Discussion Papers In Economics And Business

Comparing the role of height between men and women in the marriage market

Eiji Yamamura
Yoshiro Tsutsui

Discussion Paper 16-20

Graduate School of Economics and
Osaka School of International Public Policy (OSIPP)
Osaka University, Toyonaka, Osaka 560-0043, JAPAN

Comparing the role of height between men and women in the marriage market

Eiji Yamamura
Yoshiro Tsutsui

Discussion Paper 16-20

July 2016

Graduate School of Economics and
Osaka School of International Public Policy (OSIPP)
Osaka University, Toyonaka, Osaka 560-0043, JAPAN

Comparing the role of height between men and women in the marriage market

Eiji Yamamura*

Seinan Gakuin University, Japan

Yoshiro Tsutsui

Konan University, Japan

*Corresponding author. Department of Economics, Seinan Gakuin University, 6-2-92 Nishijin, Sawara-ku Fukuoka 814-8511, Japan.

E-mail address: yamaei@seinan-gu.ac.jp

Tel: +81 92 823 4543; Fax: +81 92 823 2506

ABSTRACT

This paper attempts to explore how the different roles of height between men and women in the marriage market changed across generations. Using individual-level data from Japan, we compared the effect of height on marriages between men and women, and investigated how the effect of height on marriage changed across generations. Our key findings are: (1) For those who were born before 1965, a 1% increase in height led to an approximately 0.3% increase in the probability that men were married. Conversely, a 1% increase in height led to an approximately 0.3% decrease in the probability that women were married. (2) For those who were born in or after 1965, a 1% increase in height led to an approximately 1.40% increase in the probability that men were married. However, the height effect disappeared for women. Japan experienced a miraculous economic development post-World War II, which resulted in changes in its economic and social structure. These changes may change the role of height for Japanese women in the marriage market.

JEL classification: J12; J16
Keywords: Marriage market; Height; Preference change.

1. Introduction

It is widely acknowledged that physical features such as height contribute to success in the labor market, because height is considered to reflect human capital and health conditions (e.g., Schultz 2002; Heineck 2005; Dinda et al. 2006; Case and Paxson 2008, 2009; Gao and Smyth 2010; Cinnirella et al. 2011; Lundborg et al. 2014; Tao 2014; Sohn 2015a; Steckel 1995).[1] Taller people can earn more, and therefore they are more highly evaluated in the marriage market.[2] Height exerts a positive effect on marriage success because of an increase in income (Sohn 2015b). Previous research has provided evidence that tall men are advantaged in the marriage market (e.g., Fu and Goldman 1996; Harper 2000; Murray 2000; Belot and Fidrmuc 2010).[3] Educational level is also a key factor in the search for a partner in the marriage market because human capital as captured by education is positively related to marginal labor productivity, and consequently increases earnings. From this perspective, height is nearly similar to educational attainment because both education and height indicate higher expected earnings.[4]

According to the assortative mating hypothesis, people with higher educations are preferred in the marriage market because they are anticipated to become higher earners; therefore, people with higher education are more inclined to have more highly educated spouses (Scully 1979; Boulier and Rosenzweig, 1984; Lam 1988). Thus, the husband's earnings are positively related not only to his educational level, but also to his wife's educational level.[5] This holds when we consider the role of height in the marriage market (Sohn 2015b), i.e., the husband's earnings are positively related not only to his height, but also to his wife's height.[6]

The role of height cannot be separated from its socioeconomic context (Steckel 2009).[7] In Italy, the relationship between the probability of marriage for men and male height was monotonically positive in Treppo Carnico, whereas it was inversely U-shaped in Alghero (Manfredini et al. 2013). Furthermore, women place greater weight on the intelligence and race of their partner, while men respond more to physical attractiveness (Fisman et al. 2006). Buunk et al. (2008) found that male height was negatively correlated with jealousy in response to socially influential rivals, whereas female height was negatively correlated with jealousy in response to physically attractive rivals. These findings suggest that key features to influence mate choice are thought to differ between men and women. Based on data from the United States (1979–1991), shorter men were less likely to get married while taller women were less likely to get married (Fu and Goldman 1996).[8] Murray (2000) used historical data from the United States to suggest that male height is positively related to marriage, while female height is not positively related to marriage.[9] Similarly, the effect of male height on marriage is opposite to that of female height on

---

1 Height is also considered to reflect a stylish appearance and thus a kind of beauty. Beauty is observed to be highly evaluated in the labor market (e.g., Biddle and Hamermesh 1998; Hamermesh et al. 2002; Hamermesh and Biddle 2004; Borland and Leigh 2014).

2 Tall people can also enjoy benefits from acquiring political power (Yamamura et al. 2015).

3 Shorter men are less likely to be in a relationship (Herpin 2005).

4 It should be noted that height is nonlinearly associated with male abilities (Heineck 2009).

5 The cross-productivity effect is another possibility; i.e., education level increases individual productivity and also possibly plays a critical role in improving spouse's productivity through household interactions (Huang et al. 2009; Mano and Yamamura 2013).

6 Individuals' earnings were found to be associated with their spouse's body mass index (Chiappori et al. 2012).

7 Belot and Fidrmuc (2010) show that height distribution differences are important in explaining the phenomenon that Black men are substantially more likely to have white spouses than are Black women, but the opposite is true for Chinese men and women.

8 Relatively shorter French men were less likely to be in a relationship than their taller counterparts (Herpin 2005).

9 Another study based on historical data from the United States did not find a robust positive relationship between male height and marriage (Hacker 2008). In a German case, not only male height, but also female height were observed to be positively related to marriage (Baten and Murray 1998).

marriage in the case of the United Kingdom (Harper 2000).

An interpretation of the contrary effect of male or female height on marriage is that men's evaluation of female height is contrary to women's evaluation of male height. According to the classical work by Becker (1991), the gender division of labor within a household increased household productivity. Especially in societies where women have labor market disadvantages, women have a comparative advantage in housework and become housewives. In contrast, men tend to become full-time breadwinners in the labor market and do not do any housework. In addition, if height is only valuable in the labor market, taller women are not preferred in the marriage market. In less-developed countries, such as Indonesia, Sohn (2016) analyzed the impact of height difference between husband and wife on happiness and found that women with a taller spouse are more likely to be happy.[10] This observation is consistent with the argument that gender division of labor becomes dominant in society because an increase in the number of women in the labor market increases the risk of marital disruption (e.g., Preston and Richards 1975; Cherlin 1992). Apart from economic reasons, height is influential in the marriage market (Sohn 2015b). In general, women are physically inferior to men. Inevitably, weaker women depend on physically stronger men to survive under natural conditions. The female preference for taller men seems to be intrinsic because male height reflects a physical advantage in the struggle for existence. Conversely, the role of height is thought to depend on norms shared by members of society, although the norm may possibly evolve in the process of economic development (Hayami 1998, 2001). In developed countries, the socioeconomic gap between men and women in society has been reduced (Fortin et al. 2015). Japan has experienced rapid economic development in the post-World War II period. This miraculous economic growth has transformed the social structure and changed women's social status in Japan. Accordingly, the gender division of labor appeared to decline and height preferences may have possibly changed. The role of height in mate choice may also possibly differ between generations.

Preferences for height and family relationships are thought to change if socioeconomic conditions change. Accordingly, the role of height has changed in the marriage market. However, the existing literature did not consider the effect of the height difference between men and women on the process of social and structural change (Sohn 2015b, 2016). The rapid economic development in Japan enables us to investigate how the effect of height difference changed in a long-term perspective. Thus, this paper used data from Japan to examine the different roles of male or female height on marriages and consider how and the extent to which these differences changed over generations. On the one hand, we found that for the older generation, height is positively and negatively related to marriage for men and women, respectively. On the other hand, we found that for younger generations, a positive relationship between male height and marriage is persistent, while a negative relationship between female height and marriage disappeared. The remainder of this paper is organized as follows. An overview of the data and empirical method is presented in Section 2. Section 3 presents and discusses the major findings. Section 4 concludes.

2. Data and methods

2.1. Data

We used individual-level data from Japan gathered by the Survey of Life Satisfaction and Preferences provided by the Global Center of Excellence at Osaka University, which conducts the Human Behavior and Socioeconomic Dynamics program. This periodical survey has been carried out throughout Japan annually; this paper used the data from 2009–2013. A random-sampling method is used to collect the data. The targets of the survey were male and female adults aged between 20 and 69 years. Therefore, the socioeconomic conditions in which survey respondents were raised varied according to the generation to which they belonged because socioeconomic conditions have changed noticeably in the post-World War period in Japan. The data that we obtained includes basic individual socioeconomic characteristics, such as age, sex, household income, number of family members, educational level, occupations, and residential place. In

[10] Men do not value women's intelligence or ambition when it exceeds their own (Fisman et al. 2006).

addition, as key factors in this paper, the respondents' height and marital status were also available from the data.

Table 1 includes definitions of the variables used in this paper and their mean values based on the whole sample, and the male and female samples. The mean value for *Married* is about 0.80 for men and women, which suggests that the rate of marriage for respondents is 80%. There is no difference in the rate of marriage between men and women. The average value of *Height* is 169.1 cm and 156.1 cm for men and women, respectively. On average, men are 13 cm taller than women, which reasonably reflects the biological height difference. The average value of *University* is 0.37 and 0.15 for men and women, respectively. The final education level indicated that 37% of men and 15% of women were university graduates; therefore, more men completed higher education than did women. The average of *Own Income* is 4,577 and 1,593 for men and women, respectively. This income difference may be decomposed into two factors: first, the difference in wage rate between men and women, and second, women are more likely to be part-time workers or full-time housewives. Accordingly, women's working hours are significantly fewer than men's working hours.

Figures 1 and 2 compare the height differences between married and unmarried men and women. In both figures, respondents are divided into the older generation (born before 1965) and the younger generation (born in or after 1965). In 1964, the first Tokyo Olympics were held, which is considered as the time when Japan emerged from a weaker stage of economic development. In addition, calorie intake and nutrition differs between generations, which results in height differences. Furthermore, the Equal Employment Opportunity Law was enacted in 1985; therefore, women born in 1965 were 20 years old when they graduated from college and sought work. Thus, women born after 1965 are likely to enjoy decreased gender discrimination in the labor market. Hence, the socioeconomic conditions were reasonably different between the older and younger generations. Accordingly, the effect of height on marriage may also differ between generations.

Figures 1 and 2 show that the younger generation are taller than the older generation, which may be because the older generation grew up in a period when Japan had not yet caught up with the most developed countries. Furthermore, Figure 1 shows that married men were taller than unmarried men were in both generations. The mean difference test suggests that the absolute t-value is 1.73 and 3.32 for the groups born before 1965 and after 1965, respectively. Therefore, height differences between married and unmarried men are statistically significant for both generations. In contrast, Figure 2 shows that married women were shorter than unmarried women were for the older generation. However, it is interesting to observe that the height difference between married and unmarried women disappeared for the younger generation. The mean difference test suggests that the absolute t-value is 5.80 for the group born before 1965 while it is 0.24 for the group born in or after 1965. Therefore, the height difference is statistically significant only for the older generation, which is consistent with findings in the United States (Fu and Goldman 1996; Murray 2000). This result does not persist for the younger generation, which suggests that socioeconomic changes meant that male height played no role in the marriage market. However, this finding does not control for various factors that seemingly influence the probability of marriage. Hence, in the following sections, we examine the influence of height on the probability of marriage more closely by controlling for various factors.

2.2. Methods

To assess the effect of height on the probability that individuals are married, we adopted a probit model. The estimated function takes the form:

$$Married_{it} = \alpha_0 + \alpha_1 \text{Ln}\,(Height)_{it} + \alpha_2\,\text{Ln}(Age)_{it} + \alpha_3\,University_{it} + \alpha_4 \text{Ln}(Own\ Income) + Y'_i B_i + Z_t + u_{it},$$

where $Married_{it}$ represents a marriage dummy and the dependent variables for individual *i* and year *t*, and *α* represents the marginal effect of independent variables. Considering independent variables (see Table 1 and Figure 1), there are large gaps in height between men and women, and between the older and younger generations, even for the same sex. Because of different height scales, it is inappropriate to compare the effects on male height with that on female height, or the heights of the older generation with that for the younger generation. For interpretation convenience, the log value of *Height* is used to provide height elasticity (effect of 1% increase of height on marriage rate). Furthermore, there is a large gap in *Own Income* between men and women; therefore, the log value of *Own Income* should be used to compare the magnitudes. However, the log value of *Own Income* is 0 when respondents are full-time housewives or unemployed. In this case, the log value of *Own Income* cannot be calculated. Therefore, the log value of (*1+ Own Income*) is used for calculations. For consistency, the log value of *Age* is used.

The key independent variable is *Height*. From the previous literature (e.g., Fu and Goldman 1996; Harper 2000; Murray 2000), the coefficient of *Height* is expected be positive and negative for men and women, respectively. We attach importance to checking whether this expected effect of *Height* changed according to generations. Other than *Height*, economic conditions are captured by *Own Income.* Education levels and age are controlled. Besides these variables, the vectors of the control variables are denoted by Y_{it}. Respondents lived in residential areas defined according to types of local government, such as large city, medium city, small city, town, and village, which are classified by the numbers of residential people. These control variables are dummies of residential government scale, dummies of residential prefectures, and dummies of occupation. Year dummies are included to control for *Z*, which includes factors that commonly affected respondents in t. The estimations were conducted based on the full sample, male sample, and female sample. A gender dummy is included for the estimation based on the full sample.

3. Results and discussion

The regression estimates for the probit model are reported in Tables 2–5. Table 2 presents the results based on the full sample. After dividing the full sample into men and women, results based on the male sample are presented in Table 3, while those based on the female sample are presented in Table 4. In each table, the results based on the sample covering all generations are shown in columns (1) and (2). The results based on the younger generation are presented in columns (3) and (4), while those for the older generation are presented in columns (5) and (6). Columns (1), (3), and (5) show the results when economic-related variables (*Own Income* and occupation dummies) are included as the independent variables. There are observations for which economic-related information was not available and therefore are not included in the estimations in columns (1), (3), and (5).[11] Therefore, to include these observations in the estimations, we also conducted estimations where we deleted economic-related variables as independent variables. These results are reported in columns (2), (4), and (6). Naturally, the observations are larger in columns (2), (4), and (6) than those in columns (1), (3), and (5).

Table 5 shows the results of closer examination whether the height effect varies according to generations. In this estimation, the full sample was divided into men and women, and interaction terms between height (education) and generation dummies were included to show how the height effect differs among the younger generation.

First, we begin by interpreting the results in Table 2. The coefficient of *Age* is positive and statistically significant at the 1% level in all columns. The probability of being married is larger as one ages. The sign of the coefficient of *University* is positive for the older generation, which is

[11] Owing to data limitations, *Own Income* is only available for the year when the surveys were conducted. That is, we cannot examine the effect of *Own Income* in the year of marriage. Therefore, making a decision to get married inevitably affected *Own Income*. To take a typical example, getting married caused women to retire from work to be full-time housewives in Japan. Hence, there is a reverse causality between *Own Income* and the decision to get married, which leads to estimation bias. Care should be taken when interpreting *Own Income* data*.* Furthermore, this bias is avoided by excluding *Own Income* and job dummies.

interpreted as suggesting that education reflects the human capital to gain higher earnings and increases competitiveness in the marriage market. In contrast, the sign of the coefficient of *University* is negative for the younger generation. The results of *Own income* are similar to those of *University.* This finding will be scrutinized in more detail in the discussion of the results shown in Tables 3–5.

We now focus on the results of the key variable *Height* when we interpret the overall results. The coefficient of *Height* is positive and statistically significant at the 1% level in columns (1) and (2), which is line with the literature (e.g., Baten and Murray 1998; Sohn 2015a, 2015b). However, once the full sample was divided into older and younger generations, the statistical significance of *Height* disappeared for the older generation although the significance continued to be observed in the younger generations. The results shown in Tables 3 and 4 explore the reason why *Height* is unrelated to the probability of marriage for the older generation.

Table 3 shows that for the male samples, *University* and *Own Income* are positive for the older generation. *University* is statistically significant in column (4), but its significance disappears once *Own Income* is included in column (5). This can be interpreted that the male educational attainment advantage does not exist in the marriage market when economic advantages caused by education are controlled for by *Own Income.* Considering the younger generation, statistical significance for *Own Income* is also observed in column (5). However, statistically significant negative signs for *University* are observed in columns (5) and (6). One possible interpretation of this finding is that more highly educated people are more likely have higher earnings and enjoy the single life. Getting married possibly leads them to distribute money to family members and spend time involved in family life. The opportunity cost of marriage is larger for higher educated people, who then postpone the timing of marriage even though they can get married at any time if they want. Table 3 shows that the coefficient of *Height* is positive and statistically significant at the 1% level in all columns. Furthermore, the absolute value of the *Height* coefficient is about 0.30 for the older generation, which implies that a 1% increase in male height leads to a 0.30% increase in the probability of marriage. However, the absolute value of the *Height* coefficient is about 1.40 for the younger generation, which implies that a 1% increase in height leads to a 1.40% increase in the probability of marriage. That is, the effect of height is about three times larger for the younger generation than for the older generation. One possible interpretation is that height currently plays a greater role in increase in income. However, even after *Own Income* and occupation dummies are controlled for, the effect of *Height* is distinctly larger for the younger generation than for the older generation. Therefore, the height effect on marriage through economic channels is unlikely to cause the gap between these generations. Another possible interpretation is that women took the initiative to choose marital partners in the marriage market because the probability of men marrying depends on female preferences for taller men. However, this holds true only if male preferences are less likely to influence marriage for the younger generation. Thus, it is necessary to examine whether the effect of female height on marriage changes.

Table 4 indicates that *University* and *Own Income* are negative and statistically significant in all columns for the older and younger generations. The negative sign of *Own Income* can be interpreted in different ways. Women with higher income have lower incentive to depend on male income and are less likely to get married. Another interpretation is derived from reverse causality; people who cannot enjoy the benefits of getting married have a higher incentive to work hard and receive higher earnings. That is, the causality of *Own Income* and dependent variables is ambiguous. The negative sign of *University* can be interpreted as implying that higher educated women are less likely to get married at a marriageable age because they give more importance to their studies and work career than to married life.

The results of *Height* reported in Table 4 are noticeably different from those in Table 3. In columns (1) and (2), the coefficient of *Height* is not statistically significant, although it is positive. For the older generation, as shown in columns (3) and (4), the coefficient of *Height* is negative and statistically significant at the 1% level. Additionally, the absolute value of the *Height* coefficient is about 0.30, which implies that a 1% increase in female height leads to a 0.30%

decrease in the probability of marriage. Considering the results for the older generation in Tables 3 and 4 led us to argue that male preferences for shorter women has a sizable effect, which is almost equivalent to the effect of female preferences for taller men. The opposite significant effect of height on marriage between men and women is considered to neutralize the effect of height on marriage when male and female samples are combined as indicated in columns (3) and (4) in Table 2. Considering columns (5) and (6) in Table 4, it is surprising to observe that the statistical significance of *Height* disappeared and its sign changed to positive. In our interpretation, the male preference for shorter women does not influence the probability of marriage for women. The combined result for the younger generation shown in Tables 3 and 4 implies that women have the initiative in marriage because female preferences for taller men are dominant in the marriage. As a whole, with respect to Tables 3 and 4, the R-square for the estimations of the younger generation is larger than that for the older generation. We interpret this finding as follows: For the older generation, traditional Japanese values such as familism, where parents have great bargaining power within the family, were dominant at their marriageable ages. Individual-level characteristics were then less likely to influence their marriage decision-making. In contrast, the younger generation is more able to make their own decisions than the older generation was because individualism is pervasive and more influential than familism.

In Table 5, to examine how the height effect on marriage varies over age in more detail, we used the full sample covering all generations and added interaction terms for each younger generation dummies (*AGE_20*, *AGE_30*, and *AGE_40*) and *Height* (*University*). In this model, the reference generations are those who are equivalent to 50 years old or older than 50 years old. There is the possibility of reverse causality between *Own_Income* and decision to get married, which results in estimation bias. Therefore, the effect of *Own_Income* is only included as a control variable, but is not interacted with generation dummies. *Ln(Height)*AGE_20*, *Ln(Height)*AGE_30*, and *Ln(Height)*AGE_40* show positive signs in all columns. For men, *Ln(Height)*AGE_30* and *Ln(Height)*AGE_40* are statistically significant. This means that taller men in their 30s and 40s are more likely to enjoy advantages in the marriage market than are older generations. For women, *Ln(Height)*AGE_20* is statistically significant. This means that taller women in their 20s are less likely to suffer disadvantages in the marriage market than generations over 50 years old. It is interesting to observe that *University*AGE_20*, *University *AGE_30*, and *University *AGE_40* show negative signs in all columns and are statistically significant, with the exception of *University *AGE_40* in column (2). For both men and women, the absolute coefficient values are larger when the generation dummies represent the younger generation. This implies that the opportunity cost of marriage for higher educated people is larger for younger generations. Furthermore, the absolute coefficient values for women are about three times larger than for men. In our interpretation, the labor market conditions for women have been improved drastically; this structural change distinctly increased the opportunity cost of marriage for women. We found that more highly educated women have a smaller incentive to get married when they have the opportunity to display their ability in the workplace because of the increase in women's employment status. The reduced difference in employment status between men and women led women to attach more importance to work than to marriage. This is consistent with the argument that women's increasing "independence" from men partly reduced the marriage rate in Japan (Raymo and Iwasawa 2005). In contrast, existing literature found that women are happier when they were housewives and enjoying their husband's higher income in Japan (Lee and Ono 2008). However, Lee and Ono (2008) used a sample aged 20–69 years and did not compare the results between generations. As we observed in this paper, there is a great difference between generations in the decision-making for marriage. Therefore, it is valuable to extend this work to consider how economic factors influence happiness by comparing different generations.

What we have considered thus far indicated that the height effect on marriage differed between men and women and the difference varied between generations. One interpretation is that preferences for the height of the opposite sex changed, which led the role of height to change. As for the older generation, men preferred shorter women to maintain their physically dominant position over their spouses who become housewives to support and increase their husbands' productivity. However, women preferred taller men to anticipate their husbands' higher earnings related to the height premium in the labor market. Such male and female preferences fit the model of gender division of labor in the household where the husband works to earn money and the wife becomes a homemaker (Becker 1991). However, socioeconomic conditions changed because of the rapid economic development in Japan. Women's employment status has improved and women are more able to display her ability in the workplace than ever before. Therefore, the differences in employment status between men and women have diminished. Such changes in socioeconomic conditions reduced the differences between male and female preferences; e.g., the male preference for female height possibly became similar to the female preference for male height. From this, we conjecture that the male advantage and female disadvantage of higher height in the marriage market might be reduced. Our estimation results show that the negative effect of female height for getting married disappeared in the younger generation. Thus, tall women are not disadvantaged in the marriage market, at least in the younger generation. However, the positive effect of male height for the younger generation is larger than that for the older generation. This suggests that the male preference for female height changed while the female preference for male height did not change. Such a difference in the change in height effect between men and women may be because of the differences in innate characteristics between men and women. Weaker women instinctively prefer taller men because of the male physical advantage, which is valuable for survival under natural conditions. Additionally, as Persico et al. (2004) found, taller parents tend to have taller children, which enables their children to enjoy the benefit of the height premium in the labor market. The high intergenerational correlation of height naturally leads women to prefer taller men. This is because women have a maternal instinct to care for their children, which is not influenced by socioeconomic conditions.

Another possible interpretation of the findings of this paper is that men and women had equal influence in matching partners in the marriage market for the older generation even though women were at a disadvantage in Japanese society. In traditional Japanese society, parents' intentions influenced marriage decision-making. Therefore, women's parents' bargaining power can be considered equal to men's parents' bargaining power. Naturally, there is no difference in height effect between male and female heights. In the period when women's social position greatly improved, women were more able to work full-time in the workplace where men have dominated in former times. The gender division of labor within a household is not the typical household model in Japan. According to classical sociology literature (e.g., Parsons 1942; Persons and Bales 1955) and more recent studies on bargaining within the couple (e.g., Presser 1994; South and Spitze 1994), a lack of specialization caused a status competition to arise between husband and wife. Furthermore, the improvement of social and employment status possibly altered the balance of power between men and women. That is, women's bargaining power outweighed the men's bargaining power, so that while the female preference for taller men continues to play an important role in matching partners, the male preference for shorter women does not. This implies that women of the younger generation have the initiative to select their partner in the marriage market.

4. Conclusion

A number of studies suggest that height is positively associated with the probability of marriage. Height can be considered to reflect the degree of ability to earn, which is an important factor when searching for a marital partner. The literature suggests that height has a greater contribution to marriage for men than for women (Murray 2000). One possible interpretation is that women's earning ability is less valuable than other attributes for men if there is gender discrimination in the labor market or if women have comparative advantages in household labor. However, even after controlling for earning attributes, tall men are preferred by women (Sohn 2015b). Therefore, there might be noneconomic reasons that tall men have the advantage in the labor market. For instance, the female preference for taller men is intrinsic. Furthermore, men in the marriage market prefer shorter women; therefore, the effect of female height is opposite to that of male height (Fu and Goldman 1996; Harper 2000). It is likely that the influence of height in the marriage market varies according to social structure and values shared in the society. However, little is known about how the influence of height in the marriage market depends on people's values formed in the social structure.

Japan experienced rapid economic growth in the post-World War II period, which inevitably caused changes in the social structure, and in turn changed the role of height in the marriage market. We used individual-level data from Japan to examine how the difference in height effect on marriage between men and women changed from the older generation to the younger generation.

Our key findings are: For the older generation, tallness increased the probability of men marrying while it decreased that of women marrying. For the younger generation, tallness continues to increase the probability of men marrying, but tallness does not affect the probability of women marrying.

These findings can be variously interpreted by considering the structural changes in society. In older, more patriarchal times, men held control of the family and decision-making on family issues. Both men and women shared traditional values based on a male-dominated culture. Therefore, in families dominated by the husband, the husband is more likely to be a higher earner, and older and taller than his wife. Men are required to be strong and reliable to be competent husbands. Thus, the gender division of labor was widely accepted. However, because of the rapid economic development in Japan, its male-dominated culture declined and men had reduced incentive to control the family. We can offer a possible interpretation that these results reflect that the male preference for shorter women has changed, while the female preference for tall men persisted. The male preference for women mainly depends on the socioeconomic conditions, while the female preference for men is intrinsic and does not depend on the socioeconomic conditions. Another possible interpretation is that the height difference between men and women is a critical factor for the marital couple (Sohn 2015b; 2016); i.e., women prefer men taller than themselves. Inversely, men prefer women shorter than themselves. On the one hand, the female preference for male height persisted in the marriage market. On the other hand, the male preference for female height is influential for the older generation, but not for the younger generation. Women's bargaining power relatively increased through changes in the social structure as a consequence of economic development. In other words, the improvement of the social position of women reduced men's bargaining power in the marriage market.

Owing to limitations of the data, we cannot identify the reason why the positive effect of male height is persistent while the negative effect of female height disappeared. This issue remains to be addressed in future research.

References

Baten, J., Murray, J.E. 1998. Women's stature and marriage market in preindustrial Barvaria. J. Fam. Hist. 23, 124-135.

Becker, G. 1991. A Treatise on the Family. Harvard University Press, Cambridge.

Belot, M., Fidrmuc, J. 2010. Anthropometry of love: height and gender asymmetries in interethnic marriages. Economics and Human Biology 8(3), 361-372.

Biddle, J.E., Hamermesh, D.S. 1998. Beauty, productivity and discrimination: Lawyer's looks and lucre. Journal of Labor Economics 16(1), 172-201.

Borland, J. and Leigh, A. 2014. Unpacking the Beauty Premium: What Channels Does It Operate Through, and Has It Changed Over Time? Economic Record 90(288), 17-32.

Boulier, B.L., and M.R. Rosenzweig, 1984, Schooling, search, and spouse selection:

Testing economic theories of marriage and household behavior. *Journal of Political Economy*, **92**, pp.712-732.

Buunk, A.P., J.H. Park, R. Zurriaga, L. Klavina, and K. Massar (2008). "Height Predicts Jealousy Differently for Men and Women," Evolution and Human Behavior 29, 133-139.

Case, A., Paxson, C. 2008. Stature and status: Height, ability and labor market outcomes. Journal of Political Economy 116(3), 499-532.

Case, A., Paxson, C. 2009. Making sense of the labor market height premium: Evidence from the British household panel survey. Economics Letters 102(3), 174-176.

Cherlin, A.J. 1992. Marriage, Divorce, Remarriage. Harvard University Press, Cambridge.

Chiappori, P.A., Oreffice, S., Quintana-Domeque, S. 2012. Fatter attraction: Anthropometric and socioeconomic matching on the marriage market. Journal of Political Economy 120 (4), 659-695.

Cinnirella, F., Piopiunik, M., Winter, J. 2011. Why does height matter for educational attainment? Evidence from German children. Economics & Human Biology, 9(4), 407-418.

Dinda S, Gangopadhyay PK, Chattopadhyay BP, Saiyed HN, Pal M, Bharati P. 2006. Height, weight and earnings among coalminers in India. Economics & Human Biology 4, 342–350.

Fisman, R., S. Iyengar, E. Kamenica and I. Simonson. 2006. Gender Differences in Mate Selection: Evidence from a Speed Dating Experiment," Quarterly Journal of Economics, 121(2) 673-697.

Fortin, N. M, Oreopoulos,P., and Phipps,S. 2015. Leaving boys behind: gender disparities in high academic achievement. Journal of Human Resources 50(3), 549-579.

Fu, H., Goldman, N., 1996. Incorporating health into models of marriage choice: demographic and sociological perspectives. J. Marriage Fam. 58, 740-758.

Gao, W., Smyth, R. 2010. Health human capital, height and wages in China. Journal of Development Studies 46(3), 466-484.

Hacker, D. 2008. Economic, demographic, and anthropometric correlates of first marriage in the mid-ninetheenth-century United States. Soc. Sci. Hist, 32, 307-345.

Hamermesh, D.S., Biddle, J.E. 2004. Beauty and labor market. American Economic Review 84(5), 174-194.

Hamermesh, D.S., Meng, X., Zhan, J. 2002. Dress for success: Does primping pay? Labour Economics 9, 361-373.

Harper, B., 2000. Beauty, stature and the labour market: a British cohort study. Oxford Bull. Econ. Stat. 62, 771-800.

Hayami, Y.1998. Norms and rationality in the evolution of economic systems: a view from Asian villages. Japanese Economic Review 49(1), 36-53.

Hayami, Y. 2001. Development Economics: From the Poverty to the Wealth of Nations. New York: Oxford University Press.

Heineck, G. 2005. Up in the skies? The relationship between height and earnings in Germany. Labour 19(3), 469-489.

Heineck, G. 2009. Too tall to be smart. Economics Letters 105(1), 78-80.

Herpin, N. 2005. Love, career, and height in France, 2001. Economics and Human Biology 3,

420-449.
Huang, C., H. Li, P.W. Liu, and J. Zhang, 2009, Why does spousal education matter for earnings? Assortative mating and cross-productivity. Journal of Labor Economics, 27; 633-652.
Lam, D. 1988. Marriage markets and assortative mating with household public goods: theoretical and empirical implications. Journal of Human Resources 23, 462-487.
Lee, K.S., Ono, H. 2008., Specialization and happiness in marriage: A U.S.–Japan comparison. Social Science Research, 37, 1216–1234.
Lundborg, P., Nystedt, P., Rooth, D.O. 2014. The height premium in earnings: The role of physical capacity and cognitive and non-cognitive skills. Journal of Human Resources 149(1), 141-161.
Manfredini, M., Breschi, M., Fornasin, A., Seghieri, C. 2013. Height, socioeconomic status and marriage in Italy around 1900. Economics and Human Biology, December 11(4), 465-473.
Mano, Y. and Yamamura,E. 2013. Human capital accumulation through interaction within a married couple: comparison between a housewife and a working wife. Asian Economic Journal, 27(4), 323-339.
Murray, J.E. 2000. Marital protection and marital selection: evidence from a historical-perspectives sample of American men. Demography 37, 511-521.
Parson, T. 1942. Age and sex in the social structure of the United States. American Sociological Review 7, 604-616.
Parson, T. , Bales, R.F. 1955.Family, Socialization and Interaction Process. The Free Press.
Persico, N., Postlewaite, A., Silverman, D. 2004. The effect of adolescent experience on labor market outcomes: the case of height. Journal of Political Economy, 112(5), 1019-1053.
Presser, H.B. 1994. Employment schedules among dual-earner spouses and the division of household labor by gender. American Sociological Review 59(3), 348-364.
Preston, S.H., and Richards, A.T. 1975. The influence of women's work opportunities on marriage rates. Demography 12(2), 209-222.
Raymo, J.M., Iwasawa, M. 2005. Marriage market mismatches in Japan: an alternative view of the relationship between women's education and marriage. American Sociological Review 70, 801-822.
Schultz, T.P. 2002. Wage gains associated with height as a form of health human capital. American Economic Review 92(2), 349-453.
Scully, G.W., 1979, Mullahs, Muslims and marital sorting. Journal of Political
Economy, 87, 1139-1143.
Sohn, K. 2015 a. The height premium in Indonesia. Economics & Human Biology 16, 1-15.
Sohn, K. 2015 b. The value of male height in the marriage market. Economics and Human Biology 18, 110-124.
Sohn, K. 2016. Does a taller husband make his wife happier? Personality and Individual Differences, 91, 14-21.
South, S.J., Spitze, G. 1994. Housework in marital and nonmarital households. American Sociological Review 59(3), 327-347.
Steckel, R.H. 1995. Height and the standard of living. Journal of Economic Literature 33, 1903-1940.
Steckel, R.H. 2009. Heights and human welfare: recent developments and new directions. Explorations in Economic History 46, 1-23.
Tao, H.L. 2014. Height, weight, and entry earnings of female graduates in Taiwan. Economics & Human Biology 13, 85-98.
Yamamura, E., Smyth, R., Zhang, Y. 2015. Decomposing the effect of height on income in China: The role of market and political channels. Economics & Human Biology 19, 62-74.

Figure 1. Comparison of heights between married and unmarried men.

Figure 2. Comparison of heights between married and unmarried women.

Table 1. Definition of variables used for estimation and mean values.

	Definitions	Mean	Mean (Male)	Mean (Female)
Married	Value of 1 is given if respondents are married, otherwise 0 (%)	0.79	0.80	0.79
Height	Height (cm)	162.1	169.1	156.1
Age	Respondent's ages	52.0	52.5	51.5
University	Value of 1 is given if respondents graduated from university or graduate school, otherwise 0 (%).	0.25	0.37	0.15
Own Income	Respondent's own income (thousands of yen)	3,073	4,577	1,593
AGE_20	Value of 1 is given if age of respondent is between 20 and 29 years, otherwise 0 (%)	0.05	0.05	0.05
AGE_30	Value of 1 is given if age of respondent is between 30 and 39 years, otherwise 0 (%)	0.13	0.13	0.15
AGE_40	Value of 1 is given if age of respondent is between 40 and 49 years, otherwise 0 (%)	0.23	0.22	0.24

Table 2. Determinants of marriage based on male and female samples (probit model).

	(1) All	(2) All	(3) Birth year <1965	(4) Birth year <1965	(5) Birth year ≥1965	(6) Birth year ≥1965
Ln(Height)	0.29*** (5.00)	0.37*** (6.68)	0.04 (0.76)	0.07 (1.36)	0.61*** (3.29)	0.66*** (3.86)
Ln(Age)	0.37*** (46.5)	0.37*** (48.6)	0.17*** (10.9)	0.14*** (10.3)	1.18*** (31.4)	1.18*** (36.7)
University	–0.02*** (–4.64)	–0.02*** (–4.29)	0.006 (1.34)	0.01*** (2.66)	–0.11*** (–6.96)	–0.10*** (–7.75)
Ln(Own Income)	0.003** (1.97)		0.005*** (5.08)		–0.01** (–2.54)	
Occupation dummy	Included	Not included	Included	Not included	Included	Not included
Various dummies [a]	Included	Included	Included	Included	Included	Included
Pseudo R square	0.31	0.27	0.13	0.06	0.31	0.27
Observations	15,240	19,379	8,720	11,827	5,701	6,816

Note: Numbers in parentheses are z-statistics calculated using robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers above the numbers without parentheses indicate marginal effects. *Ln(Own income)* is log of "own income +1" because there are 0 values and in this case log value cannot be calculated,

a. Constant, year dummies, gender dummy, dummies of residential city scale, dummies of residential prefectures, and dummies of occupation are included, but the results are not reported.

Table 3. Determinants of marriage based on male sample (Probit model).

	(1) All	(2) All	(3) Birth year <1965	(4) Birth year <1965	(5) Birth year ≥1965	(6) Birth year ≥1965
Ln(Height)	0.51***	0.66***	0.30***	0.37***	1.41***	1.46***
	(6.01)	(8.17)	(4.10)	(4.48)	(4.31)	(4.84)
Ln(Age)	0.42***	0.44***	0.26***	0.26***	1.29***	1.49***
	(32.6)	(38.6)	(11.4)	(11.2)	(20.5)	(26.4)
University	–0.02***	0.01	0.01	0.03***	–0.10***	–0.05**
	(–2.68)	(1.29)	(0.85)	(4.40)	(–3.83)	(–2.57)
Ln(Own Income)	0.03***		0.02***		0.11***	
	(13.8)		(11.2)		(6.44)	
Occupation dummy	Included	Not included	Included	Not included	Included	Not included
Various dummies [a]	Included	Included	Included	Included	Included	Included
Pseudo R square	0.37	0.31	0.24	0.11	0.32	0.28
Observations	7,865	9,410	4,056	4,982	2,640	3,011

Note: Numbers in parentheses are z-statistics calculated using robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers above the numbers without parentheses indicate marginal effects. *Ln(Own income)* is log of "own income +1" because there are 0 values and in this case log value cannot be calculated.

a. Constant, year dummies, dummies of residential city scale, and dummies of residential prefectures are included, but the results are not reported.

Table 4. Determinants of marriage based on female sample (Probit model).

	(1) All	(2) All	(3) Birth year <1965	(4) Birth year <1965	(5) Birth year ≥1965	(6) Birth year ≥1965
Ln(Height)	0.01 (0.09)	0.03 (0.56)	–0.32*** (–3.73)	–0.36*** (–4.40)	0.20 (0.92)	0.14 (0.71)
Ln(Age)	0.25*** (26.1)	0.29*** (30.2)	0.06*** (3.02)	0.04** (2.15)	0.89*** (21.4)	0.96*** (25.6)
University	–0.05*** (–7.65)	–0.06*** (–9.42)	–0.03*** (–3.24)	–0.03*** (–3.10)	–0.13*** (–7.02)	–0.14**** (–8.63)
Ln(Own Income)	–0.01** (–7.78)		–0.01*** (–3.78)		–0.04*** (–6.86)	
Occupation dummy	Included	Not included	Included	Not included	Included	Not included
Various dummies [a]	Included	Included	Included	Included	Included	Included
Pseudo R square	0.37	0.26	0.17	0.06	0.43	0.30
Observations	7,330	9,907	3,358	5,162	3,004	3,735

Note: Numbers in parentheses are z-statistics calculated using robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers above the numbers without parentheses indicate marginal effects. *Ln(Own income)* is log of "own income +1" because there are 0 values and in this case log value cannot be calculated,

a. Constant, year dummies, dummies of residential city scale, and dummies of residential prefectures are included, but the results are not reported.

Table 5. Determinants of marriage: examination of generation effect (Probit model).

	(1) Male	(2) Male	(3) Female	(4) Female
Ln(Height) **AGE_20*	0.10 (0.27)	–0.10 (–0.27)	0.50* (1.94)	0.47* (1.84)
Ln(Height) **AGE_30*	0.51** (2.27)	0.56** (2.45)	0.30 (1.47)	0.38* (1.82)
Ln(Height) **AGE_40*	0.54** (2.34)	0.60*** (2.63)	0.22 (1.06)	0.22 (1.12)
University **AGE_20*	–0.07* (–1.95)	–0.08** (–2.50)	–0.20*** (–5.03)	–0.21*** (–5.80)
University **AGE_30*	–0.04** (–2.23)	–0.03* (–1.82)	–0.05** (–2.41)	–0.05** (–2.42)
University **AGE_40*	–0.03* (–1.75)	–0.02 (–1.16)	–0.05** (–2.31)	–0.04* (–1.90)
Ln(Height)	0.06 (0.44)	0.16 (1.19)	–0.38** (–2.43)	–0.41*** (–3.08)
University	0.004 (0.35)	0.03*** (2.64)	–0.01 (–0.98)	–0.02 (–1.45)
AGE_20	–0.95 (–0.47)	0.06 (0.04)	–0.99** (–2.10)	–0.99** (–2.04)
AGE_30	–0.99** (–2.37)	–0.99*** (–2.62)	–0.99 (–1.57)	–0.99* (–1.592
AGE_40	–1.00** (–2.43)	–1.00** (–2.72)	–1.00 (–1.08)	–0.99 (–1.15)
Ln(Own Income)	0.03*** (14.0)		–0.02*** (–7.38)	
Occupation dummy	Included	Not included	Included	Included
Various dummies [a]	Included	Included	Included	Included
Pseudo R square	0.35	0.30	0.38	0.28
Observations	7,865	9,410	7,330	9,907

Note: Numbers in parentheses are z-statistics calculated using robust standard errors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers above the numbers without parentheses indicate marginal effects. *Ln(Own income)* is log of "own income +1" because there are 0 values and in this case log value cannot be calculated.

a. Constant, year dummies, gender dummy, dummies of residential city scale, dummies of residential prefectures, and dummies of occupation are included, but its results are not reported.