Retirement Decisions of Married Couples

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Abstract

In this paper we construct a simple structural dynamic model of retirement in which partners make joint retirement decisions, based on their age, current health and expected health. We estimate the model using the Israeli SHARE data. The model generates a predicted probability of retirement of each spouse for every year in which the husband age is between 55 and 75. Based on these predicted probabilities we define a synchronization index, which measures difference between the probability that both partners will be in the same state (retired or working) and the probability that they will be in a different state (one works and the other is retired). We show that couples actually synchronize their retirement decisions. We then use the model to simulate the predicted impact of the recent changes in official retirement ages of men and women in Israel on synchronization of retirement decisions.

1 Introduction

There is accumulating evidence of a positive correlation in the retirement decisions of married spouses (see, Hurd, 1990, Gutsman and Steinmeier, 2000, Coile, 2004, Queiroz, 2006 and Kapur & Rogowski, 2006).[1] There may be several reasons for such a correlation:

- The partners can be tied through the budget constraint. Thus, poor couples may be forced to delay the retirement of both spouses, while rich couples can afford to "purchase" leisure for both of them.
- Married partners are selected to have similar preferences and thus would make, independently, similar choices.
- The preferences of married partners may be linked. For instance, each one of them may have a larger marginal utility from leisure if their spouse consumes more leisure. Thus, even if the partners act independently, their choices of retirement are correlated, as each one of them is more inclined to retire if his\her spouse retires.

[1] Hurd (2000) reports that a postponement of one year in the husband's retirement age delays the wives retirement age by about 3 months.

- The partners can go further and *coordinate* their retirement by choosing a joint strategy that maximizes some common objective, such as the sum of their utility. This is indeed the natural outcome if the partners can transfer resources among themselves at a fixed rate of exchange (transferable utility). Then, both partners would agree to maximize the *sum* of their utilities, irrespective of the actual division of this sum. Of course, the fact that partners are linked and care about each other does not imply that they retire together and coordination may also imply negative correlation in retirement decision, as would be the case if one partner becomes sick and his\her spouse is forced to retire later.[2]

  In this paper we construct a simple structural dynamic model of retirement in which partners make joint retirement decisions, based on their age, current health and expected health. We estimate the model using the SHARE data.[3] The model generates a predicted probability of retirement of each spouse for every year in which the husband age is between 55 and 75. Based on these predicted probabilities we define a synchronization index, which measures difference between the probability that both partners will be in the same state (retired or working) and the probability that they will be in a different state (one works and the other is retired). We present here results for Israel, which show that couples actually synchronize their retirement decisions. We then use the model to simulate the predicted impact of the recent changes in official retirement ages of men and women on synchronization of retirement decisions. During the sample period, the official retirement dates were 65 for man and 60 for women. However, in 2004 a new law was introduced which raised the retirement ages to 67 for men and 64 for women. These changes were imposed gradually and are expected to be completely effective by 2011. These changes have two distinct effects: 1) The common rise in the age of retirement may induce *both* partners to delay their retirement and thereby increase their coordination. 2) The law has also reduced the difference between the official retirement ages of men and women, which is also likely to increase coordination. We intend to test which types of couples are more likely to be influenced by this change of policy.

2 A first look at the data

To focus on the retirement choices, we look at the work patterns of husbands and wives when the husband's age is between 55 and 75 years. The reason for this restriction is that work patterns at older ages are no longer a matter of choice, as most men over 75 retire and their wife does not work either, while most men under 55 work and many of their wives work too. We use the *retrospective*

[2] Queiroz (2006) reports that an increase in the age difference between spouses, or if one of the partners is sick, reduces the probability that both spouses work.

[3] The precipitating countries are :Austria, Belgium, Denmark, France, Germany, Greece, Israel, Italy, Netherlands, Spain, Sweden and Switzerland.

aspects of the survey, specifically the age of retirement of the two spouses, to generate work histories for husbands and wives. We can thus record not only if the husband and wife worked at at the survey year (2005-2006) but also record the *work history* of each couple. However, the panel is unbalanced in the sense that different couples have histories of different length. Only men who were over 75 at the survey can provide a complete work history for the selected 20 years, while younger men provide shorter histories and couples in which the husband is younger than 55 are not included in the restricted sample. The sample used for analysis includes 442 couples and 5654 panel observations. Thus on the average each couple provides information on about 13 years.

Table 1 describes our sample at the *survey* year, classified by the age of the husband. In each row we provide the sample size, the mean wage of the wife and the average work and health patterns of the husbands and wives. Health is measured by two indices; having a moderate illness (e.g. blood pressure, high cholesterol, asthma, rheumatism) or a severe illness (e.g. heart attack, stroke, cancer).Table 2 provides the same information for the *panel* sample that we use for estimation. The difference between the two samples is that the panel sample includes retrospective data and, therefore, the number of observations for every age group (except for 75) is larger and the time patterns are smoother. We shall therefore elaborate here only on the patterns recorded in Table 2. As the husband gets older, the age gap between husband and wife rises from 1.5 years when the husband is 55 to 6 years when he is 75. The proportion of husbands that work decline from .96 at age 55 to .13 at age 75 with a sharp decline around retirement age of 65 (from .69 at age 63 to .29 at age 67. Wives usually work less than their husbands (despite being younger) and the proportion of wives that works declines from .71, when the husband is 55, to .13 when he is 75. The proportion of husbands who are severely sick rises from .13 at age 55 to .49 at age 75. The health of the wife is typically better than that of her husband and the proportion of wives that are severely ill rises from .04 when the husband is 55 to .29 when the husband is 75.

Figures 1a and 1b show the empirical hazard of married men and women to retire when the husband's age is 55 to 75 years old (conditioned on working when the husband is 55). For married men the Hazard peaks at age $65-66$ old and for married women the hazard is generally rising, with a local peak when the husband's age is 66. Figure 2a and 2b present the changes in the proportion of husband and wives that work as a function of the age of the husband, when he is between 55 and 75 years old. The decline in the proportion of working husbands is very fast when the husband's age is close to 65, dropping from .81 at age 60 to .23 at age 70. At the same time, the wives of these men, who are on the average four years younger, reduce their work effort at a more moderate rate from .64. to .18. The proportion of couples in which *both* partners work declines from .55 when the husband is 60 to .07 when he is 70 (Figure 3). Correspondingly, the proportion in which *both* partners do *not* work rises sharply from .10 when the husband is 60 to .65 when the husband is 70 (Figure 4). The proportion of couples in which the wife has retired and only the husband works drops from about .32 when the husband is 60 to about .17 at age 70 (Figure 5) while the proportion of couples in which the husband has retired and only the wife works peaks at .19 when the husband is about 66 (Figure 6). The patterns in figures 5 and 6 suggest that some men retire earlier than the mandatory retirement at 65, because their wife has already retired, and some women postpone their retirement beyond their official retirement date at 63, because their husband has not retired yet.

Figure 7a shows the proportion of couples in which *both* partners act in the *same* manner, that is, both of them work or both of them do not work. This index of synchronization is obviously higher when the husband is relatively old, so that both spouses are likely to retire, and when the husband is relatively young and both spouses are more likely to work. However, the fact that this proportion always exceeds half suggests synchronization in the retirement decision as well. One may ask, however, whether this synchronization is due to some coordination of actions within married couples or reflects sorting, whereby spouses are of similar in age and schooling and thus behave in a similar manner. A simple way to address this issue is to compare observationally identical couples in which the husband and wife have the same schooling, the same age and the same health when the couple firstly observed (both are healthy when the husband's age is 55) and examine whether the behavior of the man and woman in two different such couples are correlated. [4] Assuming, of course, that such artificial couples are subject to independent shocks to health and other unobservables and do not coordinate their work choices. We can also create artificial couples in which each man is assigned a random wife that may have different attributes than his current wife. Such comparisons are presented in Figures 7b and 7c. It is seen that married couples synchronize substantially more than random couples of men and women and slightly more than artificial couples with the same schooling and age and with the same health when the husband's age is 55.

In tables 1 to 4, we bring some evidence on variables that may influence the joint retirement decision. We use age and health as the time varying explanatory variables. Health is measured by two indices 1. Having only a moderate illness (e.g., blood pressure, high cholesterol, asthma, rheumatism) or a severe illness (e.g., heart attack, stroke, cancer). In Table 2, we see that, as the husband's age rises, the proportion having a moderate or a severe illnesses rises from .48 at age 55 to .82 at age 75 and the proportion having a severe illnesses rises from .13 at age 55 to .49 at age 75. Wives who are, on the average 4 years younger than their husband are also are healthier. When their husband's age rises from 55 to 75, the proportion of wives with moderate or severe health problem rises from .32 to .75 and the proportion with severe health problem rises from .04 to .29. Table 3 shows the transition rates across health states, where the transitions are estimated by multinomial logit if a person is healthy (and can either remain healthy or become moderately sick or severely sick) or logit if a person is already moderately sick and can either remain moderately sick or become severely sick).

[4] Health is measured in this case at the beginning of the sample period, when the husband is 55.

The coefficients of these logisitic regressions are allowed to depend on the person education and age. It is seen that the probability of a man who is healthy at age 60 to be severely sick at age 70, is quite high, .23. This probability is substantially smaller for women, .12. However, women have a higher conditional probability to be moderately sick at age 70 (.53 for women compared to .33 for men).

Table 4 brings evidence, on the schooling levels of husbands and wives. As is well known, there is a strong sorting on schooling and in about 50 percent of the couples, the husband and wife have the same schooling, while large gaps in schooling are relatively rare.

3 A model

Consider a couple that coordinates the work activities of the two spouses and maximizes some joint objective. We indicate the husband by a subscript h and the wife by a subscript w. In any period, t, the couple jointly determines the work status of both partners, given the constraint that retirement is irreversible. In the beginning of the period, a partner can be either retired or not and we denote by R_t the retirement status of the two partners (including four possibilities, both spouses work, husband works and the wife is retired, the wife works and the husband is retired, both retired). Another state denoted by H_t is the health status of the two partners at the beginning of period t, where each spouse can be either in one of three states, healthy, moderately sick and seriously sick. Health evolves exogenously and independently for the two spouses, according to a Markovian process in which the transition probabilities depend on the age and schooling level of each spouse. We assume that health cannot improve and that once a person is in bad health he remains in that state. For simplicity, we also assume that, conditioned on having lived up to age 55 the probability of dying between ages 55 to 75 is zero. Based on these assumptions, we can estimate from the sample a transition matrix, $\pi_{ij}(t)$, where i is the one of the 9 possible states (of both partners) in year t and j is one of the possible 9 states for the joint health status of the two spouses in year $t+1$. We shall assume that partners base their retirements decisions on this transition matrix. In particular, they form expectations on their future health based on current realizations.

Having observed their health state, the spouses can decide on whether one or both should retire. The irreversible retirement choices are determined using the value function associated with each state,

$$V_t(R_{t-1}, H_t, x, y) + \varepsilon_{jt}. \tag{1}$$

The variables x and y denote the fixed attributes of the husband and wife, such as schooling and age at marriage and ε_{jt} is an unobserved i.i.d. variable that describes the idiosyncratic preference for each of the work activities. The value function is defined recursively by the Bellman equation

$$V_t(R_{t-1,}, H_t, x, y) = f_t(R_{t-1,}, H_t, x, y) + \sum_{j=1}^{9} \pi_{1j}(t) E\{ \underset{j \in J(R_{t-1})}{Max} [V_{t+1}(j, H_{t+1}, x, y) + \varepsilon_{jt}]\}, \tag{2}$$

with the end condition that, for the last period T, $V_{T+1}(R_t, H_{T+1}, x, y) = 0$ irrespective of the state. The term $J(R_{t-1})$ denotes the set of of feasible work choices at time t, given R_{t-1}. Specifically, a spouse that was retired in period t cannot work in period $t+1$. The function $f_t(R_{t-1}, H_t, x, y)$ describes the per-period utility from being in a particular state at age t. An important feature of this function is that it changes when a person reaches the official retirement date, because of contractual or institutional changes such as social security benefits (taxes) or pension programs that occur at that age. Given a specification for the function $f_t(R_{t-1}, H_t, x, y)$ and the distribution of ε_s, it is possible to estimate the impact of attributes on the observed choices and the *probability* that each work state is observed, conditional on the attributes of the two partners, their realized health status and their expectations regarding future health.

The question whether partners synchronize their labor activities can be translated to the question whether, conditioned on their attributes and age, they are more likely to choose *similar* actions (i.e., either both partners work or both partners do not work) or *different* actions (i.e., only the husband work or only the wife works). For any particular couple with husband's attributes x and wife's attributes y, we measure the degree of synchronization at time t

$$\begin{aligned} I_t(x, y) &= \\ [pr\{\text{both work} &\mid x, y\} + pr\{\text{both do not work} \mid x, y\}] \\ -[pr\{\text{hus. works, wife retired} &\mid x, y\} + pr\{\text{wife works, hus. retired} \mid x, y\}] \end{aligned} \tag{3}$$

This index equals 1 if, conditioned on attributes, the probability that either both partners are retired or both of them are not retired is one (i.e. full synchronization). It equals -1 if whenever one spouse works the other does not work. Equivalently, we can write

$$\begin{aligned} I_t(x, y) &= \\ pr\{\text{hus. works} &\mid x, y\}[pr\{\text{wife works} \mid \text{hus. works}, x, y\} - pr\{\text{wife retired} \mid \text{hus. works}, x, y\}] - \\ pr\{\text{hus. retired} &\mid x, y\}[pr\{\text{wife works} \mid \text{hus. retired}, x, y\} - pr\{\text{wife retired} \mid \text{hus. retired}, x, y\}] \end{aligned} \tag{4}$$

It is seen that synchronization depends on the interaction in choices, given the couple's attributes. That is, whether, given x, y, the husband (wife) is more likely to retire when the spouse is retired or when that spouse is still working. It seen that $I_t(x, y) = 0$ when these actions are independent. However, in addition to the conditional probabilities, $I_t(x, y)$ depends on the probability that each spouses works. If for some unobserved reason (e.g. custom), the probability that the husband works is larger than the probability that the wife works at given x, y then it is less likely that two spouses will make the same work choice.

Finally, the index $I_t(x, y)$ also depends on the observed attributes of the spouses and one would expect to see more synchronizations among couples with similar attributes.

We remark that other studies usually measure complementarity or substitution in terms of the conditional probabilities (e.g., Hurd, 2000), based on the presumption that the partners do not cooperate and each one of them takes the decision of the other as given. Our approach that looks at the joint probabilities is more natural when the spouses cooperate and the work choices of the two spouses are jointly determined.[5]

4 Implementation

To implement these ideas, we assume that the per period utility $f_t(R_{t-1}, H_t, x, y)$ is piecewise linear in the current age of the two spouses and quadratic in their age difference. Specifically, the effects of age of each spouse are captures by piece wise linear function for each alternative of the form

$$\begin{array}{rcl} c + \alpha t \ \text{ if } t & < & \tau, \\ c + \alpha t + \beta(d_1 + d_2)t \ \text{ if } t & \geq & \tau, \end{array} \tag{5}$$

where t is current age and τ is the mandatory age of retirement, set here at 65 for men and at 60 for women and d_1 is an indicator whether a worker is self employed or salaried and d_2 is and indicator whether or not a person has a pension. The interaction in ages is captured by adding the square of the (fixed) age difference between husband and wife and in addition by dummy variables that indicate if the husband is older than his wife by more than 3 years or the wife is older than her husband. Current health is captured by a dummy variable for each spouse (had a major health problem prior to age t or not) and the interaction in health is captured by the product of these variables. For simplicity, we assume that being in moderate health affects only the expectations of falling into bad health but has no direct effect on the per period utility, which only depends on whether a person is seriously ill or not. The schooling level of each spouse is represented by dummy variables indicating five levels of schooling (less than high school, high school, some-college, college and more than college (MA or Ph.D.). Interaction terms are added that indicate whether the husband has the same, more or less schooling than his wife. We shall assume that the unobserved elements ε_s are identically and independently distributed according to the extreme value distribution, yielding the logit discrete choice model. In the dynamic context discussed here this specification provide an explicit formula

[5] Non cooperative behavior can be rejected if the choices of the wife (husband) depend on the husband's (wife) attributes in addition to her/his behavior. In the unlikely case in which the researcher observes all relevant attributes, a cooperative behavior can be rejected if, given the attributes of both spouses, the behavior of the husband (wife) affects the behavior of his (her) wife (husband). Given that some attributes are unobserved, it is more difficult to reject cooperation.

to the expectation in equation (2) (see Rust, 1989) Specifically if there are J feasible choices then

$$E\{\underset{j\in J(R_{t-1})}{Max}[V_{t+1}(j,H_{t+1},x,y)+\varepsilon_{jt}]\}=\ln\{\sum_{j\in J(R_{t-1})}\exp\{V_{t+1}(j,H_{t+1},x,y)\}. \tag{6}$$

Based on these specifications, we estimate the choice probabilities conditioned on (x, y) and, from these estimates, we generate an estimate for the the index of coordination $I(x, y)$. We can then identify the degree of complementarity or substitution of the work choices for the two spouses in any couple that we observe in the sample and also generate out of sample predictions for couples with pre specified attributes.

5 Results

The estimated coefficients are presented in Table 5. Good health and schooling generally raise the probability of work. If both partners are healthy then the probability that both work or that only one of them works are higher than in the case in which none of them is healthy. If only the wife is healthy, the probably that only she works rises and the probability that only the husband works declines, relative to the probability that both of them retired. The higher is the education of the wife, the larger is the probability that only she works. The impact of the husband schooling on the family work patterns is much weaker except that, if the husband has an advanced degree, the probability that both partners work or that only the husband work rises. Age has different effects before and after the official retirement ages (65 for men and 60 for women) and there is a marked reduction in the slope and level of the per-period utility when the official retirement age is reached. However, if the husband or wife have been working as self employed in their last job, the impact of crossing the official retirement age is smaller. When the husband and wife get older together, holding the age difference between the spouses constant, the probability that either one or both of them work *rises*. Thus the reduction in work that is observed in the sample must be attributed to the deterioration of health and not to aging as such. A larger (fixed) age difference between the husband and wife raises the probability that only she works and reduces the probability that only the husband works.

Comparing the data to the predictions of the model, we see from Figures 2a up to 7a that the model fits the data very closely with these estimates. However, the coefficients of the model are hard to interpret directly and, therefore, we present here some simulations which display the predicted impact of some key explanatory variables. Specifically, we discuss the effects of changes in health of the two spouses during their late life (when the husband is 55 to 75 years old) and the impact of the time invariant differences in age and schooling between husbands and wives.

5.1 Changes in health

Figures 8a and 8b show the impact of changes in the husband health on his and his wife's work. We set the schooling levels of both husband and wife to a high school degree. The age difference between husband and wife is set at three years and both husband and wife are assumed to work as salaried workers at age 55.

We see that as the husband becomes sick, the probabilities that he works and also that his wife works are reduced. In contrast, when the wife becomes sick the probability that she works declines, but the probability that her husband works rises. These cross effects show that, although the health events are assumed independent, spouses react to the health status of each other. The husband reacts to his wife's illness by raising his work and the wife reacts to her husband's sickness by reducing her work. These results are consistent with comparative advantage of men in market work and of women in home work. Therefore, when the wife is sick the couple purchases more services from outside the household, but when the husband is sick the wife herself provides some of the caring.

5.2 Differences in schooling

To describe the impact of differences in schooling between the spouses on retirement decisions, we examine the impact of own education, holding the education of the spouse fixed at the high school level. As seen in Figures 9a and 9b, an increase in education of each spouse is associated with an increase in work and a delay in the retirement age of each spouse. However, the cross effects on the spouse vary by gender. An increase in the husband's schooling is associated with a mild reduction in the wife's work. In contrast, the impact of the wife's education on the husband is not monotone. An increase of the wife's education is associated with a marked reduction in her husband's work if she has an advanced degree. But if she has a college education, her husband's work increases (Figures 9c and 9d). The degree of synchronization reflects these differences. In figures 9f and 9e, we see that synchronization is highest when one of the spouses has a college degree and the other spouse has a high school degree and is lowest when one of the spouses has an advanced degree and the other has a high school degree. In this regard, there is an optimal distance in schooling. If both partners have the same level of schooling, a high school degree, synchronization is low, mainly because, at this level of schooling, women typically work less than men and some increase in the wife's schooling is required to put the two spouses on equal footing.

5.3 Differences in Age

To describe the impact of age differences between spouses, we use all couples in the sample, keep the age of the husband at its sample value and artificially change the age wife. We generate 3 simulations:

1. The age of the wife is set equal to the age of the husband.

2. The wife's age is reset to be two years younger than the husband.

3. The wife's age is reset to be five years younger than the husband.

We then average the predicted probabilities in each of the simulations and compare them the sample probabilities.

Figures 10a-10e show that equating the wife's age to that of her husband lowers the average probability that both husband and wife work and the average probability that both husband and wife do not work. The only probability that rises is that only the husband works. Consequently, there is large reduction in synchronization; from .27 to .1 when the husband is 60 and from .5 to .33 in age 70. Surprisingly, raising the age discrepancy between the spouses by making the wife 5 years younger than her husband decreases the probability that only the wife works when the husband is over 65 and thereby raises synchronization.

6 The impact of changes in the official age of retirement

The estimated model is suitable to examine the impact of changes in the law regulating the date of retirement and entitlement for social security benefits. During the sample period, the official retirement dates were 65 for man and 60 for women. However, in 2004 a new law was introduced which raised the retirement ages to 67 for men and 64 for women. These changes are imposed gradually and are expected to be completely effective by 2011.

The specification of our model stated in (5) implies that if $\alpha > 0$, $\beta < 0$ and $\alpha + \beta > 0$, as the estimates in Table 5 indicate, then the predicted effect of a delay in the official retirement age is to *raise* the current period utility from work in the time interval between the old and new official retirement ages and leave it unchanged at earlier and later years. Therefore, the model predicts a *postponement* of retirement of both husbands and wives in the sample. Note, however, that in the dynamic context that we employ, anticipated changes in the official can influence the incentive to work *before* the official retirement date, and choices to retire during the interval in which the incentives to retire changed affect future outcomes, because retirement cannot be reversed.

We simulate three hypothetical legal regimes for the retirement ages of women and men and compare them to the current regime in which the wife retires at age 60 and the husband retires at age 65. The alternative retirement regimes are:

64 for women and 65 for men,

60 for women 67 for men,

64 for women 67 for men.

These numbers are chosen to allow a separation between a common delay in retirement age and the narrowing of the gap in the official retirement ages of men and women.

Figures 11a-11d show that compared with the old regime, the new regime in which the wife retires at age 64 and the husband retires at age 67, raises the probability that both the husband and wife work and reduces the probability that both husband and wife do not work. The probability that only the husband works, is reduced when the husband age is less than 65 (because the wife is now more likely to work) but increases at later ages. Similarly, the probability that only the wife works, is reduced when the husband is less than 70 (because the husband is now more likely to work) but increases at later ages. Looking at Figure 11e, we see that synchronization is higher when the husband is less than 67 but lower at later ages. At young ages, postponement is a better option and for both husbands and wives and in later years synchronization declined because some husbands (wives) continue to work while the husband (wife) has already retired for reasons related to health. Such differential retirement decisions become more prevalent, the stronger are the economic or legal incentives to retire late. This can be also seen if we imagine that the new policy consists of *two* sequential hypothetical steps. In the first step, the official retirement age of the wife is set at a new level, 64, while the husband's retirement age stays at the old level 65. Then, in the second stage the retirement age of the wife stays at the new level of 64 and that of the husband is raised to the new level of 67. We see in Figure 11e that in each step synchronization at old age declines. In the first step, this occurs because some the wives continue to work when their husband has already retired and in the second step because some husband will continue to work when their wife has already retired.[6]

[6] An alternative decomposition would be to move the husband first from 65 to 67 (keeping the wife retirement age at 60) and then raise the retirement age of the wife to 64, again it is seen that in each of these steps synchronization declines.

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Table 1: Husband's and Wife's Age, Schooling, Work and Health in the Survey

Husband's Age	Number of Obs.	Wife's Age	Husband Works	Wife Works	Both Work	Husband only Moderately Sick	Husband Seriously Sick	Wife Only Moderately Sick	Wife Seriously Sick
56	16	53.6	.81	.88	.69	.69	.19	.38	.06
57	27	54.8	.96	.70	.67	.48	.15	.70	.07
58	23	55.1	.96	.65	.61	.61	.17	.48	.04
59	18	55.9	.78	.72	.56	.56	.28	.44	.00
60	18	56.7	.78	.67	.56	.39	.17	.67	.06
61	14	58.4	.93	.71	.71	.29	.43	.57	.07
62	15	58.9	.47	.53	.27	.47	.33	.80	.07
63	13	59.2	.54	.46	.23	.54	.23	.54	.00
64	14	60.0	.50	.29	.29	.43	.29	.64	.14
65	16	62.0	.44	.38	.25	.44	.31	.69	.06
66	22	61.8	.41	.32	.23	.64	.18	.55	.14
67	23	64.1	.17	.35	.09	.52	.35	.70	.17
68	26	64.9	.08	.23	.04	.65	.27	.58	.35
69	34	66.2	.15	.21	.09	.59	.29	.68	.15
70	18	65.3	.11	.17	.06	.61	.22	.61	.11
71	12	68.6	.25	.00	.00	.50	.25	.67	.08
72	21	65.0	.10	.19	.05	.33	.52	.52	.19
73	13	68.2	.08	.08	.00	.31	.46	.62	.23
74	14	69.6	.07	.07	.00	.36	.57	.71	.21
75*	85	69.1	.13	.13	.07	.33	.49	.46	.29

* Age 75 or above at the survey date, status at age 75.

Table 2: Husband's and Wife's Age, Work and Health in the Panel

Age of Husband	Number of Observations	Wife's Age	Husband Works	Wife Works	Both Work	Husband Only Moderately Sick	Husband Seriously Sick	Wife Only Moderately Sick	Wife Seriously Sick
55	438	50.9	.96	.75	.71	.35	.13	.28	.04
56	439	51.9	.94	.74	.69	.37	.15	.30	.05
57	423	52.9	.91	.71	.65	.37	.16	.34	.07
58	396	53.8	.89	.69	.63	.37	.17	.35	.06
59	373	54.7	.86	.67	.59	.36	.20	.38	.07
60	356	55.6	.81	.64	.55	.38	.23	.41	.08
61	339	56.6	.78	.61	.51	.40	.24	.41	.09
62	326	57.5	.72	.55	.42	.40	.26	.44	.11
63	311	58.4	.69	.50	.37	.40	.26	.45	.12
64	298	59.4	.59	.44	.30	.41	.28	.47	.13
65	284	60.4	.45	.38	.21	.45	.29	.48	.13
66	268	61.2	.33	.33	.14	.45	.30	.49	.16
67	246	62.2	.29	.29	.12	.46	.31	.53	.17
68	223	62.0	.24	.24	.09	.46	.31	.53	.17
69	197	63.7	.23	.21	.08	.43	.33	.54	.16
70	163	64.2	.23	.18	.07	.41	.36	.52	.17
71	145	65.1	.21	.16	.05	.38	.40	.53	.19
72	133	65.9	.17	.15	.05	.36	.44	.51	.23
73	112	67.1	.16	.13	.05	.35	.46	.52	.25
74	99	68.0	.13	.12	.06	.35	.47	.51	.26
75	85	68.7	.13	.13	.07	.33	.49	.46	.29

Table 3: Transition Matrix for Health Changes from Age 60 to Age 70

Men	At age 70		
At Age 60	Healthy	Moderately sick	Severely sick
Healthy	.44	.33	.23
Moderately sick	0	.76	.24
Severely sick	0	0	1

Women	At age 70		
At Age 60	Healthy	Moderately sick	Severely sick
Healthy	.35	.53	.12
Moderately sick	0	.83	.17
Severely sick	0	0	1

Table 4: Education Levels of Husbands and Wives

Wife Husband	Less then High	High School	Some College	First Degree	Second Degree and PhD	Total Row
Less then High School	0.25	0.07	0.03	0.01	0	0.36
High School	0.06	0.11	0.04	0.02	0.01	0.24
Some College	0.02	0.07	0.03	0.01	0	0.13
First Degree	0.03	0.03	0.02	0.06	0.02	0.16
Second Degree and PhD	0	0.02	0.03	0.02	0.04	0.11
Total Column	0.36	0.3	0.15	0.12	0.07	1

Table 5: Estimated Coefficients and Standard Deviations of the Model

Variable	Both Work	Only Hus.Works	Only Wife.Works
Both spouses healthy	0.0590 0.0296*	0.0340 0.0282	0.2422 0.0323*
Only husband is healthy	0.0435 0.0703	-0.0009 0.0556	0.1322 0.1089
Only wife is healthy	-0.0900 0.0500**	-0.1159 0.0511*	0.1904 0.0411*
High School, husband	-0.0492 0.0383	-0.0184 0.0448	-0.1386 0.0458*
Some College, husband	0.0492 0.0586	0.0203 0.0713	-0.1311 0.0663*
College, husband	-0.0411 0.0465	0.0013 0.0476	-0.3528 0.0757*
Advanced degree, husband	0.0860 0.0592	0.2421 0.0547*	-0.2087 0.0629*
High School, wife	0.0563 0.0418	0.0074 0.0408	0.1653 0.0368*
Some College, wife	0.0369 0.0575	-0.0102 0.0624	0.2066 0.0656*
College, wife	0.0588 0.0611	-0.1240 0.0784	0.1259 0.0981
Advanced degree, wife	0.1057 0.0590**	-0.0987 0.1027	0.4737 0.0651*
Husband more educated	0.0256 0.0439	-0.0378 0.0417	0.0649 0.0622
Wife more educated	0.0479 0.0454	0.0996 0.0566	-0.0787 0.0553

Table 5 : Estimated Coefficients and Standard Deviations of the Model (Continued)

Husband's age	0.0486 0.0003*	-0.0180 0.0002*	0.0341 0.0003*
Husband's age>65	-0.0175 0.0006*	-0.0124 0.0006*	-0.0079 0.0006*
Husband's age>65& Self employed	0.0053 0.0008*	0.0053 (Restriction)	0 (Restriction)
Husband's age>65 & eligible for pension	0.0020 0.0012	-0.0002 0.0009	0.0007 0.0008
Wife's age	0.0581 0.0003*	0.0739 0.0002*	0.0495 0.0003*
Wife's age>65	-0.0097 0.0008*	-0.0026 0.0006*	-0.0092 0.0007*
Wife's age>60& Self employed	0.0021 0.001*	0 (Restriction)	0.0021 (Restriction)
Wife's age>65 & eligible for pension	0.0007 0.0012	-0.0003 0.0010	-0.0008 0.0014
Husband is older by more than 3 years	0.0144 0.0383	0.0817 0.0328*	-0.0323 0.0454
Wife of the same age as husband or older	-0.0857 0.0601	-0.2769 0.0578*	-0.2761 0.1641**
Age difference squared	0.0017 0.0005*	0.0036 0.0003*	0.0018 0.0004*
Constant	-6.0075 0.0150*	-3.0984 0.0150*	-4.9899 0.0201*

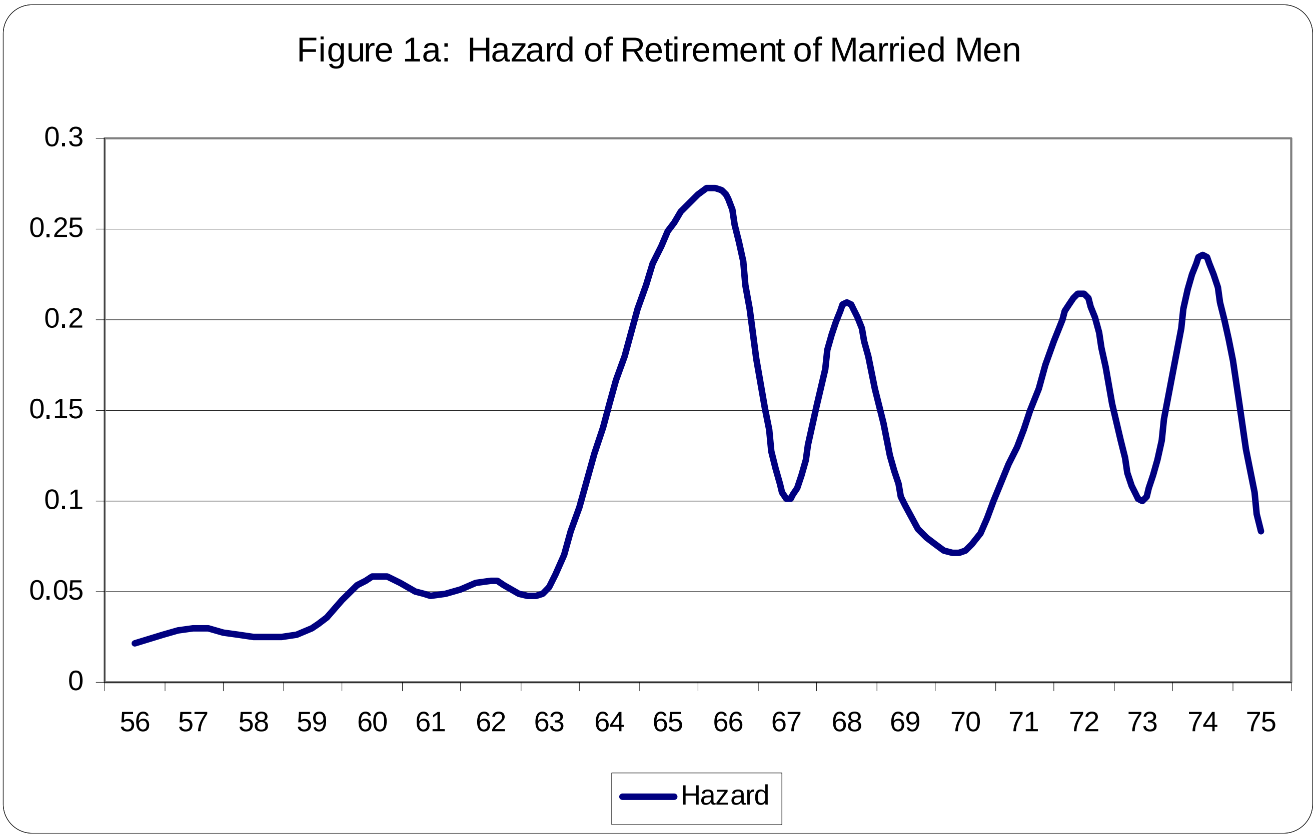
Figure 1a: Hazard of Retirement of Married Men
0.3
0.25
0.2
0.15
0.1
0.05
0
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
Hazard

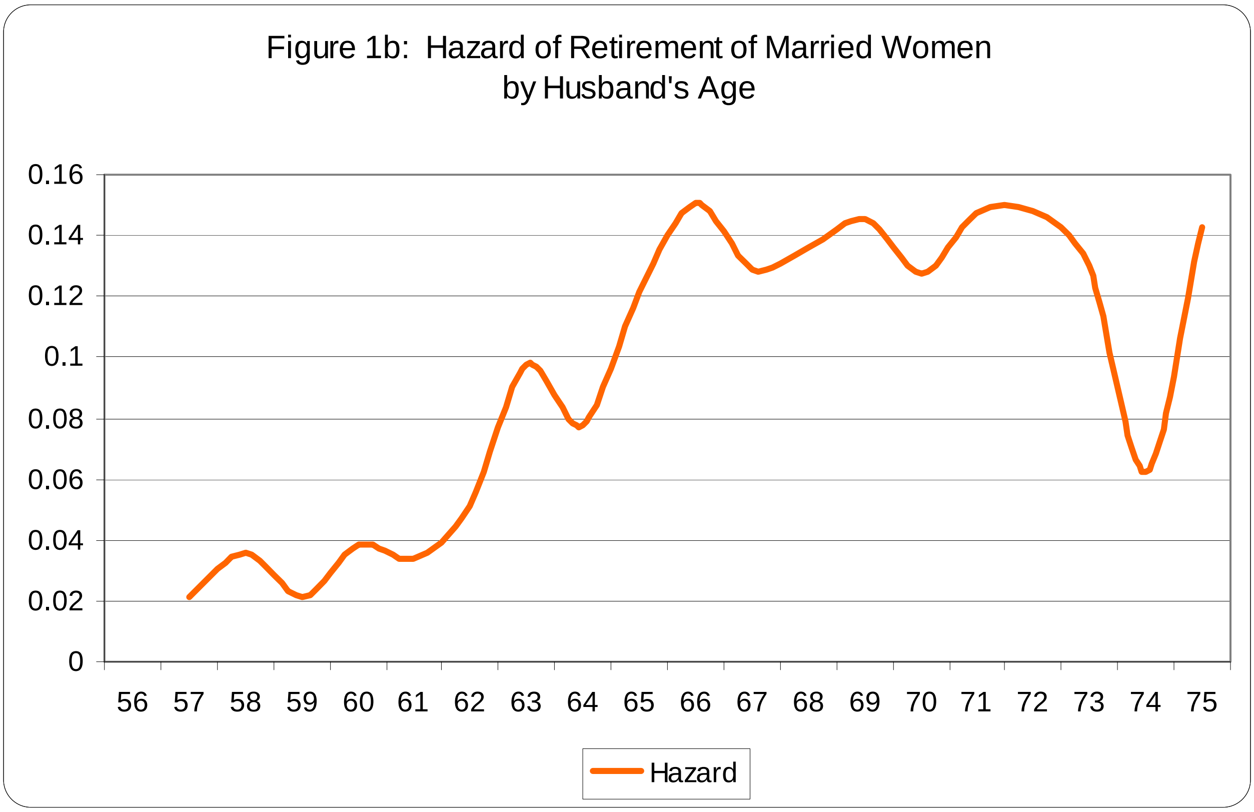

Figure 1b: Hazard of Retirement of Married Women
by Husband's Age
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75
Hazard

Figure 2a: Probability that the Husband Works

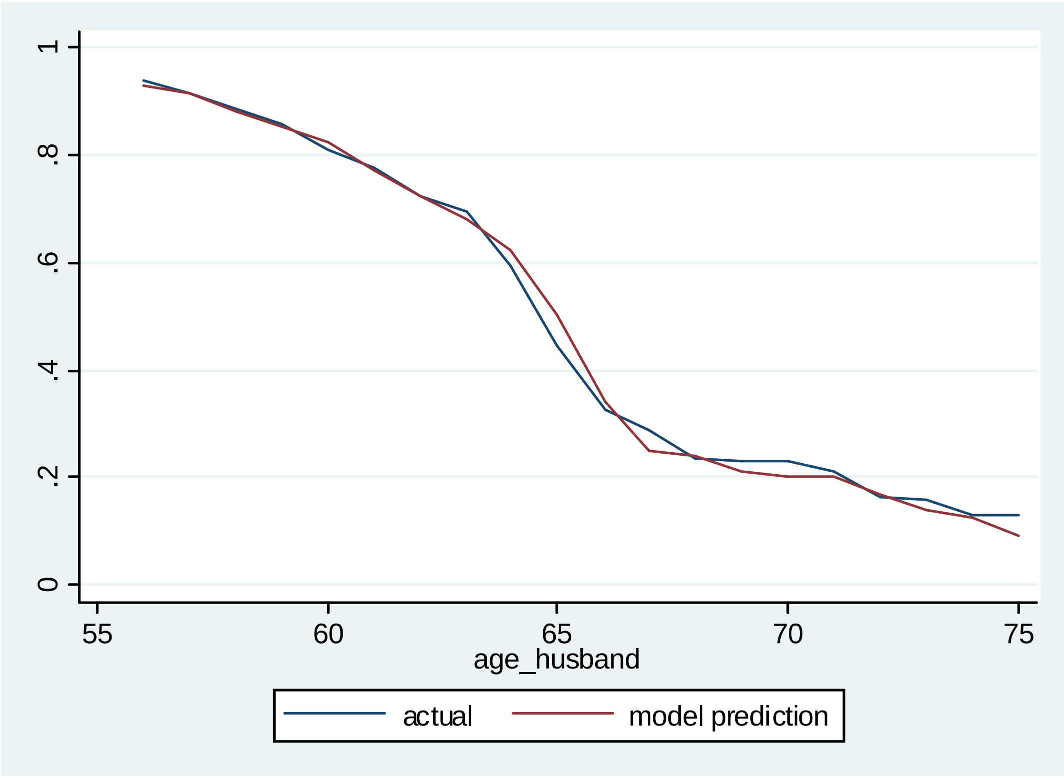

Figure 2b: Probability that the wife Works

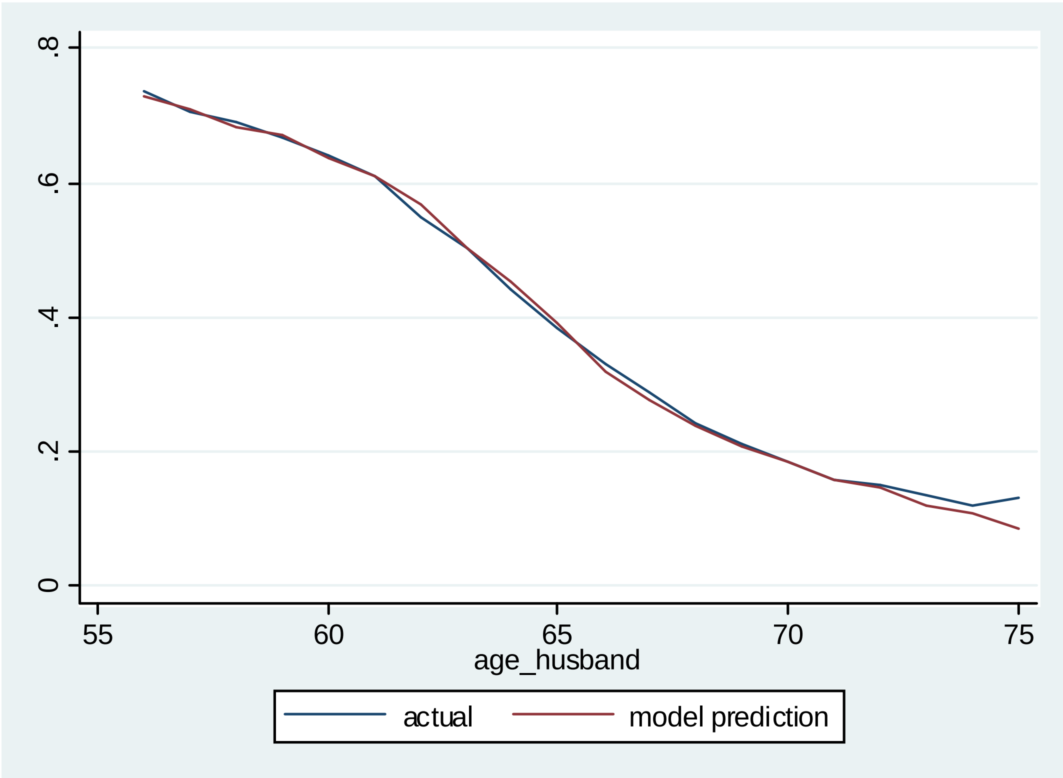

Figure 3: Probability that Both Spouses Work

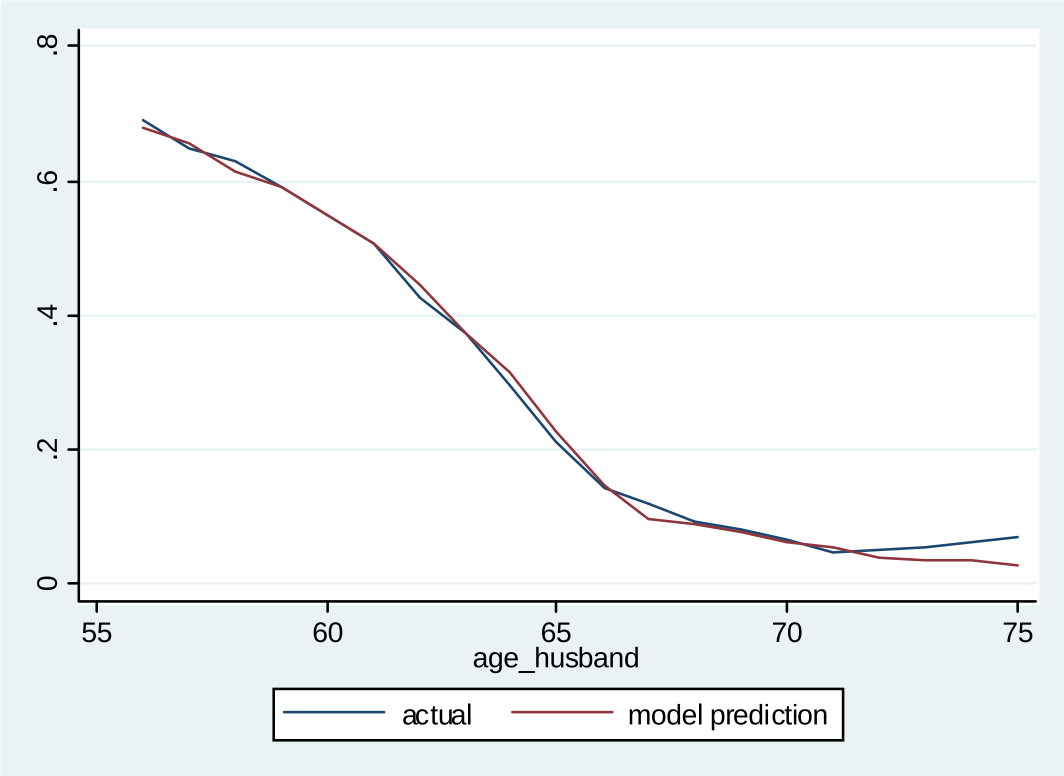

Figure 4: Probability that Both Spouses Retired

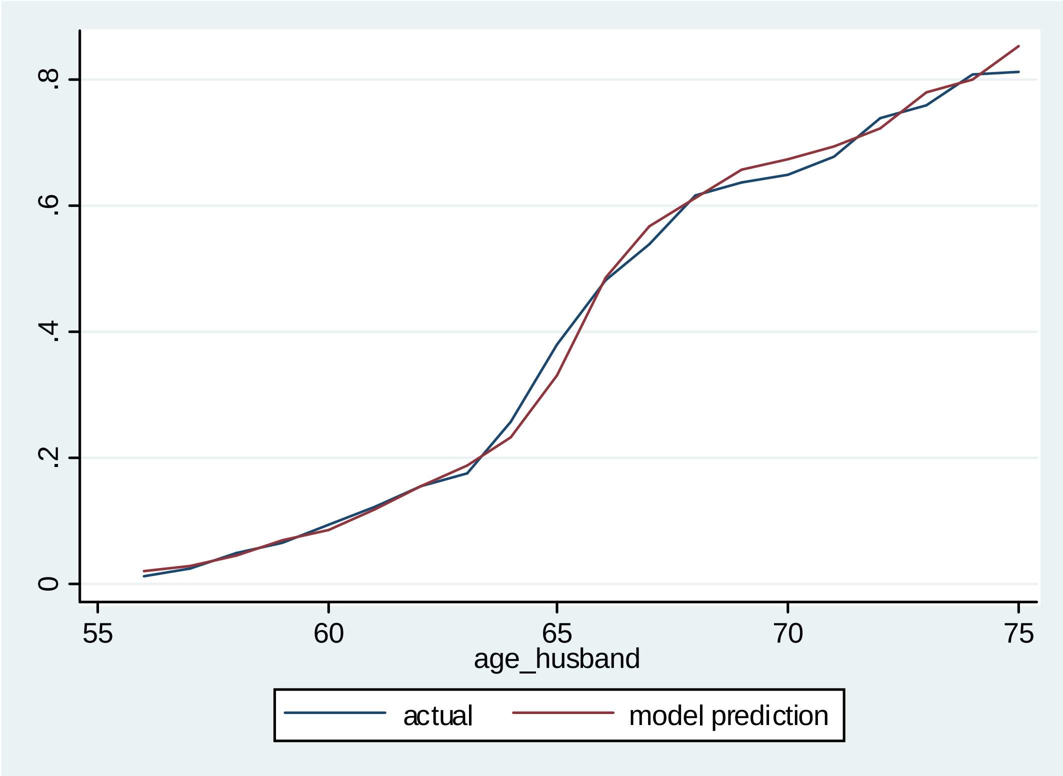

Figure 5: Probability that Only the Wife Retired

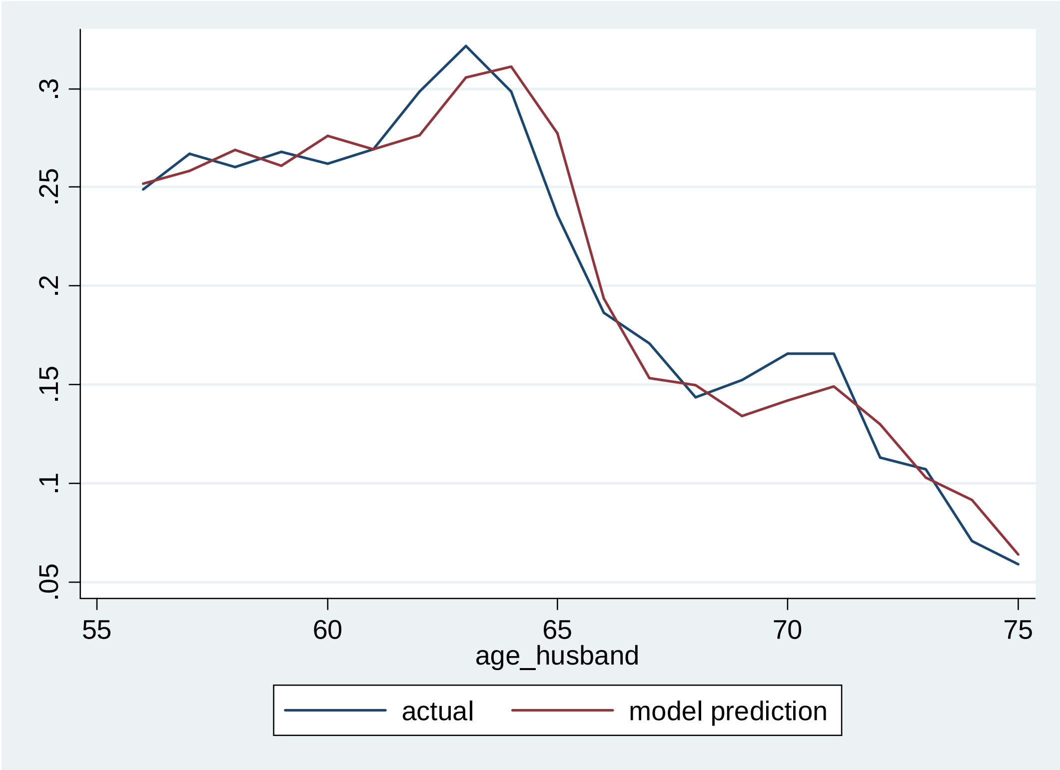

Figure 6: Probability that Only the Husband Retired

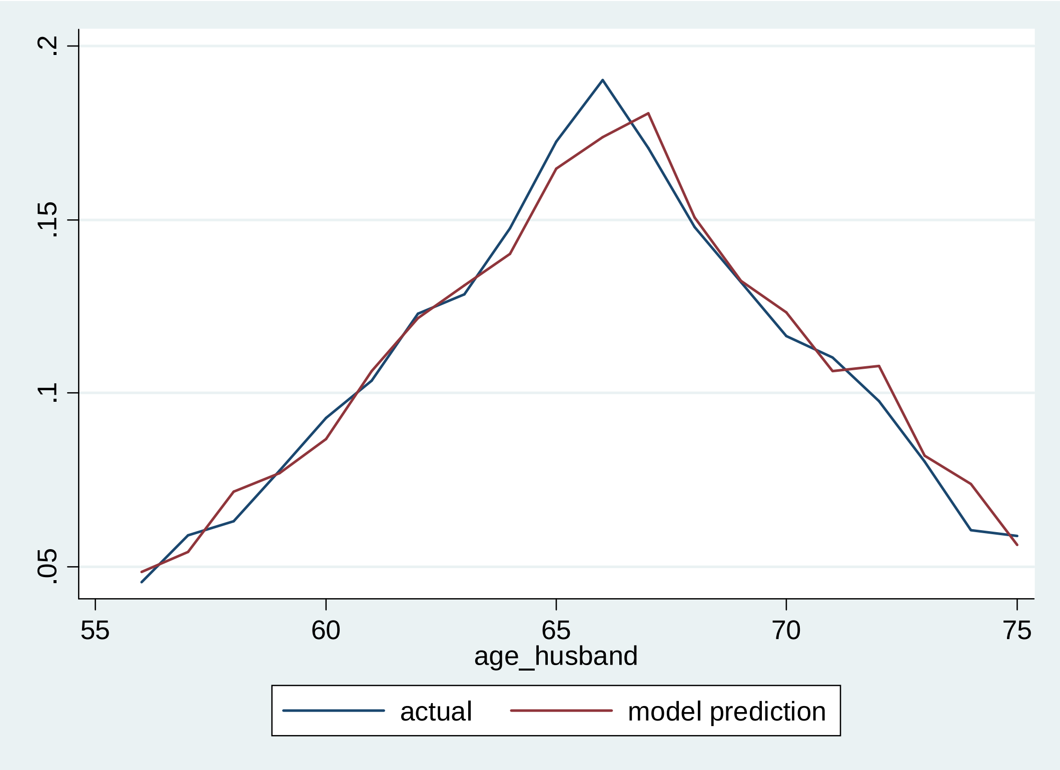

Figure 7a: Synchronization (Sample)

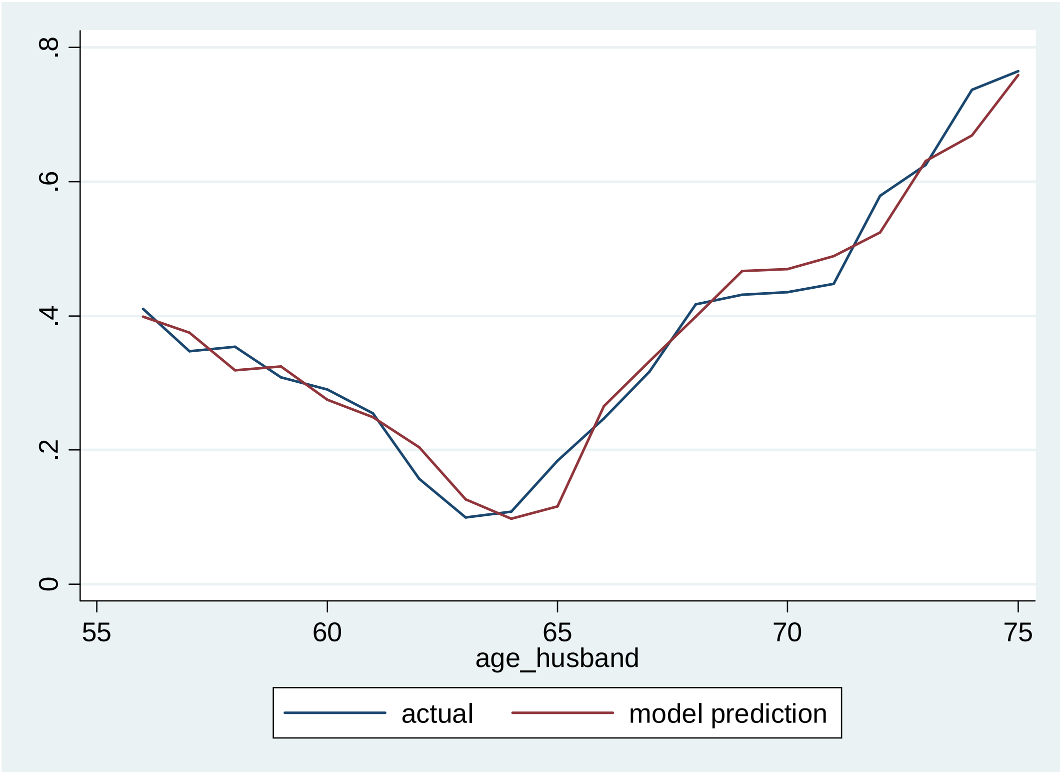

Figure 7b: Synchronization (Random Matching)

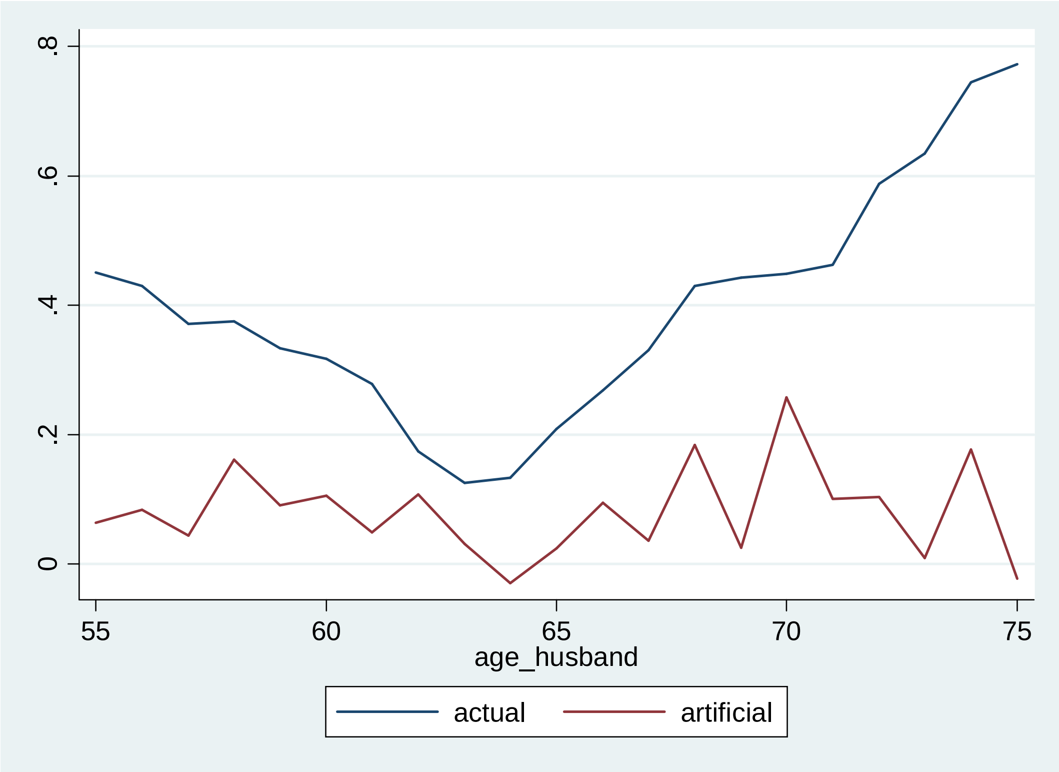

Figure 7c: Synchronization (Matched Sample)

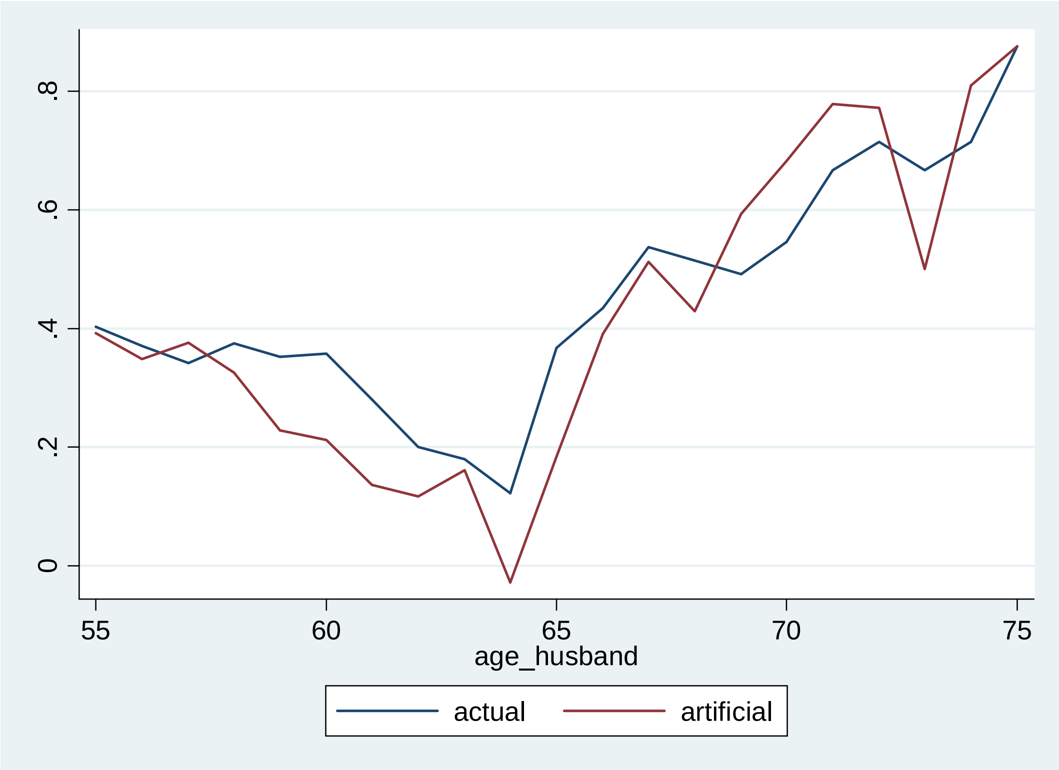

Figure 8a: Impact of the Husband’s Health on His Work

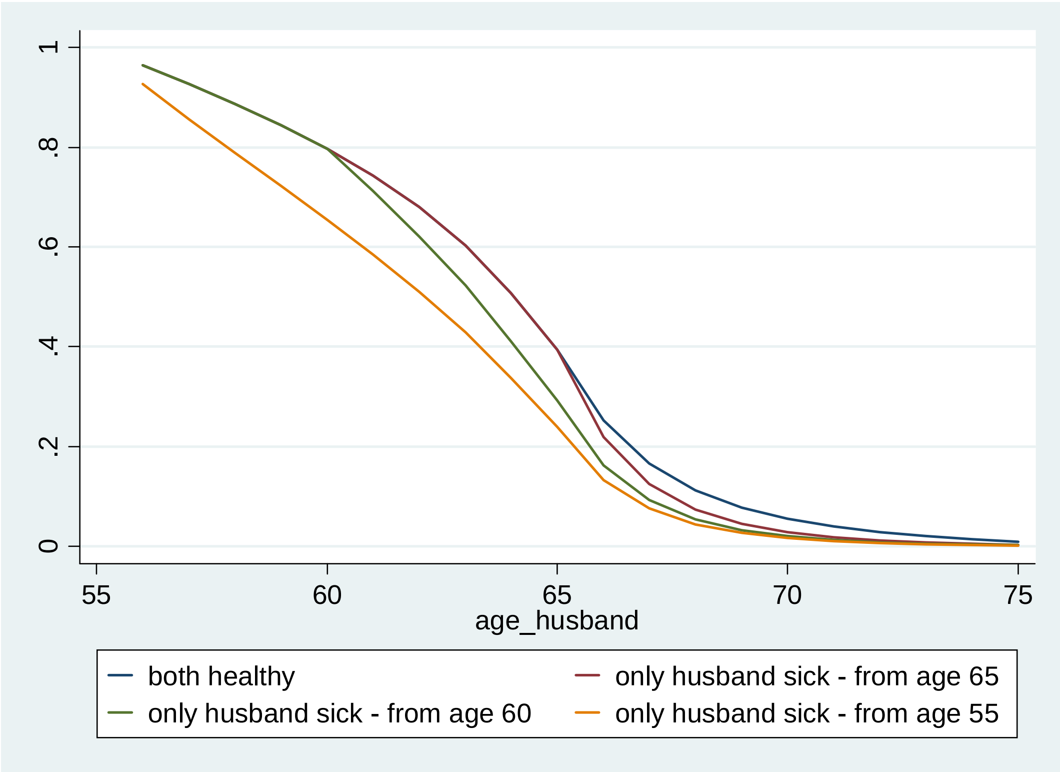

Figure 8b: Impact of the Wife’s Health on Her Work

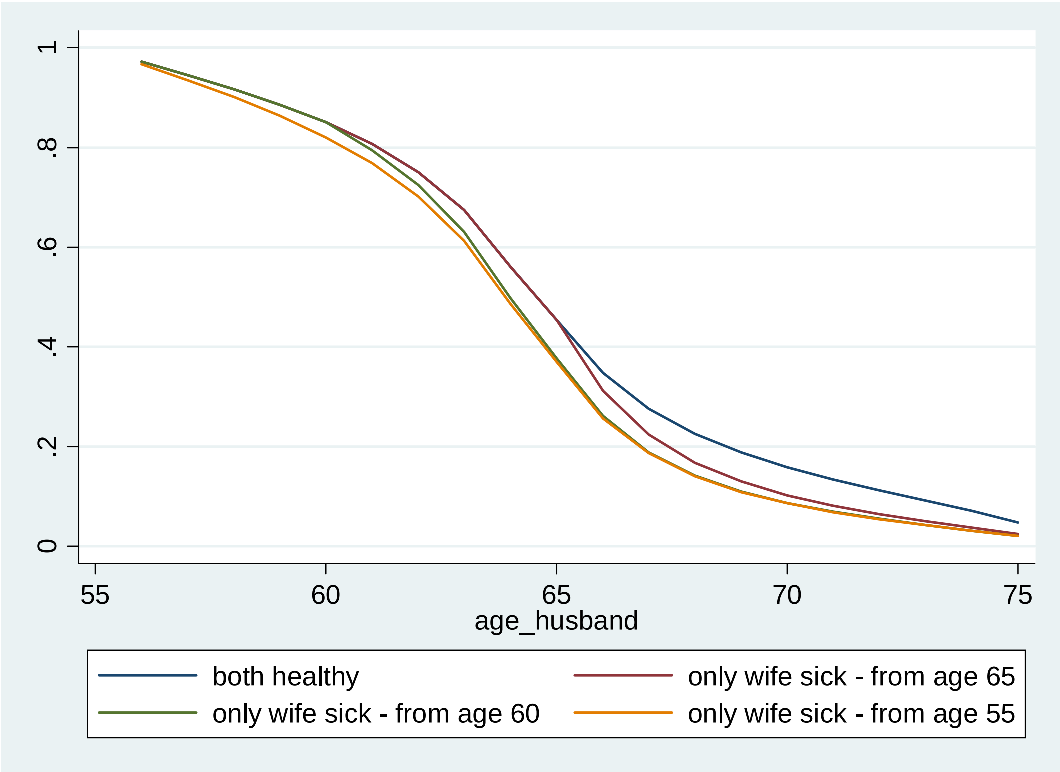

Figure 8c: Impact of the Husband's Health on His Wife's Work

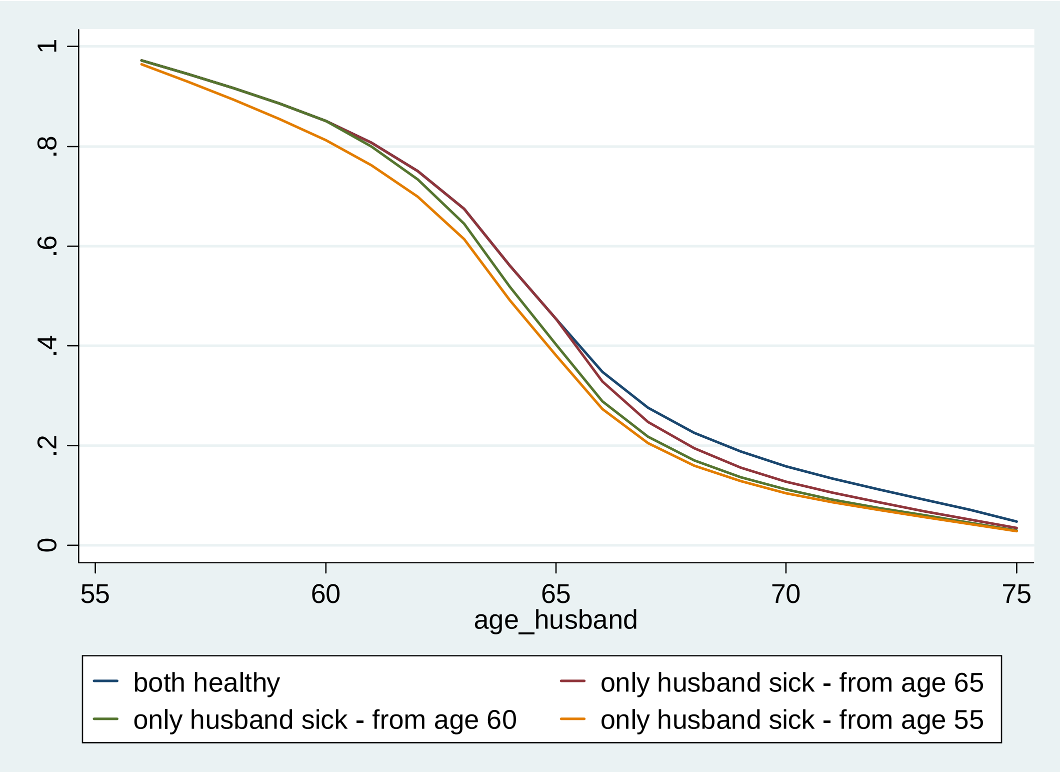

Figure 8d: Impact of the Wife's Health on Her Husband's Work

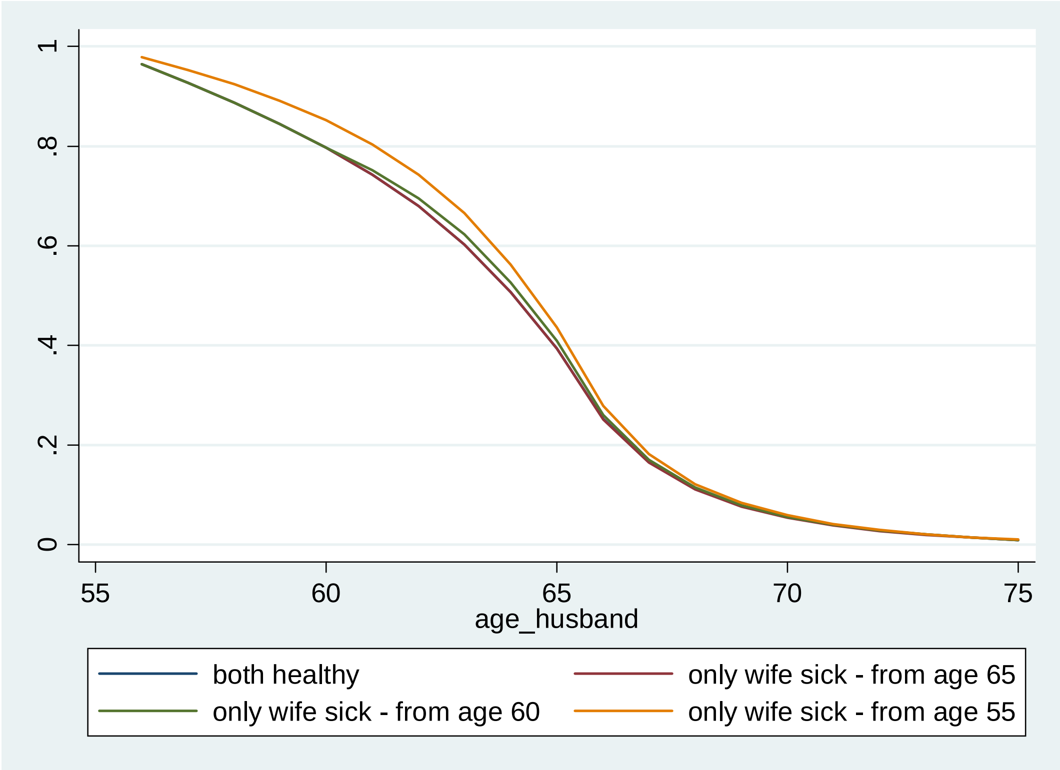

Figure 9a: Effect of Husband's Schooling on His Work

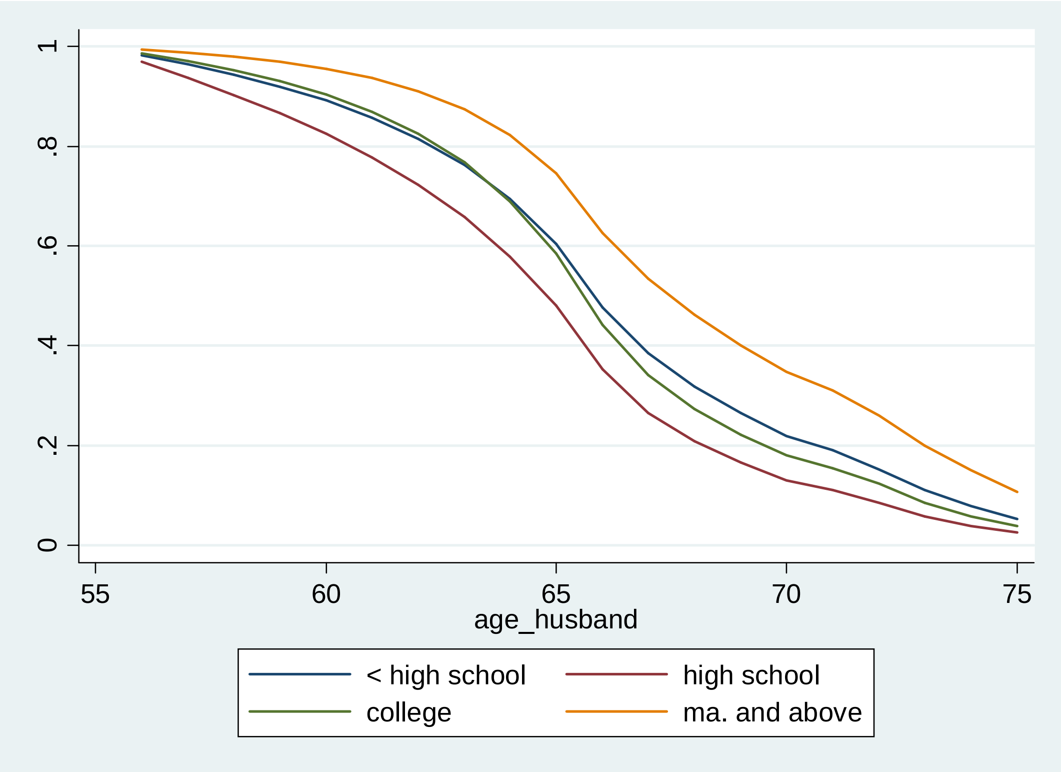

Figure 9b: Effect of Wife's Schooling on Her Work

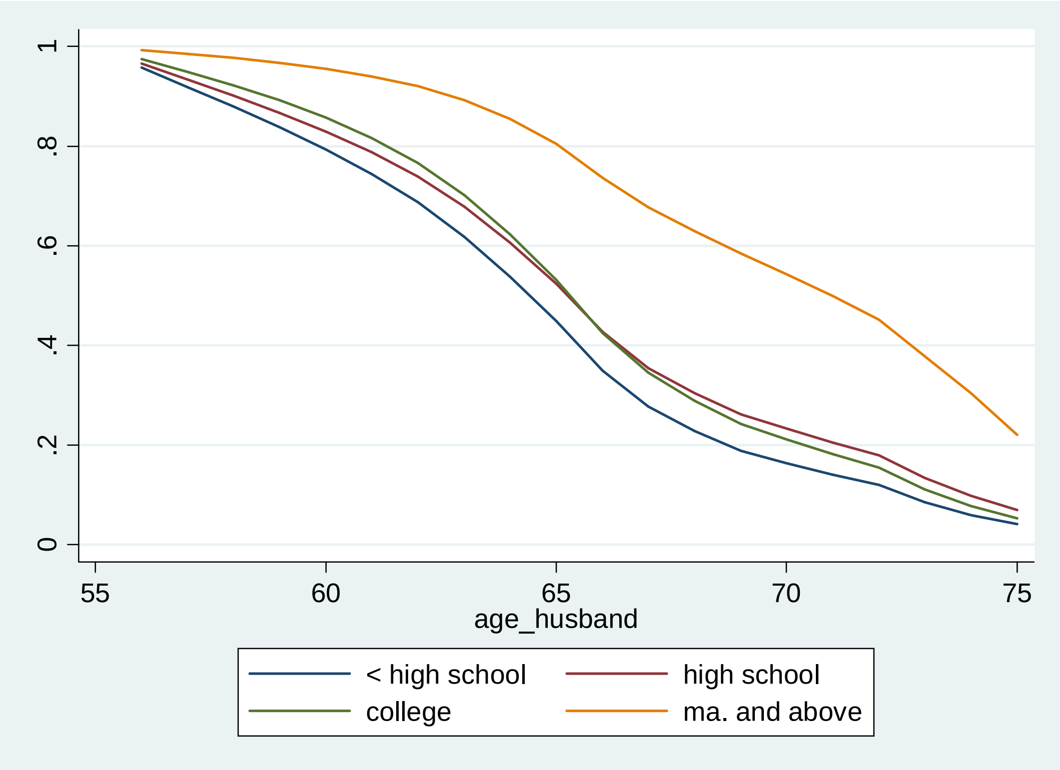

Figure 9c: Effect of Husband's Schooling on His Wife's Work

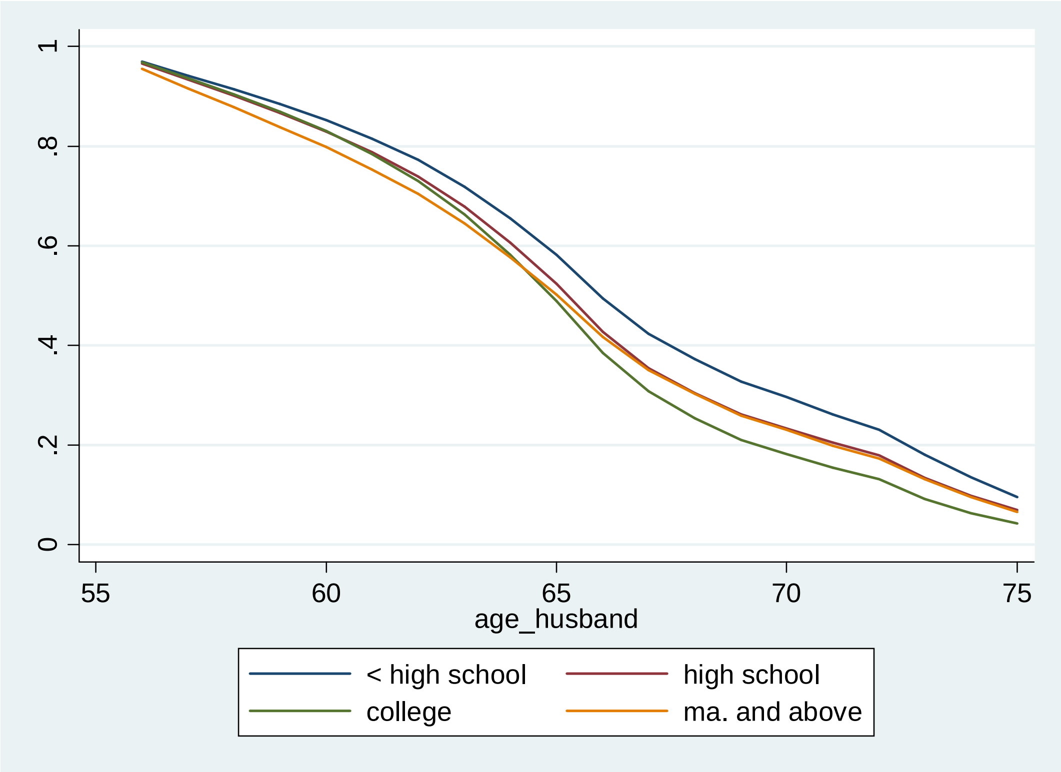

Figure 9d: Effect of Wife's Schooling on Her Husband's Work

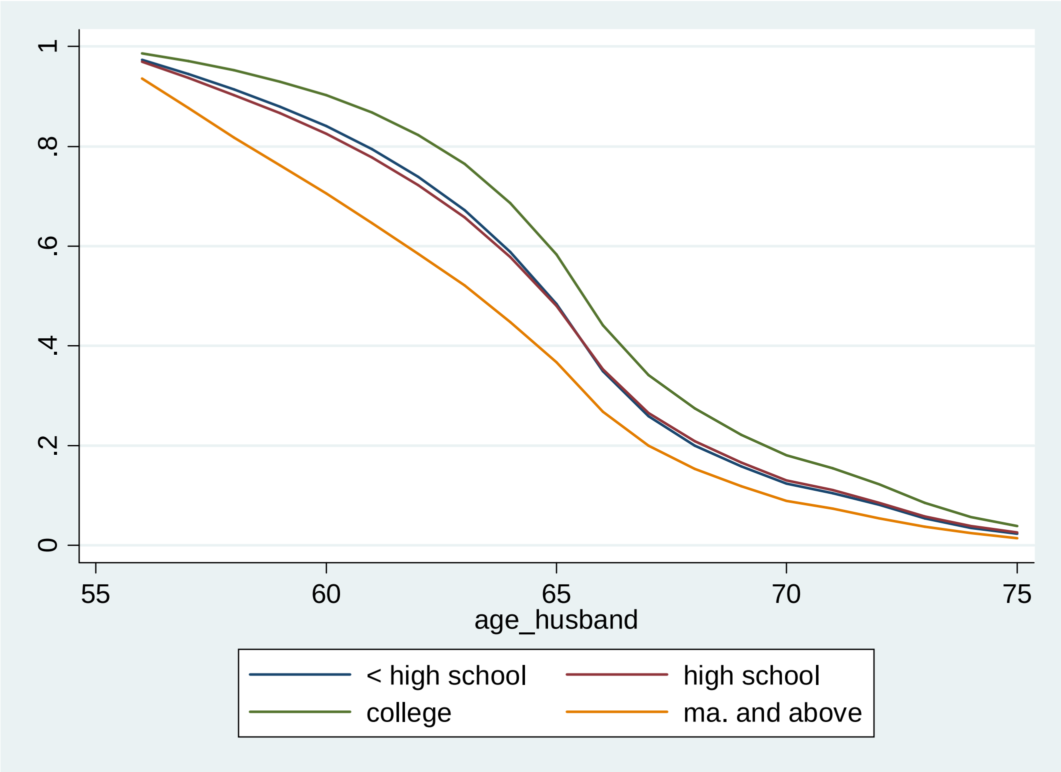

Figure 9e: Effect of Husband's Schooling on Synchronization

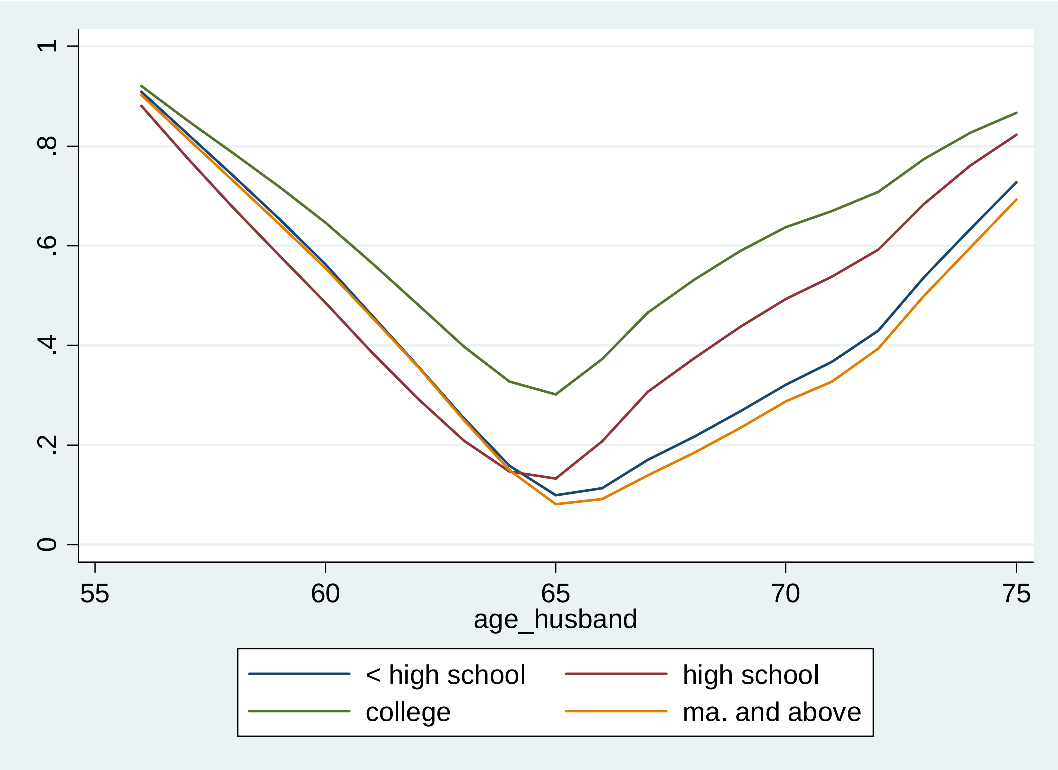

Figure 9f: Effect of Wife's Schooling on Synchronization

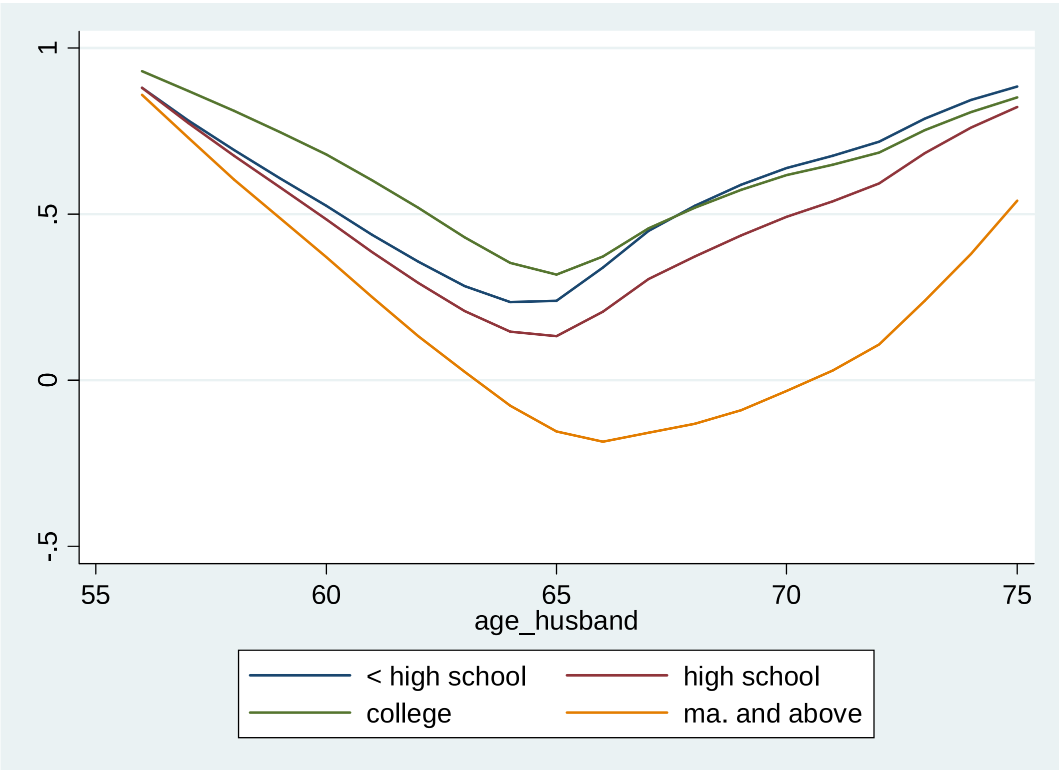

Figure 10a: Impact of Age-Diff. on "Both-Work"

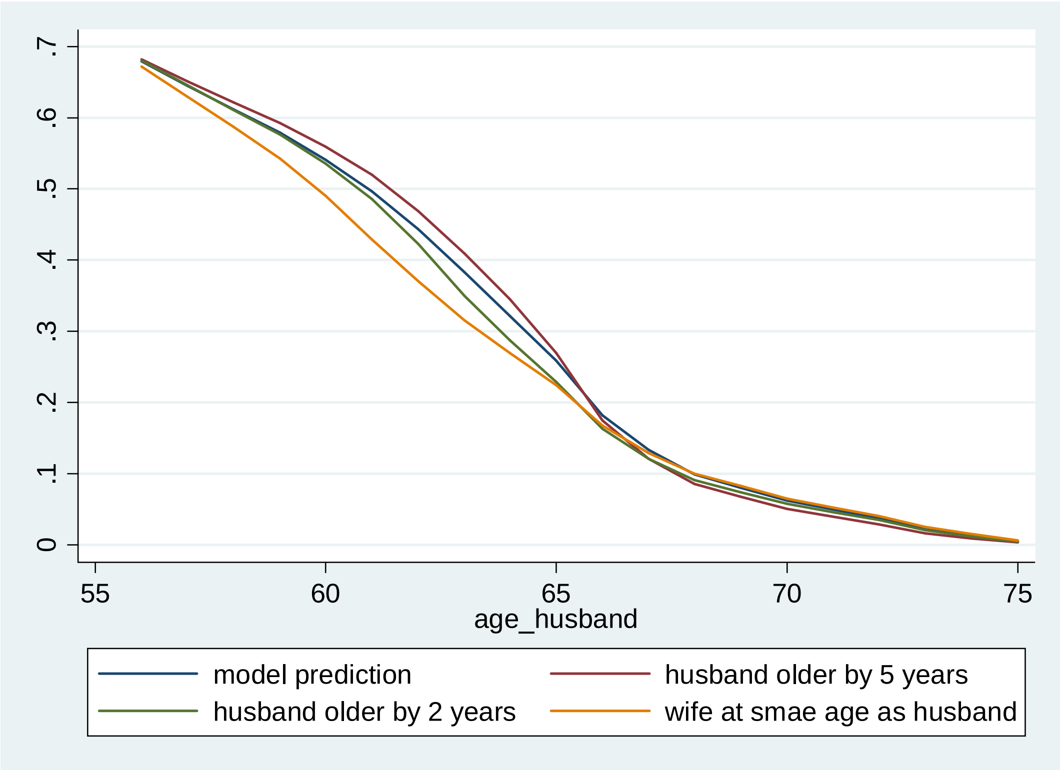

Figure 10b: Impact of Age-Diff. on "Both Do Not Work"

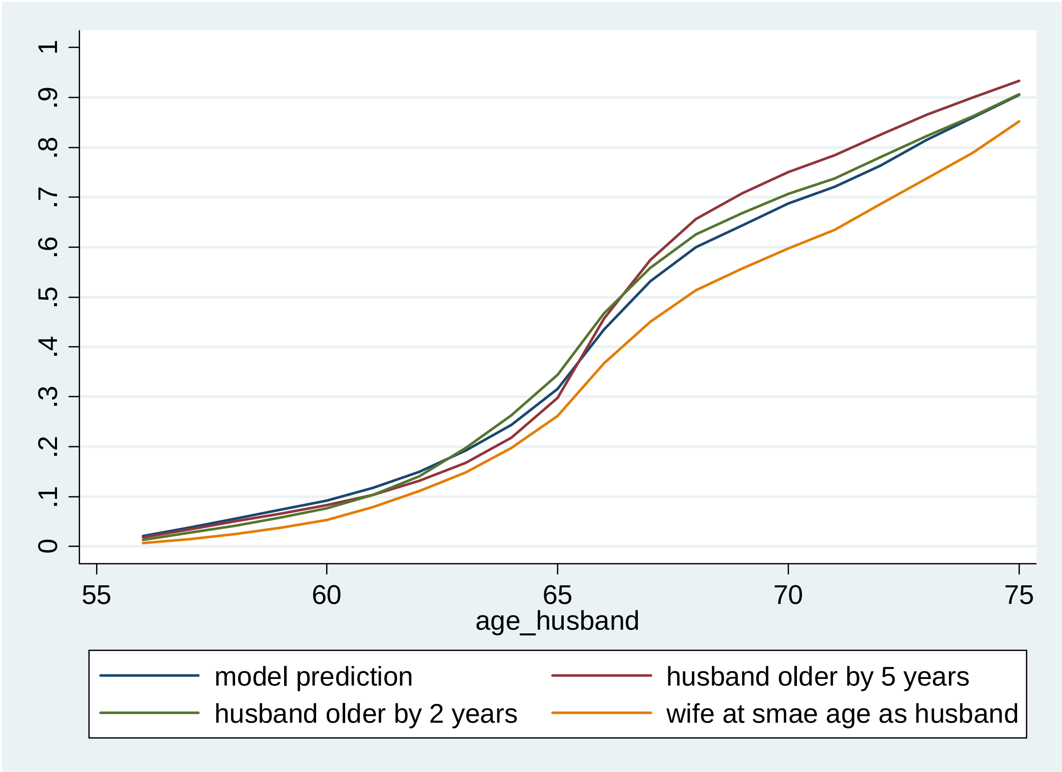

Figure 10c: Impact of Age-Diff. on "Only the Husband Works"

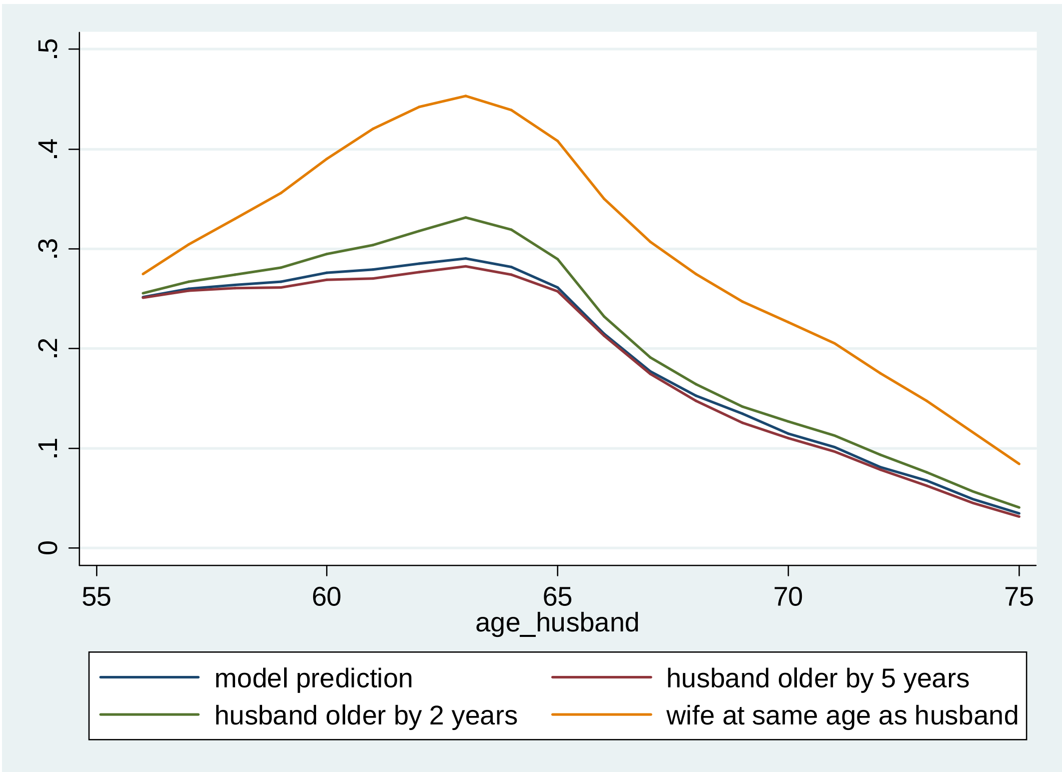

Figure 10d: Impact of Age-Diff. on "Only the Wife Works"

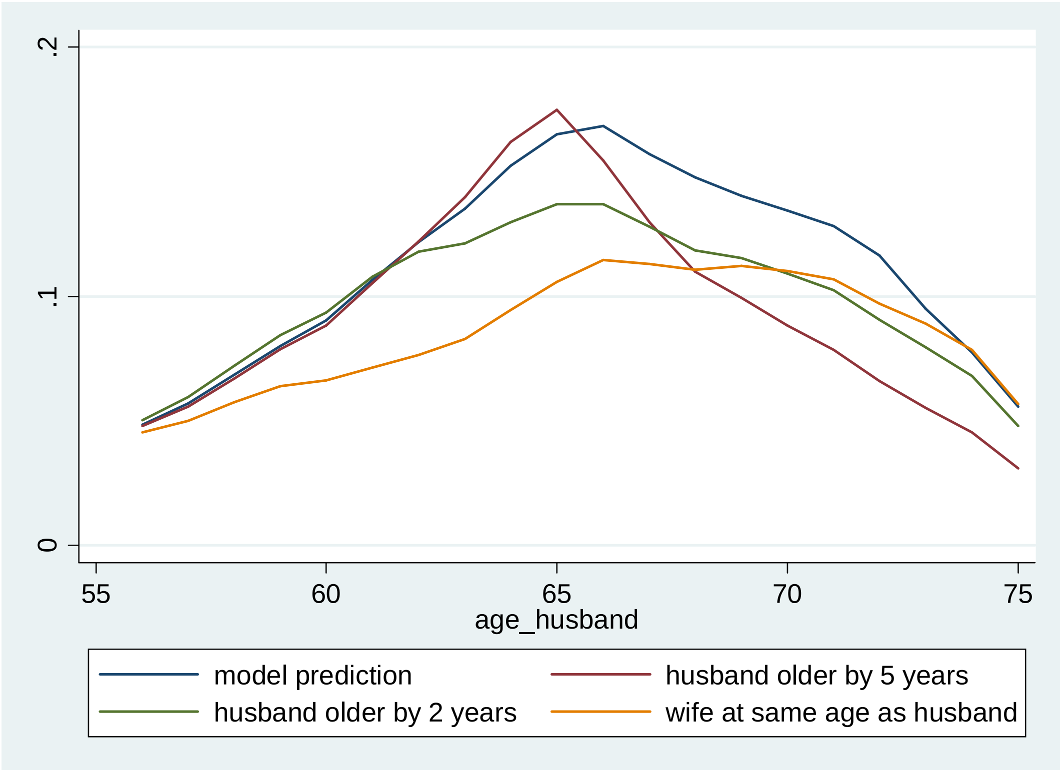

Figure 10e: Impact of Age-Diff. on Synchronization

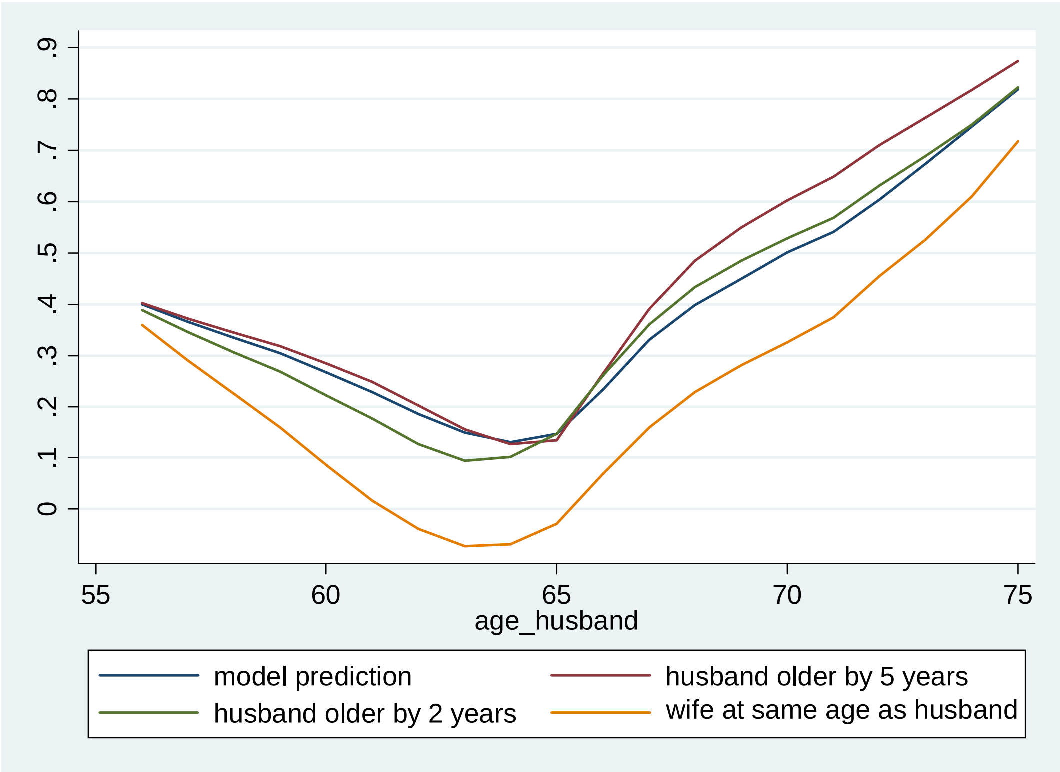

Figure 11a: Impact of Law on "Both Work"

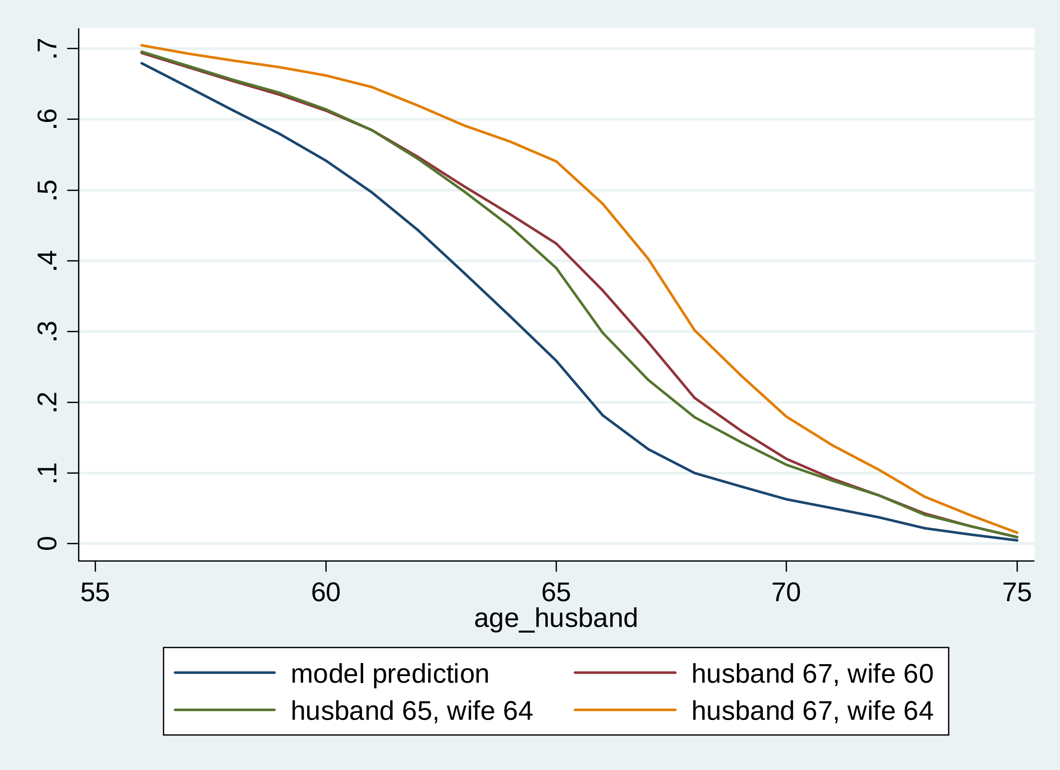

Figure 11b: Impact of Law on "Both Do Not Work"

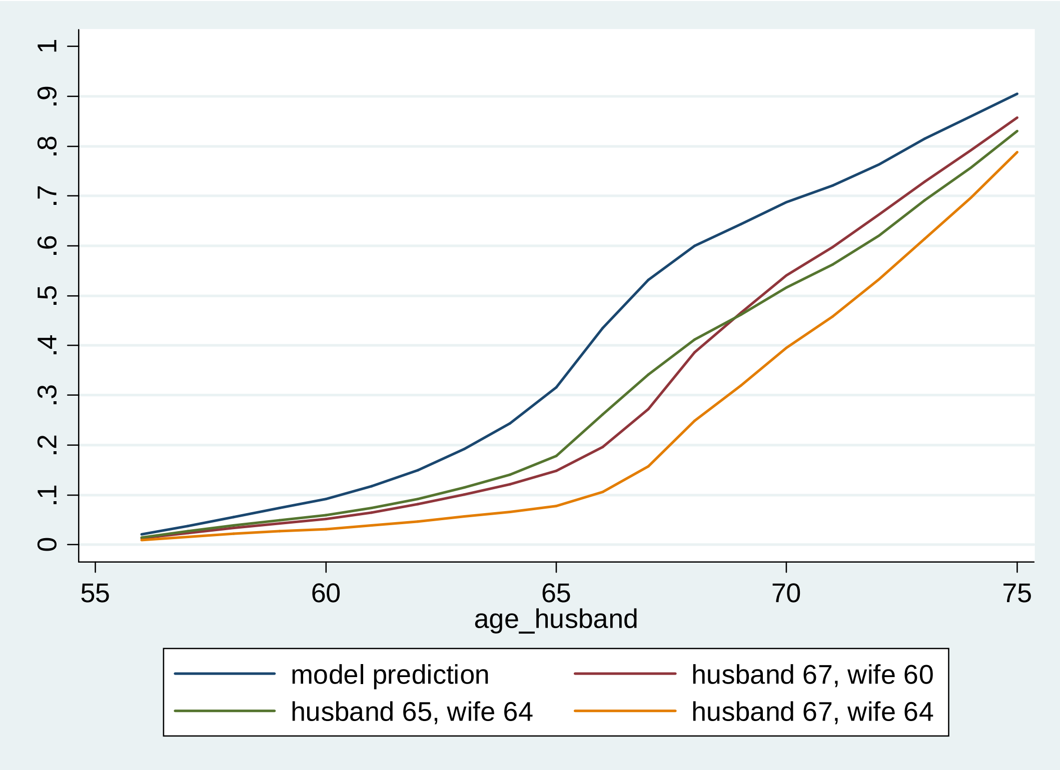

Figure 11c: Impact of Law on "Only the Husband Works"

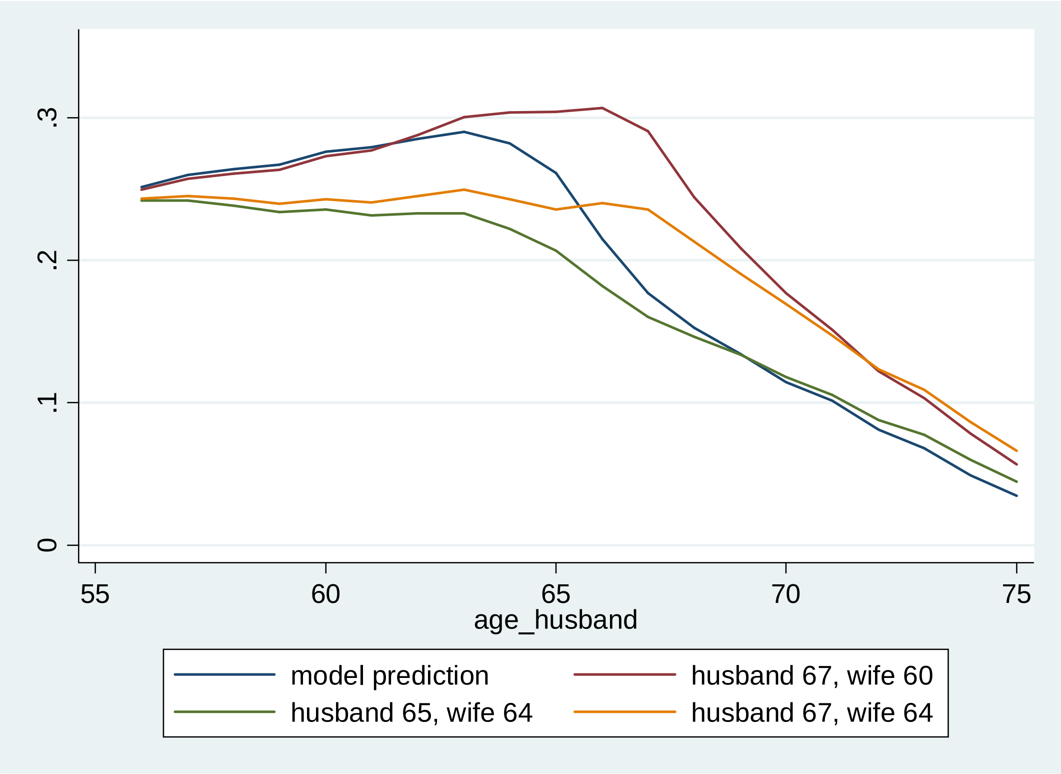

Figure 11d: Impact of Law on "Only the Wife Works"

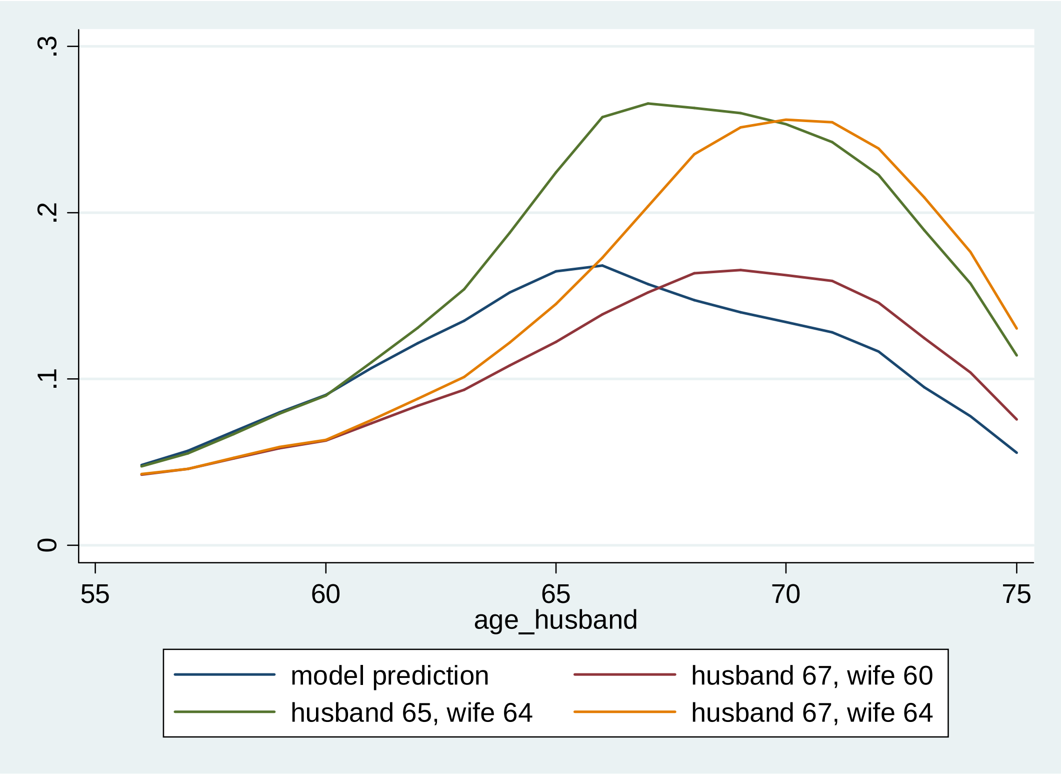

Figure 11e: Impact of Law on Synchronization