same region. The following analyses contrast the three socioeconomic categories in Tama with the two in Echizen.[7]

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[6] According to Hamano (2000) who examined different measures of household economic status, landholding is the most appropriate and most widely used indicator of household economic status in pre-industrial Japanese agrarian villages.

[7] The landless group includes those who appear in SAC as those engaging in business other than agriculture. I have tested with and without this group. Since the results were very similar to those of landless peasants, I have included them in the "landless" population.

For both data sets, marital status has been extrapolated. In both the SAC and the household register, an individual's entry into a household is noted as "married into *(enduke)* x years ago."[8] The precise timing of an entry is not discernible from a single-year register, but one can calculate the timing of marriage that occurred before the year of registration. This information can be biased by mortality (i.e., we are dealing only with survivors of the year of registration), and it is hard to confirm the accuracy or completeness of such annotations but they do provide a rough idea about observed age at marriage and can be supplemented to SMAM estimates.

Own-children method of fertility estimation

The own-children method of fertility estimation was first developed and applied to census-type data, and its refinement and extension have been applied to places where birth data are either nonexistent or unreliable (e.g., Grabill and Cho 1965, Haines 1978, Cho, Retherford, and Choe 1986, Boozer and Guinnane 1991, Breschi and De Santis 1997). In most applications, age misreporting is known to be by far the most serious source of bias in own-children estimates of fertility (Cho et al. 1986: 48). Estimates may show peaks and troughs in certain calendar years because of "heaping" of children's ages in the census. Populations using zodiacal calendars are generally known for accurate age reporting (United Nations 1983: 183), except in years particularly auspicious or inauspicious (Goodkind 1993, Kurosu 1994). The data sets of the present study appear to have recorded age trends systematically, hence the problem of age heaping around certain figures, particularly 0 and 5, is absent (Cornell and Hayami 1986: 320).

For Echizen, in only five calendar years out of twelve is the sample size big enough for analysis: 1857, 1862, 1863, 1865, and 1869. Of those five, 1865 is excluded from the analysis of socioeconomic differentials due to too many unknowns. The sample size for 1857 is not as large as those for the other years. However, since 1857 is the oldest SAC available in the data set, I decided to include it, with caveats. For both SAC and the Household Register, the recorded relationship of the individual to the household head is

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[8] The customs having to do with marriage and its registration in pre-industrial Japan were largely contextual, shaped by local custom and socioeconomic developments (Kurosu, Tsuya, and Hamano 1999).

used to match mother and child. Annotated information about year of marriage and age are used to verify the match. Most unmatched cases are due to the fact that in the year of population or household registration the biological mothers could not be determined as they were no longer at the household, either because of death or divorce. The percentage of such "non-own" children is 6.3% for Tama in 1870 and ranges from 6.5% to 11.9% for the five Echizen years (Appendix II).

Infant mortality

Assumptions as to the probability of dying at age 0 and the life expectancy at birth must be made. The estimation of infant mortality is one of the major challenges Japanese historical demographers face. The observed rates vary from 125 to 288 per 1,000, and the life expectancy at birth ranges from 24 to 55 years.[9] The consensus among some researchers is around 200 per 1,000 births (Kito 1983, Narimatsu 1992, Hayami 1992, Tomobe 1991). Others have estimated specific infant mortality rates from the temple death registers (Kako-cho) and the SAC of some villages (Jannetta and Preston 1991, Saito 1995), but their estimates do not agree. Jannetta and Preston estimated the level of infant mortality in the period 1776-1875 at about 277 per 1,000 in a village in central Japan. Saito doubts the validity of their results for two reasons: They make a strong assumption of zero migration, and temple death registers do not provide clear data about which is the population at risk (1993: 16). Saito's estimate based on 1751-1869 SAC data for three villages (Nishijo, Kano, and Koizumi) in central Japan is low by pre-industrial standards—176 per 1,000.

The regional model life tables of Coale and Demeny (1983) are what most investigators have used to estimate mortality (e.g., Tsubouchi and Tsubouchi 1984-85, Hanley and Yamamura 1977, Smith 1977). Characteristics of late Tokugawa mortality are: (1) relative to other ages (middle to old age in particular), the mortality of infants and children under age 10 is high; (2) between the ages of 10 and 30 years, the mortality curve is relatively flat compared to the standard model; and (3) the mortality of women for the period from their 20s through their mid-40s is appreciably higher than that of men (Saito 1995: 9; Kito 1993: 5). Due to the first characteristic, the observed curve during infancy and childhood is a better fit with a lower level of the life tables, that of older ages with a higher level: Smith

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[9] A summary of the previous studies is found in Saito 1993: Table 1.

compares the mortality pattern of a village in central Japan with levels 7 (life expectancy 32.48) and 11 (life expectancy 47.11) of the West model (1977: 49).

There is tentative agreement that while infant and child mortality resembles that of the West model, overall it is the North model that best fits the mortality pattern of Tokugawa Japan (Saito 1995, Tsubouchi and Tsubouchi 1984-85, Hanley and Yamamura 1977, Smith 1977). However, it should be noted that the factors that brought about the curve (pathological and social factors: e.g., episodes of high mortality caused by economic crises and epidemics) might be different from those on which the model is originally based (Saito 1995: 21). Thanks to the strength of the own-children method, I will also apply the levels suggested in Saito's study (1993, 1995) and examine how the different levels of mortality (levels 9-11 of the North model, levels 7-12 of the West model) affect the variation of the fertility level.

Marital fertility

The measurement of marital fertility is preferred over TFR for regional comparison because almost all fertility measures available for Tokugawa villages appear to be on marital fertility. The original own-children analysis yields birth rates for all women regardless of marital status. However, Cho, Retherford, and Choe (1986: 18) proposed a method to obtain marital birth rates for currently married women from two or more censuses spanning the estimation period.[10] This procedure assumes that all births occur within marriage. For both Echizen and Tama, and most of Japanese population in the nineteenth century, this assumption holds true as almost all births were legitimate births (born after marriage), except in a few fishing villages. Ideally, all the TMFR should be calculated applying the age-specific proportions currently married available from censuses (i.e., SAC or Household Register). In reality, however, this is possible for only a few

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[10] The procedure for interpolation or extrapolation they suggest is as follows (Cho, Retherford, and Choe 1986: 18): Let Pa(t) denote the age-specific proportion of currently married at ages a to a+5 at time t. Let t1 denote the date of the first census and t2 denote the date of the second census.

Then for any other time, t, Pa(t)= Pa(t1) + [(t-t1)/(t2-t1)][Pa(t2)-Pa(t1)]

I would like to thank Robert D. Retherford for pointing out the problem of dealing with marital fertility (Population Studies 58(3): 365-372, 2004).

observed years. For now, when such data are not available, I had to impose an assumption that the proportion married did not change over the span of the estimation period and use the proportion of married women for the year of data.

For Echizen 1869, I could apply the method proposed by Cho et al. When I compared an estimate using a varying proportion of married women with an estimate using a constant proportion, the difference between the two was about 0.5%. The difference is not large but TFMR in this study has to be treated carefully.

Population and regional variation on the eve of industrialization

An overview of the population history of Tokugawa Japan (1600-1870) helps put our two regions in their demographic context. There were three phases: substantial growth at the beginning, a plateau in the middle, and moderate to substantial growth at the end. There is general agreement that the population grew substantially in the seventeenth century. Hayami and Kito discuss the diverse factors, such as urbanization and the expansion of cultivated land, which drastically altered the structure of agricultural households and resulted in rapidly growing population figures (2005).[11] In the eighteenth century came a plateau often referred to as "population stagnation." However, that term is misleading. There were significant and contrasting regional population changes (Hayami 1986: 291). In the eastern and northeastern areas (Kanto and Tohoku), population decline was the rule; in the southwestern areas (Kyushu, Shikoku, and Chugoku), increases predominated; and in central Japan, there was a slight decrease (Kinki).[12]

At the start of the nineteenth century the population began to increase again and gained momentum after the 1850s. Hayami has discussed (1986: 316-317) how a moderate population increase accompanied by economic development spread throughout Japan.

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[11] Much of the resulting population growth was absorbed by the new cities and the increased land opened up for cultivation. They maintain, therefore, that throughout the seventeenth century, population control was unnecessary and growth continued to the very brink of what resources could support (Hayami and Kito 2005).

[12] Owing to the high death rate in cities, which teemed with workers who had migrated from the depressed countryside, the Kanto and Kinki regions (which included Edo, Kyoto, and Osaka) were subject to the negative-feedback function and thus their populations stagnated (Hayami 1986: 292-293).

Irreversible domestic commercial advances plus the appearance of export-oriented industries after the opening of the treaty ports spurred this process on. Population increases after 1850 are thought to have stemmed mainly from a rising birth rate. After 1872, this trend became the sustained population growth that has continued to the present.

<Map 1> <Figure 1>

Figure 1 is based on the domainal populations reported by local lords to the government every six years, beginning in 1721. Tama belongs to the area called Kanto, and Echizen to Hokuriku. Although some of the reported provincial numbers appear unlikely, the extant surveys mirror national and regional patterns of the period (Hanley and Yamamura 1977, Hayami 1986). The extant population survey of the Tokugawa period for the years 1716-1846 shows marked regional differences. In northeastern and eastern Japan, population was declining, while in southwestern Japan, it continued to grow at an annual rate of 0.2-0.3 percent. The two areas studied here fit into that picture.

Although the rate of increase was not as high as that in southwest Japan, the population of Hokuriku was certainly on the rise, with an annual rate of 0.14 percent. The population of South Kanto declined, with an annual rate of .04 percent, not as low as the rate in northeastern Japan. The last national population survey in Tokugawa Japan took place in 1846. From then until 1872, when the Meiji government conducted its first national census, the record is blank (Hayami and Kito 2005: 225). The 1872 figures suggest marked population increases during the blank quarter century in all regions of Japan. If we designate the population of the Kanto area in 1721 by the figure 100, the 1846 figure had declined to 86.63. By 1872 it had risen to 100.98 (Sekiyama 1958: 136-141). Hokuriku, which had been showing an increase all along, grew from 117.57 in 1846 to 153.06 in 1872. Hayami warns that because of underreporting in 1846, the actual degree of increase was probably less than the index figure suggests (Hayami 1993: 160-161). Nevertheless, historical demographers agree that the overall population increased during this period.

Of particular importance for this study are the statistics of December 31, 1886. In that year, and only in that year, the statistics broke down the population by age in each prefecture. From them we gain a picture of the age composition of the populations of the two areas. Figures A and B in Appendix III show the population structure of Kanagawa prefecture (to which the 35 villages of Tama belonged) and Fukui prefecture (to which the

54 Echizen villages belonged). In both figures three age groups show similar distortions. Age 50, the cohort of 1837, shows the effects of the Tempo famines, which hit all over Japan. Around age 25 the cholera epidemics of 1858-1862 made their mark. Around age 16, the unrest and uncertainties of the upheaval when the Meiji government ended the Tokugawa regime are written in the population record.

Analyses

(1) Household organization

Household organization refers to coresidential arrangement among household members. Coresidential arrangements can be influenced by cultural norms as reflected in family systems; they are also affected by other factors, such as economic and demographic constraints.[13] I use five different types of measures to demonstrate the characteristics of household organization in each region: mean household size, proportion of age groups, mean age of household head, proportion of female heads of household, and household composition. The first four measures are commonly used in comparing any population. The last one, household composition, is taken from Wall (1983) and Saito (2002). It compares number of coresident kin per 100 households. Since the focus is only on the kin members other than the head and the head's conjugal unit (wife and children), it is unaffected by the marital status of the head or the size of the head's conjugal unit and is therefore considered to give a better idea of household organization. The coresident kin categories are parent, sibling, sibling's spouse, child's spouse, sibling's child, grandchild, and other kin.

Saito used household composition to examine Japanese stem family households in various parts of Japan, contrasting them with each other and with those in Europe (2002). Saito compared the sizes of the coresident kin groups in Japanese households (taken from a national census in 1920) with those from Iceland, Norway, and Austria (in the eighteenth and nineteenth centuries) based on Wall's calculation (1983) and illustrated a striking difference between those countries and Japan. While both groups were known to have a stem family orientation, and this showed clearly in the small size of the presence of sibling's family, the average size of the coresident kin group was much larger in Japan than in the three European countries, by about 2.5 times (81 and 31 per 100 household,

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[13] Wang Feng, S. Kurosu, and M. Oris, manuscript (see note 5).

respectively). The main difference lay in the numbers for parent, child's spouse, and grandchild. This clearly suggested that the stem family organization in north and central Europe adheres to the formation of household upon marriage as is the case in simple family organization, while Japanese stem families extended vertically both upward and downward even upon or after marriage (Saito 2002: 24).

Household size of the villages in the two regions averaged around 5. Tama's average was slightly higher than Echizen's (Table 1). Both areas showed clear differences linked to socioeconomic status. Both the landed of Echizen and Tama households with larger landholdings had larger households than their less prosperous neighbors. The proportion of those aged 55 and above is larger in Tama than in Echizen. Mean age of household head in Tama is 1.3 years younger than in Echizen. This suggests a practice of early retirement, or change of headship, in Tama. The differences in the proportion of female heads of household are intriguing. Only 2% of the households in Tama were headed by females. The figure for Echizen as a whole was 9%, and for the landless Echizen households, it was 15%. While the household characteristics in the two regions are not strikingly different, Tama appears to be closer to the northeastern type of household, while Echizen is more like the western type. Retirement was early in the northeast and headship was usually restricted to males, with female heads of household occurring only rarely, as the result of accidents or as interim heads (Okada and Kurosu 1998). In the west household size tended to be smaller than in the northeast and female heads of household were not as scarce as they were in the northeast. The larger proportion of female heads is also thought to be associated with higher status of females (Hayami 2002).

<Table 1>

Household composition further reveals the characteristics of household dynamics in nineteenth-century Japan as well as the differential tendency of the two regions. The lower panel of Table 1 shows that the size of the coresident kin group was much larger in the late nineteenth century. The figures support Saito's contention about the stem family organization extending upward and downward, for there are large numbers of parents and grandchildren but very few instances of sibling's family. The size of the sibling was much larger than it was in 1920. This probably is due to the differences in fertility levels and in the timing of headship succession (i.e., one of the children becomes the household head

while that child's siblings are still too young to leave home).

While at first glance Echizen and Tama look very similar, particularly in comparison with the Japan of 1920 and nineteenth-century Europe, a closer look suggests some interesting contrasts. First, the size of the coresident kin group is much larger in Tama than in Echizen (127.3 and 96.5 per 100 households, respectively). The difference seems to be attributed to the sizes of the parent and the grandchild categories. This suggests that Tama households were more extended and complex than those of Echizen. The difference in the mean size of household discussed earlier thus can be mainly explained by this distribution.

The contrasts between the different socioeconomic groups are striking, as is the strong positive relationship between socioeconomic status and the size of coresident kin. The difference is large in the size of parent, child's spouse, and grandchild. The size of coresident kin is impressively large among the large landholders in Tama (193.9 per 100 households). Still, it is important to emphasize that regardless of the size of coresident kin, none of the subgroups suggested the presence of kin in a horizontal direction. The vertical extension of the household, i.e., stem family organization, appears to have been well at work in both regions, particularly so among those of higher social status.

(2) Nuptiality

Marriage in pre-industrial Japan is known to have been early and universal, but with large inter-village, temporal, and socioeconomic differentials (e.g., Smith 1977; Hanley and Yamamura 1977: 240-250; Mosk 1980; Hayami 1992; Kurosu, Tsuya, and Hamano 1999). Age at first marriage falls in the range of ages 14 to 25 for women and 17 to 28 for men. The timing of first marriage tended to be later in southwestern Japan than in eastern and northeastern Japan, having the regional threshold coinciding with a geological *fossa magna* (demarcated by Shizuoka-Gifu-Toyama prefectures) (Hayami 1987). According to this demarcation (based on Meiji 1886 statistics), Tama belongs to the eastern and Echizen to the northeastern pattern.

Nuptiality is measured by (a) celibacy at the beginning and the end of the reproductive span, (b) the singulate mean age at marriage (SMAM), and (c) observed mean age at marriage as a supplement. Table 2 compares celibacy rates, SMAM, and observed mean age at marriage for the two regions as well as between socioeconomic statuses within each

region. As the methods used here deal with *de facto* populations, economic status is best understood as that of the household a woman married into (or married, in the case of uxorilocal marriage).[14]

<Table 2>

The results in Table 2 confirm observations in previous studies. The proportion remaining unmarried at the beginning of the reproductive span is 87-88% and does not differ much between the two regions. Also, by the time they reach the end of the reproductive span, women in both Echizen and Tama were married.   As for the difference between SMAM in Echizen and SMAM in Tama, it is 1.6 years, with Echizen women marrying later than those of Tama.

Studies based on SAC data suggest that the age at marriage was significantly higher among those of lower economic status (e.g., Hayami 1992, Smith 1977, Narimatsu 1992). That holds true for women in both Echizen and Tama. The age at first marriage estimated for the two subgroups in Echizen are 23.88 for landless and 22.77 for landed; for the three subgroups in Tama, it is 22.04 for low status, 21.75 for middle status, and 21.14 for high status. There is a difference of about 0.9-1.1 year between the average of the low-status group and that of the high-status group. The principle of universal marriage was common to all three economic groups, but the delay of marriage is clear in the celibacy rate at age 15-19 among the landless and the small holders group (Table 2).

Domestic service is often a major reason for the delay of the timing of marriage. Daughters with experience of employment before marriage were more numerous in poor than in well-to-do families (Hayami 1992: 263).   It is true in Echizen and Tama that the majority of migration among females occurs around the mean age of first marriage. In Echizen, Fruin found that women, no matter what their relationship to the household head, left landless families more often (1980: 267-268). However, the overall proportion of females who are servants at the peak age of marriage is not large--1.2% in Echizen and

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[14] Whether or not women's economic status in the household of origin and of procreation has independent effects on fertility is an interesting question but it is not estimated here. The number of observations of women whose original economic status is known is limited and is unfortunately too small to apply the own-children method.

3.1% in Tama. It appears therefore hard to consider service as a sole determinant of marriage timing in these regions. Another important factor to be considered is a daughter's value at home. Her role in doing everyday household work was crucial. The smaller the family, the later the girl tended to marry, regardless of economic status, because the smaller the family, the more critical the daughter's contribution was likely to be (Smith 1977: 95). The economic status and the size of the family, as seen in Table 1, correlate with each other, and it seems hard to disassociate these two factors.

(3) Fertility estimation

General level and trend of fertility

In a series of studies using cross-sectional data from past populations, Breschi, Kurosu, and Oris illustrated the strength and utility of applying the own-children method of fertility estimation, a method rarely used in historical demography (2003). Taking a similar approach to the estimation I have applied earlier to the Tama Household Register (Kurosu 2003), I estimate the total fertility rates for all women and for married women in Echizen, using an infant mortality of 180 per 1,000 and a life expectancy of 40 years (West model), and contrast the results with those for Tama (Figure 2).[15]

<Figure 2>

To smooth the results, I have taken a three-year moving average. When the same assumption for mortality is applied, both TFR and TMFR of Tama are below those of Echizen. The difference is larger in the TMFR estimates. The estimates are done using different types of data as well as data from different years and regions, and for that reason, the temporal comparison is limited to 1859-68, but the general pattern nevertheless

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[15] For the own-children estimation, I used the program APPLAUSI developed by Breschi and De Santis (1997). I estimated TFR for all women and for all women except servants. However, since the number of servants was not very large in either Echizen or Tama, the two figures are very similar. Therefore, only the estimates for all women are shown here.

suggests an interesting similarity.[16]   That is, during the years 1859-63, TFR and TMFR in both regions stay the lowest during the period under consideration.   The low fertility level before 1864 can be attributed to high mortality. Local documents describe a cholera epidemic in the summer of 1858 and outbreaks of measles and death-dealing diarrheas in the summer of 1861 (Hachioji 1980: 149). Large areas in Japan, particularly around the major cities--Tokyo, Osaka, and Kyoto--were affected by cholera epidemics in 1858 and 1862 (Ojika 1982: 31-46). Local documents in the Echizen area also describe cholera epidemics in 1858 (Ishibashi 1978--Fukui Saii Nenpyo: 70).

Fertility in both areas rebounded after these mortality crises.   After that rebound in 1864, the direction of fertility is rather hard to interpret, although Tama shows downward and Echizen upward trends. It is easy to imagine that the upheaval attendant on the opening of the nation and the change of political paradigm affected Tama peasants more than Echizen peasants, because Tama was closer to the center of the scene.   The pattern of fertility, although for a short period, corresponds well to the claw marks we have seen in the age distribution of 1886 (Appendix III)--i.e., unusually small cohorts were born in these years of mortality crisis.

Table 3 uses different assumptions of infant mortality to show how mortality assumptions affect the estimated fertility level. The focus here is on TMFR.   I use several life table models suggested by previous studies of Tama. The highest estimate comes from an assumption of infant mortality of about 210 and life expectancy of 35 years (West model), the lowest estimate from an assumption that infant mortality is about 130 and life expectancy reaches 47 years (West model). The estimates with the assumptions of the West model (q_0=180) and the North models (q_0=150, 140, and 130), those suggested by the studies on infant mortality in pre-industrial Japan, fall in between these two figures (Kurosu 2003: 60). Therefore, Table 3 includes estimates with only three mortality assumptions.

<Tables 3A and 3B>

To ascertain the general trend of fertility, Table 3A shows TFR and TMFR for four periods: 1845-51, 1852-58, 1859-63, and 1864-68 for Echizen. The first period roughly corresponds to the initial period of fertility fluctuation, the second to the time of stable to

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[16] The average TFR and TMFR for the seven years are 5.1 and 6.2 for Echizen and 4.8 and 5.2 for Tama.

moderate increase, the third to the time of the cholera epidemics, and the last to the period of recovery from the epidemics and the political transformation of Japan, from Tokugawa to Meiji. For comparison, Table 3B is adopted from my previous study, suggesting the general trend described above. Beside the fourth period when the area seems to have been affected by cholera epidemics, the general fertility is clearly trending upward. With the observed high mortality of the villages in the same region (Tsubouchi 1992: 49) as well as the tentative calculation of CDR and CBR based on the SAC records (Appendix I), the fertility scenario of Echizen is more likely to fall between the estimations with middle to high mortality levels than between those middle to low mortality levels where Tama likely belongs. Both estimates for Tama and Echizen then are close to the average TMFR of eight regions (all based on village SAC studies), 5.39, which Kito calculated with the consideration of infant mortality at 200 (1991: 87). However, the averages for Echizen, particularly that of the last observation period, seem very high (even applying the low mortality assumption), almost as high as those for Nomo, a fishing village in Nagasaki whose TMFR demonstrates the highest observed rates for pre-industrial Japan (Tsuya 2001: 121).[17]

Fertility differentials according to household economic status

Previous studies suggest a positive relationship between economic status and fertility. For example, Hayami found in several villages in the Nobi region (west-central Japan) that high economic status was associated with a distinctly higher fertility rate than middle and low status (1992: 95-96). Similar patterns were found in a village in northeastern Japan (Narimatsu 1992: 126-127) and other villages in east-central Japan (Kito 1983, Hamano 1986). However, Kinoshita's observation in another village in the northeastern region suggests a mixed relationship (1990: 327). He found that the fertility of the upper class was always low regardless of the period. The discrepancy between the findings highlights the importance of being careful to define our terms, especially those used in socioeconomic

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[17] TMFR of female cohort 1802-21 was 7.2 based on SAC—the figure was adjusted for births lost through unregistered infant deaths by inflating by 10% the original rates computed directly from SAC (Tsuya 2002: 121, Table 6.6).

categorization, and being explicit about all relevant particulars of time, place, and local history when considering the relationship between fertility level and socioeconomic status.

In Tama, also, the overall estimate of fertility is positively associated with economic status, assuming the same mortality level for the three economic status groups (Table 3B). The difference between low and high status was about 1 child. Another interesting observation is that during the early 1860s, a clear difference by economic status is observed. While recovery after the cholera epidemic appears in all three groups, it is most apparent among the women of high status. After this steep incline, however, the pattern becomes less clear. Even when the high mortality assumption is applied to the smallholders, it does not change the general patterns (Table 3B, last column) except in the year 1864, when the rate jumps above that of the middle-status group.

The same scenario is confirmed in Echizen (Table 3A, right panel). Overall, TFR and TMFR estimates are always lower for the landless than for the landed peasants. This is true even after applying a high mortality assumption to the landless group. The fertility level of the landless group is even lower than that of smallholders in Tama. While the general pattern of fertility was relatively high compared to other observed rates in pre-industrial Japan, the fertility levels of landless peasants appear quite low--always under 5. With the high mortality assumption, the estimate of TMFR in the second and third periods grows beyond 5.

Figures 3A and 3B plot TFR and TMFR estimates by socioeconomic status based on four SAC (1857, 1862, 1863, and 1869). Both of them use a five-year moving average to smoothen the fluctuation caused by small sample size (Appendix II). The interpretation of the figures has to be performed with caution, particularly at the beginning and the end of the estimation as they are based solely on single-year SAC, while the middle parts are the average of more than two SAC records. Both figures show a clear upward trend of fertility until 1857 for both landed and landless peasants. Afterwards, fertility of landless peasants goes down and does not recover to the peak of 1857, but it nevertheless maintains a level higher than the low level of the late 1840s. As discussed earlier, 1858-63 is the period when various epidemics hit the region. Landed peasants, however, were less affected by contagious diseases. The fertility of landed peasants continues to rise in the 1860s until the end. A slight decline at the end is affected by the sharp drop of fertility in 1867 when mortality of this region was exceptionally high (Tsubouchi 1992: 18). Whether that resulted from the upheavals at the end of the Tokugawa era is not certainly known.

<Figures 3A and 3B>

The fertility differentials between socioeconomic statuses were striking in both Echizen and Tama. Not only was the level of fertility much lower among women of lower status, but they also reacted differently to a mortality crisis. In both areas, women of higher status were less affected by the cholera epidemics in early 1860s. The recovery from the crisis was also quicker and larger among women in higher status. It is possible to argue that women in high-status households benefited from better food, a higher living standard, and easier access to necessary resources, which allowed them to recover more quickly from the unfavorable conditions of the previous years. In addition, landed peasants and large landholders were more inclined to recover their fertility in order to perpetuate the family line and assure successors (Kurosu 2003).

The fertility of landless peasants caught up with that of landed peasants in the late 1850s in Echizen. In Tama, estimates of the last three years, 1868-70, no longer demonstrate a clear positive relationship between social status and fertility. Although the time span of this study is too short to claim any longitudinal change of peasants' fertility behavior, a couple of studies relate to these findings. In a village near Tama, Hamano found that the small landholders had increased their income from the 1830s onward by engaging in the production and marketing of Oume-jima textiles, thereby increasing the fertility level, which in turn produced an increase of the overall fertility in Shinmachi (Hamano 1991: 194). Kinoshita also found a similar pattern in his study of a northeastern village: The lower class showed an impressive increase of fertility in the nineteenth century (2002: 82).

It is probable that parts of the increase in general fertility which in turn brought about the population growth during the period 1846-1872 can be associated with the improvement of fertility among landless peasants and smallholders. Particularly in the villages of Tama, engagement in the sericulture industry might have provided people of lower status with more opportunity to increase their living standard irrespective of the size of their landholdings. The relationship between the two, however, requires further investigation.

Conclusion

Drawing data from two large cross-sectional data sets, one from Echizen (54 village

years from the period 1857-1871) and the other from Tama (35 villages in 1870), this study estimated nuptiality and fertility in the two regions during the blank period of population history in Japan, 1846-1872.   During this period, a population increase was accompanied by economic development throughout Japan. I compared the estimates for the two regions and also examined the differential nuptiality and fertility of socioeconomic groups within each region. I paid particular attention to differences in household organization in the two areas and how such differences could have affected reproductive behavior.

It was found that the principle of "universal marriage" was well at work in both regions and that almost all women married before reaching age 50. The singulate mean age at marriage (SMAM) was 23.2 in Echizen and 21.6 in Tama. Both are at the higher end of the range of marriage age observed during the Tokugawa period. Age at marriage was 1.6 years higher in Echizen than in Tama. However, the marital fertility rates were also higher in Echizen, suggesting that early marriage was not associated with higher fertility. The average of total fertility rates (TFR) during the period that can be compared between the two regions (1859-68) was 5.1 in Echizen and 4.8 in Tama. The difference is larger for total marital fertility rates (TMFR), 6.2 in Echizen and 5.3 in Tama.

Using the size of coresident kin per 100 households to measure household organization suggested that stem family organization was at work in both regions. However, the larger size of the categories *parent, child's spouse,* and *grandchild* in Tama clearly suggested that households in Tama were more complex than those in Echizen, being extended upward and downward. It was surprising that the size of the *parent* category per 100 households among smallholders in Tama was as large as that of landed households in Echizen. That is, households among small householders in Tama tended to be as complex as landed households in Echizen. The proportion of female household heads was much larger in Echizen, particularly among landless peasants, than in Tama. Altogether, Echizen is associated with relatively late age at marriage, simple household, and high fertility; Tama is associated with relatively late age at marriage (but earlier than Echizen), stem family household, and moderate fertility.

While the levels of fertility and the household compositions are different, the analysis revealed similarities in the two regions. Toward the end of Tokugawa period (1870), the age at marriage increased, the gap between TFR and TMFR increased, and despite fluctuations of fertility rates due to cholera and social upheavals, there appears to have been a sustainable increase in fertility rates. The lower the economic status of the households, the

later the age at marriage of the women and the fewer children they had. The positive relationship between economic status and fertility is maintained even after applying a higher mortality assumption for the lower-status group. Further, women in higher socioeconomic households were also more resilient after hardships (e.g., cholera epidemics) in both regions. The differences between economic statuses seem larger than the differences between the regions.

The results of this study offer several insights to fill the gaps in our understanding of historical demography in Japan; they also bear on the role of the household on reproduction in general. First, the fertility estimates suggest that the increase of population during the period 1846-1872 was supported by the incline of fertility, particularly of marital fertility, and possibly by rising fertility among those of lower economic status. De Santis (De Santis 2003: Figure 3) shows what the estimated demographic behaviors meant in terms of reproduction and intrinsic rate of growth. He plots lines for intrinsic growth rates for combinations of fertility and mortality estimates. According to this figure, r=0.01 when e_0 is about 40 and the number of children per woman is about 4.0-4.5, or when e_0 is about 35 and children per woman about 5.0. These figures are about the same level with the estimates for Echizen and Tama, and r=0.011 and r=.0064, respectively, are the rates calculated based on the population surveys in 1846 and 1872. Thus, contrary to the warning of some scholars[18] this study shows that the growth of population during 1846 and 1872 in these regions may be within the scenario of estimated mortality and fertility.

Second, regional difference shows that lower age at marriage was not associated with higher fertility. Complex household was not associated with higher fertility, either. In the stem family of Japan, marriage timing of the inheriting children as well as the departure of the non-inheriting children via marriage or adoption was tightly controlled (Cornell 1987, Kurosu 1996, Smith 1977). There was also a hierarchy in childbearing (Tsuya and Kurosu 1999): Spouses of children (heirs) were much less likely to bear a child in the next year than were the spouses of heads; the presence of married children in the household also reduced the chance of child bearing. This suggests that the reproductive span can be shorter in these villages because Japanese stem family organization has laid down strict normative rules for reproduction. It is probable that in rural settings, the fertility levels of regions

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[18] Hayami, for example, suggests that the population increases reported for some areas between 1846 and 1872 are wildly unlikely, due probably to the underreporting of the population in 1846 (1993). The area of high growth rates include Hokuriku and Kanto, where Echizen and Tama belong.

associated more closely with stem family orientation tend to be low compared to those regions where simple family orientation is found.

Finally, I would like to add that this paper demonstrated the possibility of estimating nuptiality and fertility levels using different sources and methods from the ones used in previous studies. The size of coresident kin (excluding the head's conjugal unit) per 100 households was also an effective measure of comparison of household organization. The methods used in this study could be applied to large bodies of cross-sectional data in other regions, sources that are often discarded by historical demographers in Japan. This would increase our understanding of the nuptiality and fertility trends and their relation to regional variations of household organization in pre-industrial Japan.

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Table 1. Characteristics of households in Echizen 1857-1871 and Tama 1870

| | Echizen 1857-1871 (All) | | | Tama 1870 | | | |
| | Economic Status | | All | Economic Status (landholdings) | | | All |
	Landless	*Landed*		*Small*	*Middle*	*Large*	
Mean household size	4.1	5.3	4.8	4.4	5.6	7.1	5.3
Members ages 0-14 (%)	27.4	29.1	28.3	27.8	29.4	28.2	28.4
Members ages 15-54 (%)	59.0	57.2	57.9	55.7	56.1	57.4	56.3
Members ages 55+ (%)	12.5	12.7	12.6	16.3	14.5	14.2	15.2
Mean age of household head	44.1	45.3	44.9	43.1	43.7	45.1	43.6
Female head (%)	15.0	4.1	8.6	3.8	1.4	0.0	2.1
Household composition (per 100 households)*							
Parent	25.4	41.9	33.5	40.7	49.3	66.2	47.9
Sbling	24.9	36.9	31.8	30.3	31.5	42.9	33.5
Sibling's spouse	0.3	0.9	0.6	1.1	1.2	0.9	1.3
Child's spouse	5.5	13.5	10.7	6.1	14.5	23.8	12.4
Sibling's child	0.6	2.9	2.0	1.8	1.8	0.9	2.2
Grandchild	9.0	18.1	15.2	9.7	27.5	48.5	23.0
Other kin	1.4	4.0	2.7	4.4	6.9	10.8	7.1
Total	67.1	118.2	96.5	94.0	132.6	193.9	127.3
Number of households	1,344	1,006	2,692	733	867	231	1,951

*Method adopted from Saito (2002, Tables 1.1-1.2) and Wall (1983, Table 1.11).

Table 2. Female nuptiality by economic status, Echizen 1857-1871 and Tama 1870

Nuptiality	1857-1871 (All)			Tama 1870			
	Economic Status		All	Economic Status (landholdings)			All
	Landless	*Landed*		*Small*	*Middle*	*Large*	
Celibacy at age 15-19	0.91	0.87	0.88	0.92	0.86	0.83	0.87
Celibacy at age 45-49	0.01	0.02	0.00	0.00	0.01	0.00	0.01
SMAM	23.88	22.77	23.19	22.04	21.75	21.14	21.64
Observed Mean Age	23.17	21.32	22.06	21.83	21.23	20.55	21.34
at Marriage (s.d.)	(5.72)	(5.70)	(5.87)	(5.25)	(4.59)	(5.05)	(4.90)
Number of women	1,196	1,935	3,591	950	1,368	306	3,022

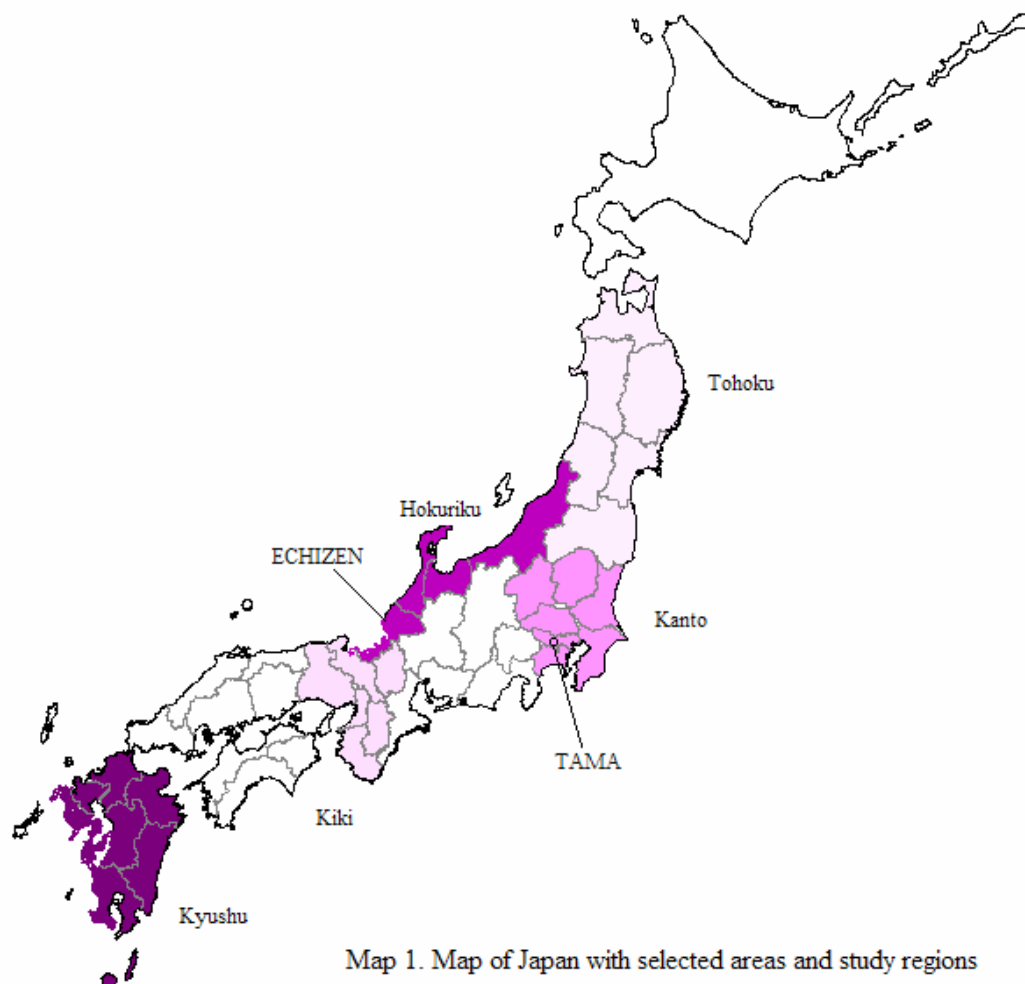Table 3. Estimated fertility by economic status and period, Tama and Echizen

(A) Based on 4 SAC (1857, 1862, 1863, 1869), Echizen

Fertility	All				Economic Status		Landless
					Landless	*Landed*	*Landless*
Average TFR	Mortality Assumption				Estimates with q_0=180, West		with q_0=210, West
	high (q0=210, West)	middle (q0=180, West)	low (q0=130, West)				
1845-51	4.94	4.68	4.36		3.43	4.32	3.62
1852-58	5.62	5.32	4.94		4.46	5.31	4.72
1859-63	4.80	4.54	4.22		4.31	5.13	4.56
1864-68	5.86	5.54	5.15		3.60	4.79	3.81
Average TMFR					Estimates with q_0=180, West		
1845-51	5.03	4.77	4.44		3.49	4.38	3.69
1852-58	6.09	5.76	5.35		4.90	5.66	5.19
1859-63	5.55	5.25	4.89		4.90	5.79	5.18
1864-68	7.31	6.91	6.43		4.05	5.88	4.29

(B) Based on 1870 Household register, Tama

Fertility	All	Economic status			Small
		Small	*Middle*	*High*	*Small*
Average TMFR		Estimates with q_0=180, West			with q_0=210, West
1859-63	4.70	4.26	4.90	5.29	4.50
1864	6.94	6.68	6.78	8.28	7.09
1865-67	5.52	5.31	5.68	6.49	5.64
1868-70	5.21	4.58	5.67	5.01	4.78

Note: This table is based on Kurosu (2003, p.62, Table 1).

Map 1. Map of Japan with selected areas and study regions

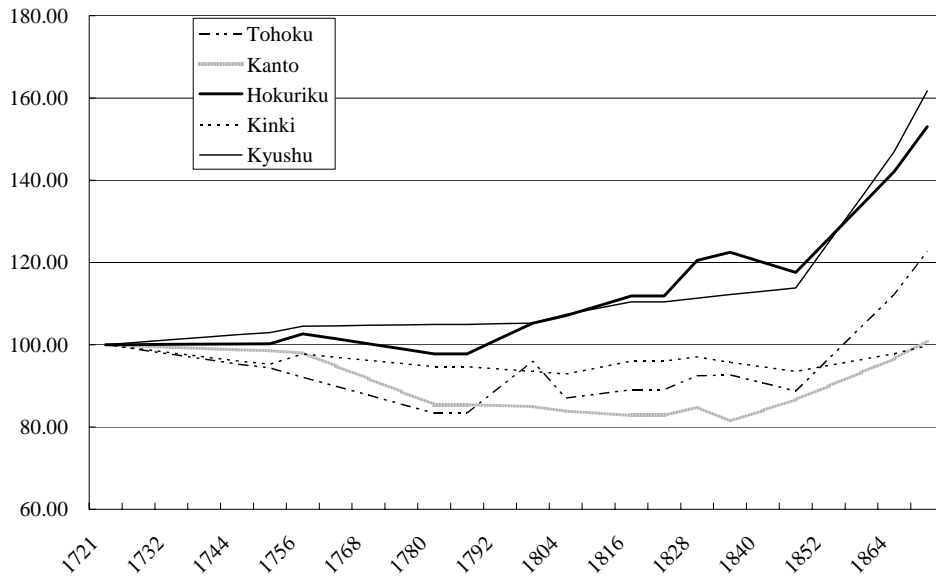Note: This map is created using "Hakuchizu MapMap (ver6.0)" developed by T. Kamada.

Figure 1. Population growth index of selected regions of Japan, 1721-1872
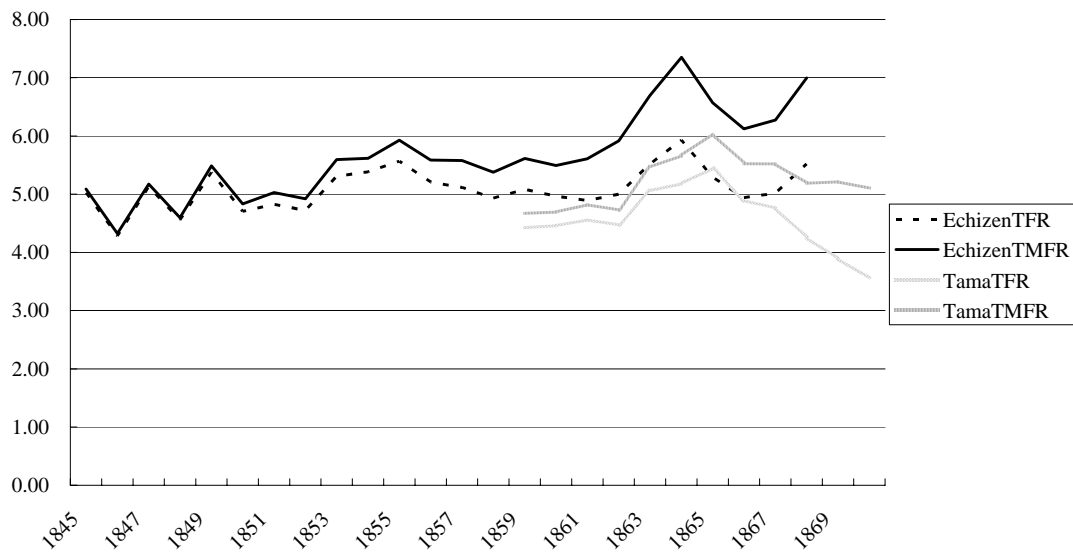(1721 as index year, Source: Sekiyama 1958, p.141)

Figure 2. TFR and TMFR estimates for Echizen and Tama, 1845-1870
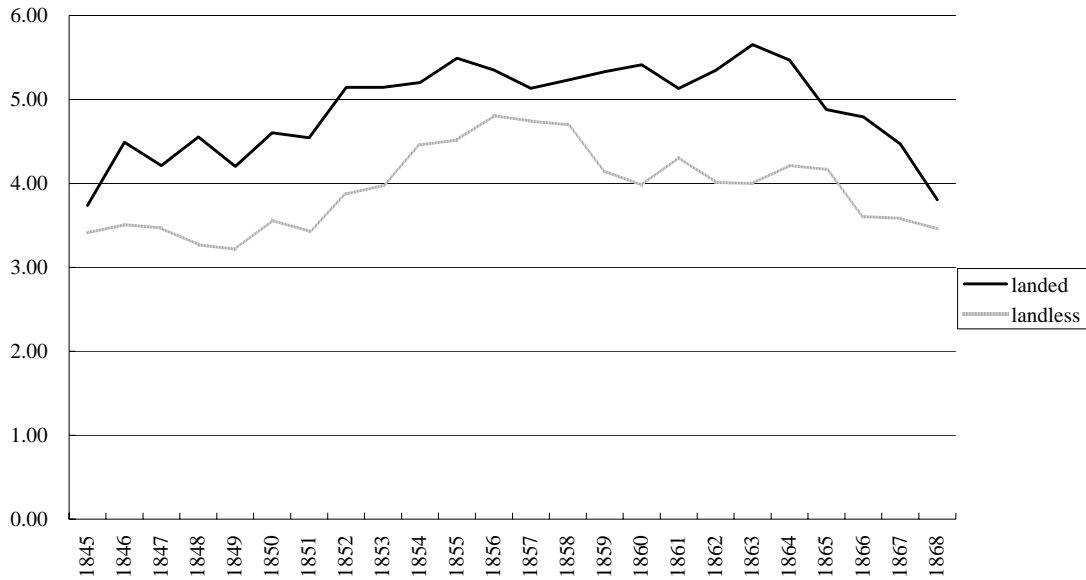(based on the same mortality assumption, three-year moving average)

Figure 3A. TFR estimates (five-year moving average) by socioeconomic status, Echizen 1845-1868
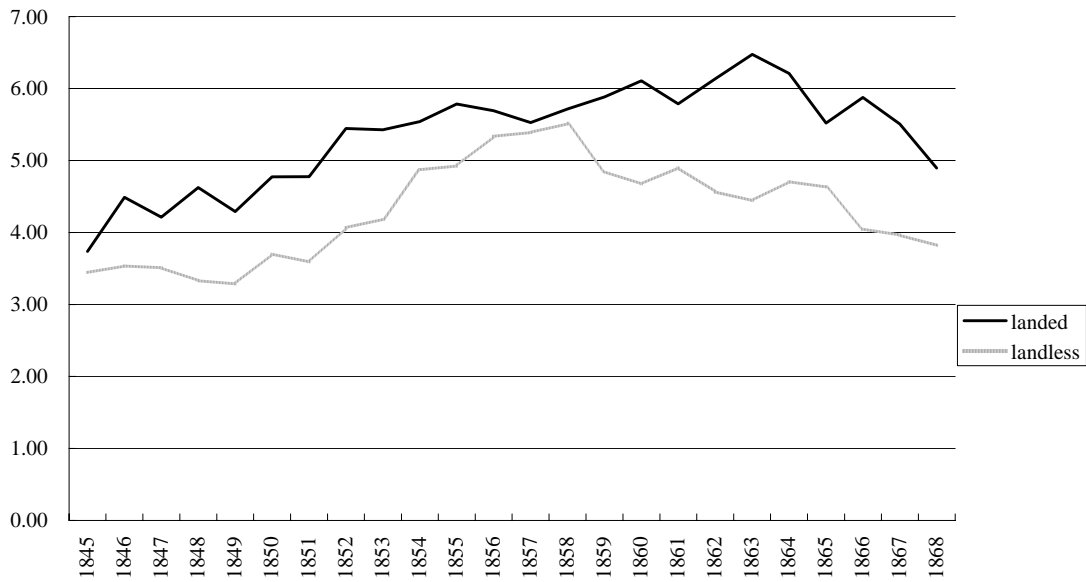

Figure 3B. TMFR estimates (five-year moving average) by socioeconomic status,
Echizen 1845-1868

Appendix I. Demographic characteristics of Echizen and Tama

	Echizen 1857-1871(all)		Tama 1870(all)	
	N	%	N	%
Total Population	12,908		10,461	
Male	6,526	50.56	5,292	50.59
Female	6,337	49.09	5,166	49.38
Sex unknown	5	0.04	3	0.03
Age unknown	132	1.02	13	0.12
Relation unknown	42	0.33	30	0.29
Marital status unknown (age 15-60)	88	1.21	1	0.02
Celibacy at age 50-54, male	5	1.69	21	8.75
Celibacy at age 50-54, female	2	0.63	7	3.10
Ever-married, male	2,025	55.28	1,913	62.27
Ever-married, female	2,547	70.93	2,197	72.70
(Widowed, male)	-	-	105	3.42
(Widowed, female)	-	-	233	7.71
Male servants	81	1.24	168	3.17
Female servants	58	0.45	115	2.23
Ages 0-4, male	622	9.53	618	11.68
Ages 0-4, female	621	9.80	565	10.94
Ages 0-4, total	1,243	9.63	1,183	11.31
Women aged 15-49	3,211		2,436	
Crude Death Rate	30.06		20.27	
Crude Birth Rate	30.90		22.46	

Note: CBR and CDR for Echizen are calculated using only villages of SAC which recorded births and deaths. Because the reporting of vital events in Echizen was not as accurate as that in Tama, these figures should be treated with caution.

Appendix II. Information of SAC data used for own-child estimation, Echizen

	1857	1862	1863	1865	1869
Total Population	710	5,408	1,616	898	1,555
Male	370	2737	830	456	760
Female	340	2670	785	442	793
Sex ratio	108.8	102.5	105.7	103.2	95.8
Ages 0-4, male	40	277	80	44	78
Ages 0-4, female	53	263	75	46	87
Ages 0-4, total	93	540	155	90	165
Women aged 15-49	151	1334	395	232	389
(landed)	92	704	241	-	142
(landless)	54	464	137	-	117
Used for analyses					
Women	214	1633	484	277	474
Children	201	1511	468	242	429
%"Non-own" children	6.5	7.8	9.0	10.3	11.9

Appendix III. Population in 1886, Fukui and Kanagawa prefectures

Figure A. Population by single age (0-86 years old) in 1886
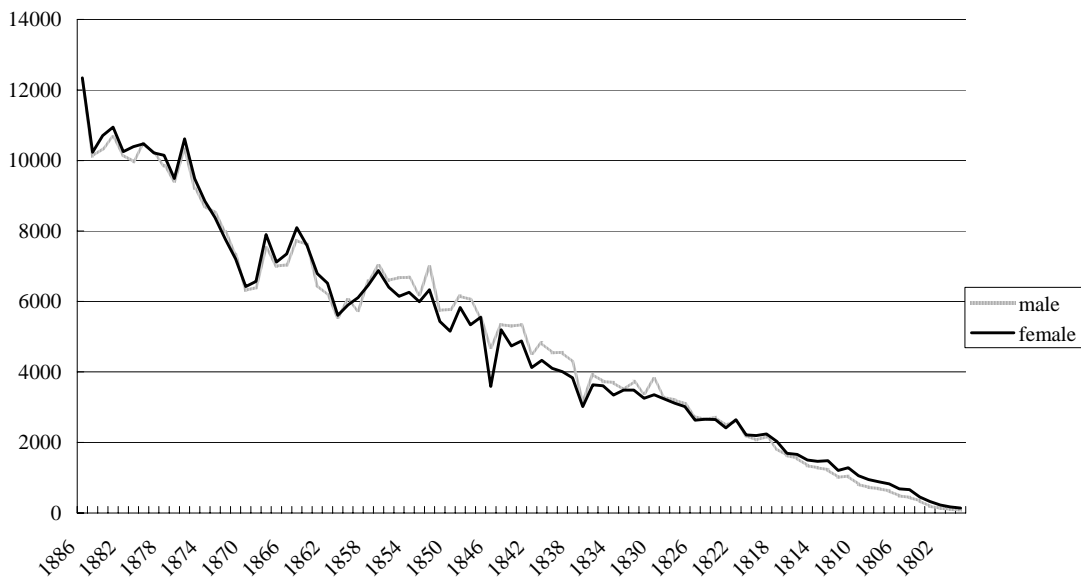shown by year of birth, Fukui Prefecture (for Echizen)

Figure B. Population by single age (0-86 years old) in 1886
shown by year of birth, Kanagawa Prefecture (for Tama)