Measurement of Effect of Employment on Transition of Marital State: Using Transition Matrix of a Markov Chain[1]

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Abstract. The main purpose of this paper is to calculate the transition probabilities between marital states by employment status, using the transition matrix of a Markov chain. The data from the Resident Registration System, Population Census, and Vital Registration System are analyzed as of 2010. The main findings of this study are summarized as follows; the employed show high transition probabilities from the 'single' state to the 'married' state, from the 'widowed' state to the 'married' state, and from the 'divorced' state to the 'married' state, in comparison with the not-working population including the unemployed and the economically inactive population. It may imply that increasing job opportunities and strengthening job security have positive effects on family formation and family solidarity, which may play an important role in recovering the fertility level.

Keywords: marital status, employment, transition probability

1   Background and Purpose

South Korea has experienced a dramatic fertility decline. The total fertility rate (TFR) dropped from 6.0 in 1960 to the population replacement level of 2.1 in 1983 and thereafter continued to decline even to 1.08 in 2005. Specifically, TFRs have fluctuated below 1.2 since 2001. It is expected that the working age population will start to decline from 2017, expediting the population aging with great speed. Such a rapid demographic transition will cause labor shortages, lowering of labor productivity, dwindling of domestic consumption, low economic growth, etc. South Korean government has launched various policies to raise the fertility rate through the Basic Plan on Low Fertility and Population Aging since 2006. Despite of the government's efforts, the lowest low fertility phenomenon continues, unprecedentedly, in South Korea.

In South Korea, giving births within legitimate marriage has been considered normal, affected by traditionally rooted Confucianism; About 2 percent of births took

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place outside of legitimate marriage in 2014. The postponement of marriage has been strengthened in the Korean marriage system; the mean age at first marriage has continued to increase and thereby the proportion of married population to the total, specifically in childbearing ages, has declined. Family dissolution such as divorce and separation has become a rather general phenomenon in Korea. It is worthwhile to note that such characteristics of marriage pattern have had a negative effect on the fertility level.

The change in marriage pattern is known to be affected by a variety of socio-economic factors such as education, employment, income level, and values. Among these factors, this study makes an attempt to calculate the transition probabilities between marital states by employment status. The result is expected to provide a basis to introduce employment related policies to change marriage pattern in favor of fertility recovery.

In this study, the employment status is classified into two groups such as 'working' and 'not-working'; the 'working' population includes the employed and the 'not-working' population includes the unemployed and the economically inactive population.

2   Methods and Data

The marital status could be classified into four states such as single (never married), married, divorced, widowed. The model for transition paths between marital states can be designed as in Figure 1. Based on the model, the sex and age specific transition probabilities between marital states are calculated by employment status, using a Markov chain. The transition probabilities are converted using Greville formula.
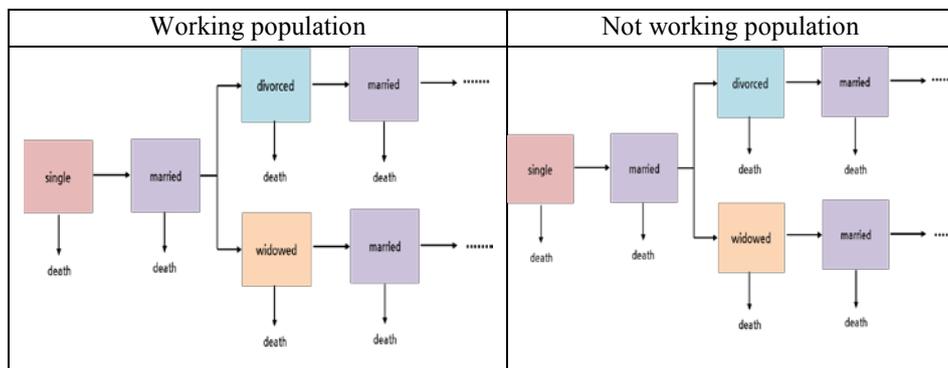

Fig. 1. Model for Transition Probabilities between Marital States by Employment Status

The source of data for calculating the transition probabilities include Residential Registration System, Population Census, and Vital Registration System as of 2010. The data from the Residential Registration System is to obtain the population by sex and age. The

data from the Population Census is to obtain the population by marital states. The data from the Vital Registration System is to obtain death statistics.

3   Main Findings

The transition probabilities between marital states by employment status, calculated on the basis of the model, are presented in Figure 2. For both male and female, those who are working show higher probabilities to transit from the 'single' state to the 'married' state than those who are not working. For the female, the transition probability from the single state to the married state shows its peak earlier than its counterpart sex, almost by three years. While the transition probabilities for the working population decline rapidly after its peak at mid-20s, the transition probabilities for the not-working population are very low in all age groups except for the mid-20s. As a result, there are big gaps between the working population and the not-working population in transition probabilities for mid-20s and early-30s and such a gap rapidly decreases as the age increases. It implies that the 'employment effect' decreases but the 'age effect' increases in older ages.

For both male and female, the transition probabilities from the 'married' state to the 'divorced' state appear to be high for the working population compared with the not-working population. It seems to be true for all groups of population by sex and employment status that those transition probabilities peak in early 20s and then start to decline with age. However, it is the only exception that the transition probability for the not-working population increases again for males in 40s, implying that those males who quit his job are more likely to divorce.

The transition probabilities from the 'widowed' state to the 'married' state tend to be higher for the working population than the not-working population; it is true for both sexes of male and female. It may imply that working is an important condition, favorable for remarriage, in several aspects such as security for income and social prestige. For all groups of population, the transition probability from the 'widowed' state to the 'married' state peaks in 20s and then start to rapidly decline with age, due mainly to increase of 'age effect' in older ages, regardless of working status.

For both sexes of male and female, the transition probabilities from the 'divorced' state to the 'married' state appear to be higher for the working population than the not-working population, similar to the transition from the 'widowed' state to the 'married' state. Those transition probabilities are apt to rapidly decline with age, being higher for the working population than the not-working population in older ages.
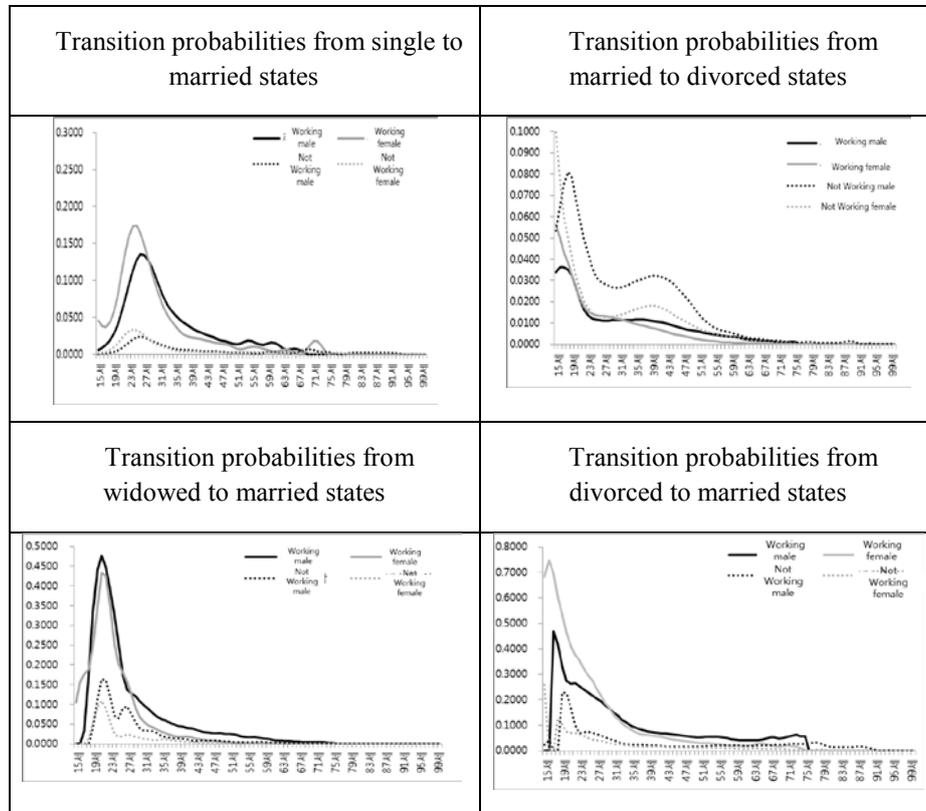
Fig. 2. Transition Probabilities between Marital States by Employment Status

4   Conclusions

The main findings of this study are summarized as follows; working is more likely to expedite transition from the 'single' state to the 'married' state, from the 'widowed' state to the 'married' state, and from the 'divorced' state to the 'married' state, in comparison with not-working. On the other hand, mot-working is more likely to push a transition from the 'married' state to the 'divorced' state, in comparison with working. It may imply that increasing job opportunities and strengthening job security have positive effects on family formation and family solidarity, which may play an important role in recovering the fertility level. It is recommendable that the government's efforts at raising the fertility rate should include the employment policies for the population in childbearing ages.

References

1. Greville, T. N. E. (1981). Moving-weighting-average smoothing extended to the extremities of the data, Scandinavian Actuarial Journal, 39–55.
2. Korean Government (2006). The First Basic Plan for Low Fertility and Aged Society (2006-2010).
3. Korean Government (2011). The Second Basic Plan for Low Fertility and Aged Society (2011-2015).
4. Lee, S. S. (2009). Low Fertility and Policy Response in Korea. The Japanese Journal of Population, Vol. 7, No. 1 (March 2009).
5. National Statistical Office (2011). 2010 Population Statistics Based on Resident Registration.
6. National Statistical Office (2011). 2010 Population Census.
7. National Statistical Office (2011). 2010 Vital Statistics.
8. Ross, S. M. (2009). Introduction to Probability Models 10th Edition. USA; Elsevier.