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Wage Inequality and Propensity to Marry after 1980 in Taiwan

Yu-Chen Kuo*
Department of Economics, Feng Chia University, Taiwan

Abstract

This paper utilizes data from Taiwan to examine whether male wage inequality explains the decline in the propensity to marry. Our empirical results find a small but insignificant effect of regional wage inequality under different measures and specifications of inequality.

Key words: marriage; wage inequality; labor market

JEL classification: J10; J12

1. Introduction

There is a general consensus that age at first marriage in Taiwan has risen for the last two decades. In 1980, the median ages of men and women at first marriage were 27 and 24 years old. Twenty-five years later, these numbers have increased to 31 and 27, respectively. Data from the Manpower Utilization Survey (MUS) show that 48% of men and 71% of women aged 22–30 had married in 1980. By 2005, these percentages dropped to 17% and 32%. There is no doubt that a growing number of individuals postpone marriage. Possible explanations include greater educational attainment, increased female labor market participation, and the availability of birth control pills. In addition, recent studies in the US suggest growing male wage inequality may be another reason for delaying marriage.

A typical marital search model suggests that greater variability in male wages will increase the duration of a single woman's search (Becker, 1973; Keeley, 1977; Mortensen, 1986). The reason is that a woman who delays marriage increases the expected value of wage offers by prospective mates. If the woman searches for a mate based on labor market prospects, male wage variability will prolong her marital search. In this case, we will observe postponed marriage more often and a decline in the propensity to marry. Putting this in a cross-sectional sense, a region with greater male wage inequality is more likely to have a lower female marriage

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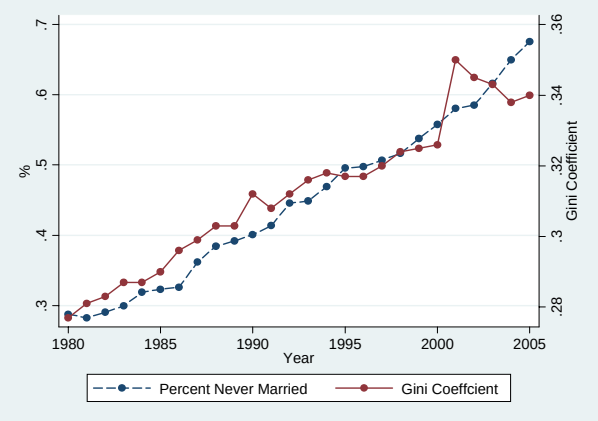
*Correspondence to: Department of Economics, Feng Chia University, Taichung, Taiwan. E-mail: kuoyc@fcu.edu.tw. I am grateful to two anonymous referees for their helpful comments. I gratefully acknowledge the financial support of the National Science Council, Taiwan under grant no. NSC 95-2415-H-035-012.

rate. Women residing where men have greater wages variability should spend a relatively long time on marital search.

Since the early 1980s, income inequality worsened and deviated from Taiwan's historical trend of rapid growth without increasing inequality. The overall Gini coefficient grew from 0.277 in 1980 to 0.338 in 2004. Figure 1 shows the Gini coefficient together with the fraction of women aged 22–30 who had not been married over this period. It is clearly seen in the figure that the rising trend in income inequality appears to be consistent with the rising fraction of unmarried women in this age group. However, if we shift our focus to male wage inequality, a different story unfolds. An extensive literature documents a substantial rise in US male wage inequality since the late 1970s but it is less clear-cut that the wage inequality in Taiwan has increased over the last two decades. For instance, Lin and Chu (2002) find that wage inequality declined between 1987 and 1989 but has risen since 1989. Chen and Hsu (2001) and Chan et al. (1999), however, claim that Taiwan has experienced declining wage inequality since the mid-1980s. The conclusions concerning inequality patterns depend on the data source and target sample used by researchers. Based on previous studies, it's fair to say that the upward trend in wage inequality is less obvious, or at least the trend is not closely parallel to that in the US and other OECD countries. Therefore, it's interesting to examine whether this connection between rising male wage inequality and declining marriage rates still holds in the case of Taiwan.

Figure 1. Percent of Unmarried Women Aged 22-30 and Gini Concentration Coefficient, 1980-2005



Note: Author's tabulation from MUS and report from Directorate General of Budget, Accounting and Statistics, Executive Yuan.

Previous studies in Taiwan either focused on the growing trend in male wage inequality (Tsai and Mai, 1998; Lin and Orazem, 2003; Cheng, 2004) or the historical marriage trends (Lee, 1994; Tu and Lee, 1994). To date, there is no study connecting these two phenomena. In this study, we use data from the MUS from 1980 to 2005 to examine whether male wage inequality is positively correlated with

women's declining propensity to marry. After constructing a pseudo-panel with an aim to capture geographic and time effects, we estimate a woman's propensity to marry using a probit model controlling for local marriage and labor market conditions. The aim of this research is not only to disentangle the connection between male wage inequality and the women's propensity to marry but also to realize the effects of local marriage and labor market conditions on marriage decisions.

2. Background

In recent decades, family-formation behavior in Taiwan changed drastically. The proportion of singles in the population has increased in the younger generations. Table 1 summarizes the fraction of men and women who have never been married by education and age over the period 1980–2005. In general, it is now more likely for men and women to remain single than it was in 1980. In 1980, 47% of men and 33% of women aged 18–44 had never been married. By 2005, these numbers rose to 55% and 44% respectively. Even after adjusting for changes in demographic composition, the upward trend still persists, as seen in Table 1. Across age groups, the fractions of singles have all increased over the period.

The patterns are less clear when we look across different educational levels. On average, men and women with higher education are more likely to postpone marriage; as a result, the fraction of the never-married population is greater in more educated groups than in less educated groups. This fact is basically consistent with the results in the table. Nevertheless, when we confine our sample to the population aged 35–44, a different picture for men and women is revealed. Despite the fact that individuals in all education groups tend to be less likely to marry over time, the likelihood of being married is positively associated with education level for men but is negatively associated for women. If we further restrict the sample in 2005 to those aged 40–44 who were much less likely to marry later on, 17% of female college graduates were single. However, only 8% of their male counterparts were still single. The typical marriage pattern in Taiwan is hypogamy (Yang et al., 2006); that is, women tend to "marry up" with respect to the partners' educational level. A man with high education tends to postpone marriage, but he is more likely to get married later on. This explains why marriage rates fall with education level for women aged 35–44 but rise and then fall for men in this age group. For a man, the increasing probability of being single is more related to delaying marriage. For a woman, this increasing probability may imply that she is likely to ever marry.

With regard to regional differences, more urbanized areas have experienced more drastic changes in marriage patterns, which are partly caused by asymmetric shifts in educational attainment in urbanized areas. In the Northern region, 33% of women aged 18–44 were single in 1980, and the number rose to 44% in 2005. In contrast, this percentage only increased from 35% to 41% in the Eastern region over the same period. This variation in regions allows us to examine factors behind this changing marital behavior.

Table 1. Percent Unmarried Population Aged 18-44 by Education and Age, 1980-2005

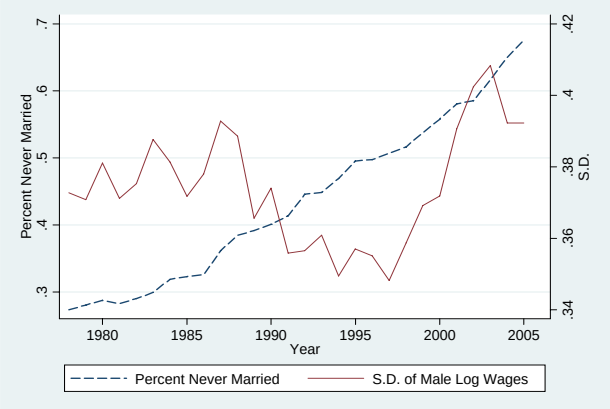
	Men				Women			
	1980	**1990**	**2000**	**2005**	**1980**	**1990**	**2000**	**2005**
All	47.4	46.0	50.6	54.8	32.0	32.9	38.1	43.7
Weighted by 1980[1]		51.8	58.7	63.2		33.4	33.8	39.3
By Education:								
Education ≤ 9 years	36.4	34.8	37.9	41.0	17.3	12.1	9.4	13.2
Education 10–12 years	61.6	54.3	51.6	52.6	59.9	49.2	37.5	35.2
Education 13–15 years	62.7	52.8	55.4	49.7	63.5	57.4	59.0	51.3
Education ≥ 16 years	59.1	51.8	63.5	71.6	70.9	60.5	67.4	72.9
By Age:								
18–24	92.2	95.4	96.2	97.4	71.5	81.5	87.9	91.4
25–34	31.4	40.1	54.2	64.7	13.3	19.9	32.5	44.8
35–44	5.5	6.5	13.9	16.2	1.1	3.5	6.9	11.1
By Region:								
Northern	48.1	45.0	50.2	55.4	32.8	32.6	37.9	43.7
Central	47.0	46.8	49.6	52.9	31.4	34.1	37.2	42.9
Southern	45.3	45.2	51.9	55.9	30.7	31.7	39.4	44.7
Eastern	55.1	52.8	53.4	53.6	34.6	37.0	36.6	40.9
Population Aged 35-44 by Education								
Education ≤ 9 years	6.2	7.2	17.3	19.9	0.6	1.8	3.7	4.7
Education 10–12 years	3.7	6.2	12.8	15.3	5.9	6.7	6.4	10.5
Education 13–15 years	2.2	4.3	9.8	12.8	4.9	7.9	15.1	15.5
Education ≥ 16 years	2.6	5.1	11.0	15.6	4.8	12.7	17.2	22.7

Notes: Author's tabulation from MUS. The weight of population composition in 1980 is used. Population is divided into four education levels and three age groups with total 12 cells. After the adjustment, the percentages are all higher for men and mixed for women. The difference arises from the change in population distribution from 1980 to 2005.

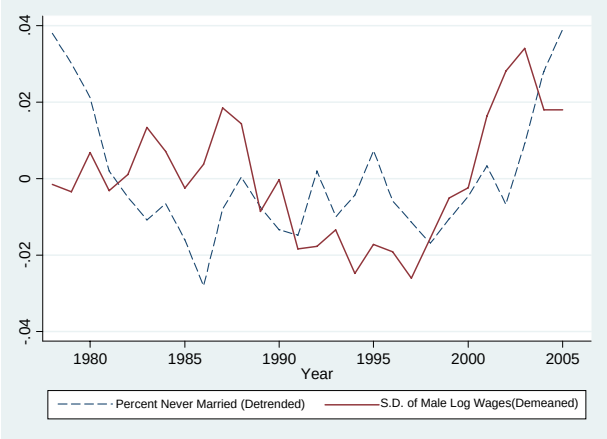
While most literature agrees that income inequity in Taiwan began to rise after the early 1980s as demonstrated in Figure 1, the pattern of male wage inequality is more complicated. Figure 2 displays the historical trend in male wage inequality, which is measured by the standard deviation of log wages for men aged 21–45 who were full-time and not self-employed workers. Male wage inequality fluctuated during the 1980s and started to decline in the late 1980s. Then, beginning in 1997, wage inequality rose until 2004. The rapid expansion of the supply of new college graduates partly counteracts the effect of skill-biased shifts in relative labor demand for skilled labor (Lin and Orazem, 2003, 2004); as a result, the pattern of male wage inequality is distinct from overall income inequality. When we compare the trend in male wage inequality alongside changes in the percent of unmarried women aged 22–30 shown in Figure 1, it is not easy to see a strong link between these two series. The fraction of unmarried women rises over the entire period. Even detrending the marriage series and demeaning the male wage inequality series as shown in the

bottom panel, there is no evidence of positive correlation.

Figure 2. (a) Percent of Unmarried Women Aged 22-30 and Male Wage Inequality, 1978-2005



(b) Percent of Unmarried Women Aged 22-30 (Detrended) and Male Wage Inequality (Demeaned), 1978-2005



Despite the absence of correlation in the historical trends, a simple cross-sectional snapshot indicates a positive correlation between male wage inequality and the proportion of unmarried women across areas within each of several sample periods. Figure 3 delineates the relationship between male wage variability and the percent of unmarried women aged 22–30 by locality at three points in time. The figure implies a positive correlation between male wage inequality and the fraction of unmarried women. Superimposed are fitted simple linear regressions. The simple correlation coefficients are 0.576, 0.501, and 0.544, respectively, for the sample periods 1981–1985, 1991–1995 to 2001–2005. Areas with greater male wage variability are more likely to have a larger proportion of

young single women. These figures appear to provide some evidence that supports the idea that greater male wage inequality is associated with longer marital searches. The variability in male wages may increase a woman's search duration and/or lead to a higher proportion of women staying single. However, this simple correlation could be confounded with other factors that vary across localities. Thus, further analysis is necessary to resolve the puzzle.

3. Literature Review

The social science literature has provided several explanations for the decline in marriage rates. Here we first briefly review the marriage behavior literature then introduce the theoretical connection between male wage inequality and the propensity to marry.

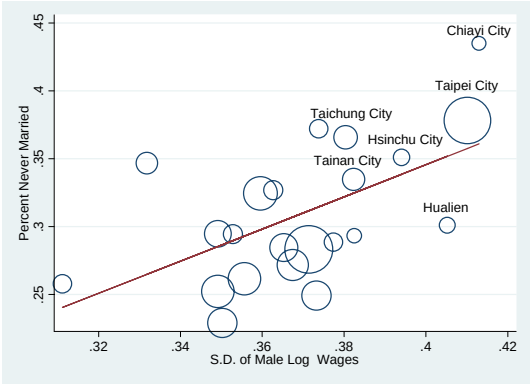
3.1 Marriage Behavior

The pioneer of family economics, Gary Becker (1973, 1981), defined the concept of marriage from an economic point of view as a union of joint production and consumption. Most economic studies follow this line and view decreasing marriage rates as a result of a decline in gains from specialization and trading. Blackburn and Korenman (1994) show that the marriage premium has greatly declined using Current Population Survey data, and Gray (1997) finds similar results. Some researchers argue the sex ratio, i.e., the relative number of men to women in the population, is fundamental to marriage rates as are female labor force participation rates. Angrist (2002) suggests that high sex ratios have a large positive effect on the likelihood of female marriage rates and a large negative effect on female labor force participation rates. Wood (1995) uses 1970 and 1980 standard-metropolitan-statistical-area-level census data to estimate a fixed-effects model of the black marriage rate in the US. He finds that the shrinking pool of "marriageable" black men could explain 3% to 4% of the decline in the black marriage rate. A long line of research has attempted to understand whether the availability and generosity of social welfare assistance affects fertility and marriage decisions. Moffitt (1992) provides a comprehensive review of the literature. Akerlof et al. (1996) and Goldin and Katz (2002) argue that the advent of the birth control pills and legal abortion are key factors for women to delay marriage.

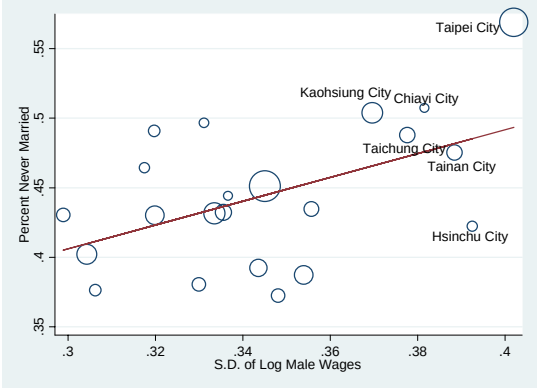
More recent studies find that rising male wage inequality may be correlated with important changes in marriage behavior. Using census data from 1970, 1980, and 1990, Loughran (2002) suggests that increasing male wage inequality explains 7% to 18% of the decline in the propensity to marry between 1970 and 1990 for white and high-educated black women. Gould and Paserman (2003) examine the same data and find a similar but stronger effect. These two papers are closest to this study. There is comparatively little research in Taiwan from this perspective.

Figure 3. Male Wage Inequality and Percent of Unmarried Women Aged 22-30 by Locality

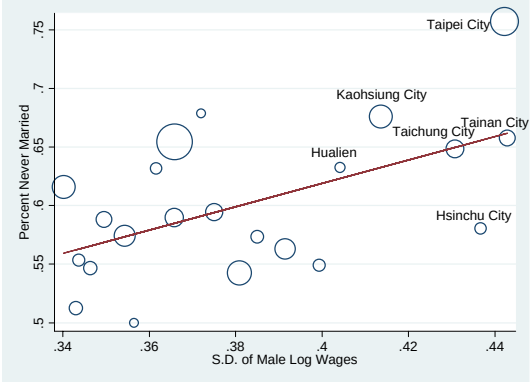
(a) 1981-1985



(b) 1991-1995



(c) 2001-2005



Notes: Author's tabulation from MUS for 1981–2005.

The majority of research in Taiwan regarding shifts in marriage behavior is related to assortative mating. For instance, both Tsai (1994) and Yang et al. (2006) show that marriage in Taiwan has become more homogenous in terms of educational attainment, i.e., couples with similar educational backgrounds are more likely to get married. Tsai and Kuan (2003) are the only researchers exploring the association between marriage and inequality in Taiwan. However, their analysis mainly concerned with the impact of increasingly positive assortative mating on rising income inequality, which is another issue and is outside the scope of this paper. Other papers describe the general trends and changes in marriage in Taiwan. Lee (1994) and Tu and Lee (1994) use census data and analyze marriage patterns in the twentieth century. They find that both men and women in the general population postpone marriage and that the proportion of unmarried people there has been increasing since 1980. To date, few studies have explored the causes of these changes in marriage behavior. One of the aims of this paper is to fill this gap.

3.2 Marital Search Model

Mortensen (1986) introduces a job search model that can be applied to marital search. It is generally agreed that a woman tend to choose a potential mate according to his labor market prospects while a man might place more emphasis on a woman's other traits, such as appearance and housekeeping ability. In addition, it is relatively difficult to measure female wage inequality because of lower female labor market participation and a higher percentage of part-time female workers in Taiwan. Thus, we focus our study on the link between male wage inequality and female propensity to marry.

We assume women select mates from a pool of potential men based entirely on the wages they earn, preferring high-wage men to low-wage men. Let the cumulative distribution function $F(w)$ represent the male wage distribution with mean μ and variance σ^2. In each period, a woman receives at most one marriage proposal from the pool with probability q. Following a standard dynamic programming maximization problem, it can be shown that there exists some reservation wage w^* such that a women is indifferent between accepting a marriage proposal and continuing to search in the next period. Mortensen (1986) shows that:

$$\frac{\partial w^*}{\partial \mu} = \frac{\phi}{r+\phi} \in (0,1), \tag{1}$$

where r is the interest rate linked to the discount factor β and $\phi = q[1-F(w^*)]$ is the instantaneous probability of accepting a marriage proposal. Equation (1) indicates that an increase in the mean of the male wage distribution will raise the reservation wage but less than proportionally. Consider the case of a mean-preserving spread:

$$\frac{\partial w^*}{\partial \sigma^2} = \frac{\beta q}{\beta q[1-F(w^*)]+1}\int_0^{w^*} \frac{\partial F(w)}{\partial \sigma^2} dw > 0 . \quad (2)$$

An increase in the variance in the male wage distribution will increase the reservation wage. In other words, a more dispersed wage distribution with an unchanged mean increases the benefit of further search by increasing the expected value of marriage offers above the reservation wage w^*. On the theoretical basis of this model, we undertake our empirical study in the next section.

4. Data and Sample Selection

This study uses data from the MUS, which is conducted by Directorate General of Budget, Accounting and Statistics of the Executive Yuan of Taiwan. The survey has been conducted every year since 1978 to gain an understanding of manpower utilization in Taiwan, with results of the survey also used for manpower research. The survey was done concomitantly with the Manpower Survey (originally called the Labor Force Survey) in May 2001. The survey has been basically consistent in terms of questions asked over time. In this article, we consider surveys from 1980 to 2005 because most researchers agree that inequality began to increase after the early 1980s. Furthermore, two cities were changed into provincially governed cities in 1982, and it is difficult to trace corresponding regional population information prior to these changes. Eligible respondents are citizens aged 15 years and up who participate in economic activities of their own will and live in ordinary households or institutional units in Taiwan. The surveys asked respondents core questions about their socioeconomic background and employment status in the labor force, which represents key information for our empirical examination.

This study only includes observations for the main island of Taiwan; Penghu county and other islands are excluded. Our primary purpose is to examine the connection between male wage inequality and marriage rates. We restrict our sample to women aged 22–30, since at these ages women's marriage decisions are most likely to be affected by current marriage conditions and most of them have already completed their education. That leaves 145,852 observations. For variables related to male wages, we confine our sample to men aged 21–45 who reported positive total earnings, who worked more than 39 hours in the previous week, and who are not self-employed. The reason we choose men aged 21–45 is that we assume women aged 22–30 search for men primarily in this age group. As a simple sensitivity analysis, we also considered using women aged 25–35 and found similar results.

Women use men's current hourly wages to make expectations of their future earnings. Due to data limitations, we only used primary salary income to calculate hourly wages. Hourly wages are calculated by dividing monthly wages by the product of weekly working hours and 4.33 weeks. We additionally dropped the observations for which the hourly wage was less than half the minimum hourly wage rate due to suspicion about misreporting. Income values are adjusted for the impact of top-coding. Top-coded values were replaced by numbers times 1.5. In

each survey year, top-coded and very low-wage observations represented less than 0.2% of the sample.

5. Empirical Study and Results

The previous search model suggests that a woman's propensity to marry is associated with local marriage market conditions and her reservation wages. Local marriage market conditions include variables such as the local population and sex ratio. Reservation wages, as mentioned in the last section, are affected by the mean and variance of male wages. A woman is expected to be less likely to marry as her reservation wage increases. Therefore, our empirical study will estimate a woman's propensity to marry as a reduced-form specification. The fundamental regression in our analysis is a probit model:

$$P(y_{ijt}=1)=\Phi(\beta_0+\beta_1\mu_{jt}+\beta_2\sigma_{jt}+\beta_3X_{ijt}+\beta_4Z_{ijt}+\varepsilon_{ijt}), \quad (3)$$

where y_{ijt} is an indicator variable equal to 1 if woman i living in area j in year t is currently married or widowed and 0 otherwise. We include widowed women in the sample since those observations are not considered mismatched and voluntarily separated. There are very few widowed observations among the young population (less than 1%) and excluding widowed sample would not affect the results. In (3), μ and σ are the mean and standard deviation of male wages, X_{ijt} is a vector of control variables including age and education dummies, Z_{ijt} is a vector of variables for the local marriage market, and ε_{ijt} represents the error term, which captures geographic and time fixed effects. Specifically, the error term takes the form:

$$\varepsilon_{ijt}=\theta_j+v_t+e_{ijt}, \quad (4)$$

where θ_j is the time-invariant geographic location effect capturing unobservable aspects of the local marriage market, v_t represents changes in marriage over time that are common to all individuals, and e_{ijt} capture remaining error. According to the political division in Taiwan, we divided our sample into 22 localities, including 2 municipalities, 5 provincially administrated cities, and 15 counties. The inclusion of geographic fixed effects accounts for possible unobserved local characteristics such as social norms. However, we may find that, after controlling for these effects, most cross-sectional variation in inequality and propensity to marry disappears.

To find variables that are sufficient proxies for local market conditions, we first divide the entire sample into several cells by year and geographic location and then compute average characteristics in each cell. In other words, we generate a pseudo-panel indicating local market conditions in each region and each year. These conditions include the local population and sex ratio (the ratio of total men to total women), which attempts to capture the probability that a woman meets a potential partner. Grossbard-Shechtman (1984) and Grossbard-Shechtman and Neuman (1988) observe that a marriage market that favors women would lower female labor

participation rates. Blau et al. (2000) also find that better female labor markets are associated with lower marriage rates. Therefore, we expect that local labor market conditions do influence female marriage decisions. In addition to mean male and female mean hourly wages, we also add male and female employment ratios as indexes of local markets in the regression. As mentioned previously, the aim of this research is not only to examine the connection between male wage inequality and the propensity to marry but also to gain insight into the effect of local marriage and labor market conditions on marriage decisions.

Table 2 reports our main empirical results for the three specifications. We use the standard deviation of log male wages as the measure of male wage inequality. In all regression models, standard errors are adjusted for clustering sample by year and locality in order to take the grouped structure of the error term into consideration. Of the total 145,852 observations, 54.5% of women were married and 0.2% were widowed. Without the locality dummies, the first regression model presents results using only region dummies: Northern, Central, Southern, and Eastern. After controlling for education and local labor and marriage market prospects, we find that the probability that a woman is married is negatively associated with local male wage inequality as predicted. However, after taking into account geographic effects and a linear time trend as in the second and third models, the negative effect becomes small and insignificant. This suggests that the unobserved local preference for marriage may be positively correlated with male wage inequality. For instance, it is possible that an area with a more open attitude towards being single tends to have a wider diversity of work type, which may lead to greater male wage inequality. This finding is consistent with previous findings observed based on time series trends. Male wage inequality appears to have had little effect on marriage behavior.

It is anticipated that women with more education tend to delay marriage due to greater opportunity costs of choosing a mate. It is also expected that a local labor market with more job opportunities for women defers marriage since there is a strong incentive to reap returns to schooling immediately after graduation. In contrast, a prosperous local labor market for men, which implies more "marriageable" men in the pool, increases a woman's propensity to marry. Our results confirm that marriage rates decline with higher educational attainment by women and a higher female employment ratio. In addition, marriage rates increase with higher male employment ratios. Other results show that propensity to marry is positively associated with age and local population size as anticipated. In general, women are more likely to stay single if the female labor market prospects improve and they are more likely to marry if male market conditions improve. However, we are not able to detect significant effects of either male wages or female wages on marriage rates.

Table 3 checks the robustness of the results using alternative measures of wage inequality. We adopt two differences in the regression: the difference in log hourly wages at the 90^{th} and 50^{th} percentiles and at the 50^{th} and 10^{th} percentiles. This measure of inequality can capture asymmetric growth in the wage distribution over time across areas. It also allows us to test whether a woman' propensity to marry

responds more to increasing inequality in the upper tail than in the lower tail of the male wage distribution. The regression results are very similar to those in Table 2. The coefficients of wage inequality are negative and significant without locality dummies but are statistically insignificant once we impose locality effects and a linear time trend. Moreover, women appear to respond more to changes in the lower tail of the wage distribution than to changes in the upper tail.

Table 2. Probit Regression Results with 22 Localities

	Pooled	Local fixed effects	Local fixed effects + linear trend
	(1)	(2)	(3)
Standard deviation of male log wages	−0.157**	0.030	−0.020
	(0.066)	(0.07)	(0.068)
Mean male log wages	−0.086*	−0.007	−0.039
	(0.049)	(0.047)	(0.048)
Mean female log wages	−0.141**	0.026	0.015
	(0.038)	(0.038)	(0.039)
Sex ratio	0.015	0.009	0.018
	(0.021)	(0.021)	(0.02)
Log population	−0.013**	0.05*	0.374**
	(0.004)	(0.026)	(0.093)
HS graduate dummy	−0.246**	−0.245**	−0.246**
	(0.004)	(0.004)	(0.004)
Some college dummy	−0.446**	−0.446**	−0.446**
	(0.004)	(0.004)	(0.004)
College graduate dummy	−0.544**	−0.544**	−0.544**
	(0.004)	(0.004)	(0.004)
Proportion males employed	0.436**	0.304**	0.156*
	(0.093)	(0.087)	(0.089)
Proportion females employed	−0.230**	−0.300**	−0.280**
	(0.036)	(0.035)	(0.037)
Year dummies	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes
Geographic fixed effects	Region	Locality	Locality
Locality specific linear time trends	No	No	Yes
No. of localities	22	22	22
No. of observations	145,852	145,852	145,852

Notes: Male wage inequality is measured in terms of the standard deviation of log male wages. Estimated coefficients represent the marginal effects of the explanatory variables (evaluated at the means) from a probit model. Standard errors in parentheses are corrected for clustering by locality and year. * and ** denote significance at 10% and 5% levels.

Our identification strategy relies heavily on the choice of geographic partition. Political division may not actually reflect the separation of different local marriage markets. Data limitations on respondent historical records prevent the use of

migration status as an additional control. To circumvent the problem, we regroup the sample into 16 areas according to major township "living circles" suggested by the Ministry of the Interior and the Council for Economic Planning and Development in Taiwan. The concept of a living circle is similar to the idea of a metropolitan area and may more realistically capture boundaries among different local marriage markets.

Table 3. Probit Regression Results with 22 Localities (Alternative Measure of Wage Inequality)

	Pooled	Local fixed effects	Local fixed effects + linear trend
	(1)	(2)	(3)
90-50 male log wages	−0.025	0.012	0.003
difference	(0.033)	(0.036)	(0.031)
50-10 male log wages	−0.103**	0.018	−0.009
difference	(0.039)	(0.037)	(0.036)
Mean male log wages	−0.091*	−0.008	−0.040
	(0.05)	(0.047)	(0.047)
Mean female log wages	−0.146**	0.026	0.015
	(0.038)	(0.038)	(0.039)
Sex ratio	0.023	0.008	0.019
	(0.022)	(0.021)	(0.021)
Log population	−0.012**	0.05*	0.374**
	(0.004)	(0.026)	(0.094)
HS graduate dummy	−0.246**	−0.245**	−0.246**
	(0.004)	(0.004)	(0.004)
Some college dummy	−0.446**	−0.446**	−0.446**
	(0.004)	(0.004)	(0.004)
College graduate dummy	−0.544**	−0.544**	−0.544**
	(0.004)	(0.004)	(0.004)
Proportion males	0.434**	0.307**	0.157*
employed	(0.092)	(0.087)	(0.089)
Proportion females	−0.236**	−0.300**	−0.281**
employed	(0.036)	(0.035)	(0.037)
Year dummies	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes
Geographic fixed effects	Region	Locality	Locality
Locality specific linear time trends	No	No	Yes
No. of localities	22	22	22
No. of observations	145,852	145,852	145,852

Notes: Male wage inequality is measured in terms 90-50 and 50-10 male wage differentials. Estimated coefficients represent the marginal effects of the explanatory variables (evaluated at the means) from a probit model. Standard errors in parentheses are corrected for clustering by locality and year. * and ** denote significance at 10% and 5% levels.

Table 4. Probit Regression Results with 16 Localities

	Pooled	Local fixed effects	Local fixed effects + linear trend
	(1)	(2)	(3)
Standard deviation of male log wages	−0.054	0.021	−0.037
	(0.083)	(0.079)	(0.073)
Mean male log wages	−0.064	0.004	−0.034
	(0.054)	(0.051)	(0.051)
Mean female log wages	−0.118**	0.065	0.040
	(0.042)	(0.041)	(0.042)
Sex ratio	−0.063**	−0.021	0.004
	(0.027)	(0.024)	(0.022)
Log population	−0.019**	0.065**	0.365**
	(0.005)	(0.028)	(0.093)
HS graduate dummy	−0.248**	−0.248**	−0.249**
	(0.004)	(0.004)	(0.004)
Some college dummy	−0.449**	−0.45**	−0.450**
	(0.004)	(0.004)	(0.004)
College graduate dummy	−0.547**	−0.548**	−0.548**
	(0.004)	(0.004)	(0.005)
Proportion males employed	0.417**	0.23**	0.027
	(0.110)	(0.097)	(0.096)
Proportion females employed	−0.169**	−0.271**	−0.235**
	(0.040)	(0.040)	(0.041)
Year dummies	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes
Geographic fixed effects	Region	Locality	Locality
Locality specific linear time trends	No	No	Yes
No. of localities	16	16	16
No. of observations	145,852	145,852	145,852

Notes: Male wage inequality is measured in terms of the standard deviation of log male wages. Estimated coefficients represent the marginal effects of the explanatory variables (evaluated at the means) from a probit model. Standard errors in parentheses are corrected for clustering by locality and year. * and ** denote significance at 10% and 5% levels.

As presented in Table 4, we have similar results except that we do not find a significant effect of wage inequality even in the most naive setup. A further attempt to check the robustness of our approach using the alternative measures of wage inequality reaches the same conclusions and is shown in Table 5. The weak connection between wage inequality and the propensity to marry is independent of the choice of geographic partition. In summary, the evidence presented here does not support the hypothesis that changes in wage inequality contribute to the decline in marriage rates. We argue that the rising proportion of single women cannot be attributed to increasing male wage inequality in Taiwan. The reason for sensitivity

of our results may be that women in Taiwan weight other traits of potential spouses more than current wage rates. For instance, it is very likely that women pay more attention to potential spouses' employment status and labor market potential than simply their current salary. Another factor that may dilute the effect of male wage inequality on marriage rates is the high mobility across regions in Taiwan. It is not uncommon to observe cross-regional or cross-broader marriages in Taiwan, which may be partly responsible for this weak connection.

Table 5. Probit Regression Results with 16 Localities (Alternative Measure of Wage Inequality)

	Pooled	Local fixed effects	Local fixed effects + linear trend
	(1)	(2)	(3)
90-50 male log wage	0.014	−0.012	−0.012
difference	(0.041)	(0.039)	(0.036)
50-10 male log wage	−0.085*	0.036	0.002
difference	(0.045)	(0.041)	(0.038)
Mean male log wages	−0.061	0.005	−0.033
	(0.054)	(0.051)	(0.051)
Mean female wages	−0.117**	0.069	0.041
	(0.042)	(0.041)	(0.041)
Sex ratio	−0.059**	−0.021	0.005
	(0.027)	(0.024)	(0.022)
Log population	−0.019**	0.066**	0.365**
	(0.005)	(0.028)	(0.094)
HS graduate dummy	−0.248**	−0.248**	−0.249**
	(0.004)	(0.004)	(0.004)
Some college dummy	−0.449**	−0.450**	−0.45**
	(0.004)	(0.004)	(0.004)
College graduate dummy	−0.547**	−0.548**	−0.548**
	(0.004)	(0.004)	(0.004)
Proportion males	0.401**	0.231**	0.035
employed	(0.109)	(0.097)	(0.095)
Proportion females	−0.174**	−0.269**	−0.235**
employed	(0.040)	(0.040)	(0.041)
Year dummies	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes
Geographic fixed effects	Region	Living Circle	Living Circle
Locality specific linear time trends	No	No	Yes
No. of localities	16	16	16
No. of observations	145,852	145,852	145,852

Notes: Male wage inequality is measured in terms 90-50 and 50-10 male wage differentials. Estimated coefficients represent the marginal effects of the explanatory variables (evaluated at the means) from a probit model. Standard errors in parentheses are corrected for clustering by locality and year. * and ** denote significance at 10% and 5% levels.

6. Concluding Remarks

Studies from the US indicate that rising male wage inequality partly accounts for a decline in a woman's propensity to marry. This paper examines this hypothesis in Taiwanese marriage markets. Based on several regression model specifications incorporating individual, local market, and time control variables as well as different measures of male wage inequality, we do not find evidence to support this hypothesis in recent decades.

Relative to inequality, other economic explanations such as local employment rates and education attainment appear to be more important for explaining the decline in marriage propensity. Young women are more likely to get married in an area with a higher male employment rate, a lower female employment rate, a higher sex ratio, and a larger population. Generally speaking, women tend to stay single longer when the labor market for women improves or the labor market for men worsens. It is also worth noting that better educated women tend to stay single for a longer period and are less likely to get married even after controlling for various factors. This finding contrasts with the US experience, where lower marriage rates are more concentrated among less educated women and black women. More research is necessary to better understand why young college graduates are more likely to stay single in Taiwan.

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