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Economic Fluctuations, Household Factors, and Old-age Mortality: A Comparative Analysis of Five Historical Societies in Europe and Asia

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INTRODUCTION

Old-age mortality is an under-explored topic in studies of historical populations and societies. The primary reason for the scarcity of historical studies on mortality in old age is the difficulty in obtaining data on 'population at risk', i.e., *all the elderly* present in the area and at risk of experiencing a death. Historical studies on mortality responses of the elderly to economic variations and household factors are even more scarce as they require longitudinal micro-level records in which not only the population at risk, but also demographic, socioeconomic, and household characteristics of individual elders were documented.[1] Even for contemporary populations, such multivariate analyses of mortality responses are of fairly recent vintage since they are only possible with longitudinal data such as those from the Health and Retirement Survey.

Using longitudinal, nominative household registers in five pre-industrial societies in Europe and Asia, the EurAsian Project on Population and Family History (called the EAP project hereafter) has a unique advantage in conducting such multivariate studies in comparative historical perspective. Based on similar models and measures (see Appendices A and B of the volume), we conduct event history analyses of the socioeconomic, demographic, and household factors of mortality of males and females in old age in different parts of Belgium, Sweden, Italy, China, and Japan.

Historians have long engaged in studies on differences between the East and West, as well as within the East or West, in demographic and social behaviors. Such studies are best represented by the monumental study by Malthus (1803) and continue on to the now classic study by Wrigley and Schofield (1981) and to the recent reappraisal of the Malthusian accounts by Lee and Wang (1999). East-West differences in the family systems were also the subject of inquiry by numerous family historians and demographers such as Hajnal (1965, 1982), Laslett (1977, 1983), and Saito (1998).

From the contemporary perspectives of gerontology and demography of aging, studies on patterns and factors of old-age mortality in past times are also valuable and useful. All the societies under consideration have undergone the 'first' demographic transition. For example, in 1995-2000 life expectancy at birth in the five societies under consideration ranges from around 68 to 77 for men and from 72 to 83 for women (United Nations 1998). Under such circumstances, roughly 70 to 90 percent of men and women are expected to survive until age 65. However, average expectancy of life at birth in these societies in the 19th century was in the range of early thirties to early

[1] Most quantitative studies of the elderly in the past appear to have been descriptive, focusing on living arrangements and presence of kin either with cross-sectional data or simulation (e.g., Alter 1996; Hareven 1996; Kertzer and Laslett 1995; Okada and Kurosu 1998).

forties. In those circumstances, the proportion surviving to age 65 was around 30 percent or less. Among such pre-industrial populations, were the patterns and factors of mortality in old age different or similar to today and to each other? As little cross-cultural or historical evidence is available, the EAP project is uniquely qualified to answer such a question.

In this paper, focusing on ever-married men and women aged 55-74 in rural communities in 18th and 19th century Belgium, Sweden, Italy, China and Japan, we seek to examine the mortality effects of variations in local economic conditions and household and individual characteristics in comparative multivariate context. We pay special attention not only to the spatial differences between Europe and Asia, and within Europe or Asia, but also to gender differentials as well.

In pre-industrial agrarian societies the public systems of social security and welfare for the elderly were under-developed at best. Chances of survival in old age were therefore affected strongly by local economic conditions. Elderly men and women, however, are thought to have responded differently to short-term economic stress, depending on local economic development and social organizations. At the same time, their mortality responses would also have differed, depending on the economic resources and structural features of households in which they resided. Given economic and demographic constraints, the vulnerability of individual elderly would further have differed by his/her status and position within the household.

In the next section, we discuss theoretical backgrounds on old-age mortality in historical perspective by synthesizing major hypotheses and findings of existing studies. This enables us to situate the results of our analyses in larger theoretical contexts. We also explain briefly the data and measurements pertaining to the analyses of old-age mortality. We next examine and compare the levels and gender differentials of mortality of elderly men and women in rural communities in the five countries. We then discuss the results of the event history analyses of old-age mortality for men and women separately. Specifically, through event-history analyses, we first look at mortality responses to fluctuations in local grain prices or wages. Controlling for local economic fluctuations, we next compare the effects of household socioeconomic status and age compositions on mortality of elderly men and women. To identify who, among elderly men and women, were most or least likely to suffer death, we further examine the mortality effects of demographic and household factors measured at individual levels. Through these analyses, we seek to elucidate, in comparative Eurasian perspective, the patterns and causal mechanisms of old-age mortality, an important but under-examined aspect of the mortality regime in past times.

THEORETICAL BACKGROUNDS

In this paper we examine three aspects of mortality among the aged in rural communities in five Eurasian societies: (1) responses to local economic conditions; (2) how aggregate characteristics of the household such as its labor capacity and dependency ratio affected mortality; and (3) how positions of individual elders within the household affected their likelihood of death.

In pre-industrial agrarian settings, living standards were influenced strongly by agricultural output, and chances of people's survival were affected, often seriously, by income fluctuations caused by variations in harvest yields (see Bengtsson and Ohlsson 1985; Galloway 1988). Local economic downturn may have had even harsher effects on persons/households in poverty, than on those who were better off economically. The mortality effects of local economic fluctuations are thought to have been especially strong for elderly men and women, especially elderly in least well-to-do households, who were likely to be more frail and vulnerable to deterioration in living standards in the community.

Characteristics of household in which individual elders lived are also thought to have affected their chances of survival. Postulated originally by Chayanov (Thorner et al. 1966: 53-69) for peasant families in pre-transitional Russia, size and age compositions of household are argued to have influenced the economic well-being of that household. Specifically, the consumer-worker ratio within the household is argued to have been negatively associated with the general volume of its economic activity and also with economic productivity in pre-industrial agrarian households. Based on this 'Chayanov rule,' providing that household size and the amount of household resources did not drastically change in short-run, the ratio between consumers (children and elderly) and producers (working-age adults) within household is hypothesized to have adversely affected the health and survival chances of its elderly members.

Old-age mortality would also have been affected by overall socioeconomic status of household in which the elderly lived. Results from contemporary studies on socioeconomic differentials in mortality show that persons with higher socioeconomic status (such as higher education or higher social class based on occupation) are likely to have lower mortality in old age (e.g., Kitagawa and Hauser 1973; Preston and Elo 1995; United Nations 1982: 42-82; Valkonen 1998). Providing that the public social security and welfare systems were under-developed in pre-industrial societies, the health and survival of the elderly would have been strongly influenced by the availability of economic resources within household.

Chances of survival of individual elders were also affected by their marital statuses as well as their positions and relationships within household. Mortality differentials by marital status and sources of such differentials are the focus of a number of studies on contemporary populations (e.g., Goldman 1993a, 1993b; Goldman and Hu 1993; Gove 1993; Hu and Goldman 1990; Lillard and Panis 1996). Though the number of studies on factors of old-age mortality in pre-industrial populations is much more limited, a substantial portion of existing studies discusses the effects of marital statuses, especially the relationship of widowhood to mortality (e.g., Cornell 1989; March 1912; Neven 1998; Nystedt 1999; Tsuya and Kurosu 1998; Uhlenberg 1980). These studies commonly found that, compared to currently married individuals, those without spouse (widowed, divorced, and never married) were more likely to suffer death, and that the mortality effect of the loss/lack of spouse was generally stronger among men than among women.

This association between the loss/lack of spouse and mortality can be explained by the competing or complementary hypotheses of *marriage selection* and *marriage*

protection.[2] According to the hypothesis of marriage selection, widowed, divorced, or single individuals (especially men) are more likely to die because they failed to marry or stay married because of their poor health.[3] On the other hand, the marriage protection hypothesis postulates that married persons are less likely to die because an array of social, economic, psychological, and environmental benefits associated with marriage enhances their health and helps them counter mortality risks. Though we cannot rule out the possibility of marriage selection as widowed elderly could and did remarry and healthy elderly probably had a higher chance of remarriage than unhealthy ones, marriage protection seems to be a more plausible explanation. Existing evidence uniformly suggests that due either to psychological difficulties or to economic and social deprivation, the mortality of ever-married elderly men and women in pre-industrial populations increased significantly with the loss of their spouse.

Their mortality may also have varied by living arrangements, especially the presence of coresident adult children. While historical studies of the effects of coresident kin on mortality in old age are rare, Cain's studies (1981, 1983) on fertility in contemporary South Asia offer important theoretical implications. According to him, children are not only the contributors of labor to their parents' household but also offered the longer-term economic benefits as insurance against the risk of income insufficiency in parents' old age. Given the virtual absence of old-age pension system and health insurance in pre-industrial agrarian communities, coresident adult children must have been even more important than in contemporary South Asia for the well-being and health of elderly parents. Previous historical demographic studies on Belgium and Japan indeed found that the elderly enjoyed the support and protection from adult children living with them (Alter 1996; Alter et al. 1996, 1997; Cornell 1989; Tsuya and Kurosu 2000).

At the same time, marital statuses of coresiding adult children may also have important implications for mortality in old age in pre-industrial communities. In the context of pre-industrial Western European nuclear households, unmarried children are thought to have been more valuable to their parents because the parents could enjoy a larger share of time and care from the children. In the East-Asian context of extended family households, however, married children may have been more beneficial to their parents as their spouses (especially sons' wives) were supposed to care for the older generation.[4]

In pre-industrial rural societies, chances of survival in old age may also have been enhanced or reduced by the positions that individual elders occupied within their household, especially their relationships to the head of household. For example, in the context of stem family households in pre-industrial Japan, non-stem kin and non-heirs were likely to have suffered structural vulnerability and powerlessness whereas heads

[2] For specifics of these hypotheses, see Goldman (1993a, 1993b).

[3] By contrast, according to Lillard and Panis (1996), in the contemporary U.S. unhealthy men tend to marry/remarry sooner than healthy men, suggesting the possibility of "adverse selection" in the sense that men in poor health have a stronger incentive to marry.

[4] Hermalin et al. (1992) found that in contemporary Taiwan daughters-in-law play a key role in providing assitance to the elderly.

and heirs are thought to have enjoyed more structural advantages (Skinner 1993). Lee and Campbell (1997) also found that in communities under the Eight Bannar state farm system in northeastern Qing China, the likelihood of dying in old age differed according to their relationship within household. The five specific Eurasian societies under consideration in this study had different household systems. Our analysis of these societies seeks to shed light on the workings of household systems and their differential impact on the survival of men and women in old age.

DATA AND MEASUREMENTS

The study focuses on ever-married men and women aged 55-74. The lower age boundary (age 55) was selected because this is the age at which a substantial proportion of household heads in Sweden and Japan began to retire (see Okada and Kurosu 1998). It was also the age at which men in the Chinese household registers began to be annotated as 'old' or 'retired,' and the age that the Belgian population census in 1866 to 1910 regarded as the beginning of old age. The upper age boundary was chosen primarily to avoid the estimation bias caused by increasingly selective populations who survived to very old ages.[5] The decision to make age 74 as the upper limit is also due to concern over the quality of data for some of the populations under consideration. For example, in Liaoning in northeastern China many people who appear to have survived past age 75 were actually people who were dead but whose deaths were not registered. Consequently, their records were carried forward from one register to the next.

The five sets of analyses presented in this paper use different age measures: chronological age in the three European populations; traditional age in *sui* in the northeastern Chinese populations; and the number of annual population registration that an index individual survived after birth--referred as the *shumon-aratame-cho* (NAC) age--in northeast Japan.[6] Given that the focus of our analysis is the last phase of life, these differences in measurements of age do not seriously affect our results.

Our analyses draw their data from 16 rural communities in different regions of five Eurasian societies: the commune of Sart in eastern Belgium; four Scania parishes in southern Sweden; two parishes--Casalguidi in Toscana and Madregolo in Emilia-Romagna--in northern Italy; seven Liaoning state farms in northeast China; and two farming villages of Shimomoriya and Niita in northeast Japan.[7] Table 11.1 presents the sex- and country-specific numbers of person years and deaths that were included in our comparative analyses of mortality in old age. Though there are differences in the duration and size of data among the five countries, the overall size and depth of data that we use are considerable. The number of person years recorded is 68,497 for Liaoning,

[5] Inclusion of elders at very old ages introduces the selectivity bias because, as the upper cut-off age goes up, individual genetic and socioeconomic characteristics of a small minority of robust elderly have increasingly stronger influences on the results.

[6] For details on the definitions and measurements of the Chinese age *sui* and the Japanese NAC age, see Campbell and Lee 2000 and Tsuya and Kurosu 2000, respectively.

[7] The EAP project also covers the city of Venice in Italy. However, because urban-rural differences in the geographic, economic, and socioeconomic features and contexts were too large to merit comparability, this paper excludes Venice from the analysis.

15,941 for Shimomoriya and Niita, 13,958 for Casalguidi and Madregolo together, 17,874 for Sart, and 6,538 for four Scania parishes; while the number of deaths is 3,730 for Liaoning, 704 for Shimomoriya and Niita, 543 for Casalguidi and Madregolo, 1,152 for Sart, and 313 for the Scania parishes. In all, the total number of person years and deaths included in our analyses are 122,808 and 6,642, respectively.

[Table 11.1 about here]

We next turn to measurements of the community, household, and individual factors. We first explain these measures in a summarized manner and give detailed explanations only when they relate to issues of aging and old age. Our analyses test structures of mortality responses to variations in local economic conditions, household context at household level, and household context at individual level. Table 11.2 presents the descriptive statistics of the two-levels of household contextual variables used in our multivariate analyses of old-age mortality. To examine the effects of changes in local economic conditions, the analyses employ the local price series of staple grains or wages of agricultural day-laborer used in other earlier studies of the EAP project (see Chapters 11-15 of Bengtsson and Saito 2000).

[Table 11.2 about here]

To account for the effects of household characteristics, our analyses employ household socioeconomic status and size of adult household members and age composition. To measure household economic status, we use occupation of household head for the European populations,[8] occupation of elderly men themselves or husband of elderly women for the Chinese analysis,[9] and household landholding (in *koku*) for Japan.[10]

Household-level characteristics are also measured by three structural variables: the number of working-age adults (those aged 15-55) in household; the proportion of household members under age 15 (i.e., children); and the proportion of those above age 55 (i.e., the elderly). The average number of working-age adults in elder's household varies considerably among the five Eurasian societies under consideration--from around 2.3 in northeastern Japan to over 5.4 in northeastern China, reflecting in part differences in dominant household types. However, there are not as much inter-country differences in the proportions of children and the elderly. The proportion of children ranges from 14 to 23 percent while the proportion of elderly is roughly in the 25-40 percent range.

[8] The exception is Madregolo in northern Italy for which no information on head's occupation or other household socioeconomic indicators are available.

[9] Because the death of household head was a prerequisite for the transfer of household headship in pre-industrial rural Liaoning (Lee and Campbell 1997: 109-19), occupation of self or husband is almost equivalent to head's occupation.

[10] Because the two villages under consideration were both almost exclusively agricultural, almost all households were those of farmers and peasants. Given the absence of objective criteria to group household landholding, it was measured by a continuous variable. The average landholding of households in which the elderly lived was around 12-13 *koku* while 30 *koku* or higher represented the top 5 percent. One *koku* is equivalent to approximately 5 bushels.

To account for the mortality effects of household context experienced by individual elders, our analyses use three indicators: elders' marital status, their relationship to household head, and presence of children in household. Providing that this paper focuses on ever-married elderly, marital status consists of the currently married and the formerly married, with the exception of Sweden for which such a distinction is not possible. As shown in Table 11.2, in all populations except for northeastern Japan, the formerly married consist of widows and widowers with the virtual absence of divorced persons. Even in the two northeastern Japanese villages where marital disruption due to divorce was substantial (Kurosu et al. 1999), widowhood was much more prevalent among the formerly married in old age. The divorced consisted of only a small proportion of the formerly married.

To measure relationship to household head, we grouped elderly men and women into five categories: head, spouse of head, stem kin of head, non-stem kin of head, and non-kin or servant.[11] The five populations under consideration varied in the composition of household relationships of men and women in old age, probably reflecting differences in the patterns of headship transfer and dominant household types. In northeastern Japan in which the ideal family system was the patrilineal stem family, retirement of heads before death was frequent (Okada and Kurosu 1998). On the other hand, retirement of household head rarely happened in eastern Belgium (Alter and Oris 1997), northern Italy (Lagazio et al. 1998), and northeastern China (Lee and Campbell 1997: 109-19). In northeastern China complex households were also much more prevalent than the other communities whereas in eastern Belgium most households were simple. In northern Italy, simple households and multiple family households seem to have co-existed as multigenerational coresidence was relatively common among sharecroppers (Kertzer and Karweit 1995).

Consequently, in eastern Belgium an overwhelming majority of elderly men and women were household head and head's wife, respectively. In northern Italy, as in eastern Belgium, a large majority of elderly men were head and the largest category among elderly women in was head's spouse. However, it is also notable that a considerable minority of elderly women in northern Italy were head or stem kin (mother) of head, probably reflecting the prevalence of multi-family households among sharecroppers' households in Madregolo. On the other hand, non-stem kin (mostly uncles, aunts, and cousins of head) were much more common in northeastern China than in the other four populations whereas spouse and stem kin (mother) of head were both common among elderly women. In northeastern Japan, as expected, head and stem kin (father) of head were equally prevalent among elderly men whereas head's spouse and stem kin (mother) of head were common among elderly women.

Presence of children in household is also a factor thought to have strongly affected the mortality in old age in pre-industrial rural communities. As explained in the previous section, marital statuses of coresident children could also have been important

[11] In the Swedish data, household relationship was not recorded in the original sources, and therefore had to be inferred from the results of family reconstitutions. Because of this, the only possible distinction was for head and non-head (including former owners of the land, lodgers, and servants) for elderly males. Similarly, for elderly females, the only distinction was between heads' spouses and others. Because the proportions of elderly men and women who fell into the latter categories (i.e., non-heads for men and others for women) were very small, household relationship was not included in the Swedish analysis.

from the standpoint of the protection and support that elderly parents receive from coresident children. To capture the possible non-linear effect of coresident children by their marital status, our analyses specify presence and marital status of children by four categories: no children present, only unmarried children present, only married children present, and both unmarried and married children present. Somewhat unexpectedly, in all Eurasian populations ever-married men and women spend a large part (70-85 percent) of their elderly years with their coresident children, except for southern Sweden in which about one half of elderly years were lived with children (see Table 11.2). However, given the differences in household systems and marriage timing among these populations, the proportion of the elderly whose coresident children were all married was by far the highest in northeastern China. By contrast, the proportion of the elderly living only with unmarried children was highest in eastern Belgium.

THE PROBABILITY OF SURVIVAL TO AND THROUGH OLD AGE

Before we discuss the results of the event-history analyses, we compare the levels and patterns of rural old-age mortality in the five pre-industrial Eurasian societies under consideration. Through this, we seek to situate survival to and through old age in the overall mortality regimes in comparative perspective. Table 11.3 presents the life-table estimates by sex of the proportions surviving and the life expectancies by age through the elderly years.[12]

[Table 11.3 about here]

Looking at the overall levels of survival, there appears to be a divide between the two Western European populations (eastern Belgium and southern Sweden) and the two East Asian populations (northeastern China and northeastern Japan), with a Mediterranean population, northern Italy, in the middle. The levels of survival to and through old age in the five historical Eurasian populations therefore form an almost perfect continuum with eastern Belgium at one end and northeastern China at the other. In Sart, in eastern Belgium, roughly one half of persons born are estimated to have survived to age 55 and around one third to age 65. On the other hand, in northern Liaoning in northeastern China only around one-third of births are estimated to have survived to age 55 and roughly 20 percent of them to age 65.

Furthermore, in Sart the level of old-age mortality declined significantly during the last period of 1875-99 (data not shown). On the other hand, there were no significant period differentials in Liaoning whereas old-age mortality increased significantly during the decades of 1840-70 in the two farming villages in northeastern Japan (data not shown). Given these, if we are to compare the Western European and the East Asian populations during the latter half of the 19th century, the East-West differences in the level of elderly mortality are likely to be even larger.

[12] Given the nature of data, direct estimates of the proportion of dying during infancy are not available for northeastern China and northeastern Japan (see Appendix A of the volume). Thus, based on previous studies (Lee and Campbell 1997: 58-70; Tsuya and Tomobe 1998), the probability of dying during infancy was assumed to be .200 for both sexes in northeastern China, and .200 for males and .180 for females in northeastern Japan.

Within the two world regions (Europe and East Asia) and also within each country, there are also differences in the level of survival by the climatic/environmental differences and economic development. Within Western Europe, eastern Belgium had a higher proportion surviving to and through old age than southern Sweden, possibly a reflection of early industrialization and more favorable climate. Within northeastern China, northern Liaoning shows clearly lower levels of survival than its southern counterpart, a reflection of a harsher climate.

However, there are no consistent regional or country patterns in sex differentials in the overall level of survival. In the four Scania parishes and in southern Liaoning, the estimated proportion of survival tends to be higher for females than for males. By contrast, the proportion surviving is in general higher for males than females in Sart, the two northern Italian communities, northern Liaoning, and the two northeastern Japanese villages.

Though there are clear East-West and inter-/intra-country differences in the level of survival to and through old age, there are no distinguishable patterns in life expectancy in old age. Rather, the age patterns of life expectancy in old age were similar between and within the East and the West. If anything, life expectancy at age 55 was somewhat lower in Western European populations than in populations in Mediterranean Europe or in East Asia. This offers partial evidence for the 'frailty effect' hypothesis in the sense that a community with a lower probability of survival to old age tended to have higher life expectancy at old age, although this was not always the case in some of the populations under consideration. As shown in the right panel of Table 11.3, having survived to age 55, men and women in these five historical societies can expect to live roughly 14 to 17 more years. If they survived to age 65, they can expect to have live roughly 8 to 10 more years. Hence, if they survived until their mid-fifties, the elderly in these five historical societies survived on average to around age 70. And if they survived the first ten years of the elderly years (until their mid-sixties), they could expect to live to their mid-seventies.

In summary, whereas the proportion of persons who managed to survive to and through old age differed clearly between the East and the West and also within each region, life expectancy during the elderly years did not show distinctive differences. In these five historical societies, elderly men and women in rural communities were members of a robust minority who managed to win the race of survival. Once they survived through the years of high mortality risks, they enjoyed the life expectancies not so different from those of contemporary post-transitional populations.[13]

RESULTS OF THE EVENT HISTORY ANALYSIS

This section first compares the patterns of mortality responses of rural men and women in old age to short-term economic stress caused by fluctuations in local grain prices or real wages in the five historical societies. Controlling for variations in local economic conditions, we examine the mortality effects of household socioeconomic status as

[13] For example, in the contemporary Sweden, life expectancy at age 65 was 15.6 for males and 19.2 for females in 1993 (United Nations 1996). In Japan in 1985, life expectancy at age 65 was 15.5 for males and 18.9 for females (National Institute of Population and Social Security Research 2000: 82).

measured by occupation of household head or household landholding. We then move to the analysis of the mortality effects of household contexts measured at household level such as the number of adults present in household and the compositions of children and elderly in household, net of the effects of price fluctuations and household socioeconomic status. Finally, controlling for local economic fluctuations, household socioeconomic status, and other household-level characteristics, we examine the mortality effects of individual-level characteristics such as marital status, household relationships, and presence of children.

(1) Responses to Price Fluctuations

Table 11.4 presents the results of the event-history analysis of the effects of local price fluctuations on mortality of rural men and women aged 55-74 in the five historical Eurasian populations. Controlling for age, household socioeconomic status, time period (in eastern Belgium and northeastern Japan), and community (in southern Sweden and northeastern Japan), the estimated risk ratios indicate the mortality effect of a one-unit increase in logged prices.[14]

[Table 11.4 about here]

We can see from Table 11.4 that, with the exception of Sart in eastern Belgium, old-age mortality in the other four pre-industrial Eurasian rural populations was in general vulnerable to price fluctuations. When local prices went up (due to crop failure), the likelihood of death among the elderly also had a tendency to increase. However, the magnitude of responsiveness was different by sex and community. In four Scania parishes in southern Sweden, mortality of men and women was both highly responsive to fluctuations in real wages caused by grain price variations, and the magnitude of the mortality effect was, though women seem to have been somewhat more responsive, similar between the sexes.

In the Toscan village of Casalguidi in northern Italy, elderly women were extremely vulnerable to economic stress caused by harvest failure while elderly men were largely unaffected. However, in the Emilian village of Madregolo in the same region, both men and women were affected by local economic fluctuations but women were much more vulnerable than were men. By contrast, in the rural communities in the northeastern part of the two East Asian countries (northern Liaoning and Shimomoriya and Niita), it was men who were likely to suffer death whereas women were largely unaffected by changes in local economic conditions.

We can interpret these findings to suggest that, similar to the situations in contemporary developing populations, gender differentials in the mortality responses to price fluctuations captured differences in their statuses in the larger society. If this was the case, however, we cannot find a plausible explanation for the vulnerability of elderly men to economic variations in the two East-Asian populations. Rather, these gender differentials in northeastern China and northeastern Japan could have been due not only

[14] Because the expected effects of changes in real wages are opposite of those in grain prices (i.e., wages went down when prices went up), Table 11.4 presents the inverse of the estimated effects (risk ratios) of fluctuations in real wages for southern Sweden to make the estimation results comparable.

to the generally low status of women but also to differences in power over finite resources within household in the context of patriarchal family systems. Under the patriarchal family system in East-Asian societies, males, especially adult and elderly men ordinarily enjoyed a much greater share of household resources. When the local economic conditions took abrupt downturns because of widespread harvest failure, however, men suffered more because the degree of economic deprivation they experienced in crisis times was much greater than was the case for females. [15] It was not that women did not suffer in the times of economic hardships. They probably did. Nonetheless, their life conditions did not deteriorate as drastically as did men's because women faced more limited economic opportunities to begin with.

(2) Effects of Household Socioeconomic Status

Table 11.5 presents the estimated effects (risk ratios) of household socioeconomic status on mortality of ever-married elderly men and women in rural communities. We can see that there are no clear patterns in the mortality effects of household socioeconomic status in the pre-industrial Eurasian rural populations under consideration, with an exception of northeastern Japan.

[Table 11.5 about here]

In both Sart in eastern Belgium and Casalguidi in northern Italy, elderly women in households headed by artisans or industrial workers (many of whom were wives of artisans or industrial workers) were more likely to die than women who were wives of farmers or sharecroppers, whereas mortality of elderly men was virtually unaffected by their occupational status. In Sart, relative to women whose household head (mostly whose husband) was a cultivator, women whose head was a functionary had significantly lower mortality, whereas elderly men faced similar mortality independently of whether the head of household (usually an elderly man himself) was a cultivator or a functionary. For both these societies, it thus seems that the occupation of head/husband influenced the mortality of the wife in old age more than it did the mortality of the husband in elderly years.

In Liaoning, compared to men who were adult male farmers, elderly men who were soldiers were 35 percent more likely to suffer a higher risk of casualty. On the other hand, in this northeastern part of the Qing China, elderly women in households headed by a soldier were *less* likely to die than those in households headed by an adult male farmer. In other words, belonging to soldier's households affected the mortality of elderly men and women in the opposite directions in rural Liaoning. In addition, elderly men who were functionaries also suffered a higher mortality at the time of local economic hardships, as the main effect of this occupational category was insignificant but its interaction with grain price was significant and positive (results not shown). Male soldiers and functionaries in the Eight Banner state farm system traveled frequently and were therefore away from home often (see Lee and Campbell 1997: 159-76). Those soldiers and functionaries might have been more frequently exposed to infectious diseases as they certainly had more interactions with people from other areas.

[15] Campbell and Lee (2000) made a similar point about reasons for the vulnerability of elderly males in rural Liaoning during the Qing China.

This frequent travel and wider exposure to health risks apparently had harmful effects on the survival of soldiers and functionaries in old age. On the other hand, while those elderly soldiers were away from home, their wives/elderly female household members enjoyed better health possibly because they did not have to work as hard, taking care of their husband/head. Putting it differently, the absence of husband (who was also household head) helped women have better chances of survival. This finding is in turn tied closely to the mortality effect of marital status that we will discuss later in the paper.

In contrast to the other four Eurasian populations, household socioeconomic status exerted strong and consistent mortality effects in Shimomoriya and Niita, two farming villages in northeastern Japan. As shown in Table 11.5, the chances of survival of elderly men and women were both affected significantly by their household landholding, and the magnitudes of the effect were very similar between the sexes. An increase of landholding by one *koku* reduced their mortality by 2 percent. Though this may seem small, the effect could be substantial. Compared to elders whose households did not own any land (roughly 10 percent of the households in the villages), if elderly men and women lived in household with 12 *koku* worth of land (which was the median), their likelihood of death was reduced by about 24 percent. If the elderly was in household with 30 *koku* worth of land (top 5 percent), their likelihood of death was 60 percent lower than that of the landless elderly.

In summary, the findings of this section suggest that whereas socioeconomic status of household had some effects on the chances of survival of individual elderly in some of our populations (especially in East Asia), the effects were in general neither strong nor consistent. Further, none of the interactions between household socioeconomic status and prices were statistically significant (results not shown) in all of the rural populations under consideration. This lack of consistent effects and insignificant interaction with grain prices in turn imply that, in many of our populations, household socioeconomic status did not generally have strong effects on the likelihood of death among men and women who survived to old age. And this was the case even at the times of economic hardships.

(3) Effects of Household Structure

Table 11.6 presents the estimated effects of household structure measured at household level on the mortality of ever-married elderly men and women in rural communities in the five historical societies. Focusing first on the mortality effect of the number of working-age adults (those aged 15-55) in household, we do not see any systematic differences between/among the European and the East-Asian populations. In fact, the directions of the effects are the opposite between the two West European populations--eastern Belgium and southern Sweden. In Sart the mortality of elderly women went down significantly as the size of adult household member increased, suggesting that the more adults an elderly woman had living with her, the better her chance of survival. By contrast, the mortality of elderly men and women in Scania is found to have increased as the number of household members aged 15-55 went up. In Shimomoriya and Niita, male old-age mortality also increased as the number of working-age adults in the household increased.

[Table 11.6 about here]

The number of working-age adults in household measures household labor capacity. There is also a possibility that this factor was measuring the degree of support and protection that elders received from coresident adults. Whichever effects this variable captures, their mortality effect is hypothesized to be negative and it seems to be the case in rural eastern Belgium. But this is clearly not the case for southern Sweden and northeastern Japan. Instead, if this factor was a proxy of crowding, the findings suggest that the elderly in Scania and elderly men in northeastern Japan were vulnerable to health risks caused by crowding in household. No matter which the explanation is, however, we cannot find consistent explanations to account for the whole picture. It is probably the case that in different family systems and economic contexts the number of working-age adults in household meant and measured different factors of old-age mortality.

Turning to the effects of the two variables of household age composition (the proportions below age 15 and above age 55), we can see that these compositional factors did not significantly affect the mortality of elderly men and women in our rural populations in Europe and East Asia. The only exception was men in Shimomoriya and Niita. The likelihood of death of elderly men in these two Japanese villages increased significantly as the proportion of household members above age 55 went up. Because many of the households with a high proportion of members above age 55 were those in which elderly men lived alone with their wife, it is possible that this variable captures the deteriorating effect on old-age mortality of the lack/absence of adult children and other adults in household.

As discussed earlier in the paper, an important work by Chayanov (Thorner et al. 1966) postulates the mortality-lowering effect of household labor capacity and the mortality-enhancing effect of consumer-worker ratio within household. Our findings suggest that empirical evidence does not render a strong support to these theoretical arguments at least from the viewpoint of micro-level analysis. Number of working-age adults and age composition within household did not have strong and consistent effects on mortality of elderly men and women in the pre-industrial rural communities in Europe and East Asia. Household structure and composition did not seem to matter much even at the times of economic downturn, as interactions of these factors with local grain prices were all insignificant (results not shown).

(4) Effects of Individual Statuses within Household

We next turn to the effects of marital status and household relationships, i.e. demographic and household characteristics measured at individual levels. Table 11.7 presents the estimated effects of marital status on the mortality of elderly men and women in rural settings in the five historical societies.[16] As expected, in most of our populations, widowhood was associated strongly with mortality. In Sart in eastern Belgium the mortality of widowed men was significantly higher than that of currently married men. On the other hand, in the two East-Asian populations under consideration,

[16] As found by a number of previous studies (e.g., Helsing and Szklo 1981; Niemi 1979; Martikainen and Valkonen 1996; Nystedt 1999), the mortality effect of widowhood tends to decrease through time from the death of the spouse. Our analyses estimate the average (general) effect of widowhood.

the mortality of widowed elderly of both sexes was significantly higher than men and women whose spouse was alive. Especially in the two northeastern Japanese villages the loss of spouse for any reasons (not only by the death of spouse but also by divorce) seems to have increased the likelihood of death of elderly men.[17]

[Table 11.7 about here]

Turning to the other measures of individual household status, namely, household relationships of individual elderly men and women, we can see from Table 11.8 that in the European populations household relationships did not result in significant mortality differences. On the other hand, in the two northeastern Japanese villages, being stem kin of head significantly reduced mortality of elderly women.[18] Relative to women who were spouse of head, women who were stem kin (mothers and grandmothers) of head had much better chances of survival in old age. Studies on mortality in pre-industrial Japanese villages found that during adulthood (at ages 15-54) women who were spouse of stem-kin of head (most of whom were daughters-in-law of head) suffered a much higher mortality, compared to women who were head's wives (Skinner 1993; Tsuya and Kurosu 2000). These results together imply the structural advantage brought about by the privileged status of mothers-in-law in pre-industrial rural Japanese household. In these Japanese villages in which marriage was early and universal (Tsuya and Kurosu 1999), if women were robust enough to survive through their years as daughters-in-law and lucky enough to have their children succeed the headship, they enjoyed a much better chance of survival.[19]

[Table 11.8 about here]

(5) Effects of the Presence of Children

Table 11.9 presents the estimated effects of presence of children on old-age mortality in the five historical societies. As shown in the table, though the effects are not necessarily significant and consistent, the presence of adult children in general helped elderly men and women counter health risks. The mortality-reducing effects of presence of children were especially strong and notable in the two Italian parishes. In Sart in eastern Belgium presence of only married or only unmarried children reduced the mortality of elderly men significantly with significant interaction with grain price fluctuations (results not shown). This suggests that the presence of children help elderly

[17] Given the high geographical mobility of the population in Madregolo (Lagazio et al. 1998), it is likely that widowed elderly women in the community was a highly selective group as many elderly women would have moved out of the community upon the loss of their husband.

[18] Lee and Campbell (1997) found that, compared to other male household members, household heads had significantly higher mortality in rural Liaoning in the Qing China.

[19] In the Chinese population men who were stem kin of head had significantly lower mortality than men who were heads. Unlike in pre-industrial villages in northeastern Japan in which male household heads passed the headship to their sons and sons-in-law in their mid-fifties and early sixties (Okada and Kurosu 1998), in Liaoning men were likely to hang onto the headship until their death. Under this context, elderly men who were stem-kin of head (who were retired fathers or sons of head) were a small minority in exceptional situations. We therefore do not interpret this finding in the text.

men counter health risks at the time of economic hardships though coresiding children did not make a notable difference in the likelihood of their survival in ordinary times.

[Table 11.9 about here]

On the other hand, in the East-Asian populations, the effects of presence of children on old-age mortality were, though significant, more limited. In Liaoning the presence of unmarried children helped improve chances of survival of elderly men and the presence of children of any marital status helped reduced the mortality of elderly women. In Shimomoriya and Niita, in clear contrast to the case of Liaoning women, mortality of elderly women *increased* significantly when they have only unmarried children living with them (but not when all or some of coresident children were married), relative to women who did not have any coresiding children. Given the patrilineal stem family *system* (not stem-family households) prevalent in pre-industrial northeastern Japan, having only unmarried children at home probably indicated a poverty or disability in contrast to Europe in which this was a normal consequence of the marriage system. At least, this meant that elderly women in these northeastern Japanese villages did not have any coresident children-in-law, especially daughters-in-law who could have taken over some of household tasks and responsibilities. This in turn suggests that women with only unmarried children were worse off than women without any children living with them probably because the burden of taking care of unmarried children without the help from married children and their spouse overweighed the benefits brought about by children's labor and support.

SUMMARY AND DISCUSSION

Life in pre-industrial societies was unsure. Only a minority succeeded in surviving to old age. This study shows that elderly men and women in rural communities in five historical Eurasian societies were a selected minority who managed to 'beat' the races of survival. Once they survived through the years of high health risks such as infancy and childhood and, for women, reproductive ages, they enjoyed life expectancies not so different from those in contemporary post-transitional populations.

This study also identified significant East-West differences in the overall levels of elderly mortality, with the Western European populations (eastern Belgium and southern Sweden) at the low end and the East Asian populations (northeastern China and northeastern Japan) at the high end, with a Mediterranean population, northern Italy in the middle. We also found that within the two regions (Europe and East Asia) and also within each country, there were differences in the level of survival by the climatic/environmental differences and economic development. The level of old-age mortality was in general higher in countries and communities with less favorable economic and geographic conditions.

Event history analyses of mortality responses to local economic variations reveal that old-age mortality in these pre-industrial rural populations in Europe and East Asia was in general vulnerable to price fluctuations. When local grain prices increased, the likelihood of death among the elderly also had a tendency to increase though the degree of mortality responses was different by sex and community.

The multivariate analysis of the mortality effects of household socioeconomic status showed no discernable consistent patterns in the pre-industrial European and East-Asian populations under consideration. There were no notable differences in old-age mortality by their household socioeconomic status with the exception of two northeastern Japanese villages in which household resources (as measured by household landholding) clearly helped old men and women avoid mortality risks in old age. Similarly, none of the three household structural variables--the number of working-age adults in household and the compositions of members below age 15 and above age 55--were found to have strong and systematic effects in terms of mortality differences between/among the European and the East-Asian populations. This suggests that, contrary to what Chayanov (Thorner et al. 1966) argued, labor capacity and consumer-worker ratio in within household did not strongly affect the mortality of elderly men and women in rural communities at least in multivariate contexts.

On the other hand, we found stronger and more consistent effects of *individual-level* demographic and household characteristics on old-age mortality. In most of our rural populations in pre-industrial Europe and East Asia, widowhood was found to have significantly raised mortality in old age, supporting findings from many existing studies on the mortality effects of marital statuses in historical and contemporary populations (e.g., Cornell 1989; Goldman 1993a, 1993b; Hu and Goldman 1990; March 1912; Neven 1998; Nystedt 1999; Tsuya and Kurosu 1998). As argued by Cain (1981, 1983) in his studies of contemporary South Asia, our findings also show that the presence of adult children helped elderly men and women counter mortality risks under various situations in pre-industrial rural communities. And this was especially the case for elderly in three European populations.

Life of the elderly in pre-transitional rural societies was vulnerable to changes in local economic conditions. However, coresident spouse and adult children helped these rural men and women survive health risks in old age. In a pre-industrial Europe and East Asia, the systems of social welfare and social security in the public domain were underdeveloped. Under such circumstance, it was very important for the elderly to have spouse and children living with them because coresident kin was probably the most important and readily available source of support and protection in old age. Clearly, more studies are needed to account for what old age meant in comparative historical perspective. Intricacies of the causal mechanisms of mortality at the last stages of life also need to be further examined in multi-level comparative context.

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Table 11.1. Summary of Data Used in the Analyses of Old-age Mortality: Ever-Married Males and Females Aged 55-74 in Rural Communities in Five Historical Societies in Europe and Asia

Country & community	Person years			Deaths		
	Male	Female	Total	Male	Female	Total
China:						
Liaoning	30,971	37,526	68,497	1,915	1,815	3,730
Japan:						
Shimomoriya & Niita	8,229	7,712	15,941	361	343	704
Italy:						
Casaliguidi	4,901	4,913	9,814	210	188	398
Madregolo	2,257	1,887	4,144	81	64	145
Belgium:						
Sart	9,473	8,401	17,874	609	543	1,152
Sweden:						
4 Scania parishes	3,449	3,089	6,538	158	155	313
Total	59,280	63,528	122,808	3,334	3,108	6,642

Table 11.3. Life Table Estimates of the Percentage of Survivors and Life Expectancy by Age and Sex among the Elderly in Rural Communities: Five Historical Societies in Europe and Asia

Country, community & period	% surviving to age: 55	60	65	70	75	Life expectancy at age: 55	60	65	70	75
China[a]:										
Liaoning North 1789-1909										
Male	35.6	29.0	22.7	16.0	9.9	14.5	12.2	9.9	8.0	6.4
Female	27.4	24.1	19.8	14.6	9.6	16.4	13.3	10.6	8.5	6.6
Liaoning South 1789-1909										
Male	40.7	34.0	26.6	19.1	13.0	16.0	13.6	11.6	10.3	8.9
Female	39.2	34.5	28.8	22.9	15.8	17.3	14.3	11.7	9.0	6.9
Japan[b]:										
Shimomoriya & Niita 1716-1759										
Male	37.6	32.7	28.8	21.8	13.6	16.5	13.6	10.0	7.4	5.4
Female	36.8	32.6	28.1	20.3	11.7	16.0	12.7	9.3	6.9	5.2
Italy:										
Casaliguidi 1819-1859										
Male	39.2	34.7	28.6	21.6	13.1	16.4	13.1	10.4	8.0	6.5
Female	34.5	30.5	24.9	19.2	13.6	17.9	15.0	12.8	10.8	9.2
Madregolo 1800-1883										
Male	41.7	38.1	31.3	24.4	15.6	16.3	12.6	9.8	6.9	4.4
Female	36.6	33.2	29.0	21.8	11.6	16.4	12.8	9.4	6.6	5.2
Belgium:										
Sart 1812-1899										
Male	47.5	40.9	34.3	25.6	15.8	16.2	13.4	10.5	8.1	6.7
Female	45.0	39.5	32.9	23.8	14.2	15.8	12.7	9.7	7.4	5.7
Sweden:										
Four Scania parishes 1815-1865										
Male	43.3	37.4	28.9	20.5	12.1	15.2	12.2	10.1	8.1	6.7
Female	46.9	39.2	30.4	22.0	13.2	14.8	12.2	9.9	7.6	5.7

NOTES: a--Assuming the probability of dying during infancy being .200 for both sexes.
b--Assuming the probability of dying during infancy being .200 for males and .180 for females.

Table 11.2. Means of the Socioeconomic and Household Variables Used for the Event-History Analysis of Mortality of Ever-Married Elderly in Rural Communities: Five Historical Societies in Europe and Asia

Variables	CHINA Liaoning		JAPAN Shimomoriya & Niita		ITALY Casaliguidi		ITALY Madregolo		BELGIUM Sart		SWEDEN Scania	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Socioeconomic Status:												
Head's occupation/status:												
Adult male farmer/peasant	.965	.977										
Artisan	.007	.004										
Soldier	.016	.011										
Functionary	.012	.008										
Hh landholding (in koku)			10.561	11.122								
Head's occupation/status:												
Sharecropper/farmer					.690	.653						
Paid farm laborer					.142	.116						
Artisan/other non-farm worker					.117	.191						
Middle-class					.051	.040						
Cultivator									.826	.747		
Functionary									.024	.028		
Artisan & industrial workers									.058	.052		
Day laborers									.057	.057		
Miscellaneous									.117	.117		
Freeholder/crown tenant											.165	.100
Tenant on noble land											.191	.229
Semi-landless											.227	.225
Landless											.417	.447
Household Characteristics:												
No. of adults in household	5.712	5.413	2.323	2.277	3.053	2.724	3.705	3.554	2.435	2.375	4.162	3.900
Proportion below age 15	.141	.141	.181	.194	.192	.166	.216	.204	.209	.135	.23	.21
Proportion above age 55	.321	.322	.408	.421	.323	.373	.303	.355	.337	.380	.24	.25
Marital Status:												
Currently married	.682	.503	.774	.600	.807	.517	.754	.614	.556	.408		
Widowed	.318	.497	.155	.353	.193	.483	.246	.386	.444	.592		
Divorced			.045	.015								
Unclear if widowed/divorced			.026	.032								

Table 11.2 - Continued

Variables	CHINA Liaoning		JAPAN Shimomoriya & Niita		ITALY Casaliguidi		ITALY Madregolo		BELGIUM Sart		SWEDEN Scania	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Household Relationship:												
Head	.671	.046	.492	.050	.927	.281	.943	.177	.886	.000		
Spouse of head	.000	.367	.003	.232	.000	.493	.000	.598	.000	.866		
Stem kin of head	.045	.298	.482	.699	.007	.158	.038	.168	.049	.055		
Non-stem kin of head	.284	.289	.009	.007	.066	.056	.016	.056	.068	.079		
Servant/other	.000	.000	.014	.012	.000	.012	.003	.002	.000	.000		
Presence of Children:												
None	.187	.208	.227	.244	.183	.300	.263	.334	.121	.154		
Only unmarried	.226	.164	.300	.353	.490	.334	.320	.236	.531	.435		
Only married	.437	.497	.076	.037	.120	.166	.200	.223	.209	.246		
Both	.150	.131	.366	.344	.207	.200	.217	.207	.139	.164		
Child's marital status unknown			.031	.022								
Any marital statuses											.579	.505

NOTE: Means are computed based on the number of person years observed/recorded.

Table 11.4. The Estimated Effects of a One-unit Increase in Logged Prices on the Mortality of Ever-Married Elderly Males and Females in Rural Communities: Five Historical Societies in Europe and Asia

Country & community	Male		Female	
	Risk ratio	p-value	Risk ratio	p-value
China:				
Liaoning North 1789-1909	1.24	0.01	0.99	0.88
Liaoning South 1789-1909	0.85	0.13	0.98	0.82
Japan:				
Shimomoriya & Niita 1716-1870	2.16	0.00	1.09	0.64
Italy:				
Casaliguidi 1819-59	0.98	0.96	4.62	0.00
Madregolo 1800-83	1.54	0.27	2.30	0.047
Belgium:				
Sart 1812-99	0.55	0.11	0.67	0.35
Sweden:				
4 Scania parishes 1829-67	1.79	0.13	1.96	0.08

NOTES: The above values are estimated by controlling for the effects of age, household/household head's socioeconomic status (except for Madregolo), time period (in Belgium and Japan), and community (in Sweden and Japan). Prices used are: for Belgium, log of differences from trend in oats prices lagged one year; for Sweden, inverse of logged real wages; for Italy, log of raw wheat/corn prices; for China, logged raw sorghum prices; and for Japan, log of raw rice price. In the models for Belgium, the trends in oats prices are also controlled.

Table 11.5. The Estimated Effects of Socioeconomic Status of Household or Household Head on the Mortality of Ever-Married Elderly Males and Females in Rural Communities: Five Historical Societies in Europe and Asia

Country & community	Indicator	Male		Female	
		Risk ratio	p-value	Risk ratio	p-value
China:					
Liaoning	Occupation of self, husband, or father:				
	Adult male farmer	1.00	--	1.00	--
	Artisan	0.91	0.74	0.41	0.12
	Soldier	1.35	0.06	0.55	0.06
	Functionary	1.30	0.16	1.04	0.90
Japan:					
Shimomoriya & Niita	Household landholding (in *koku*)[a]	0.98	0.02	0.98	0.01
Italy:					
Casaliguidi	Head's occupation:				
	Sharecropper/farmer	1.00	--	1.00	--
	Paid farm laborer	1.13	0.55	1.03	0.91
	Artisan/blue collar	0.89	0.62	1.42	0.05
	Middle class	0.76	0.44	0.55	0.25
Belgium:					
Sart	Head's occupation:				
	Cultivator	1.00	--	1.00	--
	Functionary	1.01	0.98	0.39	0.04
	Artisan/industrial worker	0.87	0.46	1.39	0.09
	Day laborer	0.98	0.92	1.24	0.22
	Miscellaneous	1.53	0.02	1.02	0.89
Sweden:					
4 Scania parishes	Head's occupation:				
	Freeholder	1.00	--	1.00	--
	Tenant on noble land	0.88	0.74	0.94	0.88
	Semi-landless	0.66	0.17	0.67	0.26
	Landless	0.94	0.82	0.82	0.53

NOTES: The above values are estimated by controlling for the effects of age, price variations, time period (for Belgium and Japan), and community (for the pooled populations in Sweden, China and Japan).

a-Given that the villages were exclusively agricultural, head's occupation was almost totally farmers and peasants. Landholding being zero means landless peasants; landholding of around 12 *koku* is the average; and landholding of 30 *koku* belonged to top 5 percent.

Table 11.6. The Estimated Effects of Household Characteristics Measured at Household Level on the Mortality of Ever-Married Elderly Males and Females: Five Historical Societies in Europe and Asia

Country & community	Characteristics	Male		Female	
		Risk ratio	p-value	Risk ratio	p-value
China:					
Liaoning	# of adults in hh	1.00	0.39	1.00	0.62
	Prop. below age 15	0.94	0.74	1.14	0.50
	Prop. above age 54	0.80	0.11	0.92	0.54
Japan:					
Shimomoriya & Niita	# of adults in hh	1.08	0.05	0.98	0.75
	Prop. below age 15	1.42	0.28	0.72	0.62
	Prop. above age 54	1.88	0.00	1.04	0.92
Italy:					
Casaliguidi	# of adults in hh	0.91	0.15	1.08	0.22
	Prop. below age 15	0.45	0.18	2.22	0.11
	Prop. above age 54	0.50	0.24	2.45	0.10
Madregolo	# of adults in hh	0.98	0.69	1.04	0.54
	Prop. below age 15	2.22	0.33	2.70	0.21
	Prop. above age 54	1.22	0.32	2.22	0.32
Belgium:					
Sart	# of adults in hh	0.97	0.49	0.89	0.05
	Prop. below age 15	1.49	0.16	1.25	0.49
	Prop. above age 54	0.93	0.82	0.64	0.17
Sweden:					
4 Scania parishes	# of adults in hh	1.07	0.01	1.06	0.18
	Prop. below age 15	1.19	0.73	0.67	0.45
	Prop. above age 54	1.81	0.37	1.34	0.66

NOTES: The above values are estimated by controlling for the effects of age, price variations, socioeconomic status of household/household head (except for Madregolo), time period (for Belgium and Japan), and community (for the pooled populations in Sweden, China and Japan). "Adults" in the table refer to persons aged 15-55.

Table 11.7. The Estimated Effects of Marital Status on the Mortality of Ever-Married Elderly Males and Females in Rural Communities: Five Historical Societies in Europe and Asia

Country & community	Marital status	Male		Female	
		Risk ratio	p-value	Risk ratio	p-value
China:					
Liaoning	Currently married	1.00	--	1.00	--
	Widowed	1.10	0.06	1.23	0.00
Japan:					
Shimomoriya & Niita	Currently married	1.00	--	1.00	--
	Widowed	1.50	0.00	1.31	0.01
	Divorced	1.30	0.15	0.82	0.71
	Unclear if wid./div.	1.35	0.14	1.26	0.35
Italy:					
Casaliguidi	Currently married	1.00	--	1.00	--
	Widowed	0.97	0.56	0.82	0.15
Madregolo	Currently married	1.00	--	1.00	--
	Widowed	0.69	0.20	0.23	0.17
Belgium:					
Sart	Currently married	1.00	--	1.00	--
	Widowed	1.21	0.03	1.09	0.37

NOTES: The above values are estimated by controlling for the effects of age, price variations, socioeconomic status of household/household head (except for Madregolo), household relationship, presence of children, time period (for Belgium and Japan), and community (for the pooled populations in China and Japan).

Table 11.8. The Estimated Effects of Individual Household Relationships on the Mortality of Ever-Married Elderly Males and Females in Rural Communities: Five Historical Societies in Europe and Asia

Country & community	Relationships	Male		Female	
		Risk ratio	p-value	Risk ratio	p-value
China:					
Liaoning	Head	1.00	--	0.87	0.28
	Spouse of head	--	--	1.00	--
	Stem kin of head	0.53	0.00	1.03	0.70
	Non-stem kin of head	0.92	0.11	1.02	0.84
Japan:					
Shimomoriya & Niita	Head	1.00	--	0.65	0.29
	Spouse of head	--	--	1.00	--
	Stem kin of head	1.15	0.21	0.58	0.07
	Non-stem kin of head	0.70	0.60	1.13	0.82
	Servant/other	0.95	0.92	0.46	0.63
Italy:					
Casaliguidi	Head	1.00	--	1.15	0.75
	Spouse of head	--	--	1.00	--
	Stem kin of head	2.44	0.25	0.98	0.96
	Non-stem kin of head	0.78	0.43	0.75	0.52
	Servant/other	--	--	1.65	0.42
Madregolo	Head	1.00	--	4.40	0.20
	Spouse of head	--	--	1.00	--
	Stem kin of head	0.98	0.97	4.25	0.19
	Non-stem kin of head	1.64	0.64	2.47	0.22
Belgium:					
Sart	Head	1.00	--	--	--
	Spouse of head	--	--	1.00	--
	Stem kin of head	0.90	0.58	0.85	0.37
	Non-stem kin of head	1.04	0.82	1.03	0.85
Sweden:					
4 Scania parishes	Head/kin of head	1.00	--	--	--
	Servant/other	1.20	0.57	--	--

NOTES: The above values are estimated by controlling for the effects of age, price variations, socioeconomic status of household/household head (except for Madregolo), marital status (except for Sweden), presence of children, time period (for Belgium and Japan), and community (for the pooled populations in Sweden, China and Japan).

Table 11.9. The Estimated Effects of Presence of Children on the Mortality of Ever-Married Elderly Males and Females in Rural Communities: Five Historical Societies in Europe and Asia

Country & community	Presence of children	Male		Female	
		Risk ratio	p-value	Risk ratio	p-value
China:					
Liaoning	None	1.00	--	1.00	--
	Only unmarried	0.85	0.04	0.78	0.00
	Only married	1.02	0.73	0.90	0.10
	Both	1.01	0.92	0.82	0.02
Japan:					
Shimomoriya & Niita	None	1.00	--	1.00	--
	Only unmarried	0.92	0.75	1.45	0.08
	Only married	0.78	0.26	1.13	0.44
	Both	0.92	0.75	0.99	0.97
	Child's marital status unknown	1.29	0.32	0.88	0.84
Ialy:					
Casaliguidi	None	1.00	--	1.00	--
	Only unmarried	0.32	0.00	0.37	0.00
	Only married	0.27	0.00	0.46	0.00
	Both	0.33	0.00	0.40	0.00
Madregolo	None	1.00	--	1.00	--
	Only unmarried	0.17	0.00	0.23	0.00
	Only married	0.22	0.00	0.37	0.01
	Both	0.25	0.00	0.35	0.01
Belgium:					
Sart	None	1.00	--	1.00	--
	Only unmarried	0.98	0.83	0.89	0.34
	Only married	0.95	0.71	1.01	0.94
	Both	1.17	0.23	1.10	0.46
Sweden:					
4 Scania parishes	No	1.00	--	1.00	--
	Yes	0.87	0.61	1.26	0.29

NOTES: The above values are estimated by controlling for the effects of age, price variations, socioeconomic status of household/household head (except for Madregolo), marital status (except for Sweden), household relationship (except for Swedish females), time period (for Belgium and Japan), and community (for the pooled populations in Sweden, China and Japan).