



Title	アジア諸国における都市化・少子化・非婚
Author(s)	野村, 茂治
Citation	大阪外国語大学論集. 2007, 36, p. 23-53
Version Type	VoR
URL	https://hdl.handle.net/11094/80027
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アジア諸国における都市化・少子化・非婚

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Urbanization, Low Birthrate and Non-marriage in East Asian Countries

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要約

アジア諸国において、経済発展が低い段階で第一次産業が中心であった時代、農村では共同で作業を行うことから、家族の絆は強く、また伝統が受け継がれるように各個人の行動には、おのずと制約が加えられていた。また女性においては、戸主に従い家事・育児・老親の世話などの家庭内のすべての仕事を引き受けていたといっても過言ではないように思われる。特に、儒教の影響を強く受けている国々においてはその傾向が強いと思われる。

しかしながら、経済が発展し、産業構造において第三次産業が大きなウエートを占めるようになると、家族の形態とりわけ女性のライフスタイルが大きな変容を遂げるようになってきた。農村から都市へ移住する人々が増大し、核家族で住むようになってきた。女性にも教育投資が行われ、高学歴の女性が増えてきている。彼女達は、これまでの性の役割に根ざした拘束から解放され、一人の人間としての生き方を追求するようになってきている。一方でこれを可能にするような女性労働市場の改善、家庭労働に代替するような家庭電化製品の拡大が行われてきている。また女性のライフスタイルの変化の結果で、晩婚・非婚・少子化などの現象も起こってきている。

本論文においては、アジア諸国における都市化の推移を概観し、経済発展とともに女性のライフスタイルが大きく変化してきていることを実証的・理論的に説明しようとしている。従来、女性の行動を規定してきた社会的通念・慣習が経済社会の発展に伴って変容を遂げてきている。その背景として、家族形態も変化し、結婚の意味、あるいは結婚生活による生活スタイルも多様化してきている。非婚・少子化による、老親の世話の問題に関して、これまでの家族中心（子供中心）から公的な支援体制に中心を移しつつあるが、これは一方で、財政的問題を引き起こしている。

本論文の理論分析では、ゲーム論的なアプローチから、東アジアにおける家族構造の変容のメカニズムを明らかにしている。そこにおいて、個人の行動変化がどのように関連して社会的な現象として現れてきているかが、詳細に説明されている。

Introduction

Enlargement of urbanization occurred in the post World War in Asian developing countries, and many people have moved from rural areas to big cities. That had great effects on lifestyle as well as the roles of women, and family structure. In the rural areas, the women engaged in the agricultural works as helpers of the husbands, rearing children and doing household. They worked from morning to evening and supported their family. It would be true that they couldn't afford the time to go to work outside the home even if they have intension of working in the labor markets. In the past, men were supposed to finish school, get a job, marry and support his family. On the other hand, educational attainment and employment were less important for women and what they have to do were supposed to be marriage, childbearing and childrearing. Single-parent families which were mainly the result of divorce were thought to be an unhappy surprise in the marital life and non-marital childbearing was an anomaly. Furthermore, since children were considered to be labor forces as well as a social security against parents' old age, it was usual that females bore many children. So, women were the central person to maintain family in the past.

However, with the urbanization lifestyle for women has changed. Urban life is totally different from rural life for women. It is more creative and innovative, and there is few binding rule of community compared with rural areas. In recent decades, marriage rates have fallen, divorce rates have risen, and the characteristics of marriage have changed. Total fertility rate has also been declining and average expectancy has been increasing in Asia (Table 1). Thus, the aging problem has become serious. The speed of aging in Japan is tremendously fast. The biggest problem is who takes care of old parents. Increased longevity and declining fertility mean that most of one's adult life is spent without one's own children in the family, and the rise in first marriage at older ages means that many families form with no intention of producing children. Moreover, increases in female labor participation suggest that the division of labor by gender has either declined or taken on a different meaning. Thus, the division of labor by gender is decreasingly central to modern family life.

When we look at the historical process from the Second World War to modern times from the perspective of gender, we can observe an increasing power of women, in which they try to free themselves from the traditional way of life and thinking. John Bauer [ch14 of 1] also deals with the economic status of women in East Asia. In particular, we are focusing on the marriage here. It used to be considered to be natural to get married for females, but in recent times, non-marriage has become popular. Furthermore, the division of labor by gender has changed. In addition, the filial piety has weakened¹ and social norm in female's life style has also changed. It seems that

urbanization and the improvement in women's labor markets are closely associated with the above phenomenon. The previous researches on low fertility rate and aging of society try to analysis from the perspective of micro cost-benefit analysis (Francine 2005). Our point emphasizes the change of norm in women's life style.

In this paper, we would like to examine the flight process from the traditional lifestyle for females in Asia theoretically as well as empirically. In particular, we try to focus on the low fertility rate, non-marriage and the issue of taking care of old parents and would like to examine about how to deal with those problems. The structures of this paper are the follows. In the first section, the relationship between urbanization and status of women in East Asian countries are explained in Asian countries. In the second section, determination of marriage are analyzed. In the third section, the incense of non-marriage is examined of family relationships is examined. In the four section, role of family is analyzed, and finally the condition is explained.

1. Urbanization and status of women in Asian countries

When the first industry was dominant in East Asian countries, in particular in the cultural zone of Confucianism such as Japan, Korea, Taiwan, Hong Kong and Singapore, it was usual that the parents and their child's couple who was a direct descendant lived together (Table 3). In this background, as population increases and the size of land per capita decreases, it seems that it is the best way to live with the parents in order to maximize the efficiency of the family-oriented management in agriculture. Furthermore, living with the parents together is efficient in terms of living cost and desirable from the perspective of social security. And since the succession of the family "dynasty" is highly valued in Asian countries, one of children is supposed to succeed to the family and inherit its estates and traditions². In such a family, every family member was forced to obey the head of family.

What is expected to do for women in such a traditional society is to bear and rear many children, keep households and do agricultural work as helpers to assist their husbands. In addition, Children were taught that they should put filial piety into practice and take care of their old parents in the cultural area of Confucianism. In Japan, the eldest son's wife has played a major role of taking care of them. In Singapore as well as China, children are in duty bound to keep it by law.

However, many women face the difficulty in supporting the elderly parents. When facing the situation of taking care of old parents, some women have been forced to quit their jobs. In that case, the higher the human capital for them, the higher the opportunity cost. In addition, the married females have their own life plans, and some households can't afford to take care of the old parents in terms of time and money since

taking care is very burdensome work, and there is every probability that its duration becomes long. Thus, many countries come to think that the governments should support the elderly. In Japan, the caring insurance was introduced in 2000 and the society as a whole tries to take care of the elderly.

The idea that women should marry, bear and rear children and take care of the elderly parents seems to have been social norms. As long as most of women accept them, they function as the binding enforcement and determine their behavior. In this system, it seems that marriage was an indispensable institution to maintaining this family system.

However the norms have changed little by little in recent times. When we look at table 6, over the past two decades some dramatic changes have taken place in Asian countries: non-marriage for women is becoming much more common, and in many urban areas. Though evidence is limited, college educated women have very high levels of non-marriage. Expansion of education brought development of human resources to women and had a great effect on the behavior of women.

As national income grows, some households have been able to afford to get daughters to go to high education institutions such as universities. As a result, the number of female with higher academic career has increased (Table 1). It seems to be reasonable that they would not like to stay at home but like to take jobs that are pertinent to their abilities from the point of view of cost-benefit. Furthermore, when people work in the labor markets, they can get the wages, which are pecuniary and visible reward. On the other hand, no matter how hard they contribute to their families, they will not be able to get the visible reward such as wages. Of course, though they would get spiritual pleasure from such activities, only a few of them would be content with it. So, it is natural that they try to derive the return from investment in education³. On the other hand, it would take a great cost for females to stay at home without working in the labor markets after marriage.

We do simple regression analysis about the relationship between urbanization and low fertility rate at the end of this paper. The results indicate that if the urbanization rates are heightened, the fertility rate would be decreased.⁴ In this background, it seems that there are other reasons. The educational investment in the women has increased as economic development has proceeded, and human capital for the women has improved a lot (table 1). Increasing numbers of Asian women have been entering universities, closing the gender gap in tertiary schooling. In particular, in Taiwan, Japan, Singapore and Thailand there are relatively few sex differences in fields of study within higher education recently. It seems that the women with high academic career have tried to get their jobs in the labor markets positively, and been reluctant to have

children.

As economic development has advanced more and more, and service industry sector has become dominant, the labor demand for females has also increased. And women's wages rises, many females came to think that it is desirable for them to have no children rather than having children in order to pursue a career woman. They have been giving priority to living their own life rather than contributing to family and rearing children for several years. Thus total fertility rate has been declining, and the traditional division of labor by gender, which means that men work outside while women stay at home and do household as well as rear children, has weakened. It seems that in the past, gains to marriage were based on the division of labor by gender and exchange within the family. But this way of thinking has not held as in the past due to the rise of the earning power of women.

However the causal relationship between household role of women and the earning power of women is not straightforward. Education, market work, and fertility are interrelated one another. That is, women who expect to have fewer children and maintain a consistent attachment to the work force will rationally invest more in market skills as well as technologies. For these women, greater investment in education and improved employment opportunities raise the cost of childbearing and childrearing. Furthermore, educational investments of young women in recent years seem to be caused by a change in the career expectation. We need to think as a whole.

As family structure changes due to divorce and non-marriage, the care-giving relationships between elderly parents and children become more tenuous. In reality, the increased diversity of families such as divorce, cohabitation and non-marriage might have reduced community enforcement on family member's behavior. In the past, if the working-age individuals support their elderly parents, it was considered that they would be supported in old age by their working-age children. This system seems to be a self-enforcing family constitution from the perspective of economics. The family constitution specifies that working-age individuals who support their elderly parents will be supported in old age by their working-age children. Therefore, the game of the care-giving was thought to be repeated in the past. However changes in market opportunities, government programs and social norms may cause these arrangements to break down. In fact, working-age adults who have no children might renege on supporting their parents. Thus, now it seems that it changed to one-shot voluntary game. On the other hand, the government's welfare program is trying to be replacing care-giving of the children little by little. However it cost a lot in order to sustain this system and the problem of fiscal burden is showing up.

In addition, in post-agrarian societies, families do not need children to provide farm-

labor, and financial and government infrastructure came to provide alternative sources of old-age support. As the narrowly economic motives for childbearing and childrearing decline in importance, from the parents' viewpoint, children look less like investments and more like expensive consumer durables. Thus, the future trend of the demand for children depends on the evolution of preferences as well as on income and substitution effects.

In Asian countries, total fertility rates were quite high in 1950s and these labor surpluses including women in the rural areas have been absorbed in manufacturing industry of the cities. As a result, urban way of life freed the women from the unpaid labor activities and gave them free hands. Social norms have changed little by little, and marriage came to be considered as a choice. In fact, the number of female-headed households has been increasing (table 3, 4 and 5). They are mostly composed of spinsters or single parent families due to divorce.

Let's look at each country in Asian countries. Economic growth in Korea developed due to the strongly governmental export-led economic policy. And population moved from the rural to urban areas. The rate of urbanization rose from below 30% post-war to around 80% in 1990s dramatically⁵ and according to the UN statistical data, the total fertility rate decreased from 5.4 in 1950-55 to 1.5 in 2000-2005 along the urbanization. On the other hand, women's participation rate in the labor market has been increasing and fertility rate has been decreasing. Low fertility rate is mainly caused by the increase of unmarried young generation, and less number of children in married household. As a result, aging of population has occurred at an unprecedented rate. In 1998, persons aged 65 and older account for 6.6% of the total population, and this ratio is expected to reach 15.7% in 2020. In addition, according to the National Statistical Office, the crude divorce rate (number of divorce per 1000 population) showed its growing trend with 1.1 cases in 1990 and with 3.0 in 2002. As a result, there has been a remarkable increase of female-headed households in Korea due to increase of one-person households and women living alone due to never-marriage and divorce (table 5). Considering family-oriented consciousness in Korea used to be very strong, it is worth while taking notice that women's life style in Korea has greatly changed.

The total fertility rate in Taiwan decreased from around 6.0 in 1950s to below 2 in 1990s. On the other hand, the urbanization rate increased from around 50 to around 70 in 1990s. It is characteristic of Taiwan that many cities were established from the point of view of the government's policy, which is different from Korea. Since the initial economic conditions were relatively good in Taiwan, the educational investment in women has taken place from the early time and the labor force participation rates for women have been sustaining high rates.

As economic development has proceeded in Thailand, the urbanization rate has been increasing. However the rate was 13% in 1970, and 20% in 1996 and was relatively slow. And about the half of the urban population live in Bangkok. This means that many people in Thailand still live in the rural areas. Thus the characteristic of the movement of population in Thailand is inter-regional movement between the central area and the suburbs of Bangkok. It is worthy of remark that the rate of the women moving into the central area from the suburbs of Bangkok is 53.1% and very high. The total fertility rate in Thailand is around 2.

In China, the only one child policy was established in 1980. And as economic development has proceeded, the school attendance rate has increased. That of secondary school increased from 46% in 1980 to 67% in 1995 and that of tertiary school increased from 2% to 5%. The movement from the rural areas to the urban areas has been restrained through the family register system. However the urban population has been increasing. The lifestyle of young couples in the urban areas is the same as the one in the developed countries. They are concerned about the problem of taking care of the old parents. In particular, the share of the aged 65 or above is 12.4% in Shanghai and relatively high compared with the other regions, and the problem of the aging society has been getting serious.

The total fertility rate in Malaysia was 6.0 in 1950s and around 5 in 1990s. It is still high relatively. It seems to be affected by religious matters. It is also high in Philippines and this also might be affected by religion. People in Philippines have strong religious feeling in Catholicism. With regard to the urbanization, the small-scaled farm families have difficulty in managing because the modern management of agriculture has prevailed under the large-scaled landownership, and consequently they are forced to move into the urban areas and some of them have remained as the workers of the informal sectors. In Singapore, educational investment in the women become high and the labor participation rate for women is high, and total fertility rate has been decreasing.

At last, let's see the recent trend of low fertility rate theoretically from the point of view of economics. If we consider children as consumer goods, then we may derive the demand for them using conventional economics. First of all, let us define the parent's utility function. We assume that their utility depends on two goods which are market goods(X) and their children (C_h).

$$U = U(X, C_h)$$

Their budget constraint is

$$Y = P_x X + P_2 C_h$$

where P_x represents the price of X goods and P_2 the opportunity cost of bringing up

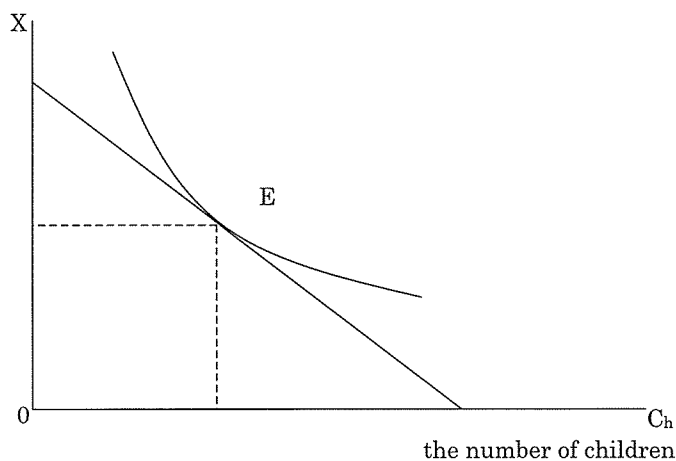


Figure 1

and educating the children. We can find out the equilibrium point (E) which is determined by the tangent point of the budget line and the indifference curve at its largest possible index as in the basic model of consumption theory in figure 1. At this equilibrium, the marginal utility per one unit of money of each goods should be equalized.

$$(MU_{ch}/P_2) = (MU_x/P_x)$$

From here on, we can derive a demand function that shows an inverse relationship between the number of desired children and their price (opportunity cost). We can define the demand function as

$$D_{ch}=D_{ch}(P_2, P_x, Y, t) \quad \partial D_{ch}/\partial P_2 < 0$$

Y represents the income and t other parameters. This sign shows that a rise in the price of children gives rise to fewer children assuming that all the variables but P_2 are constant. And if the marginal utility from children decline for some reasons⁶, then the demand for children will decrease.

However once we admit the possibility that the income(Y) changes, the problem becomes more complicated since the income and substitution effects may act in opposing directions. So, an increase in the mother's salary would cause a double effect which is an income effect and a substitution effect. The demand for children depends on which of these two effects predominates. If the income effect predominates, a rise in the mother's salaries will imply a larger demand for children. However, if the substitution effect predominates, the demand for children will fall.

Some researches [Butz and Ward & Winegarden] show different values in the fertility elasticities with regard to the father's and mother's salaries. They are not only different, but they also have opposite signs. The former is negative, and the latter is

positive. However when we look at the relationship between the couple's income and the number of children, the problem is getting more complicated. A recent tendency seems to suggest that children are considered as inferior goods, in the sense that family demand fewer children as their income increases. But we have to be careful about the conclusion. We assume that the other variables but the income are constant in that case. In reality it is not true. What could also happen is that as women acquire better professional qualifications and greater possibilities of earning a higher income in the labor market, the opportunity cost of having children will be greater. Therefore negative correlation between income and the number of children would represent that a substitution effect exceeds an income effect. From the point of family policy, if we are facing a substitution effect nowadays, a policy of reducing the opportunity cost of having children would be needed in order to increase birth rates.

2. Trend of marriage

The changes in lifestyle of women have been occurring for about a decade. We would like to focus on change in marriage. What we want to emphasize is that the number of women who do not get married has been increasing and the divorce rates also has been increasing. Even if they get married, they came to marry late. When the level of economic development is relatively low, they couldn't afford to get high education. In addition, labor market didn't favor women. So, marriage was considered to be an only tool for women to live happy lives. Therefore it seems that there is no merit in delaying marriage. It was rather thought that the sooner they get married, the happier lives they could live. And it seems to be natural that the early marriage could lead to high fertility rate.

With the urbanization due to economic development, the women have been able to make the most of their opportunities to give full play to their abilities. Some of them go to universities and professional schools and some of them try to find the suitable jobs for them. The higher human capital they acquire, the more expensive the opportunity cost of the interruption of career due to marriage and baby-bearing gets. As a result, the human capital and the probability of getting married have negative relationship for women (Figure 2). We formulate this relationship as the followings:

$$P = P(K_h), \quad 0 < P < 1$$

where P is the probability of getting married and K_h is the endowment of human capital of the person in question. General data show that this function will be an increasing one in the case of men and will be an decreasing one in the case of women. Figure 2 shows the differences in the probability of getting married as a function of human capital and sex.

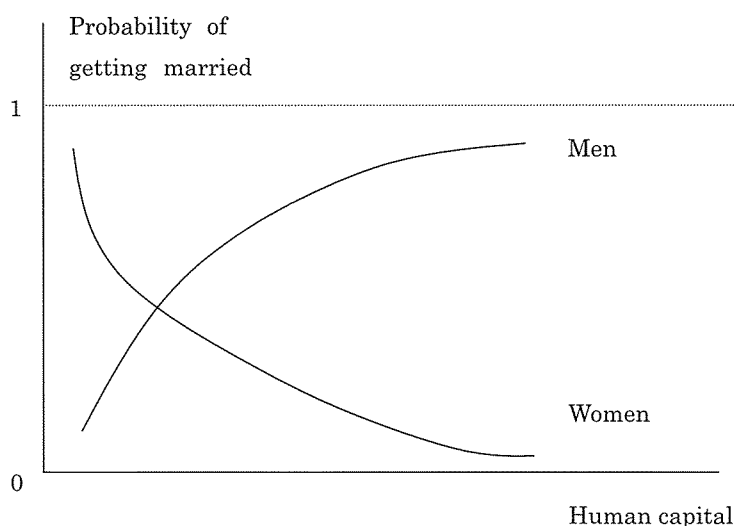


Figure 2

In the time of low economic development, the women's position was put into a disadvantage one in terms of the endowment of the human capital. In general, women have tended so far to marry at a slightly earlier age than men. We can understand this tendency from the point of view of the endowment of the human capital. To marry young means a lesser endowment of human capital *ceteris paribus*. This inferior human capital is the result of a lesser investment in years of academic education as well as experience in the work force. Such inequality between men and women would give rise to important differences not only in how domestic work is allocated between the couples, but also in the advantages that each partner obtains from the marriage. As a result of that, from the point of view of women, it is reasonable behavior for them to marry a partner with a higher endowment of human capital to raise their social status.

On the other hand, it seems that women with a higher education have tended to get married and to live with their husband to a much lesser extent than women with lower professional qualifications. Women with a higher education tend to follow a professional career and not to choose to devote their time to the traditionally female household chores. Since it costs a lot to invest in human capital, it is reasonable that women should pursue a working career. As a result of that, their probability of marrying is substantially reduced.

In addition, both a husband and wife are able to get benefit through this marriage. In particular, since he can stand on an advantageous position through his high earning power, he would gain a larger proportion than his wife of the benefits produced during the marriage. However, this does not imply that the wife is exploited by the husband, since she also makes her position improve better through the marriage. She could gain

possession of the some share of the benefits produced by the partnership, which would be larger than she produces by herself.

Such a relationship might reinforce the stability of the marriage by making a breakup more costly for women. Therefore when the difference of the endowment of human capital between men and women is getting smaller, due to the large endowment of human capital accumulated by women, it seems natural that the stability of marriage decreases and the divorce rate rises.

When we think about the timing of marriage, we can consider it from the viewpoint of search theory in economics. For example, if women intend to devote themselves to doing household and rearing children, it does not take them long time to think whether they get married or not. They tend to get married relatively quickly in this case. Finding a potential marriage partner with satisfactory characteristics requires time and money. It is indeed true that the greater the efforts made and the longer the time spent, the greater the probability of finding a suitable partner. Since it costs to search a partner, this does not mean that the more effort made and the longer time spent are desirable. We need to think from the perspective of marginal benefit (MB) and cost (MC). The curve of marginal cost (marginal benefit) shows the cost (return) from the last unit invested in the process in terms of quality improvement of the possible partner. When MB is greater than MC, it will be efficient to increase the amount of investment in the search. But when MC is greater than MB, it will be efficient to decrease one. The optimal search process should terminate when marginal cost is equal to the marginal return. Figure 3 shows the equilibrium point (E).

The recent delay of getting married is considered to be increase of the marginal costs, which means upward shift of the MC curve. Many young women have been engaged in their business as the career ones. As a result, searching means interruption of the business and costs them a lot. So they don't have strong incentive to search for a partner. This leads to the delay of marriage. In addition, the delay does not bring a great cost to women.

In reality, the process of searching for a partner is more complex than the curves of MB and MC show, where we are assuming that we have fairly accurate information on what the costs and benefits will be of the resources invested in the search for a marriage partner. But in fact, it is not always true. We do not know with any precision with regard to what the quality level of our future partner will be and how people of opposite sex value our own qualities. So, we adopt a more realistic assumption that each person has certain minimum requirements that are subjective and different in each case with regard to his or her future partner, and that he or she may marry any person who fulfils this minimum.

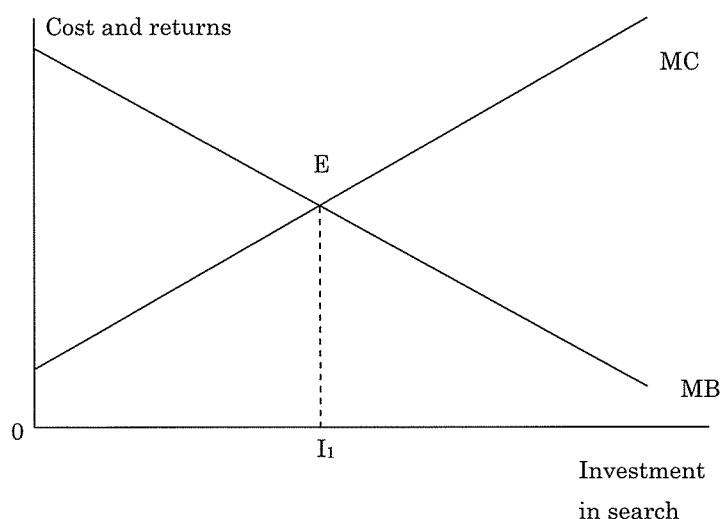


Figure 3

Figure 4 shows the role that this minimum quality level plays. We suppose the positive relationship between quality of partner and investment in search and this function is a concave function. Each person establishes minimum quality levels, below which he or she will not marry. For example, if he or she sets up the quality level of Q_1 , he or she will stop investing in search at the level I_1 . If a minimum level is raised to Q_2 , a search investment will increase to I_2 .

This minimum level could change with various conditions. One of them is social pressure toward marriage. As this is getting weaker, *ceteris paribus*, the minimum level seems to get higher. As a result of that, *ceteris paribus*, the amount of investment in searching for a partner will increase and the initial age of marriage will be delayed. In addition, the women with high level of academic career tend to desire their partners with higher level of minimum than average women in general. This factor also will increase the investment in the searching and will delay marriage.

In addition, when women choose their partner, they tend to choose the man who is expected to earn income as much as possible. It takes men long time to accumulate human capital and to get the most suitable job for their abilities. Therefore they also tend to delay the marriage age. On the other hand, as women accumulate their human capital, it becomes more difficult for them to find a partner who has higher human capital than they have, and as a result, the possibility of non-marriage for them tends to increase. In general, men tend to get married from the viewpoint of social standing. In this case, it seems that men with a higher education wish to get married strongly (Figure2). And they tend to choose a partner who does not pursue a professional career and would to prefer to choose domestic activities. Therefore it seems desirable

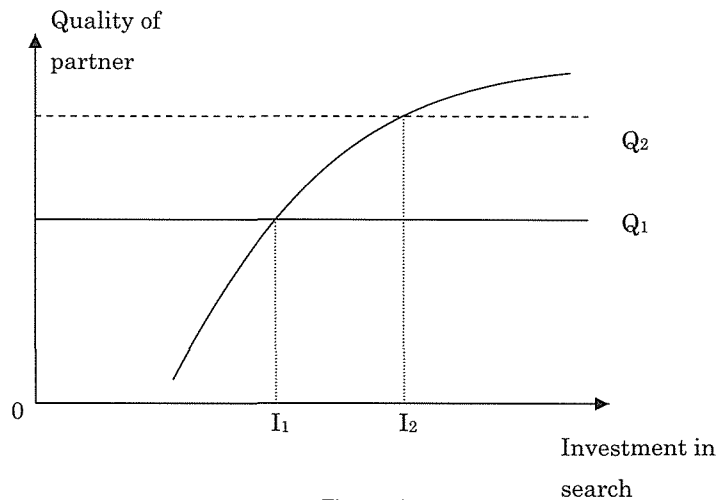


Figure 4

to have great differences of human capital between men and women from the viewpoint of a stable married relationship.

Nowadays, women has tended to go their own way without relying on men as environment around them has improved. In other words, marriage has not been the only way to stabilize their life. They have been able to get jobs more easily than in the past because the third industry has been dominant in the industrial structure and the educational level of the women has improved. As a result, they did not have to rely on men and could come to live their own life. Therefore marriage has become one of choices. This symptom is reflected in the late marriage as well as non-marriage. Let's see the non-marriage rates in Asian countries (table 6). The proportion of women remaining never-married in their late 20s was ten percent or something soon after the Second World War, but nowadays is over 50 percent. Non-marriage rates in the Philippines have been high and stable. This would be probably due to the value placed by Catholicism on celibacy and on taking holy orders. In Korea and Indonesia, the rises in non-marriage rates were relatively more modest, though in Korea the rate of women remaining non-married in their 20s has been increasing. In Thailand, there is a great difference between the big cities and the rural areas. The rate of women remaining non-married in the early 30s is over 25% in 1990 in Bangkok. It is higher in Peninsular Malaysia compared to Indonesia though they believe the same religion.

These tendencies of non-marriage are particularly remarkable in some of the large cities in Asian countries. Individualism has prevailed in cities and women have been freed from the traditional customs and institutions. The level of education for women in cities is relatively high. Women tend to live their lives in their own way. For example, the rate of educated women remaining unmarried in Singapore has been increasing.

The government tries to arrange the meeting opportunities for couples in order to promote marriage. In Japan, since the role of gender has been maintained for a long time and many women have felt the pressure under the subjection to the head of the household, many young females might hold the negative image toward marriage. Therefore they are very reluctant to get married.

Furthermore it seems the number of females who think that it is not good to divorce has been decreasing. They tend to think it is better to divorce rather than putting up with unpleasant married life. The divorce's increasing prevalence has already removed its aberrant image. In fact, the number of female-headed households has increased due to divorce and non-marriage. The continuation or breaking off of a marriage will depend on the cost and benefits of either option. If there are fewer benefits to be gained from maintaining the marriage than from breaking off for each of the parties, or if the gains of one of the parties are sufficient to allow for the other party to be compensated so that it is not left in a worse situation than before, the divorce will increase social wellbeing.

By the way, where does divorce come from? It seems that there are two possible explanations. The first is wrong decision about partner because of lack of information. The second is that over the years the character and the interests of the husband or wife (both) have changed to such an extent that it is impossible to continue the marriage. When a couple breaks up during the early years of marriage, the main cause of divorce is likely to be the former. If the latter is the main reason, the divorce rate would rise with the years of marriage⁷.

Recently, cohabitation without getting married legally can be seen frequently. Whether it is good or not, it is considered as one of ways to avoid the divorce due to the lack of information or to get the return from a kind of marriage without costing too much. However since it is easy to break up the relationship in the case of cohabitation, we cannot judge easily if cohabitation leads to a stable marriage relationship or not. Furthermore, since cohabitation doesn't always assure normal marriage, it would lead to the increase of non-marital birth.

By the way, in fact many of single women who divorced suffered from the problem of poverty and big burden of the children care. If divorce were a result of free negotiation and benefited the couple as well as the whole of society, the public sector would need to support them.

3. Some effects of the increase in non-marriage

The biggest problem of non-marriage is the decline in the total fertility rate. This has some effects on the economy in the fields of labor supply and social security system.

We are facing with the problem of fewer families as well as increasing women of non-marriage nowadays and there is occurring the question of who takes care of old parents. In the developing countries, where the social system is immature, it is getting a serious problem.

Non-marriage and low fertility rate is considered to be put into a prisoner's dilemma in a sense. That is, a desirable choice for an individual is not thought to be an optimal one for the society. In order to resolve these problems, we have to think from the point of view of repeated game, that is, from long-term perspective.

Table I, (player1's profit, player2's profit)

		Player 2	
		NC	C
Player 1	NC	4 / 4	8 / 2
	C	2 / 8	6 / 6

Now let's think about a game with two players in which each player has two strategies: having children(C) or no children (NC). We suppose that they are competing in the ladder race and they don't want to have their own children to win the race. They also think that if anybody else has no children, they would have difficulty in living in their old age. Moreover, they desire society in which they can afford to have children ideally. In this game, the worst case for each player is that he has his children and the other player has no children and he gets only profit of 2 and the other player gets 8.

This is a non-cooperative game and represents prisoners' dilemma situation. The pay-off of the players is written in the table I. Both players have a dominant strategy. Each does better not to have his own children, regardless of what the other player does. Thus, the equilibrium outcome entails both players deciding to have no children and each getting profit of 4. However, if they both chose to have children, they would have been better off with profit of 6.

In any prisoners' dilemma game, there is always a cooperative strategy. In this game, having children is the cooperative strategy. One of the simplest ways to avert the prisoners' dilemma is to inflict some direct penalty as well as reward on the players

when they don't cooperate. For example, the government gives rewards to a player who has his own children. As a result of this, if the profit of having children would become 10, C would be a cooperative strategy. In reality, we can see such a policy in many countries. Of course, we could impose penalty such as heavy tax and penalty if the player had no children

So, the government needs to try to change the pay-off matrix as the above explained using various policies. For example, it seems that establishment of the child-rearing leave and supporting system for the child-rearing suit the aim. Consequently, they can cooperate and work as a full-time worker rearing children much easily. In Confucian society, it seems that the role of gender-consciousness within families has played a positive role in maintaining family system whether it is good or bad. In this case, with regard to women's behavior, it would be safe to say that certain (cooperative) behaviors are forced to be done. However nowadays, women have tried to establish economic base and lived in their own way. Technical progress in home-electric products might promote such a trend. Since it reduces the number of hours required to carry out domestic tasks such as cooking and cleaning, as a result women have more free time and they have come to work in the labor market. The important thing is to establish society in which mothers can live brilliant lives for themselves and contribute to the prosperity of their families greatly.

The trends in non-marriage have any implications for the problems of care for the elderly. As women live independently and pursue a career more and more, we cannot expect them to be caregivers. If they try to work in the labor markets, it reduces availability of time and energy for caring activities. Thus we need to establish a new caring system for the elderly. However it seems that it is important to reduce the number of the elderly who need cares. Some of the elderly have strong incentive to work if they are employed. We need to try to establish the labor market institutionally in which the elderly can work if they have strong physical strength enough to work.

4. Role of family

Let's see the institution of family from the point of view of economics. As a model, we suppose that a husband works in a company and his wife looks after the family and the children. The reason why such a division of labor takes place is to be able to attain more utility than otherwise. In other words, family produces more utility than single person.

We assume that two spouses (M and F) are able to produce the two types of goods (C and S). C is consumer goods and the producer of consumer goods earns the monetary resources (N) that can be used to purchase them. We can formulate the

followings.

$$C \cdot P_c = N = w \cdot L$$

where P_c is the prices of consumer goods, w^* is wage, and L is working hours. S represents the domestic (non-market) goods that a woman or a husband produces for her own use or for her family. We assume that wage for husbands are higher than women. The line AB and GF of figure 5 represents the initial production possibility line of the woman and husband. We also assume that M is more productive in the production of C , and F is relatively more productive in the production of S . When these two people are unmarried, lines of AB and GF represent the limits of consumption possibilities. The initial points of equilibrium will be determined by E_1 with a production of OK for C and OL for S , in the case of F , and of OT and OU for the same goods in the case of M .

If F and M marry and form the family, the production possibility curve will be UE_3T in figure 6. They attempt to reach the highest possible indifference curve, given the production possibility curve. In figure 6, one of the equilibrium points is shown as E_3 , where each of them specializes in the production of those goods for which each has a comparative advantage. That is, F specializes in the production of S and will achieve the amount of OB , and M specializes in the production of C and will achieve the amount of OG . Of course, the solution is not always the case. The slope of the indifference curve depends on household, and the equilibrium point where it touches the production possibility curve is different in each case. In any case, in order for men to be able to spend more time doing market work, they must have a comparative advantage in market work and women in non-market (housework) work, which is the traditional division of labor in family.

The results analyzed by comparative advantage show that both spouses now enjoy a potential for consumption that they could not before getting married, and that they can reach a higher index of indifference curves than the initial curves ($E_1^F \rightarrow E_2^F$, $E_1^M \rightarrow E_2^M$). So the situation defined by marriage (family) is better-off in terms of welfare than being single for both M and F .

What we have to keep in mind here is that the value of services produced by the full-time homemaker is estimated in terms of market price. The comparative advantage is based on only money income and only money contributions to the economic well-being of the family are counted when we think about resource allocation within families. However in fact, we cannot measure the value of family and raising children. Since child care given by parent influences children's character greatly for a long time, it is much more valuable than the equivalent calculated by market price⁸.

When we think about resource allocation within family, it seems to me that it is

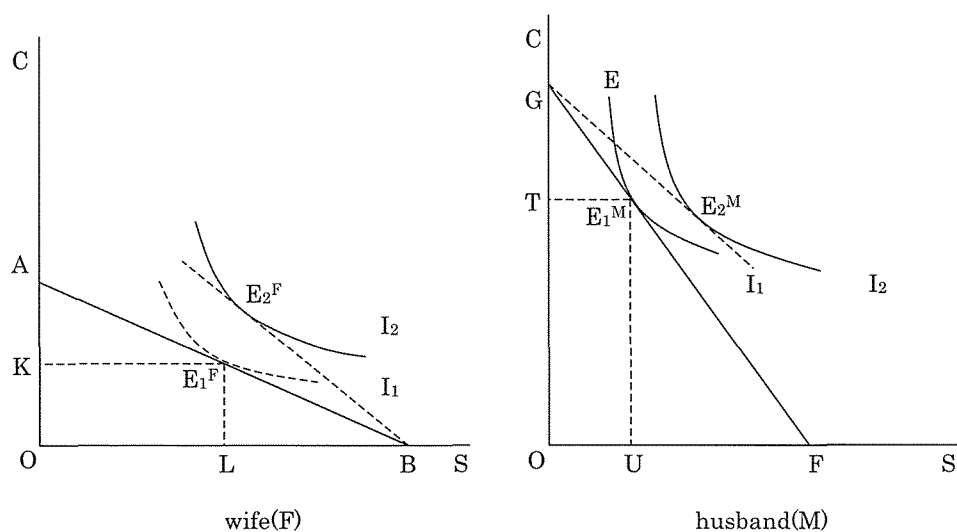


Figure 5

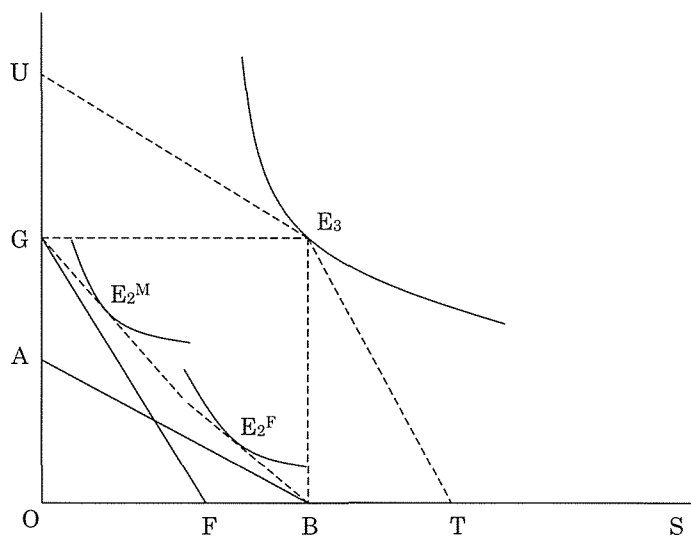


Figure 6

more desirable to analyze in the framework of repeated game. We assume that there are two members (parent and a child) in a family. Now each of them knows that if they cooperate in order for the family to prosper forever, the total revenue will increase for both of them and this creates incentives for them to try to sustain the joint action and trust in each other. However there are also incentives for them to try to betray the opponent since the non-cooperative strategy would give him a better position than if he were to cooperate and the other were not. Figure 7 shows the relationship above in the

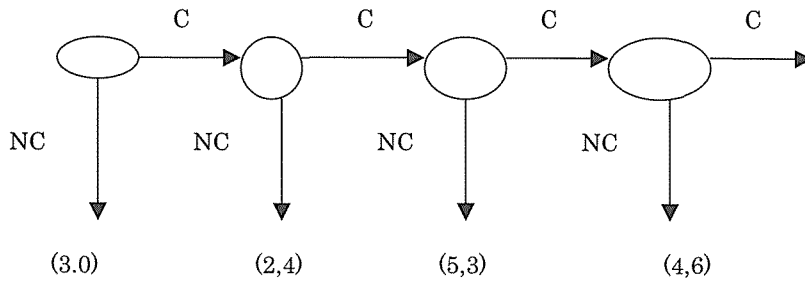


Figure 7

repeated game. As long as they can trust in the opponent of each other or they wish their family would continue to prosper forever, the best policy is cooperation. If family members are sufficiently patient, the folk theorem guarantees that every individually –rational allocation is a sub-game perfect equilibrium. However the folk theorem does not imply that the equilibrium will be Pareto-efficient. And as time passes, economic conditions and social systems might change. But it is assumed here that the stage game remains unchanged from one period to the next. This might be problematic.

It seems that in Asian countries conception of family is valued highly and cooperative attitude in a family has been taught and formed. As a result, every member of a family has behaved cooperatively so far. When we think in the framework of the above-mentioned example, many women in Asian countries tended to be willing to provide public goods or unwilling to withhold the household public and private goods.

However, in recent years, the family's bonds have been weakened in many Asian countries. In modern times, it seems that each member of family tends to give priority to his or her own interests rather than family and tends to have short-sight perspectives rather than long-term one.

However, there are many women who do not consider complete specialization in the production of domestic goods as their optimum strategy for utility maximization in the long run. Let's think the reasons. Firstly, the explanation above considers the advantage over the division of labor within the family from the point of view of only efficiency. But some of the spouses may find more utility from the different perspective. For example, the husband may find more satisfaction in taking care of his children than working in the labor market, and the wife may gain more utility by working outside the home than by staying at home, although this may not be the most efficient thing in terms of strict productivity.

Secondly, arguments for full specialization and exchange are based on the following implicit assumptions: (a) the exchange will continue permanently under the same conditions; (b) the production potential of each spouse will not change after some

periods of full specialization. In reality, these do not hold true. For example, the possibility of divorce or widowhood and the difficulty in finding a new spouse under the same conditions seem to make fulfillment of the first assumption very unlikely. And there is much probability that specializing in domestic tasks for long time without working in the labor market makes women put into positions of comparative disadvantage in terms of the accumulation of human capital and lack of use for long periods of any skills acquired earlier. Thus, it is very risky to choose full specialization. In particular, from the point of view of long-term utility maximization it is efficient not to choose full specialization, even at the cost of reducing her short-term utility.

Figure 8 shows it is efficient for a risk-averse woman not to choose full specialization. We assume that a budget line for women change to YW line⁹. As a result of that, the equilibrium point shifts to E_4 . When the absolute as well as relative wages for women improve, many women come to choose both working in the labor markets and domestic activities, and in that case, might choose not to marry. It seems that such a situation reflects the non-marriage of women.

The major characteristic of the model of division of labor is to deal with a family as an economic agency (unit). Within the family, a common decision is made and each family member is satisfied with the decision. In other words, one family member such as father maximize his utility subject to the family's resource constraint and to the participation constraint that no other family member be worse off than he or she would be outside the family. Therefore the person who makes a decision is assumed to be an

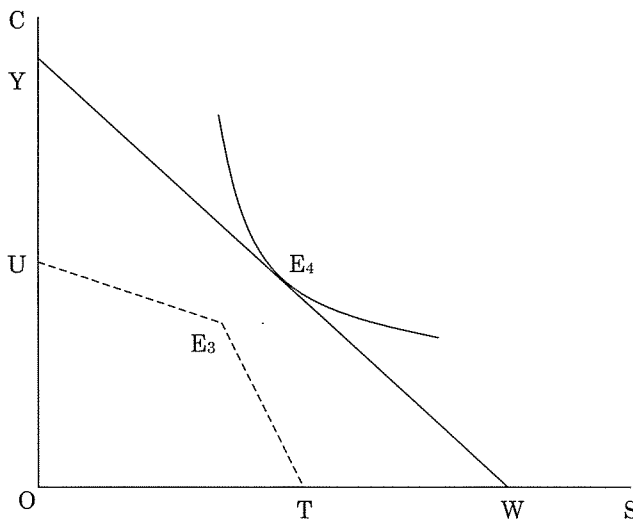


Figure 8

altruist. In other words, he is the proposer who can confront other family members with take-it-or leave-it choices¹⁰.

However, the reality is not so simple. Utility of families' member is different from person to person. For example, a wife might prefer to work outside rather than to stay at house. In particular, as women's wages rise and the gap between men's and women's wage is getting smaller, they would like to work outside. How to make a decision on the division of housework is a big problem. In this case, the most important factor is bargaining power between a husband and wife. In the past, there was social norm that women had traditionally had the major responsibility for housework, while men had had the major responsibility for market work. However in recent years, labor force participation rates of married women are rising and the number of women-headed families due to divorce is increasing. Let's see about decision-making within families from the point of view of negotiation power.

There seems to be two approaches toward the decision-making within families. One is cooperative bargaining and the other is non-cooperative bargaining models. One can understand that the threat point and the reservation utilities coincide with each other and correspond to the utility of divorce. The Nash-bargaining model is one of the former. It implies a decision that maximizes the product of the gains to cooperation subject to the family's constraint. More concretely, the Nash product function is given by:

$$N = (U^h - U^{*h}) (U^w - U^{*w})$$

U^h, U^w denote the utilities of the husband and wife and (U^{*h}, U^{*w}) is the threat point. Figure 9 illustrates the Nash bargaining model. As the threat point for the wife rises, her utilities would also increase.

By the way, in rural areas of many Asian countries people think that following the head of family (or cooperation) should be a sort of duty. It seems that it comes from Confucianism or inevitable conduct in agricultural works. In this framework, all agreements, whether they are implicit or explicit, are enforceable, and all conducts are binding. Cooperative models assume that bargaining always leads to Pareto-efficient outcomes. However in order for this statement to hold, it needs the strict assumption of the binding conducts. So, let's see the non-cooperative bargaining model.

In Asian countries, many people have moved from the rural to urban areas where social norm is weaker compared with rural area. They have fewer opportunities to cooperate in the usual jobs such as agricultural works. As economic development has advanced, each family member has been trying to pursue his or her own interests. There are no formal rules in modern urban society. So when we think about the decision-making within family, it would be desirable to consider it in the framework of

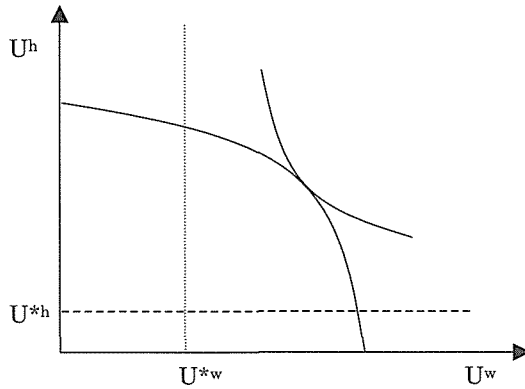


Figure 9

non-cooperative game.

Non-cooperative bargaining models assume that family members are restricted to self-enforcing agreements. Lundberg and Pollak[6, 7] describe the non-cooperative family's interaction as a voluntary contribution of public goods to household. Spouses allocate some of their resources to provide household public goods. The provision of the public goods is usually thought to be less than optimal level. As market work has become more equally shared between men and women in the family, if the division of housework remains very unequal, the consequence is likely to be a reduction in leisure for women. They claim that it is not fair. In addition, since wages have come to be determined by workers' job performances, they would like to more concentrate on the work rather than household work. The rise in the number of family with no kids and non-marriage might reflect the strong preference of women.

One of ways to derive cooperation from spouse in the resource allocation within family is punishment as well as reward. At the threat point in bargaining with household production, each spouse is holding back voluntary inputs into the production of household public goods and private goods that enter the utility function of the other spouse. Such behavior is analogous to holding back voluntary contribution to the purchase of public goods. This is the same as Tit-for-tat strategy. But in this case, it is more effective for each spouse to hold back the production of private goods that enter the utility function of only the other spouse than withholding public goods because the spouse producing public goods also consume them. For example, not servicing dish for other spouse is more credible than neglecting child care with regard to threat.

In the framework of non-cooperative game, it is impossible to attain binding agreements. As a result, it would lead to inefficient resolution. In recent years, the number of divorce and cohabitant has been increasing. In particular, it is increasing in

European countries, nowadays, and in Asian countries it seems that it would increase in the future. These phenomena seem to be one of equilibrium points in the non-cooperative game. We need to check whether these resolutions are efficient equilibrium points or not. We would like to leave this research agenda to further research.

It would be useful to think about family's decisions in the framework of repeated game or two-stage games. But in this case also, it is not always possible to attain Pareto-efficient equilibrium. For example, let's think about who takes care of old parent among adult children. The first stage determines which child should live with the parent together, or whether the parent should live in a nursing home. The second stage determines intra-family transfer of their property. It seems intuitively that the second-stage allocation is conditionally Pareto-efficient given the living arrangement determined in the first-stage. However this equilibrium needs not to be Pareto-efficient. The children cannot (or will not) make binding agreements. For example, it seems that the child who had lived together with the elderly parent would be disadvantaged in future bargaining with her siblings, since he or she cannot change the strategy of living together according to the other siblings' responses. Therefore no child may be willing to live together with the parent. As a result, the parent may move into a nursing home, even though she and all of the children would prefer that she live with one of children. In the absence of binding agreements, it might be impossible to attain an equilibrium of living together with an adult child.

We can also understand about low fertility rate and marriage from the perspective of two-stage games. A husband's promise to share equally in child care is unenforceable and, recognizing this, a couple may have fewer children than both spouses would prefer. With regard to marriage, prospective spouses cannot make binding agreements regarding allocation within marriage life. In addition, it seems it is difficult to remarry and even if he or she could remarry, the condition would be worse in general.

In talking about the negotiation, we can think of divorce as the threat point. In recent years, the divorce rate has increased in many countries. The threat point depends on the technologies to the spouses individually following divorce. Thus, a spouse who has low productivity in household production will be disadvantaged in bargaining within marriage life if the following conditions are not met. They are (a) the goods market offers satisfactory substitutes for the outputs of household production or (b) the economic and psychological costs of divorce are small, and remarriage offers the prospect of readily finding a new spouse whose household production skills replace those of the previous spouse. These conditions seem to be satisfied due to development of the market and the prevalence of divorce. Therefore the cost of divorce has been decreasing and the benefit of one seems to have been increasing. So, it seems that the

reservation utility of divorce for wives as the threat point rises. Thus, the negotiating power for women has increased.

Home-electronic-products made the rise of greater productivity in household production possible, and these gave an individual (normally woman) greater bargaining power. In other words, an outward shift in the production frontier is analogous to an outward shift in the earning function. In this point, women might stand in advantageous point and the negotiation power also might rise.

5. Conclusion

The family is not a static institution. In recent years, marriage rates have fallen, divorce rates have risen, and the defining characteristics of marriage have changed. This paper tries to explain these trends by reference to game-theoretic models. Economics has continued to analyze marriage, child bearing, and care of the elderly as results of maximizing choices made by individuals. These individual choices, and the outcomes they imply, are constrained at the family level by the requirements of equilibrium in bargaining with other family members and at the social level by the requirements of equilibrium in marriage/ care for the elderly markets.

As families have become more heterogeneous and less stable, we need to attempt to account for a widening range of family arrangements and life-cycle trajectories. We would like to focus on the two factors toward the increased heterogeneity and instability of families: (1) a decline in the value of marriage compared to its alternatives and (2) a decline in individuals' ability and willingness to make credible long-term commitments to partners/spouse, children, and parents. With regard to the second point, it is worth mentioning that the family bond that has functioned as the binding commitments in many Asian countries has faded away. In addition, in the background of the change in the role of families, it is proved that the bargaining power for women has increased in this paper.

Table 1 TFR=Total Fertility Rate

	1950 - 55	1975 - 80	2000 - 05	2025 - 30	2045 - 50
Japan	2.7	1.8	1.3	1.6	1.8
Korea	5.4	2.9	1.5	2.0	2.1
Philippines	7.3	5.5	3.2	2.1	2.1
Hong Kong	4.4	2.3	1.2	1.7	1.7
China	6.2	3.3	1.8	1.9	1.9
Singapore	6.4	1.9	1.5	1.8	1.9
Thailand	6.4	4.0	2.0	1.9	1.9
Indonesia	5.5	4.7	2.3	2.1	2.1

Source: UN; World Population Ageing 1950-2050

Table 2 ratio of female to male secondary and tertiary school students in six Asian countries, 1960-90

Secondary school

	1960	1970	1975	1980	1990
Japan	0.96	0.96	1.00	0.96	0.96
Korea	0.37	0.61	0.69	0.82	0.92
Taiwan	0.52	0.69	0.82	0.92	1.00
Singapore	0.43	0.92	0.96	1.00	1.00
Thailand	0.61	0.72	0.79	0.85	0.92
Indonesia	0.49	0.52	0.61	u.a	0.82

Tertiary school

	1960	1970	1975	1980	1990
Japan	0.25	0.39	0.47	0.54	0.67
Korea	0.20	0.32	0.37	0.43	0.52
Taiwan	0.30	0.56	0.59	0.75	0.85
Singapore	0.30	0.43	0.67	u.a	u.a
Thailand	0.43	0.72	0.67	u.a	1.13
Indonesia	u.a	0.33	u.a	0.47	u.a

Source: Population change and economic development in East Asia
Ed by Andrew Mason, Stanford University Press, 2001, p362-3

Table 3 The rate of household structures (%), Singapore

year	sum	single	couple	couple & children	a parent & children	three generations	others
1986	100.0	18.2	14.4	41.4	5.1	15.3	5.7
1989	100.0	20.0	16.0	39.3	5.0	14.2	5.5
1992	100.0	21.8	17.2	37.0	4.8	13.1	6.1
1995	100.0	22.6	18.4	35.3	5.2	12.5	6.1
1998	100.0	23.9	19.7	33.6	5.3	11.5	6.0
2001	100.0	24.1	20.6	32.6	5.7	10.6	6.4
2002	100.0	23.5	21.5	32.5	6.2	10.0	6.3
2003	100.0	23.3	21.4	32.5	5.8	10.4	6.6
2004	100.0	23.4	21.9	32.7	6.0	9.7	6.3

source: the graying of Singapore, Tay Boon Nga, Humanities Press, 2003

Table 4 Percentage distribution of household structure by marital status of head of household, 1990

Type of family nucleus	total	single	married	widowed	Divorced
no family	100	52.6	24.9	16.3	6.1
One family	100	3.9	84.5	9.1	2.5
Two family	100	3.8	94.0	1.8	0.4
three or more family	100	10.2	87.3	1.9	0.6

2000

	total	single	married	widowed	Divorced
no family	100	56.4	13.7	16.6	13.3
One family	100	4.1	86.9	5.4	3.6
Two family	100	3.0	87.4	6.8	2.8
three or more family	100	1.3	88.1	9.8	0.8

sources: the graying of Singapore, Tay Boon Nga, Humanities Press, 2003, p69

Table 5 Percentage of single parents (%), 1995, Korea
marital status of household-head

	total	married	death of spouse	divorce	Unmarried	single parent Families
Total	100	54.8	12.9	9.8	22.5	7.4
single mother	100	21.0	58.2	9.3	11.6	6.1

2000

Total	100	22.5	44.7	21.9	32.8	7.9
single mother	100	21.5	48.5	16.9	30.0	6.3

source: Report on population census, National statistical office

Table 6: Trends in never-married among females aged 25–29 to 40–44 (%)

Japan

	1955	1960	1965	1970	1975	urban	rural	1980	urban	rural
25–29	20.6	21.6	18.9	18.1	20.9	21.7	17.7	24	24.9	20.5
30–34	7.9	9.4	9.0	7.2	7.7	8.3	5.1	9.1	9.9	6.1
35–39	3.9	5.5	6.8	5.8	5.3	5.8	3.3	5.5	6	3.4
40–44	2.3	3.2	4.7	5.3	5.0	5.6	3.0	4.4	4.9	2.8

	1985	urban	rural	1990	urban	rural	1995	urban	rural	2000
25–29	30.6	31.7	26.6	40.2	41.2	35.6	48.0	48.9	43.9	n.a
30–34	10.4	11.3	7.3	13.9	4.9	10.1	19.7	20.8	15.0	26.6
35–39	6.6	7.3	4.2	7.5	8.2	5.0	10.0	10.9	6.8	13.8
40–44	4.9	5.4	3.1	5.8	6.3	3.7	6.7	7.4	4.5	8.6

China

	1982	1990	urban	rural
25–29	5.3	4.3	7.5	2.9
30–34	0.7	0.6	1.4	0.3
35–39	0.3	0.3	0.7	0.1
40–44	0.2	0.2	0.5	0.2

Hong Kong

	1961	1966	1971	1976	1981	1986	urban	rural	1991	1996
25–29	15.5	13.6	20.1	25.6	30.3	37.5	38.2		45.5	52.0
30–34	6.0	6.3	5.6	6.9	11.0	14.5	14.8	9.5	19.8	26.5
35–39	5.0	3.8	3.0	2.8	4.5	7.4	7.5	5.5	10.4	14.6
40–44	5.9	4.4	2.9	2.2	2.7	3.8	3.8	3.0	6.8	9.0

アジア諸国における都市化・少子化・非婚

Indonesia

	1964	1971	1980	urban	rural	1985	urban	rural
25-29	3.6	5.0	7.4	14.5	5.2	8.9	17.5	5.6
30-34	1.8	2.2	3.4	6.5	2.5	4.1	8.2	2.7
35-39	1.4	1.4	1.9	3.5	1.5	2.5	4.3	1.9
40-45	1.0	1.2	1.4	2.5	1.2	1.7	2.8	1.4

	1990	urban	rural	2000	Jakarta
25-29	11.2	19.0	7.3	n.a	n.a
30-34	4.5	7.3	3.1	6.9	14.3
35-39	2.7	4.5	1.9	3.5	7.0
40-45	2.0	3.3	1.6	2.4	3.8

Korea

	1955	1960	1966	1970	1975	urban	rural	1980	urban	rural
25-29	3.0	2.7	7.7	9.7	11.8	14.5	7.4	14.1	15.8	10.4
30-34	0.7	0.4	1.0	1.4	2.1	2.9	1.0	2.7	3.3	1.6
35-39	0.3	0.2	0.3	0.4	0.7	1.0	0.3	1.0	1.2	0.6
40-44	0.3	0.1	0.1	0.2	0.3	0.4	0.2	0.5	0.6	0.3

	1985	urban	rural	1990	urban	rural	1995	urban	rural	2000
25-29	18.4	20	13.6	22.1	22.4	20.7	29.6	30.8	22.8	
30-34	4.2	4.8	2.6	5.3	5.6	4.1	6.7	7.1	4.7	10.7
35-39	1.6	1.8	1.0	2.4	2.6	1.7	3.3	3.4	2.4	4.3
40-44	0.7	0.9	0.4	1.1	1.2	0.8	1.9	2.0	1.4	2.6

Malaysia-Malays

	1991	urban	rural	2000
25-29	25.9	30.7	19.3	n.a
30-34	12.4	15.1	8.7	9.7
35-39	7.8	10.0	5.1	6.0
40-44	5.7	7.7	3.4	4.4

Malaysia:Peninsular Malaysia

	1957	1970	1980	urban	rural
25-29	5.6	13.8	21.7	28.4	16.7
30-34	2.1	5.6	10.1	14.3	7.2
35-39	1.5	3.3	5.3	8.3	3.4
40-44	1.5	1.9	3.5	6.1	2.1

Philippines

	1960	1970	1975	1980	urban	rural	1990	1995	2000
25 – 29	19.5	21.5	24.3	21.0	28.0	15.7	27.3	28.1	n.a
30 – 34	11.6	11.6	12.1	11.9	16.1	8.7	13.4	14.3	14.8
35 – 39	8.1	8.0	8.2	8.0	11.1	6.1	8.7	8.7	9.5
40 – 44	7.6	7.3	6.8	7.0	9.8	5.2	7.2	6.8	7.1

Singapore

	1957	1970	1980	1990	2000
25 – 29	9.2	22.6	34.0	39.3	n.a
30 – 34	4.4	9.6	16.7	20.9	21.9
35 – 39	4.0	5.1	8.5	14.8	16.2
40 – 44	4.9	3.3	6.0	11.5	14.1

Thailand

	1956	1960	1970	urban	rural	1980	urban	rural
25 – 29	13.2	14.1	15.6	30.7	12.8	20.8	36.8	16.2
30 – 34	5.6	6.7	8.1	16.3	6.7	11.8	22.5	9.0
35 – 39	3.1	4.1	5.2	10.1	4.5	7.3	14.0	5.7
40 – 44	2.2	3.1	3.9	7.1	3.4	5.3	9.9	4.3

Thailand

	1990	urban	rural	2000
25 – 29	25.3	43.3	19.8	n.a
30 – 34	14.1	25.8	10.7	16.1
35 – 39	9.6	17.9	7.3	11.6
40 – 44	7.0	13.6	5.3	9.3

Viet Nam

	1989	urban	rural	2000
25 – 29	17.7	25.0	15.4	n.a
30 – 34	11.1	15.2	9.6	10.9
35 – 39	8.5	12.3	7.2	8.7
40 – 44	5.9	8.4	5.0	8.3

Sources: United Nations: Demographic Yearbook, Historical supplement

Simple Regression Analysis:

Y=fertility rate, X=scale of urbanization (scale of urban population)

The data is available in "East Asian long-term economic statistics;

2. Economic development and demographic change, ed. by Watanabe and Kajiwarra,

Keiso shobo,

China; $Y=39.23 - 0.069X$, $R^2=0.49$, (19.6) (-6.6)	Hong Kong; $Y=48.6 - 6.9X$, $R^2=0.88$ (31.9) (-17.7)
Indonesia; $Y=50.6 - 0.446X$, $R^2=0.91$, (74.1) (-21.1)	Japan; $Y=31.4 - 0.203X$, $R^2=0.71$ (21.0) (-10.4)
Malaysia; $Y=44.9 - 1.86X$, $R^2=0.82$, (62.9) (-14.0)	Philippines; $Y=29.8 - 0.069X$, $R^2=0.007$ (27.8) (-1.16)
Korea; $Y=44.9 - 0.957X$, $R^2=0.91$ (52.2) (21.3)	Singapore; $Y=68.5 - 20.2X$, $R^2=0.91$ (33.0) (-20.7)
Thailand; $Y=38.6 - 1.96X$, $R^2=0.76$, (34.5) (-11.8)	Viet Nam; $Y=49.5 - 1.29X$, $R^2=0.82$ (59.5) (-14.2)
Taiwan; $Y=55.9 - 2.74X$, $R^2=0.94$, (52.1) (-26.9)	

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1 Raymond Ngan [5.6] emphasizes on this point.

2 In Confucianism, the concept "house" does not imply only a construction but also heritage that

is inherited from the ancestors and keeping traditions in one's family is considered to be an important virtue. In addition, the only behaviors of parents are supposed to teach their children the principles of behaviors here.

- 3 Although it is parents that might invest in education in general, we think that parents and children have same utility.
- 4 This tendency depends on country. In Scandinavian countries, there is a positive relationship between fertility rate and women's rate of participation in labor markets.
- 5 The data on the urbanization in this paper is available from the book, Economic development and demographic transition edited by Watanabe and Kajiwara.
- 6 For example, we can imagine perfect services of social security as one of the reasons.
- 7 In Japan, the number of divorce of old couples with many years of marriage increase recently.
- 8 For example, having a dinner home is much more valuable than having dinner at a restaurant.
- 9 The wage for a woman in YW line is absolutely much bigger than the wage for a man.
- 10 The altruist model is observationally equivalent to an "ultimatum game" .

(2007. 7. 24 受理)