Excess of Marriageable Males and Violent Crime in China and South Korea, 1970-2008

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The extremely rapid decline in fertility rate and the sharp rise in sex ratio at birth in China since the 1980s have led to much concern about increasing excess of marriageable males and violent crimes in coming decades. Our research addresses the gap of previous studies on low-sex-ratio western societies and high-sex-ratio Asian societies by assuming a U relationship between excess or shortage of marriageable males and crimes. By using Korea case (1970-2008) for reference, the effect of excess males on violent crimes in China (1982-2008) is examined separately from the percentage of young male in population. Other control variables include GINI coefficient, Ln of GDP per capita and its quadratic term. The quadratic term of percentage of marriageable males is significantly related to increased assault rate in China and assault, robbery and rape rates in Korea, suggesting that either an excess or shortage of marriageable males will cause some corresponding rise in crime rates.

Keywords: Violent Crime; Percentage of marriageable males ; Percentage of young males; Marriage Squeeze

Previous research found that males commit most of the crimes(Smith and Visher, 1980) ,

especially violent ones in a country and the unmarried men exhibit higher rates of

offending(Smith and Visher, 1980; Mazur and Michalek, 1998).The strong relationship between

gender and criminal activity at the individual level would seem to imply that, at the macrolevel ,

populations with a higher percentage of males should exhibit higher levels of crime rates. The

imbalanced sex structure of population will cause 30 to 50 million excessive males in decades in

China (Coale and Banister, 1994; Tuljapurkar et al. 1995; Das Gupta and Li, 1999; Chen 2004;

Poston and Glover, 2005). The relationship between excessive males and violent crime has

become an issue of much concern to scholars.

Previous quantitative research on sex structure and crime at the macrolevel are mostly

based on the western low-sex-ratio societies(Barber 2000; 2003,2009; Messner and Blau 1987;

Messner and Sampson 1991) and the observed results always conflict with the high-sex-ratio

ones in Asia (Dreze and Khera 2000; Edlund et al., 2007). Our research examines both the

effects of the excessive of males in the marriage market and the excess of young males in

population on violent crime in China (1982-2008), with the case of Korea (1970-2008) for

comparison and reference. Specifically, the effect of sex structure on violent crimes has been

examined both through mating competition in marriage market and the sex-age structure. They

have been respectively measured by the percentage of suitable marital males in marriage market

and the percentage of young males rather than sex ratio in previous researches. At a general level,

our objective is to explore a possible explanation and solution for the current rather inconsistent

researches.

Previous Macrolevel Quantitative Researches on the Age-sex Structure and Crime

There is a growing body of research concerning demographic determinants on crimes in recent years. The specific substantive foci of the studies vary, but the basic analytical design is very similar throughout the literature. Typically, multiple regression equations are estimated with crime rates serving as dependent variables and with certain demographic characteristics of population serving as independent variables. We have reviewed a sample of over fifty studies on crime rates which include demographic characteristics as key or controlling independent variables in recent thirty years. However, the indicator of sex structure such as sex ratio is not commonly reported in these researches. Indeed, only thirteen of the studies in our sample report results for a measure of sex composition.

The observed effects of sex structure which is frequently measured by sex ratio on violent crime rates in early studies tend to be weak and inconsistent. In their analysis of the largest 124 SMSAs, Messner and Blau (1987) detect significant positive effects of the sex ratio (males per 100 females) for selected violent offenses. In contrast, several studies based on other samples of SMSAs (DeFronzo, 1983; Messner, 1986a; 1986b) report nonsignificant effects of sex ratio in the fully specified regression equations. Rather surprisingly, Crutchfield (1982) reports significant negative effects for young males (percent males ages 10-18) on murder, assault, and the violent crime index across SMSAs. In Blau and Golden's (1982) research, the percentage of males between the ages of 15 and 29 in total SMSA population yields the expected positive effect on the total violent crime rate, the rape rate, and the assault rate in certain specifications. Simpson (1985), in contrast, discovers negative relationships between age-sex structure indicator (the logit of percent white males ages 15-29) and several violent offenses, also for a sample of SMSAs.

Messner and Sampson (1991) firstly begin to explore the explanation and solution for the previous inconsistent studies. They introduce an indirect variable "family disruption" to improve the framework of this issue according to the concept of "marriage squeeze" in demography. They suggest the sex structure is highly relevant to the marriage market because it determines the supply and demand of marriage partners. They believe when women are in excessive supply in the marriage market, it will reduce the number of women who are able to find suitable partners and reduce the economic compensation that women can expect to receive for their household labor and the investment on the next generation. The low sex ratio is expected to impede family formation and contribute to marital instability. The positive relationship between marital instability or "family disruption" (e.g. divorce rates or single parent families) and crime rates is well demonstrated. In contrast, the excess of males with high sex ratio bears a paradoxical relationship to crime rates. A high sex ratio implies a relatively large number of persons at high risk of criminal, which lead to increase the crime rates. At the same time, however, a high sex ratio is likely to reduce levels of family disruption, which is expected to lower crime rates. They only examine the effect of sex ratio (15-64years) on family disruption based on the SMSAs data. Their research implies significant negative relationship between sex ratio and crime rates.

Given the paradoxical relationship between sex structure and crime, Barber believes it necessary to measure the marriage market separately from the sex ratio. He improves Messner and Sampson's study by introducing both the marital sex ratio and general sex ratio to the regression model and extending the analysis unit to the national level (Barber, 2000). He detects significant negative relationships between the general sex ratio and selected crime rates with the

panel data of 70 countries in 1990. The marital opportunity measured by sex ratio in first marriage market is improved by the single sex ratio among the high peak of marriage age (20-24 years) and the general sex ratio (15-64 years) is improved by the adults ratio (15-44 years) at highest risk for crime in the subsequent study with longitudinal data from U.S. (1900-1988), England(1856-1980) and Scotland(1871-1980) (barber,2003). The study partly provides the evidence that some selected crime rates such as homicide rate `positively correlate to adult sex ratio but negatively relates to marital opportunities for women.

Some researchers argue that findings from western low-sex-ratio society(excluding the short increase in war time which consumes the excessive males (Hesketh and Xing, 2006)) may not be applicable to the traditional Asian high-sex-ratio societies (Edlund et al., 2007). The SRB in Western societies is constantly around the normal level of 105. Due to the loss of men during World War II and the postwar baby fever (growing population structure background), western societies are faced with the condition of female marriage squeeze and female excess (Akers, 1967; Schoen, 1983) In contrast, the male excess is even more distinguishing in Asian societies especially East Asia. India's SRB increased rapidly since 1980s and reached 110-113 in 1991. Dreze concludes strong positive correlation between homicide rate and total sex ratio on the level of districts (Dreze 2000). Recently, some researchers have attempted the quantitative study of the relationship between China's rising sex ratio of the youth at highest risk of crime and violent and property crime rates with annual province-level data from 26 provinces, covering the period of 1988-2004 (Edlund et al., 2007). The results imply that a 0.01 increase in the sex ratio raises violent and property crime rates by 0.03.
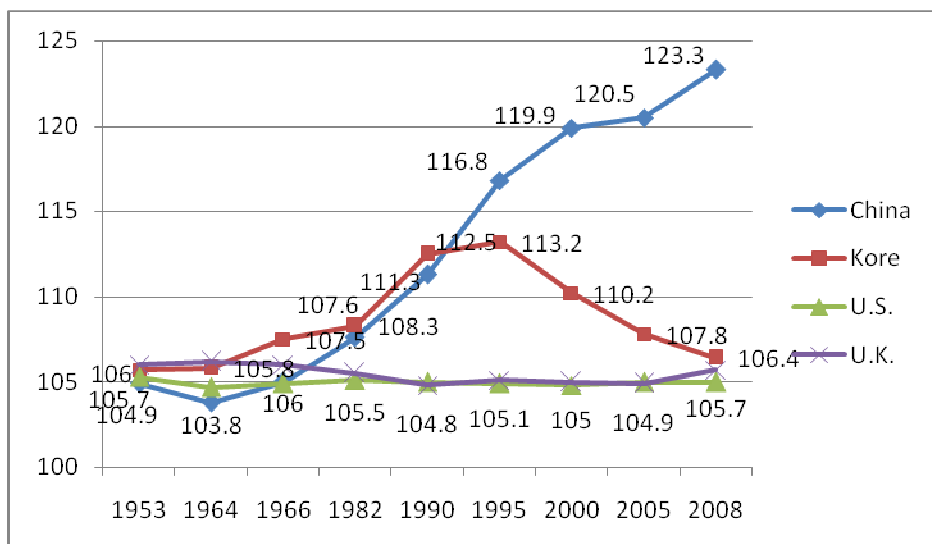
Figure1 SRB in China, Korea, U.S. and U.K. 1953-2008

A Hypothetical Model of Excess of Marriageable Males and Violent Crime Rates

    Previous quantitative studies of sex structure and crime differ in hypothesis and method, which lead to the inconsistence of the results. The differences of method will be discussed in the next part. The hypothesis difference focus on whether the increase of the males at high risk of crime, the increasing number of bachelors in the marriage market or both of them lead to the rising of crime rate. Evidence consistently indicates that young people and males are at comparatively high risk of becoming offenders in cross-cultural or cross-national studies (Blonigen, 2010). Males commit over 90% of homicide and other violent crimes (Daly and Wilson , 1988). The increasing percentage of young males most at risk of offending will inflate violent crimes. The robust link between percentage of young males and violent crimes is noted by many scholars while the relationship between sex composition in marriage market and violent crimes is rather inconsistent.

Evidence of Relationship between Marital males and Violent Crimes

Sex structure imbalance in marriage market is high relevant to "marriage squeeze" which refers to the excess of one sex corresponding to a shortage of the other sex in marriage market. Previous researches based on western low-sex-ratio societies have provided evidence of the negative relationship between female marriage squeeze (excess of females) based on the Guttentag and Secord's theory of sex ratio and sex roles. Their principal theme is that in societies where women are in short supply, they are highly valued by men, particularly for their roles as mothers and homemakers. In such societies, women will be revered and protected. In contrast, where women are in over supply, they will tend to be devalued by society and they will be more inclined to strive for economic and political independence (Guttentag and Secord, 1983).

Gartner (1990) argues that greater status resources for women lead to a larger "gender gap" in victimization because female victimization decreases relative to male victimization. Indeed, women are generally more dependent on men economically and politically whether they are in short or over supply. Especially in high-sex-ratio societies, the shortage of women is substantially caused by the discrimination against women. In contrast, women are not high valued but pornography and crimes of violence, especially sex-related ones such as rape and molestation, may increase (Ullman and Fidell, 1989; Hudson and Den Boer, 2002). Therefore we assume that the shortage of suitable female or male marriage partners will both lead to the increase of violent crimes. We propose a U relationship between suitable male marriage partners and crime rates (Figure 2).
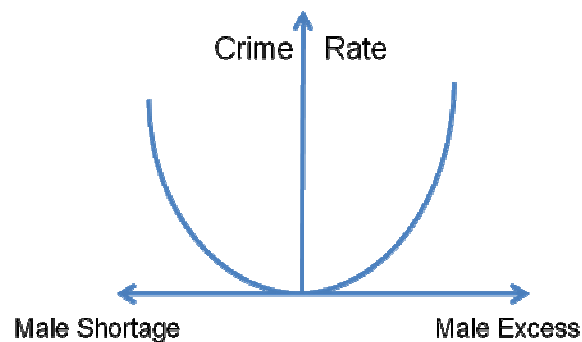
Figure 2 U Relationship Hypotheses

A scarcity of women at marriageable age might increase mating competition and male aggression. The primary motive for homicide is sexual jealous among men (Symons,1979). When there is a deficit of women, premarital chastity is common and men are more likely to compete indirectly via resource acquisition (Guttentag, 1983).China is poised to experience an increasingly intense competition among young men for the nation's limited supply of brides. In China men usually need to prepare large bride prices, the intense mating competition may lead to the increase of the bride prices (Bhat and Halli, 1999) and poverty related crimes (i.e. robbery and theft). The male bachelors often come from lower social and economic class. Cross-culturally, an overwhelming percentage of violent crime is perpetrated by young, unmarried, low-status males. Given that the 100-150 million floating population of China is overwhelmingly young, male, and low status-characteristics which have been demonstrated to be hallmarks of bachelors, the typical male bachelor syndrome may be found among China's floaters.

Some case studies also provide evidence for the relationship between male marriage squeeze and violent crime. Given that the relationship between excess young unmarried males is complicated rather than a liner relationship, Hudson suggests a method of " process tracing"—

historical case study (Hudson and Bore, 2004). The Nien Rebellion of 1851-63, finally quelled in

1868, originated with an organized group of bandits from the poor area of Huai-pei in northern

China. This region experienced flood, drought, or locust invasion on an average of every three

to four years. Many died of starvation. The response of the people of Huai-pei to this period of

famine and stress was female infanticide. Nineteenth-century statistics for the Huai-pei region

reveal that there was an over-all average of 129 men for every 100 women. In 1949, the People's

Liberation Army defeated the Chinese Nationalist Army. Hundreds of thousands of mainland

Chinese, including nearly the entire nationalist government and military, fled to the island of

Taiwan. Men outnumbered women by a factor of four to one in this group. The impact on the

sex ratio of Taiwan was dramatic. Between 1947 and 1950, the overall sex ratio increased from

101 to 119, and the sex ratio of 20-24 year olds jumped from 97 to 152 (Guo, 2000). The case of

Taiwan is a natural experiment to examine the relationship between marriage squeeze and violent

crimes, because demographic shock was large and unexpected. During the decades that followed,

there was virtually no immigration to or emigration from the island. The male marriage squeeze

leads to the large number of unmarried, low-economic-status aboriginal males. The crime rates

in Taiwan sharply increase in 1952, reach the peak in 1964 when the male marriage squeeze is

most intense (Denq et al., 1994) .

Indeed, the shortage of women in high-sex-ratio societies is substantially caused by

discrimination against women. Women are not highly valued, and pornography, crimes of

violence, especially sex-related ones such as rape and molestation, may increase (Ullman and

Fidell, 1989). At least three types of explanatory mechanisms may be involved: sociological,

behavioral, and physiological. At a sociological level, the social disorganization theory believes

that marriage is one of the important social ties and informal controls to individuals. At the behavioral level, a scarcity of women might increase mating competition and male aggression. In China men usually need to prepare large bride prices, and thus intense mating competition may lead to the increase of bride prices (Bhat and Halli 1999) and poverty related crimes. The physiological influence includes levels of testosterone and other androgens (Archer 2006).

Given the fact that the percentage of young males also contributes to crime rates, we suggest exploring both the effects of excessive males in marriage market and the percent of young males who are at the highest risk of crime. Our full hypothetical model is summarized in Figre3: the rising percentage of young males and the intense male marriage squeeze will both lead to the increase of violent crime rates.
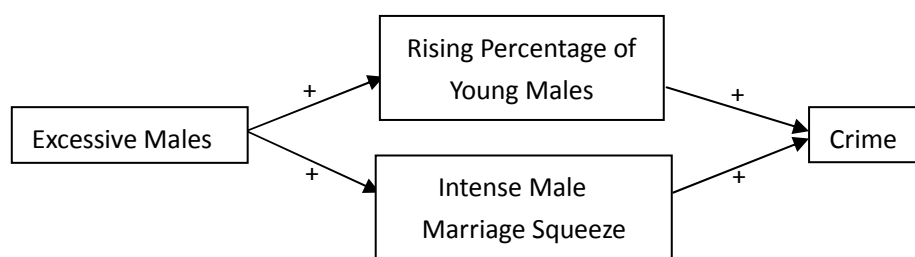
Figure 3   Full hypothesis Model

There are three main factors that account for the rising percentage of young males, there are cohort size over time (or fertility rate), sex ratio at birth (SRB, boys per 100 girls at birth) and age differentials in mortality. In the absence of large-scale international migration, there are four main factors that account for sex imbalance in a marriage market, namely SRB, gender differentials in mortality, changes in cohort size over time (or fertility rate) and age gaps between spouses (Beiles, 1974) .

Son preference is popular in agricultural societies such as traditional China and South Korea, but the sex structure is not obviously imbalanced until 1980s. Since 1980s, son preference has been expressed at earlier birth order for the stringent one-child policy, natural transition of fertility in China , and the availability of ultrasound technology enabling the prenatal determination of sex (Hull, 1990, Zeng et al. 1993, Eberstadt, 2000, Chu, 2001). All these three factors lead to the sharp rising of SRB from 107 to 123 between 1982 and 2008 in China. Due to the human intervention and natural demographic transition, the SRB surprisingly rise and fertility rate fall sharply.

Method

Research design

China and South Korea are culturally fairly homogeneous countries and experienced similar demographic transition(Li et al., 2000). South Korea is the first country to report very high sex ratios at birth in 1970s, because the widespread use of sex selective technology in Korea precede other Asian countries (Hesketh and Zhu 2006). Benefiting from economic and social development especially the raised level of female education , female labor participation and social security, Korea's SRB has fell to normal level in 2005(Chuang and Gapta, 2007;Chun et al, 2009). Some researchers believe that the turning point of SRB in Asian countries such as China and India will be coming with the economic and social development in the future (Lipatov et al., 2008) .Recently, Chinese official announces that SRB firstly begins to decline in 2009 after rising for decades.

By using the case of Korea (1970-2008) for reference and comparison, this paper examines

the relationship between sex structure and violent crime in China (1982-2008). Previous analysis

units include district，province，SMSAs and nation. Given that the nonstandardized

cross-regional crime data in the regression model is unreliable and weak and male's age

distribution of crime is invariant across an array of factors such as place, race and social context,

we examine the longitudinal data of China and South Korea respectively in multi-regression

models (OLS). For all of the models reported, variance inflation indexes (VIF) were calculated

for multicollinearity bias.

Dependent Variables

The dependent variables were the violent rates per 100,000 for assault, rape and robbery.

Data of China is calculated from the *China Law Yearbook* (1982-1008) published by China's

Supreme Court which have officially reported the crime data of China since 1982; rape rate of

Korea is calculated from the database of United Nations Surveys on Crime Trends of Crime and

Operations of Criminal Justice Systems (1970-2008), which have been collecting quantitative

cross-national crime data from United Nations member states since 1970. The United Nations

provides a modest level of quality control on the collected data. The data are considered official

statements by national governments about the extent of crime and the operations of criminal

justice systems in their countries and, therefore, these data are considered more valid than the

Interpol data in previous researches (Stamatel, 2006). data of robbery and assault（1990-2008）is

calculated from Korean National Police Agency.

Independent Variables

The independent variables include the percentage of suitable marital males in marriage market and percentage of young males in population. We suggest that "sex ratio" is not appropriate for the measuring of sex structure imbalance. "Sex ratio" (number of males per hundred females) directly reflects the relative number of males and females. It varies from 0 to 100 in the case of male shortage and covers from 100 to infinity in the case of male excess, which is not suitable for the linear regression model. The reasonable indicator should be the percentage of males (1).

We focus on the percentage of young males between 15 to 24 years (2) for two reasons: first, these are the most crime-prone ages, accounting for more than 70% of the total number of criminal offenders since themid-1980s; second, this age group is consistent with the official statistical approach. There are three measures of marriage squeeze: crude ratio of males to females at prime ages of marriage; relative numbers of males and females at marriageable age and single males to single females in first marriage market (Akers, 1967; Schoen, 1982). Given that detailed marital status data is difficult to obtain, which impend the estimate of single males to females, we use the relative number of males to females at marriageable age and improve it to be the percentage of suitable marital males (3). It can be roughly estimated through the number of males (26-44years) to total population including females (24-42 years) and males (26-44years) (3). The age difference between spouses is presumed as 2 and the possible age of marriage squeeze is presumed as 24-42 years for females and 26-44 years for males(Guo and Deng, 2000). Its value between 0 and 0.5 refers to male shortage in the marriage market while 0.5-1 represents the male excess. The percentage of suitable males minus 0.5 which is the point of the balance directly reflects the intensity of mating competition in marriage market. Data of China is projected from

1982, 1990 and 2000 census data; data of Korea comes from the Population Projection Database

of Korea (1970-2008).

$$P = \frac{P^m}{P^m + P^f} \qquad (1)$$

$$PY = \frac{\sum_{x=15}^{24} P_x^m}{P} \qquad (2)$$

$$PM = \frac{\sum_{x=26}^{44} P_x^m}{\sum_{x=26}^{44} P_x^m + \sum_{y=24}^{42} P_y^f} \qquad (3)$$

Given that the percentage of suitable males and crime rates are proposed to be U

relationship, it is necessary to introduce the quadratic term of it in the linear regression equation.

GINI coefficient, Ln of GDP per capita and its quadratic term (on the basis of Huntington and

Durkheim's theory that crimes will rise in the transitional process of modernization and diminish

once the society has modernized (Lafree and Tselsoni 2006)) are also introduced into the

regression model as control variables. GINI coefficient of China is from a related paper (Chen et

al., 2010), unemployment rates and that of Korea is from Korea Statistics Bureau. GDP data is

from the statistic yearbook of China and Korea.

<center>Results</center>

Regression results from China and Korea are presented in Table 1. The regression models

have generally explained 32%-94% variance of selected crime rates. The hypotheses have been

mostly demonstrated. The quadratic term of marriageable males yields the expected positive

effects on assault rate in China and assault, robbery and rape rates in Korea. These results imply

that either the excess or shortage of males in marriage market will cause some corresponding

rise in the crime rate.   However, it shows a significant negative effect on assault rate in Korea with a high standard error of 80, probably due to the reliability of assault crime data of Korea. The quadratic term for the standardized coefficient shows relatively great effects both on the assault rate in China and crime rates in Korea.

The percentage of young males is significantly positively related to assault a rate in Korea suggesting that a higher percentage of young males will increase the assault and robbery rate. However, analysis of China does not show any significant relationship between percent young males and crime rates. One reason may be because the 1982 census did not include military personnel, which would cause the percent of young males to be projected much lower. GINI coefficient, Ln GDP per capita and its quadratic term are also significantly associated with violent crime rates.

Table 1 Regression Results

Predicators	Assault Rate		Robbery Rate		Rape Rate	
	b	Beta	b	Beta	b	Beta
China(1982-2008)						
Percent Young Male	.08(.25)	.03	-1.66(.85)	-.24	-.11(.87)	-.25
PMM^2	1.01*(.54)	.22	1.73(1.68)	.16	.07(.17)	.10
Percent Marriageable Males	—	—	—	—	—	—
Gini	29.13**(9.56)	.44	123.21 (31.88)	.78	4.81*(3.28)	.49
Ln GDP per capita^2	-.01**(.01)	-.19	-.01 (.02)	-.10	-1.10*(.29)	-1.52
Ln GDP per capita	1.89**(.83)	.39	-1.63(2.77)	-.14		
Adjusted R2	.94		.88		.69	
Korea	1990-2008		1990-2008		1970-2008	
Percent Young Male	184.90*(109.80)	1.91	4.34(3.75)	2.40	-.23(.39)	-.11
PMM^2	1.36*(.67)	.85	.05*(.02)	1.52	.02*(.01)	.48
Percent Marriageable Males	—	—	4.34(3.75)	2.40	—	—
Gini	3718.41**(1326.53)	.54	33.76(45.33)	.26	30.23(22.69)	.17
Ln GDP per capita^2	—	—	—	—	—	—
Ln GDP per capita	323.80 (188.55)	1.49	5.02(6.44)	1.24	. 56(.37)	.30
Adjusted R2	.80		.32		.71	

NOTE: Standard errors are shown in the parentheses. *p < .1.   **p < .05.

Basically, China and South Korea are culturally homogeneous countries and experience similar demographic transition, which refers to sharp rise of SRB and the decline of fertility rate in the late 1970s. The percentage of young males is both relevant to the number of male birth and the age structure of the population. With the decline of fertility rate, Korea's percentage of young males falls from 11.6% to 7% between 1980 and 2008(Figure3), while it fell from 12.3% to 8.6% between 1987 and 2008 in China(Figure 4), which implies that the effect of percentage of young males on crime is declining. In contrast the percentage of suitable males in the marriage market continue to rise both in China and Korea, which will be the major demographic sex

structure effect on the rise of crime rate in the future. Unlike Korea with small population which will rely on more ways such as foreign immigrant brides or expand the age difference of spouses(Hull 1990), the condition of China and India with large population would even worse, unless they are swept by a truly radical change in cultural and social attitudes toward marriage in the next two decades (Attane, 2006; Park and Cho, 1995).
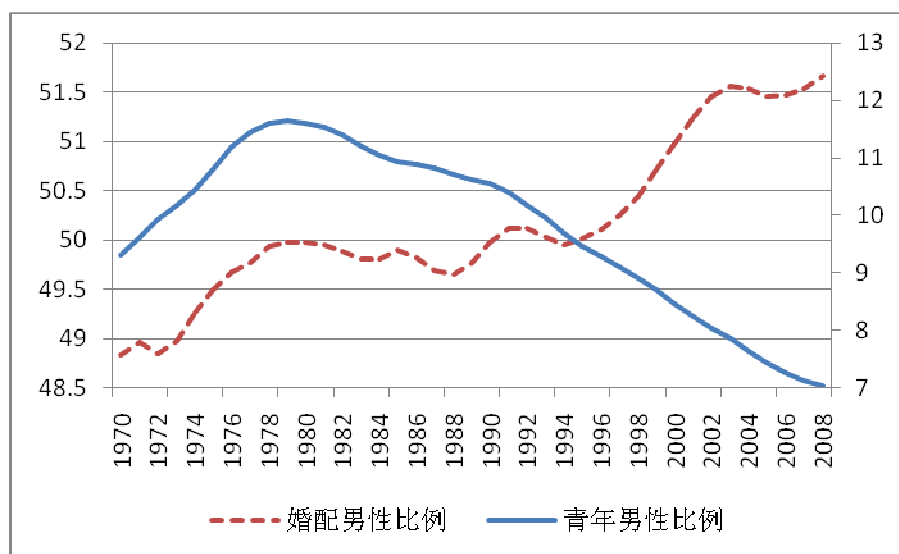

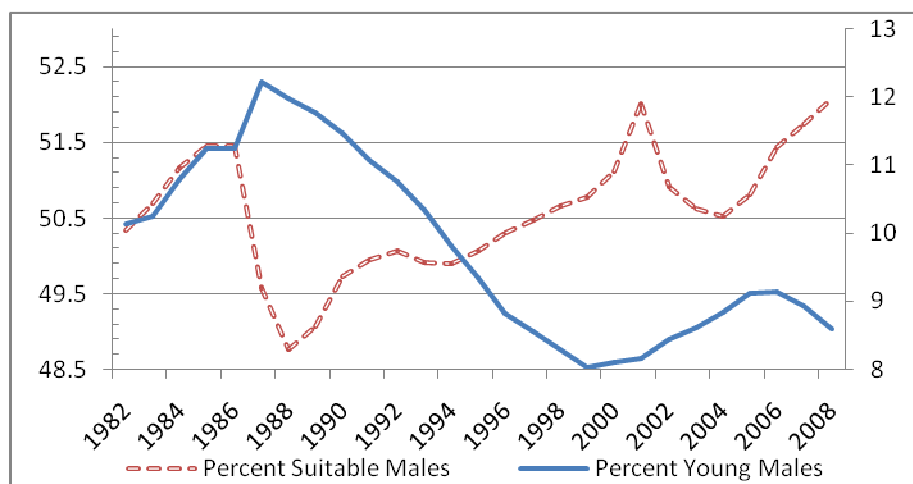Figure3 Percent Suitable Males and Percent Young Males in Korea

Figure4 Percent Suitable Males and Percent Young Males in China

Summary and Discussion

This paper improves the previous hypothesis model by examining the effect of excessive males in marriage market and the percent young males who are at the highest risk of crime. Briefly, the "young male percentage" and "percent suitable males in marriage market" substitute the previously applied indicator—sex ratio. Our analysis permits several conclusions: the sex structure has an effect on violent crimes both through the marriage market and age-sex structure. The rising of young male percentage will lead to the increase of crime rates while the comparatively high or low percentage of suitable male marriage partners will both increase crime rate, which graphically exhibit a "U" relationship.

Fewer previous studies examine both the effects of age-sex structure and sex composition in marriage markets. Due to the limitation of the western data of sex structure, previous studies ignore the U relationship between suitable male marriage partners but only examine the left part of U relationship (excess of female marriage partners). These two factors explain the inconsistence of previous studies. Our study improves the hypothesis model and method, and successfully integrates the high-sex-ratio empirical experience in Asia and the low-sex –ratio one in the West.

Given that the declining fertility rate which leads to the both increase of SRB and excess males in marriage market, the stringent one child policy should be released as soon as possible. The imbalance SRB is substantially resulted from the son preferences and discrimination against

women. Gender equality is a long-standing effort of human society, which matters the protection of the rights of women, social security and sustainable development of human society. However, the patriarchal society tracing back to Zhou Dynasty has rooted through a series of economic, political and social, cultural institutional arrangements, so that people's reproductive behavior and attitudes alienate, manifested as male biased preferences. The institutional discrimination can only be solved through institutionalized ways. The case of Korea implies the importance of role of governments and social public policies. Although China has started "Care for Girls Action" since 2005, there is still a long way for Chinese central government to improve rights and status of female at legal-system level.

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