Who Marries with Whom?

Evidence from Taiwan 1990 and 2000

Bo-Yan Huang Yu-Te Shen

fall 2023

1 Introduction

In this study, we utilize the Taiwan Census data from the years 1990 and 2000, employing the marriage model developed by Choo and Siow (2006). Our primary focus is the investigation of age assortative mating within the Taiwan marriage market, extending the inquiry initiated by Chu and Yu (2009). By employing a static transferable utility model, we aim to unravel the complexities of partner selection dynamics and shed light on how individuals in Taiwan form marital relationships across diverse age groups. Our analysis delves into the net gain from marriage, utilizing modified equations to estimate the gains for both men and women, as well as the total systematic gain to marriage. As we navigate through age-related patterns and gender dynamics, our study provides a comprehensive perspective on Taiwan's marriage landscape.

Furthermore, our investigation reveals an intriguing anomaly among men born around 1930, prompting a historical exploration linked to the Retreat of the Government of the Republic of China to Taiwan. This anomaly adds a unique dimension to our analysis, illustrating the interplay between historical events and marriage dynamics in Taiwan. Through this research, we aim to contribute valuable insights to the ongoing discourse on marital patterns, enriching our understanding of the socio-demographic factors influencing partner selection in Taiwanese society.

2 Literature Review

2.1 Choo and Siow(2006)

We use the model from Choo and Siow(2006) which estimate a static transferable utility model of the marriage market. First, let the utility of type i man g who marries a type j woman be

$$V_{ijg} = \tilde{\alpha}_{ij} - \tau_{ij} + \epsilon_{ijg}$$

Let the utility of type j woman k who marries a type i man be

$$V_{ijk} = \tilde{\gamma}_{ij} + \tau_{ij} + \epsilon_{ijk}$$

Noticed that there are $2 \times I \times J$ parameters to estimate with only $I \times J + I + J$ observable. The number of observable is less than the number of unknown preference parameters, this suggest the main identification problem we face when using this type of model. Thankfully, by assuming all ϵ are i.i.d. and T1EV we can obtain the following equations:

$$Pr(i \text{ match with } j) = \frac{\exp(\tilde{\alpha}_{ij} - \tilde{\alpha}_{i0} - \tau_{ij})}{\sum_s \exp(\tilde{\alpha}_{is} - \tilde{\alpha}_{i0} - \tau_{is})}$$

$$Pr(i \text{ stays single}) = \frac{\exp(0)}{\sum_s \exp(\tilde{\alpha}_{is} - \tilde{\alpha}_{i0} - \tau_{is})}$$

$$\log\left(\frac{\frac{\mu^d_{ij}}{m_i} = Pr(i \text{ match with } j)}{\frac{\mu^d_{i0}}{m_i} = Pr(i \text{ stays single})}\right) = \tilde{\alpha}_{ij} - \tilde{\alpha}_{i0} - \tau_{ij}$$

Let $\alpha_{ij} = \tilde{\alpha}_{ij} - \tilde{\alpha}_{i0}$ be the gross return to a type i man marriage to a type j women relative to being unmarried, we have

$$\begin{aligned}\log \mu^d_{ij} &= \log \mu^d_{i0} + \tilde{\alpha}_{ij} - \tilde{\alpha}_{i0} - \tau_{ij} \\ &= \log \mu^d_{i0} + \alpha_{ij} - \tau_{ij}\end{aligned}$$

Then for woman,

$$\log \mu_{ij}^s = \log \mu_{0j}^s + \gamma_{ij} + \tau_{ij}$$

In equilibrium, supply equals to demand

$$\begin{aligned} \mu_{ij}^d &= \mu_{ij}^s = \mu_{ij} \\ \log \mu_{ij} &= \log \mu_{i0} + \alpha_{ij} - \tau_{ij} \qquad (1) \\ \log \mu_{ij} &= \log \mu_{0j} + \gamma_{ij} + \tau_{ij} \qquad (2) \end{aligned}$$

equation (1) and (2) are crucial for identifying *systematic net gain to marriage* and *total systematic gain to marriage* which we will talk more later. The model is quite brutal since is suggest that all individual level heterogeneity is capture by ϵ, however using this simple model we can observe some interesting asymmetric pattern in marriage market.

2.2 Chu and Yu(2009)

Chu and Yu(2009) centered on assortative mating, the research employs data from the Taiwan Panel Study of Family Dynamics (PSFD) survey. Using model from Choo and Siow(2006), they study assortative mating along two crucial dimensions: educational attainment and ethnicity.

Regarding educational assortative mating, the research discover a trend in Taiwan—the historical educational asymmetry, where husbands tended to be better educated than wives, is diminishing among the younger cohort. Additionally, the crossing barrier, indicating marriages between individuals with differing educational backgrounds, has decreased.

Ethnic assortative mating is another significant facet explored in the study. The research reveals a decline in the ethnicity barrier to marriage in Taiwan. This suggests a reduction in the significance of ethnic differences when individuals choose their life partners.

These findings underscore the dynamic nature of marital patterns, emphasizing shifts in traditional norms. The study's focus on assortative mating provides valuable insights into evolving societal dynamics, particularly in Taiwan, offering a nuanced understanding of how educational and ethnic factors influence partner selection. These analyses contribute to the broader understanding of marriage trends in Chinese societies, highlighting the complexities of assortative mating in the context of changing cultural and social landscapes.

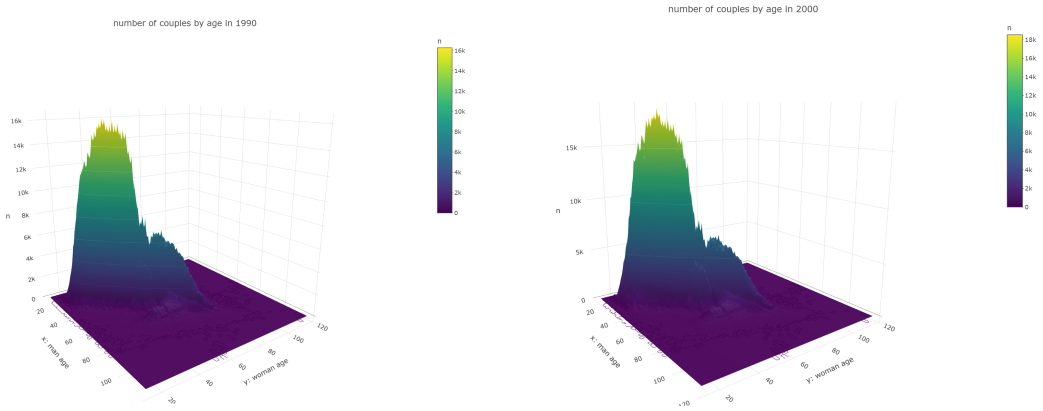
3 Data

The data for this study were obtained from the Taiwan Census for the years 1990 and 2000. These datasets provide comprehensive information on various demographic variables for the population during the specified years. The following variables were observable for each individual from the census data:

- *household ID*
- *relation with head of house*
- *sex*
- *age*
- *marriage condition*
- *education level*

Noticed that we cannot directly observe which two individuals were couple, we need to further identify which two are couples. The following criteria were applied to identify couples within the dataset:

1. **Head of Household and Spouse**:
    - Head of the household and their respective spouses were considered couples.
    - Covered approximately 68% of married individuals.



(a) 1990 (b) 2000

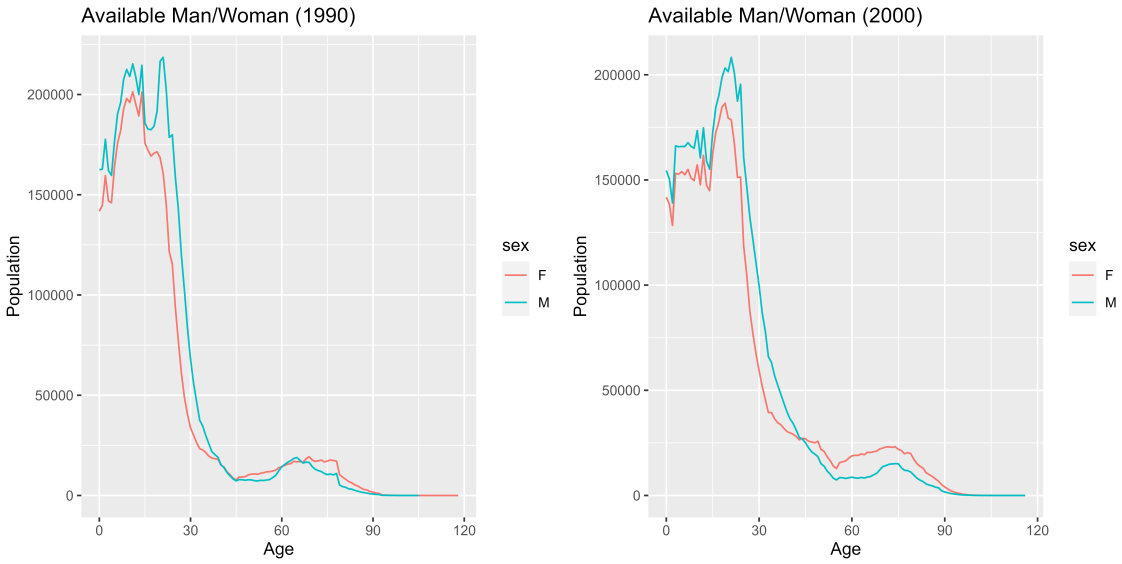
Figure 1: Number of Couples by Age

2. **Parents and Grandparents**:
    - Individuals identified as parents and grandparents were considered potential couples.
    - The sex of these individuals was cross-referenced to refine the identification process.
    - This criterion covered about 2% of married individuals.
3. **Children and Spouse of Children**:
    - Individuals identified as children and spouses of children were considered potential couples.
    - The sex of these individuals was cross-referenced to refine the identification process.
    - This criterion covered approximately 5.5% of married individuals.

Despite the application of the aforementioned criteria, identifying couples poses significant challenges, with only 75.5% of married couples conclusively identified. For the purposes of our study, we exclusively utilize this subset of conclusively identified married couples. It is crucial to note that our approach to defining marriage diverges from previous literature. Specifically, Choo and Siow consider marriages within two-year, while Chu and Yu categorize marriages based on the Year of Marriage into four groups. In contrast, our dataset encompasses all marriages across diverse age groups, offering a more comprehensive perspective on marital relationships during the specified years. However, it is essential to acknowledge the potential presence of cohort and period effects across different years of marriage. Unfortunately, due to data limitations, we were unable to isolate and examine these effects in our analysis.

Figure 1 illustrates the distribution of couples across different age pairs. It is evident that individuals tend to marry individuals of similar age. Notably, there is an observable asymmetry, with a majority of husbands being older than or of the same age as their wives.

Figure 2 presents the count of available men and women. Notably, there is a disparity in gender distribution, with fewer women than men in the younger age groups. However, this trend reverses in the older age groups, indicating a higher count of women than men. This observation may be indicative of a higher of widows and lower remarriage rates among divorced women(Choo and Siow, 2006). Additionally, the higher remarriage rate among divorced men contributes to a reduced availability of younger women. This suggests complex dynamics in the availability and remarriage patterns across different age cohorts.



(a) 1990 (b) 2000

Figure 2: Number of Available People

(a) 1990 (b) 2000

Figure 3: Systematic net gain

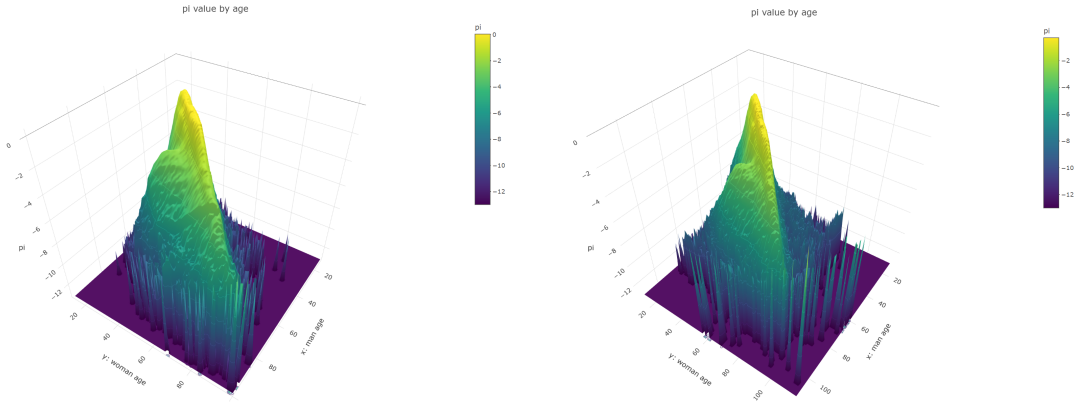
4 Results

4.1 Net gain from marriage

We are not able to specify α_{ij} and γ_{ij}.
However, we can estimate the net gain from marriage by modifying equation (1) and (2) to:

$$\log\left(\frac{\mu_{ij}}{\mu_{i0}}\right) = \alpha_{ij} - \tau_{ij}$$
$$\log\left(\frac{\mu_{ij}}{\mu_{0j}}\right) = \gamma_{ij} + \tau_{ij}$$

$\alpha_{ij} - \tau_{ij}$ and $\gamma_{ij} + \tau_{ij}$ can be interpret as net gain from marriage for man and woman.
Figure 3 illustrates the net gain from marriage for 20/40-year-old men and women with spouses of varying ages. A similar asymmetric pattern can be observed, with men experiencing the highest average gain when married to women of the same age. Conversely, women achieve the highest average gain when married to men who are +5 years older. This can be one of the reason why the majority of husbands being older than or of the same age as their wives.



(a) 1990 (b) 2000

Figure 4: π value by age

4.2 π Value

Adding equation (1) and (2) together, we have

$$\log \mu_{ij} - \frac{\log \mu_{i0} + \log \mu_{0j}}{2} = \frac{\alpha_{ij} + \gamma_{ij}}{2}$$

Let $\pi_{ij} = (\alpha_{ij} + \gamma_{ij})/2$
π_{ij} can be interpret as the total systematic gain to marriage per partner.

Figure 4 illustrates the π_{ij} values for each pair of ages. Figures 5 and 6 present the corresponding counter maps related to Figure 4. First, the π values across all age groups tend to be negative, this is nature from our model setting since unmarried population surpasses married population across nearly all ages. Second, noticed that the asymmetric pattern from previous graph follows, as the highest systematic gain occurs when a woman marries a man of the same age or a man up to five years older. Furthermore, systematic gains are higher when a woman marries an older man, and this trend exhibits a smoother decrease compared to the scenario where a man marries an older woman. However, it is worth noting an anomaly in the data: men aged 60 in 1990 and men aged 70 in 2000 exhibit an unusual peak. This anomaly is attributed to individuals born in 1930. We will delve deeper into investigating this phenomenon in the next section.

An important note regarding our identification process thus far: while our calculations include the entire available population, only approximately 75.5% of this consists of married individuals. This discrepancy may cause some problem. Figure 7 illustrates the contour map when we restrict the available population at each age to 75.5%, assuming that the 75.5% married population is randomly sampled from the overall population (i.e., conclusively identifying them is randomly assigned). The results closely resemble those in Figure 6, and the overall trend remains unchanged.

4.3 The Unusual Peak for Men Born Around 1930

The Retreat of the Government of the Republic of China (ROC) to Taiwan unfolded in 1949, following the Chinese Nationalist Party's (KMT) defeat by the Chinese Communist Party during the Civil War. Individuals born in the 1930s would have been around 20 years old, likely comprising soldiers during the retreat. Over 200 million people migrated from Mainland China to Taiwan, predominantly military personnel, resulting in a gender imbalance with more men than women. Due to the lack of earlier or employment data, confirming this hypothesis regarding the peak remains challenging.

Figure 8 reveals that men aged 60 in 1990 and men aged 70 in 2000 exhibit a higher systematic gain when married to younger women compared to men born in other age groups. Our hypothesis suggests that these individuals, who experienced the government retreat, may have higher education levels. To explore this, Figure 9 illustrates the percentage of married individuals in each age group with education beyond high school in 2000, showing a peak after the age of 70. However,

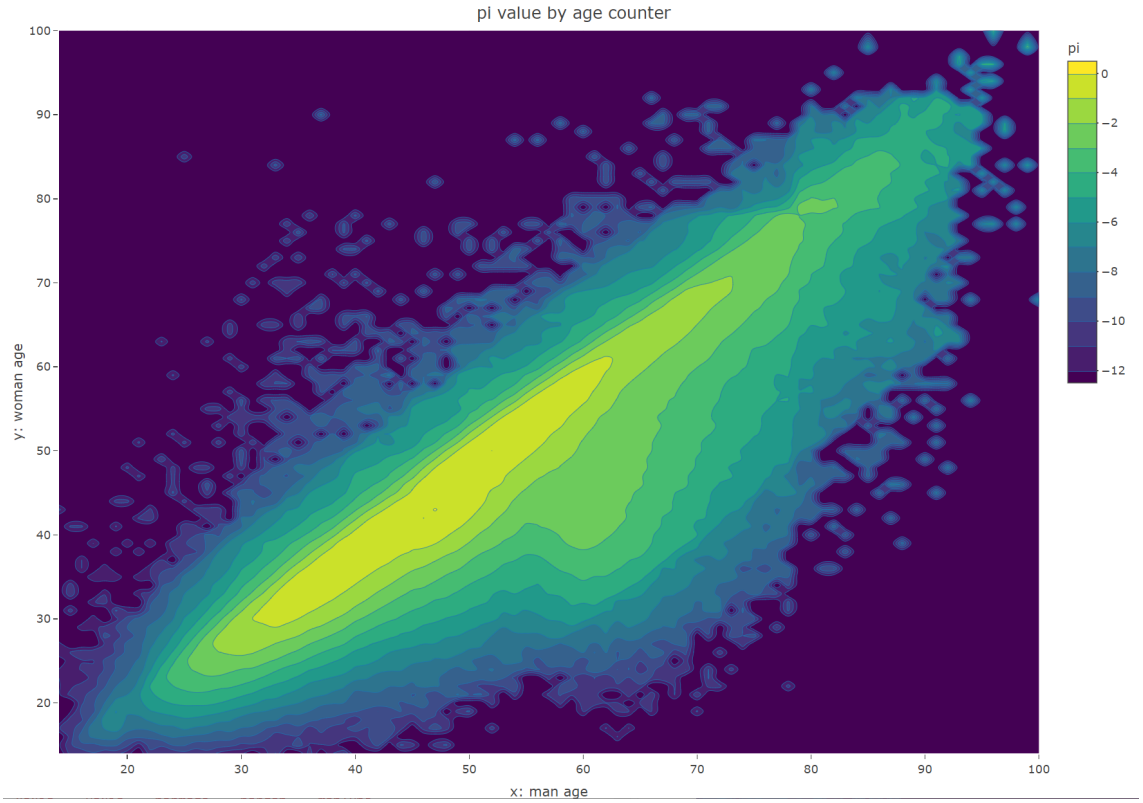


Figure 5: π value by age counter map in 1990

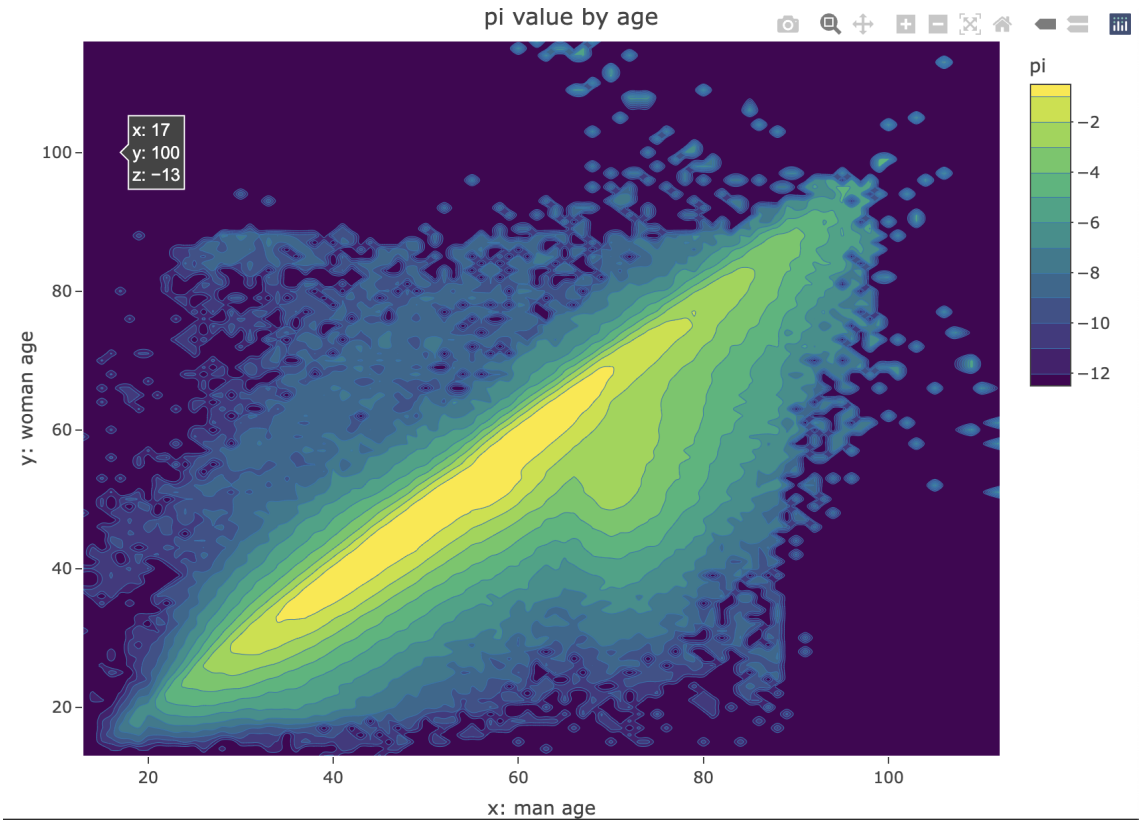


Figure 6: π value by age counter map in 2000

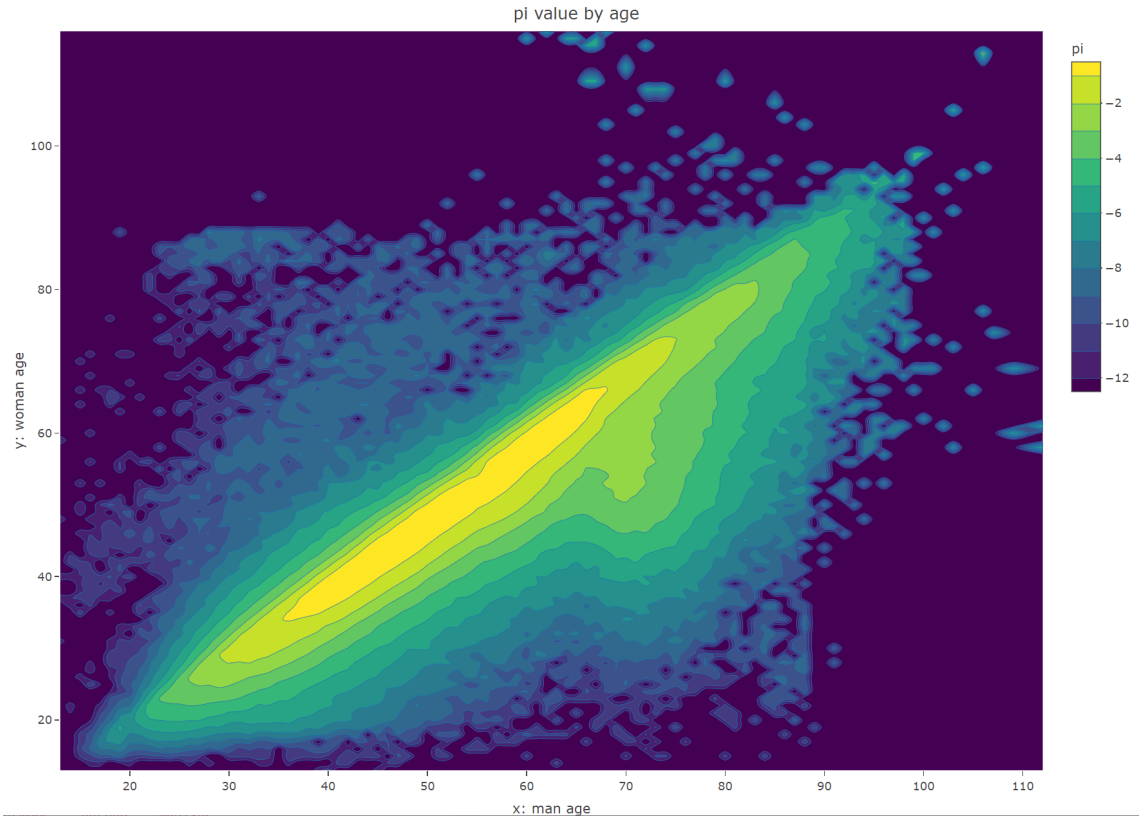
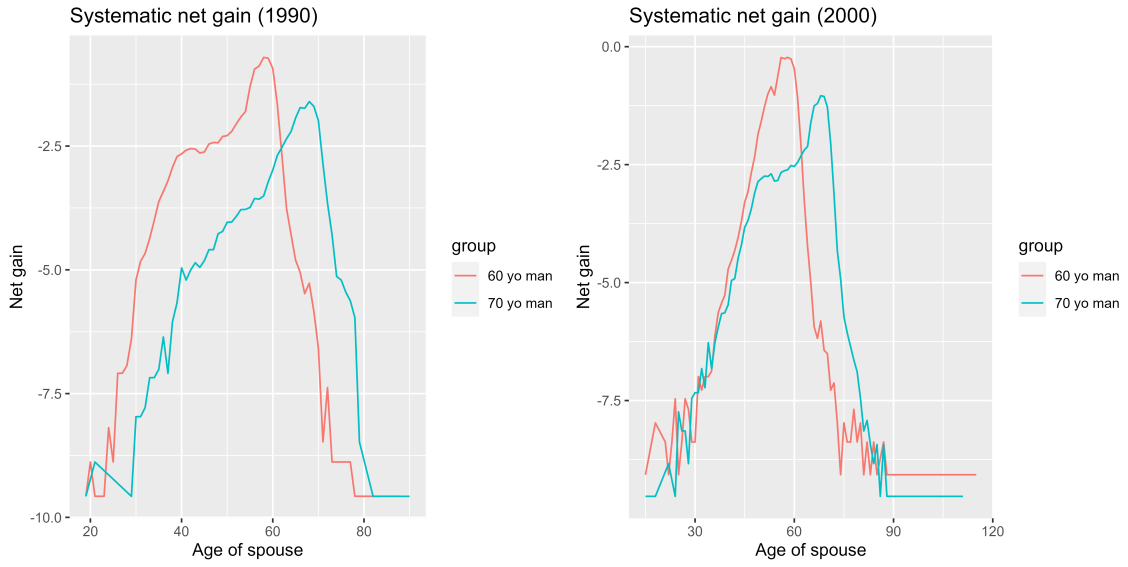


Figure 7: π value by age (adjusted) counter map in 2000



(a) 1990

(b) 2000

Figure 8: Comparison of 60yo and 70yo

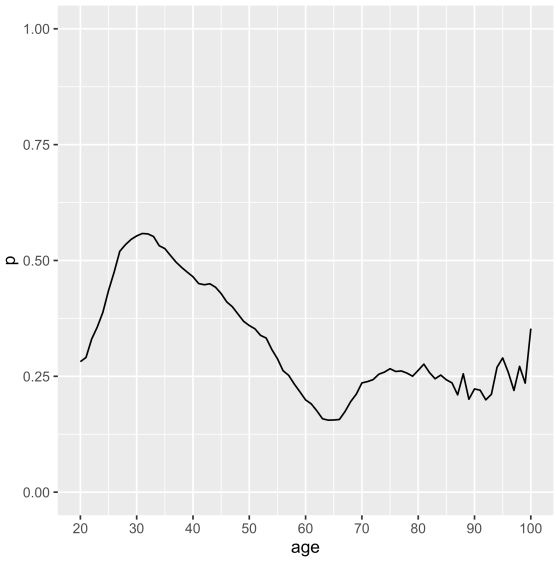


Figure 9: The percentage of individuals in each age group who obtained a higher diploma in 2000

to validate our hypothesis, we examined Figure 10, which displays the π value for each pair of education levels. Surprisingly, there is no clear evidence that higher education leads to increased gain in marriage. Instead, marrying someone from a similar educational background appears to yield higher utility, aligning with the findings of Chu and Yu (2009).

5 Conclusion

The result of the net gain from marriage, unveils an asymmetric pattern. Men experience the highest average gain when married to women of the same age, while women achieve the highest average gain when married to men who are slightly older. This sheds light on potential factors contributing to the observed trend of husbands being older than or of the same age as their wives.

After that, we introduced the π value as the total systematic gain to marriage per partner. Negative π values across all age groups reflect the nature of the model setting, where the unmarried population surpasses the married population. The systematic gains exhibit a consistent asymmetric pattern, with higher gains for women marrying older men, underscoring the complexity of partner selection dynamics.

An intriguing anomaly observed in men born around 1930 is contextualized within historical events, particularly the Retreat of the Government of the Republic of China to Taiwan in 1949. The gender imbalance resulting from the migration of military personnel during this period potentially contributes to a higher systematic gain in marriage for men born around 1930, reflecting the unique demographic dynamics of that era.

Despite potential limitations and challenges, such as the identification process and the inability to isolate cohort and period effects, this study offers valuable insights into the intricacies of marriage in Taiwan. The findings contribute to the broader understanding of societal shifts, highlighting the impact of historical events on marriage patterns and emphasizing the importance of considering diverse demographic factors in studying marital dynamics.

References

[1] Choo, E., & Siow, A. (2006). Who Marries Whom and Why. *Journal of Political Economy*, 114(1), 175–201. https://doi.org/10.1086/498585

[2] Chu, C. Y. Cyrus, & Ruoh-Rong Yu(2009). *Understanding Chinese Families: A Comparative Study of Taiwan and Southeast China*, 87–111. Oxford.

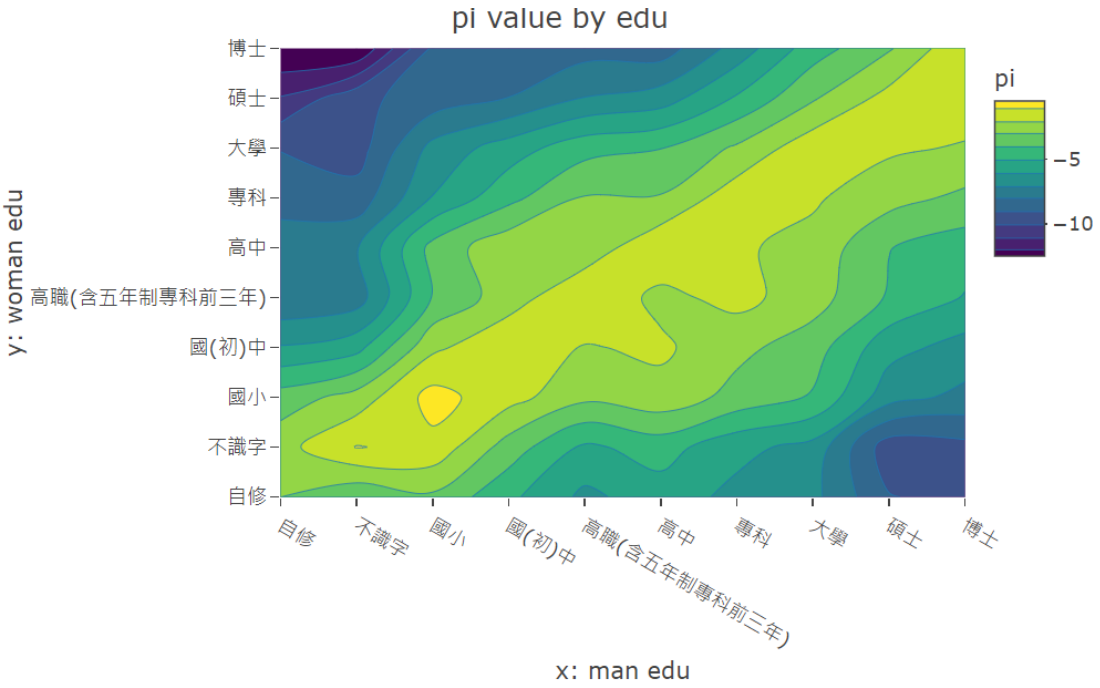


Figure 10: π value by education level in 2000