ASSORTATIVE MATING WITHOUT ASSORTATIVE PREFERENCE

Assortative mating – marriage of a man and a woman with similar social characteristics – is a commonly observed phenomenon. In the existing literature in both sociology and economics, this phenomenon has mainly been attributed to individuals' conscious preferences for assortative mating. On the one hand, sociologists have long argued that people of similar attributes are likely to have similar values, interests, tastes, economic resources, and lifestyles, and individuals often value these similarities when selecting marriage partners. On the other hand, economists have explained assortative mating by complementarities of marriage partners' attributes. For example, Becker (1972) showed that, under a market equilibrium, marriage partners are likely to be associated in traits that are complementary in producing household goods. In other words, people with similar attributes tend to enter into marriage as long as these attributes reinforce each other in improving their family production function.

Sociologists have long been aware that assortative mating may also result from structural forces that sort persons of similar attributes into separate social contexts. For marriages in a modern society, it is safe to assume that experiences and social activities leading to marriage, such as dating, require that a man and a woman get to know each other and interact. This is true even when dating takes place in cyberspace. Social structure may induce assortative mating because it defines the social spaces in which such interactions take place. In the sociology literature, social structure is said to define the exposure, i.e., potential persons with whom to interact . When persons of different attributes are segregated into different social contexts, assortative mating ensues even when they do not prefer to marry other persons of similar attributes, because they do not have a chance to meet, or are not exposed to, persons of dissimilar attributes.

In this paper, we show that patterns of assortative mating may arise from another structural source even if individuals do not have assortative preferences or possess complementary attributes: dynamic processes of marriages in a closed system. For a given cohort of youth in a finite population, as the percentage of married persons increases, unmarried persons who newly enter marriage are systematically different from those who have been married earlier, giving rise to the phenomenon of assortative mating. We use micro-simulation methods to illustrate this dynamic process.

Model Setup

Below we specify a dynamic model of marriage under several innocuous assumptions. First of all, the hypothetical population is finite with a sex ratio of one: *N* males and *N* females. Second, we postulate that a person's willingness-to-marry depends systematically only on the attributes of potential marriage partners, not on his/her own attributes. In the notation of random utility models, the *i*th male's utility from marrying the *j*th woman at time *t* can be written as:

$$U_{ijt}^{m} = \alpha_0 + \alpha_1 X_j^f + \epsilon_{ijt},$$

where X_j^f denotes the *j*th female's attribute, and ϵ_{ijt} represents a random disturbance to the *i*th male for this pairing. Similarly, U_{ijt}^f gives the *j*th female's utility from marrying the *i*th male at time *t*:

$$U_{ijt}^f = \beta_0 + \beta_1 X_i^m + \eta_{ijt},$$

where X_i^m denotes the *i*th male's attribute, and η_{ijt} represents a random disturbance to the *j*th female for this pairing . For convenience, we assume that both ϵ_{ijt} and η_{ijt} are independent and identically distributed as standard logistic. Third, we assume that entry into marriage is probabilistic and determined by both marriage partners' willingness-to-marry. Given the random utility model described above, the conditional probability that the *i*th male is willing to marry the *j*th female given their encounter can be expressed as:

$$P_{ijt}^m = \Pr\left(U_{ijt}^m > 0\right) = \frac{e^{\alpha_0 + \alpha_1 X_j^f}}{1 + e^{\alpha_0 + \alpha_1 X_j^f}}.$$

Similarly, P_{ij}^f gives the conditional probability that the *j*th female is willing to marry the *i*th male given their encounter:

$$P_{ijt}^f = \Pr\left(U_{ijt}^f > 0\right) = \frac{e^{\beta_0 + \beta_1 X_i^m}}{1 + e^{\beta_0 + \beta_1 X_i^m}} \ .$$

Since ϵ_{ijt} and η_{ijt} are assumed to be independent for any *(i, j, t),* the conditional probability that the *i*th male and the *j*th female marry given their encounter should be a product of P_{ijt}^m and P_{ijt}^f:

$$P_{ijt} = P_{ijt}^m P_{ijt}^f$$

In addition, we make two assumptions in characterizing the dynamic feature of this model. First, an encounter between a man and a woman is assumed to be random and sequential. Therefore, a random pair of potential mates date and decide whether to marry *before* the next random encounter occurs. Second, marriage is considered an absorbing state. That is, an encountered pair who marries will never again be in the pool eligible to be married again. That is, we do not allow either polygamy or divorce and remarriage.

Micro-simulation Results

We demonstrate the dynamic process of assortative mating using a micro-level simulation model (or agent-based model). In our model, a hypothetical population is composed of 5000 males and 5000 females (i.e. *N* = 5000). Individual characteristics, X_i^m and X_j^f, are assumed to follow standard normal distributions. We start the simulation at time 1 by randomly picking a pair (i, j), denoting the i^{th} male and the j^{th} female, so that they encounter, and calculating the probability (P_{ij}) that they will marry each other given that they have encountered. Knowing the probability of marriage to be P_{ij}, we make a Bernoulli draw to determine whether or not the (i,j) pair actually marries at time 1. If they marry, then the pair is removed from the unmarried population pool and cannot marry again. If they do not, they return to the original pool. We then start over to pick another random pair (i',j') and simulate their marital decision. Again, married persons are removed from the marriageable pool, and unmarried persons return to the pool. We iterate this process, until all people in the hypothetical population are married.[1]

We track the attributes of married couples at each time point, and compile them into two time series, one for each gender. Time points at which no successful marriage occurs are removed, as they provide no information to our study. Assortativeness of mating can be directly measured by the correlation between the husband's and the wife's attributes. To preserve smoothness of results, we average the individual characteristics for every 100 non-overlapping marriages, i.e. $X_{mi}^{**} = \sum_{100*(i-1)}^{100i-1} X_{mk}/100$; $X_{fi}^{**} = \sum_{100*(i-1)}^{100i-1} X_{fk}/100$. Figure 1 gives the relationship between X_m^* (the horizontal axis) and X_f^* (the vertical axis). The correlation between the two series ρ_{mf} is 0.7702, which supports our main argument that assortative mating can result without assortative preference.

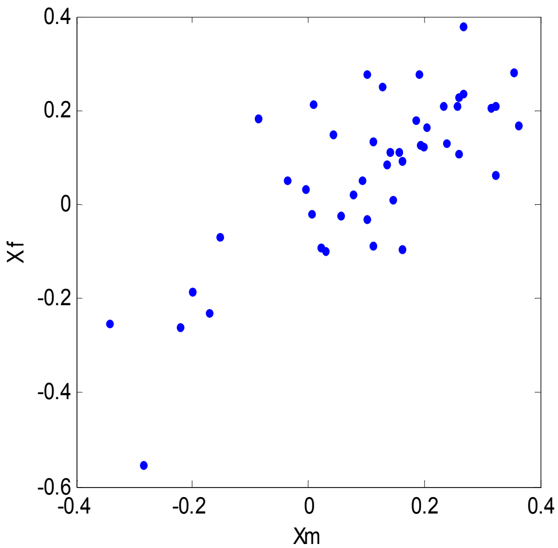
[Figure 1 is about here.]

Since we model assortative mating as a dynamic process, the question remains as to who marries early and who marries late. We plot the distribution of husband's and wife's characteristics by the period of marriage in Figure 2. It shows that the individual characteristics for married couples decline over time: males and females who are more attractive marriage partners are more likely to exit the unmarried pool early, and males and females who are less attractive marriage partners are more likely to be left to a later period of marriage. Hence, the sequential process of marriage leads to similarity in personal traits between husband and wife at each period of time.

[Figure 2 is about here.]

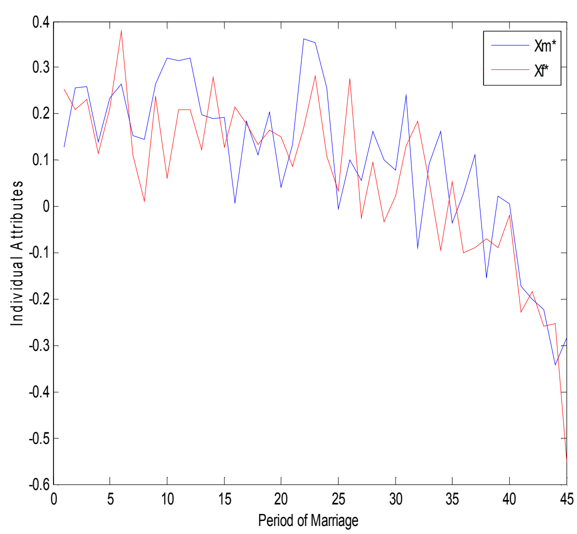
[1] In the actual simulation, there are still people who are not married after 300,000 iterations, comprising no more than 10% of the total population. Therefore, we stopped the simulation at 300,000 iterations, as those who remain are inconsequential to our model.

Figure 1: Individual Attributes of Husbands and Wives by Married Pairs



Note To preserve smoothness of results, we average individual attributes over an interval of 100, i.e. $X^{**}_{mi} = \sum_{100*(i-1)}^{100i-1} X_{mk}/100$; $X^{**}_{fi} = \sum_{100*(i-1)}^{100i-1} X_{fk}/100$.

Figure 2: Individual Attributes of Husbands and Wives by Period of Marriage



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