EFFECTS OF INCOME DISTRIBUTION ON FERTILITY IN KOREA AND THE UNITED STATES*

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This study examines a relationship between income distribution and fertility in Korea and the United States. Based on the hypothesis of nonlinear relationship between income and fertility, the relative income theory, and the theory of birth control diffusion, the concept of income distribution is introduced into the analysis of fertility. The research is based on data from the 1974 Korean National Fertility Survey (KNFS), the 1975 Korean Census, and the 1970 U.S. Census.

The findings of analyses suggest that income inequality of the community has a positive effect in Korea. In the United States, a positive effect of income inequality on fertility is found among those in the non-SMSAs (Standard Metropolitan Statistical Area), while a negative effect is found in the SMSAs. The effect of income distribution on fertility is independent of the effects of socioeconomic characteristics of the couple and income level of the community.

Introduction

Recently, there has been a growing awareness of the relationship between income distribution and fertility. It has been argued that the level of fertility may be affected by the distribution of income, apart from average level of income (R. Freedman, 1974). Kocher (1973), Rich (1973), and Bhattacharyya (1973, 1975) suggested in their cross-national studies that fertility is positively associated with income inequality. Repetto (1974, 1978, 1979) also found a positive effect of income inequality on the level of individual as well as aggregate fertility.

However, these studies do not provide satisfactory analyses of the role of income distribution in the determination of fertility. There are some methodological problems in research designs or statistical methods of analysis, and thus the findings from these studies are open to question (Flegg, 1979, 1980; Birdsall, 1977a, 1977b; Boulier, 1982; Kim, 1984). For example, the index of income inequality used in the studies of Bhattacharyya (1973, 1975) is found to be unsatisfactory. Flegg (1979) reexamined Bhattacharyya's figures and found that the evidence does not support Bhattacharyya's conclusions. The fertility function used in Repetto's studies has been criticized to be misspecified. Also, there are dangers involved in drawing inferences from the results of cross-national studies. The positive association between income inequality and fertility found in cross-national studies does not necessarily imply the positive impacts of income inequality on individual reproductive behavior.

The disparate effects of income distribution on fertility have also been found in several empirical studies. A cross-national study by Winegarden (1980) revealed that

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income distribution does not act directly on fertility. Rosenzweig and Evenson (1977) found that reducing the inequality of land holdings would increase the family size in India. In an analysis of Filipino fertility, Boulier (1982) argued that marginal transfers of income from the rich to the poor would increase fertility. However, these studies do not show the independent effect of income distribution, apart from the effect of income level, on fertility successfully mainly because of the lack of adequate conceptual framework as well as analysis technique. It is still desirable to specify how individual reproductive behavior is affected by the income distribution *per se,* over and above the absolute income level, and then to investigate the presumed intervening links.

The objective of this paper is to examine whether, and to what extent, income distribution of the community helps explain the variation in fertility at the individual as well as the community level. This is in addition to the variation explained by the individual characteristics of the couple. The hypothesized relationship between income distribution and fertility is tested for Korea and the United States. These two countries are in different stages of economic development and demographic transition. Such a comparative analysis will help to specify the societal conditions under which the hypothesized relationship between income distribution and fertility is obtained.

Conceptual Framework

This paper was stimulated by three theorizations in the previous research on fertility: nonlinearity between income and fertifity, the relative income theory, and the diffusion process of birth control.

The hypothesis of nonlinear relationship between income and fertility provides room to introduce the concept of income distribution in the analysis of fertility. It becomes convincing that the relationship between income and fertility is more complex than a simple linear pattern. Easterlin (1975) and Repetto (1979) argued a quadratic relationship: income has a positive effect on fertility at low income level, but the relationship becomes negative as income increases. Recently, Kim (1983, 1984) modified and extended the framework further and suggested a cubic relationship between income and fertility. Empirical evidence from Korea and the United States supports the hypothesis that fertility rises as income increases to a certain point of low income after which a decline of fertility occurs, and that for the highest income group, however, fertility rises again slightly as income increases further. It was suggested that the hypothesis of cubic relationship between income and fertility can be generalized across the development level of countries, although the range of the fertility curve would vary with respect to the socioeconomic level of a specific country (Kim, 1984).

The nonlinear relationship between income and fertility at the individual level implies that the response (derivative) of fertility to a marginal change in income is dependent on the level of income. In that case, the distribution of changes in income affects the level of fertility at the aggregate level. Different patterns of income distribution result in different levels of fertility for the whole population. Based on the nonlinearity between income and fertility, Repetto (1979) argued that equalizing the income distribution or transferring income from the rich to the poor reduces the aggregate level of fertility. However, his explanation does not offer much about the effect of income distribution *per se* on individual reproductive behavior. Rather, it can be called the composition effect.

The relative income theory also provides a basis for understanding the association between income distribution and fertility. As D. Freedman (1963) argued, in addition to

the absolute income level, the relative income position is an important factor of fertility. Although the level of income reflects the ability to afford children, income is also spent to fulfill aspirations for the living standard of the reference group. Couples compare their status and fertility behavior to the standard of the reference group with which they identify. Those with high income tend to spend more to keep up with their aspiration for the living standard of the reference group. This implies that higher income itself does not necessarily lead to higher fertility. The difference in income is translated into the desire for more children only when income is higher than that of the reference group on the basis of the same socioeconomic status (R. Freedman and Coombs, 1966b; Kim, 1984).

There have been several empirical studies that support the relative income theory. When the level of income or socioeconomic status of the couple is controlled, those with higher relative income tend to have higher fertility than those with lower relative income (D. Freedman, 1963; Kunz, 1965; R. Freedman and Coombs, 1966a, 1966b; Easterlin, 1972; Chaudhury, 1977; Kim, 1984). These findings suggest that reproductive behavior is influenced by the income of the reference group, that is, the relative income position of the couple. Thus, the extent to which the income of the couple deviates from the mean income of the reference group, or income distribution in general, is likely to affect the reproductive behavior, although the direction of effect is not self-evident (Mueller and Short, 1983).

It is postulated in this study that the couple's reproductive behavior is affected not only by their own socioeconomic status but also by socioeconomic status of others in the community. For example, once an individual gets modern ideas on reproductive behavior or contraceptive information, they can be passed on to other community members, and thus affect fertility of others. In fact, Simmons and de Jong (cited in Cochrane, 1979:123) found in their rural Latin American study that educational level of the community was important in determining the percentage of women with contraceptive knowledge even when individual education was controlled. This implies that socioeconomic status and structure of the community may have effects on fertility above and beyond the effects of the couple's own socioeconomic status (Duncan, 1964; Rhodes, 1971; R. Freedman, 1974; Goldberg, 1976; Anker, 1977).[1]

In this paper, it is hypothesized that income inequality of the community is positively associated with fertility at the individual and community levels. Emphasized in this connection is the diffusion process of birth control. As Repetto (1979) and Retherford (1979, 1983) suggested, egalitarian distribution of income or homogeneity in population accelerates internal communication and spread of shared norms, values, attitudes, and institutions—all of which are central to the diffusion of motivation, knowledge, and services for birth control.[2] Thus, once fertility decline starts, egalitarian distribution of

1. In fact, the idea of community effect on individual behavior is not a new one in sociology. It can be traced back to the "social fact" of Durkheim and other classic theories of social realism. As R. Freedman (1974) indicated, the reference group theory can also be applied to explain individual behavior, which depends on how individuals compare their own status and behavior to standards observed in groups or strata of people with which they identify.

   However, despite recognition of the conceptual importance of the community effect, most of the previous research on fertility has relied upon one level of analysis; either individual or aggregate level. There have been only a few empirical studies that include socioeconomic variables at both levels simultaneously and analyze the community effect on individual reproductive behavior (cf. Hermalin and Mason, 1980; Entwisle et al., 1982).

2. For detailed discussion on the theory of diffusion process of birth control, see Retherford (1983) and Retherford and Palmore (1983).

income in the community contributes to reducing fertility more rapidly. In the community with greater income inequality, the status-differentiating structure makes it relatively difficult for the couples, especially the poor couples, to share low fertility oriented norms, values, attitudes, and institutional health care. As a result, diffusion process of birth control is likely to be slow, and the couples are likely to have higher fertility compared to their counterparts in the community with lower income inequality. Specific gypotheses of this study are as follows:

1. The community with a higher level of income inequality is likely to be characterized by a larger mean number of children ever born.
2. At the individual level, those in the communities with higher levels of income inequality are likely, other things being equal, to have more children ever born.

In this study, Korea and the United States are selected as the study area. Korea provides a good setting for this study. A major demographic transition has taken place along with the rapid economic development since the early 1960s. Fertility decline during the period of the 1960s and the early 1970s, when women in the Korean sample of this study were in their major period of reproduction, was remarkable and recorded as one of the fastest national fertility transition (Mauldin and Berelson, 1977, 1978). The United States are characterized by the relatively gradual decline in fertility since the late 1950s, when the post World War II baby boom was over. The fertility level of the United States is far below than that of Korea, and differentials in fertility are relatively smaller in the United States.[3] Comparative analysis of the experience of Korea and the United States, which are in different stages of economic development and demographic transition, would provide the opportunity to investigate and specify more clearly the causal mechanism between income distribution and fertility.

Data and Methodology

The analysis of Korean fertility is based on data from the 1974 Korean National Fertility Survey (KNFS). The KNFS was conducted as a part of the World Fertility Survey. The one percent tape of the 1975 Population and Housing Census of Korea (hereafter, 1975 Korean Census) is also used to construct the community-level variables. For the analysis of U.S. fertility, the Neighborhood Characteristics Public Use Sample Tape of the 1970 U.S. Census (hereafter, 1970 U.S. Census) is used. This is the one per thousand national sample of households.

For both countries, the analysis is limited to currently married women who were in their first marriage and between 40 and 49 years of age at the time of the survey or census. For this age group, the implicit assumption is that the observed children ever born is a proxy for the completed fertility. Samples for the analysis of Korean and U.S. fertility are composed of 1,174 and 9,554 women, respectively.

It should be noted that there are potential biases in the sample selection. The fertility of the age cohort of this study might have been affected by the socioeconomic events that occurred during the childbearing period of this cohort. Note that women aged 40-49 in the Korean and U.S. samples of this study experienced the Korean War (1950-1953) or World War II, respectively, and the post-war baby boom. The exact effects of these events on fertility patterns and differentials cannot be assessed. In addition, the

3. While it is dangerous to make international comparisons of surveys which do not stand on the identical procedures and definitions, Korea shows more equal distribution of income than most other developing countries with a Gini index for all households of 0.36 in 1971. Korea also compares favorably with the United States, whose Gini index was 0.42 in 1972 (Jain, 1975).

exclusion of women who are not in their first marriage can be a source of bias. Given the problem of accuracy and reliability of the data used, the exact effects of these sampling biases cannot be ascertained.

Variables

The independent variables in this paper are the Gini and the Theil indices of income distribution of the community. The dependent variables are children ever born at the individual level and the mean children ever born of community. To examine the independent effect of income distribution on fertility, variables that are not the main concern of the present study but have been found to be important in explaining fertility are chosen as the control variables. The variables are defined and operationalized as follows:

Gini Index of Income Distribution (GINC):

The Gini index of household income (for U.S. data, family income) of the community. Using the 1975 Korean Census tape, household income was calculated from the income data of 367,215 individuals. Then, the whole country was divided into 201 administrative units of *Gun* (in rural areas), *Shi* (in urban areas), and *Ku* (in large cities). For each district, using the following formula, the Gini index of income distribution was calculated.

$$G = \frac{\frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} \left| X_i - X_j \right|}{2\bar{X}}$$

The KNFS data also include information on the administrative districts of current residence, and thus this variable was merged into the KNFS data set. For U.S. data, this variable is directly available from the 1970 U.S. Census tape. Each areal unit for the analysis of U.S. fertility is composed of 4,000 to 5,000 people on average.[4] The Gini index varies between 0 and 1, and the higher value indicates more unequal distribution.

Theil Index of Income Distribution (TINC):

The Theil index of household income of the community. Using the 1975 Korean Census tape, the same steps that applied to construct the Gini index of income distribution were followed. The following formula was used to compute this variable.

4. The 1970 U.S. Census tape used in this study contains 63,454 households with community and personal-level data. In this file, communities (neighborhoods) were formed by computer using geographic keys associated with each household recode. They were not designed with reference to maps, and thus do not necessarily coincide with census tracts or other geographical units for which data are published. But communities are normally contiguous and relatively compact and do not cross county boundaries except in rare cases of counties with extremely small population (cf. Bureau of the Census, 1972).

$$T = \frac{\frac{1}{n}\sum_{i=1}^{n} X_i \log X_i - \bar{X} \log \bar{X}}{\bar{X}}$$

The value of the Theil index varies between 0 and infinity, and the higher value indicates more unequal distribution.[5] This variable is not available for analysis of U.S. fertility.

Income Level of Community (CINC):

Average household income (in Won) of the community (Korea).

Median family income (in hundred dollars) of the community (the United States).

Educational Level of Community (CEDU):

Median years of education completed by people aged 25-54 in the community.

Family Income:

Total family income (in Won) during the last month (Korea).

Total family income (in hundred dollars) during the past 12 months (the United States).

Education:

Highest grade the wife (husband) completed in regular school.

Occupational Prestige:

Occupational prestige of husband measured in the Hodge-Siegel prestige score. The score varies between 0 and 100, and a high score indicates that a specific occupation is prestigious.

Age of Wife:

Current age of wife at the time of survey.

Residence:

Non-SMSA = 1, if the respondent lives outside the Standard Metropolitan Statistical Area (SMSA); zero, otherwise.

Race:

White = 1, if the respondent is a white woman; zero, otherwise.

Children Ever Born (CEB):

Children ever born alive to the respondent.

5. Each measure of income distribution has its own advantages and disadvantages, which are based on the context of population applied, the characteristics of variables used, and specific purpose of the analysis. The Gini index is the most popular measure of inequality used in the literature. In case of the bell-shaped distribution, the Gini index implies a function which tends to be most sensitive in the middle range. For example, if a research is most concerned about inequality among the medium-level income group, then the Gini index might be desirable. On the other hand, because its sensitivity to transfers decreases as scores increase, the Theil index is especially desirable for measuring distribution of income or other social rewards having diminishing marginal utility (Allison, 1978). In addition, the Theil index can be decomposed into inequality within and between groups. In the present study, therefore, both indices are used in the analysis of Korean fertility, and results are compared.

Mean Children Ever Born of Community (CCEB):

Children ever born to ever married women aged 40-49 (for U.S. data, 35-44) divided by total ever married women aged 40-49 (35-44) in the community.

In dealing with the individual and community-level data simultaneously, the so-called ecological fallacy and the contextual fallacy should be avoided. As Robinson (1950) argued, inferring individual behavior from the knowledge of ecological correlation is dangerous and may lead to the ecological fallacy. The contextual fallacy may occur when residual differences, after counting out the effects of individual characteristics, are attributed to the community characteristics (Hauser, 1970). It is based on an incomplete specification of the mechanism, which often leads to the observation of spurious correlation.

In the present study, the community-level variables are based on the aggregation of individual characteristics. Every effort is made to avoid both the ecological fallacy and the contextual fallacy in the course of analysis. In addition to inclusion of appropriate control variables, the analysis of community effects is done at the individual as well as the community level. When the community-level data are analyzed in relation to individual characteristics, the community characteristics are assigned to each individual as they were individual attributes and are treated as additional independent variables that influence the dependent variable.

Findings

Analysis of Korean Fertility

A correlation matrix of CEB at the individual level, mean CEB of community, and other community-level variables is provided in Table 1. It shows that children ever born at the individual level (CEB) is positively associated with the mean CEB of community (CCEB). Both CEB and CCEB are positively related with the Gini index of income distribution (GINC), while negatively associated with the income level of community (CINC). Although the degree of association is relatively less strong when CEB rather than CCEB is involved, the associations are statistically significant at the 0.01 level. Because of the spurious curvilinearity, the Theil index of income distribution (TINC) does not show significant relationships with both CEB and CCEB. Table 1 also suggests that

Table 1. **Correlation Matrix of Children Ever Born, Mean CEB of Community, and Other Community Characteristics: KNFS and 1975 Korean Census**

	CEB	CCEB	GINC	TINC	CINC
CEB	1.00	0.35**	0.15**	0.01	-0.25**
CCEB		1.00	0.25**	-0.04	-0.67**
GINC			1.00	0.86**	0.13**
TINC				1.00	0.45**
CINC					1.00

Note: 1. ** refers to correlation coefficients statistically significant at the 0.01 level.
2. CEB : Children ever born
CCEB : Mean children ever born of community
GINC : Gini index of income distribution
TINC : Theil index of income distribution
CINC : Income level of community

a highly positive correlation exists between the Gini and the Theil indices of income distribution, and that both indices of income distribution have positive relationships with the income level of community (CINC).

Despite a slight deviation from the linearity in the relationship, in general, income inequality of the community is found to be positively related with CEB at the individual and community levels (Table 2). This pattern holds true when the Gini index is used as an indicator of income distribution. When the Theil index is used in the analysis, the association becomes less straightforward. Table 2 presents a reverse U-shaped relationship between the Theil index of income distribution and CEB at the individual and community levels. This is mainly due to the interaction effect between the Theil index of income distribution and the income level of community. Also note that the Gini index of income distribution produces larger differences in CEB at the individual and community levels than those by the Theil index.

Table 2 also illustrates that women in the community with higher levels of household income are likely to have fewer CEB. At the community level, the mean CEB is negatively related with the income level of community. This pattern is consistent when CEB of each couple at the individual level is used in the analysis.

To explore the effects of community characteristics on CEB further, ANOVA and MCA are undertaken. The effects of income distribution and income level of the community, independent from the effect of each other, on the mean CEB of community are examined. The results of analysis are summarized in Table 3 and Table 4.

It is clear in Table 3 and Table 4 that income inequality is positively related with the mean CEB of community. This finding is consistent regardless of whether the Gini or

Table 2. **Mean Number of Children Ever Born at the Individual and Community Levels by the Community Characteristics: KNFS and 1975 Korean Census**

	Mean CEB of Community	CEB at Individual Level	
		Age	
		40-44	45-49
Total	4.92	5.41	6.28
Gini Index of Income Dist. (GINC)			
Under 0.310	4.78	4.93	5.80
0.310 - 0.329	4.78	5.43	6.18
0.330 - 0.349	4.92	5.22	6.34
0.350 +	5.21	5.97	6.85
Theil Index of Income Dist. (TINC)			
Under 0.170	4.89	5.34	6.14
0.170 - 0.189	5.03	5.61	6.30
0.190 - 0.219	5.04	5.21	6.82
0.220 +	4.79	5.44	6.06
Income Level of Community (CINC)			
Under 45,000 (Won)[1]	5.34	6.07	6.68
45,000 - 49,999	5.05	5.69	6.66
50,000 - 54,999	4.90	5.25	6.40
55,000 +	4.28	4.38	5.25

Note: 1. The exchange rate between Won and U.S. dollar was 404.5 versus 1 in 1974.

Table 3. **Multiple Classification Analysis of the Mean CEB of Community by the Gini Index of Income Distribution and the Income Level of Community: KNFS and 1975 Korean Census**

Grand Mean = 4.92	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for Independents Dev'n	Adjusted for Independents Beta
Gini Index of Income Dist. (GINC)					
Under 0.310	259	-0.13		-0.05	
0.310 - 0.329	336	-0.13		-0.19	
0.330 - 0.349	301	-0.00		0.03	
0.350 +	278	0.29		0.25	
			0.30		0.28
Income Level of Community (CINC)					
Under 45,000 (Won)	278	0.43		0.39	
45,000 - 49,999	372	0.13		0.16	
50,000 - 54,999	267	-0.01		-0.01	
55,000 +	257	-0.63		-0.64	
			0.65		0.65
Multiple R					0.71
Multiple R^2					0.50
Significance of F Ratio for GINC					0.00
Significance of F Ratio for CINC					0.00
Significance of F Ratio for Interaction GINC × CINC					0.00

Table 4. **Multiple Classification Analysis of the Mean CEB of Community by the Theil Index of Income Distribution and the Income Level of Community: KNFS and 1975 Korean Census**

Grand Mean = 4.92	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for Independents Dev'n	Adjusted for Independents Beta
Theil Index of Income Dist. (TINC)					
Under 0.170	344	-0.03		-0.14	
0.170 - 0.189	252	0.11		-0.09	
0.190 - 0.219	219	0.13		0.11	
0.220 +	359	-0.12		0.13	
			0.18		0.21
Income Level of Community (CINC)					
Under 45,000 (Won)	278	0.43		0.44	
45,000 - 49,999	372	0.13		0.17	
50,000 - 54,999	267	-0.01		-0.01	
55,000 +	257	-0.63		-0.72	
			0.65		0.73
Multiple R					0.68
Multiple R^2					0.46
Significance of F Ratio for TINC					0.00
Significance of F Ratio for CINC					0.00
Significance of F Ratio for Interaction TINC × CINC					0.00

the Theil index is used in the analysis as an indicator of income distribution. Note that the relationship between the Theil index of income distribution and the mean CEB of community is not straightforward when the income level of community is not controlled (Table 2 and the unadjusted deviations for TINC in Table 4).

It is found that the income level of community is negatively related with the mean CEB of community. The beta values in Table 3 and Table 4 indicate that the income level of community rather than the income distribution has a stronger effect on fertility. However, significance tests of F ratios reveal that the effects of income distribution on the mean CEB of community are also statistically significant at the 0.01 level.

To conclude, based on the above results from ANOVA and MCA, Hypothesis 1 that the community with a higher level of income inequality is likely to be characterized by families with more CEB is accepted in this study.

However, the positive association between income inequality of the community and fertility at the community level does not necessarily imply the positive impact of income inequality on individual fertility. To the extent that unidentified determinants of fertility are correlated with income inequality, the differences in fertility caused by these determinants would be attributed incorrectly to income inequality. Therefore, the effects of income distribution on individual reproductive behavior, independent of the effect of income level of the community, are examined. Socioeconomic variables of the couple

Table 5. **Multiple Classification Analysis of Children Ever Born at the Individual Level by the Gini Index of Income Distribution and the Income Level of Community, Controlling for the Socioeconomic Status of the Couple: KNFS and 1975 Korean Census**

Grand Mean = 5.63	N	Unadjusted Dev'n	Eta	Adjusted for Independents + Covariates Dev'n	Beta
Gini Index of Income Dist. (GINC)					
Under 0.310	215	-0.55		-0.47	
0.310 - 0.329	258	-0.03		-0.05	
0.330 - 0.349	241	-0.03		0.06	
0.350 +	229	0.57		0.44	
			0.19		0.15
Income Level of Community (CINC)					
Under 45,000 (Won)	199	0.59		0.23	
45,000 - 49,999	293	0.34		0.20	
50,000 - 54,999	223	-0.04		0.02	
55,000 +	228	-0.91		-0.48	
			0.27		0.14
Multiple R					0.44
Multiple R^2					0.20
Significance of F Ratio for Main Effects					0.00
Significance of F Ratio for GINC					0.00
Significance of F Ratio for CINC					0.00
Significance of F Ratio for Interaction GINC × CINC					0.30
Significance of F Ratio for Covariates					0.00
Significance of F Ratio for Log Family Income					0.10
Significance of F Ratio for Education of Wife					0.00
Significance of F Ratio for Occupational Prestige of Husband					0.02

Table 6. **Multiple Classification Analysis of Children Ever Born at the Individual Level by the Theil Index of Income Distribution and the Income Level of Community, Controlling for the Socioeconomic Status of the Couple: KNFS and 1975 Korean Census**

Grand Mean = 5.63	N	Unadjusted Dev'n	Unadjusted Eta	Adjusted for Independents + Covariates Dev'n	Adjusted for Independents + Covariates Beta
Theil Index of Income Dist. (TINC)					
Under 0.170	270	-0.19		-0.50	
0.170 - 0.189	187	0.16		-0.11	
0.190 - 0.219	188	0.10		0.01	
0.220 +	298	0.02		0.52	
			0.06		0.19
Income Level of Community (CINC)					
Under 45,000 (Won)	199	0.59		0.28	
45,000 - 49,999	293	0.34		0.38	
50,000 - 54,999	223	-0.04		0.09	
55,000 +	228	-0.91		-0.82	
			0.27		0.23
Multiple R					0.45
Multiple R^2					0.20
Significance of F Ratio for Main Effects					0.00
Significance of F Ratio for TINC					0.00
Significance of F Ratio for CINC					0.00
Significance of F Ratio for Interaction TINC × CINC					0.03
Significance of F Ratio for Covariates					0.00
Significance of F Ratio for Log Family Income					0.10
Significance of F Ratio for Education of Wife					0.00
Significance of F Ratio for Occupational Prestige of Husband					0.02

such as family income, education of wife, and occupational prestige of husband are also controlled in the analysis. The results of analysis are presented in Table 5 and Table 6.

The results support Hypothesis 2 of this study that income inequality of the community is positively related with CEB at the individual level. This is true regardless of the inequality index used in the analysis. Note that the association between income distribution and CEB becomes clearly linear, especially in Table 6, as other factors and covariates are controlled. Table 5 and Table 6 also clearly indicate that the income level of community is negatively related with CEB at the individual level. It can be also noted that the pattern of relationships found from Table 5 and Table 6 are the same as those from Table 3 and Table 4, where the mean CEB of community is used as the dependent variable in the analysis.

The significance tests of F ratios reveal that income distribution as well as the income level of community has an independent effect on individual fertility behavior, which is statistically significant at the 0.01 level. As far as socioeconomic variables of the couple are concerned, it is found that the effect of education of wife on CEB is highly significant (Table 5 and Table 6). The association between occupational prestige of husband and CEB is also found to be statistically significant at the 0.02 level. In contrast, when other

variables are controlled, the effect of family income (natural log value) on CEB is not statistically significant at the high level.

To summarize the results from ANOVA and MCA (in Table 3 through Table 6), the community characteristics contribute to the amount of explained variation in CEB at the individual and community levels. In Table 3 and Table 4, the explained variations (R^2) in the mean CEB of community are very large. It is suggested that fertility at the community level depends not only on the income level of community but also on the income distribution. However, it is dangerous to draw a conclusion of the community effects on fertility based on the community-level data alone. The results are more likely to be misleading because of the incomplete specification of the causal mechanism. In this study, however, the analyses of CEB at the individual and community levels reveal consistent patterns of the community effects on fertility. The income level of community and income inequality are found to have negative and positive effects, respectively, on CEB at the individual level, independent of the effects of individual socioeconomic variables. So, it seems safe to conclude that, in Korea, the level of fertility is affected by the community characteristics *per se,* over and above the socioeconomic status of the couple.

Analysis of U.S. Fertility

Table 7 presents a correlation matrix of CEB at the individual and community levels and the community-level variables. It shows that CEB at the individual level is positively associated with the income inequality of community and, negatively, with the income and educational levels of community. The mean CEB of community (CCEB) also shows the same pattern, but the associations with these community-level variables are much stronger. The income and educational levels of community are positively related to each other and are negatively associated with the Gini index of income distribution (GINC).

As hypothesized, income inequality of community is positively related with CEB at the individual and community levels, although the differentials are relatively small (Table 8). Among nonwhite women, minor deviations are observed. Women in the community with the lowest income inequality have the highest CEB (5.10). However, this is based on just 10 cases, and thus is not highly reliable.

It is also clear in Table 8 that the mean CEB of community is negatively associated

Table 7. **Correlation Matrix of Children Ever Born, Mean CEB of Community, and Other Community Characteristics: 1970 U.S. Census**

	CEB	CCEB	GINC	CINC	CEDU
CEB	1.00	0.23	0.06	-0.11	-0.11
CCEB		1.00	0.20	-0.40	-0.40
GINC			1.00	-0.42	-0.20
CINC				1.00	0.69
CEDU					1.00

Note: 1. All the above correlation coefficients are statistically significant at the 0.01 level.
2 CEB : Children ever born
CCEB : Mean children ever born of community
GINC : Gini index of income distribution
CINC : Income level of community
CEDU : Educational level of community

Table 8. **Mean Number of Children Ever Born at the Individual and Community Levels by the Community Characteristics: 1970 U.S. Census**

	Mean CEB of Community	CEB at Individual Level	
		White	Nonwhite
Total	3.11	2.91	3.56
Gini Index of Income Dist. (GINC)			
Under 0.25	2.97	2.72	5.10**
0.25 - 0.29	3.01	2.82	3.28
0.30 - 0.34	3.10	2.94	3.17
0.35 +	3.25	2.99	3.78
Income Level of Community (CINC)			
Under $7,500	3.56	3.21	3.90
$ 7,500 - 9,900	3.22	3.04	3.30
$10,000 - 12,499	3.00	2.84	3.18
$12,500 +	2.83	2.69	3.06*
Educational Level of Community (CEDU)			
Under 10 years	3.86	3.54	4.39
10 - 11 years	3.36	3.03	3.67
12 - 13 years	3.05	2.88	3.20
14 + years	2.69	2.62	3.13**

Note: * refers to figures based on less than 50 cases.
**refers to figures based on less than 20 cases.

Table 9. **Regression Analysis of Children Ever Born at the Individual Level and the Mean CEB of Community: 1970 U.S. Census**

	Mean CEB of Community		CEB at Individual Level	
	B	Beta	B	Beta
Gini Index of Income Dist. (GINC)	-0.00	-0.04**	-0.01	-0.03*
Income Level of Cmty. (CINC)	-0.02	-0.13**	-0.03	-0.04**
Educational Level of Cmty. (CEDU)	-0.12	-0.25**	-0.03	-0.02
Family Income			0.00	0.08**
Education of Wife			-0.07	-0.10**
Education of Husband			-0.02	-0.04**
Non-SMSA	-0.32	-0.27**	1.11	0.27**
GINC × Non-SMSA	0.02	0.50**	0.02	0.14*
Age of Wife			-0.06	-0.09**
White			-0.11	-0.01
White × Non-SMSA			-1.41	-0.33**
Constant	4.79		7.64	
R^2	0.23		0.05	
F Ratio	557.0		48.3	
No. of Cases	9,554		9,554	

Note: *and** refer to regression coefficients statistically significant at the 0.05 and 0.01 levels, respectively.

with the income and educational levels of community. At the individual level, women in the community with higher levels of family income and educational attainment also tend to have less CEB. This pattern holds true for both white and nonwhite women.

For a more accurate evaluation of the contribution of each variable in explaining the variations in fertility, regression analysis is undertaken.[6] The income and educational levels of community, socioeconomic status of the couple, and other control variables are included in the analysis to investigate the independent effect of income distribution on fertility. Based on the results of preliminary analysis, an interaction term between income distribution and residence (GINC × Non-SMSA) was created. In the analysis at the community level, this interaction term is found to have a very strong positive effect on the dependent variable (Table 9). Note that the dummy variable Non-SMSA has a value of 1 for women in the non-SMSAs, and 0 for women in the SMSAs. Therefore, the interaction term in this analysis becomes GINC for those in the non-SMSAs, and 0, for those in the SMSAs. This suggests that the effect of income inequality on the mean CEB of community is negative in the SMSAs, and positive in the non-SMSAs.

Table 9 clearly reveals that the mean CEB of community is negatively associated with the community levels of family income and education. Particularly, the educational level of community is found to have a strong negative effect on the mean CEB of community. After adjusting for the effects of other community-level variables, the independent effect of the dummy variable Non-SMSA becomes strongly negative. However, because of the stronger positive effect of the interaction term (GINC × Non-SMSA), this does not necessarily indicate that the mean CEB of community tends to be lower in the non-SMSAs than in the SMSAs. In fact, the mean values of the dependent variable are 2.97 and 3.33 in the SMSAs and non-SMSAs, respectively.

In addition to the above interaction term, another interaction term between race and residence (White × Non-SMSA) was created for use in the analysis of individual fertility. Other appropriate interaction terms were tested, but none of them were found to be statistically significant.[7] Compared to the high R^2 value (0.23) of the regression equation at the community level, the explained variation in CEB (0.05) is much lower in the regression analysis at the individual level. But the value of F ratio (48.3) indicates that the regression equation is still statistically significant at the 0.01 level.

Table 9 indicates that, in the SMSAs, income inequality has a negative effect on individual fertility, which is statistically significant at the 0.05 level. In contrast, because of the stronger positive effect of the interaction term (GINC × Non-SMSA), the effect of income inequality becomes positive in the non-SMSAs. It is suggested that the income level of community shows a negative effect on individual fertility. The educational level of community also shows a negative effect, but it is not statistically significant after adjusting for the effects of other variables.

It is clear in Table 9 that all the socioeconomic variables of the couple have significant effects on fertility at the individual level. Generally, the beta coefficients of these variables are higher than those of the community-level variables. Once the effects of

6. Compared to ANOVA and MCA, regression analysis provides control for more variables in the model. In addition, regression analysis makes it easier to present the result within limited space when the interaction effects between the independent variables are found to be statistically significant. Thus, for U.S. fertility, this paper presents the result of regression analysis rather than ANOVA and MCA.

7. In the separate analyses for white and nonwhite women, it was found that nonwhite women tend to be slightly less affected by the community-level variables included in Table 9. But the differences are minimal and statistically not significant, and thus interaction terms between race and the community-level variables were not created.

other variables causally linked to family income are held constant, family income shows a positive effect. In contrast, education of wife and husband are negatively associated with CEB at the individual level. The results also indicate that younger women[8] and those in the non-SMSAs tend to have more CEB. The beta coefficient of the dummy variable White (1 for white women, and 0 for nonwhite women) is negative, but it is not statistically significant. In contrast, the interaction term (White × Non-SMSA) shows the strongest negative beta coefficient. This implies that white women in the non-SMSAs tend to have significantly fewer CEB than nonwhite women. However, the pure effect of being white is not statistically significant in the SMSAs, after controlling for the socioeconomic status of the couple and other variables in this analysis.

In sum, the independent effect of income inequality on the level of fertility is positive in the non-SMSAs. This holds true at both individual and community levels. In contrast, the effect is found to be negative in the SMSAs: women in the community with a higher level of income inequality tend to have fewer CEB, and the mean CEB of community is likely to be lower in the metropolitan community. It can thus be concluded that, in the United States, Hypotheses 1 and 2 hold true only in the non-SMSAs. Note that these hypotheses were generally supported in Korea, regardless of the place of residence.

Without more research, the nature of association between income distribution and fertility in the countries at various stages of economic development and demographic transition cannot be answered clearly here. However, our finding of the negative association between income inequality and fertility in the SMSAs of the United States can be possibly explained in the following way. We have assumed that income equality or homogeneous social structure accelerates internal communication and spread of shared norms and values toward low fertility. Thus, in the community with low income inequality, couples in the low income group are more likely to have lower fertility compared to their counterparts in the community with a higher level of income inequality. However, given the socioeconomic level of the United States, this may not be an important factor of fertility for those in the SMSAs. Most SMSAs are heterogeneous and relatively difficult to have shared norms or values. Rather, the relative deprivation of couples in the low income group may be greater in the community with a higher level of income inequality, and thus they may tend to emulate the status-related expenditures of those in the higher income groups. On the other hand, income inequality may also lead those in the higher income groups to spend more status-differentiating expenditures to fulfill their aspirations. As income inequality of the community rises, couples living in the SMSAs are more likely to be exposed and receptive to the status-related and status-differentiating expenditures, which compete with children for the couple's income; thus, a negative association between income inequality and fertility may appear inside the SMSAs.

Conclusion

The hypothesis of nonlinear relationship between income and fertility, the relative income theory, and the theory of birth control diffusion have provided another perspective to the study of fertility determinants. These three theories imply that income distribution of the community can be an important factor of fertility.

8. Age of women varies between 40 and 49 in the 1970 U.S. Census sample of this study. Note the timing effects; for example, women born in 1930 had post World War II babies, while the fertility of women born in 1921 was more affected by delayed marriage and World War II.

Findings from the analysis of Korean fertility supported the hypothesis of this study that income inequality of the community has a positive effect on fertility at the community level. To elaborate on the effect and to strengthen the argument, the independent effect of income inequality on individual fertility, controlling for socioeconomic status of the couple and the income level of community, was examined. Evidence from the analysis at the individual level also supports the hypothesis. Women in the community with a higher level of income inequality tend to have more CEB. The same pattern of the positive effect was found regardless of whether the Gini or the Theil index is used in the analysis as an indicator of inequality.

In the United States, both at the individual and community levels, a positive effect of income inequality on fertility was found among those in the non-SMSAs. However, in the SMSAs, income inequality of the community showed a negative effect on fertility at the individual and community levels. Given the socioeconomic level of the United States, the assumption that income inequality impedes the internal communication and spread of low fertility oriented norms and values, and thus leads those in the low income group to have more CEB may be inappropriate to apply to those in the SMSAs. Rather, it was speculated that couples living in the SMSAs are more likely to be exposed and receptive to the status-related and status-differentiating expenditures that compete with fertility-related expenditures, and that couples in the SMSAs with a higher income inequality tend to spend more status-related and status-differentiating expenditures, and thus are likely to lower their fertility.

Attention was also given to the effect of income level of the community on fertility. As expected, both in Korea and the United States, income level of the community is negatively associated with fertility at the community level. At the individual level, those in the community with a higher income level also tend to have lower fertility, after controlling for their own socioeconomic status and income distribution of the community. Evidence revealed that the relative contribution of the income level of community to explaining variations in fertility is more important than that of the income distribution.

Based on the above results, it can be concluded that individual fertility is affected not only by socioeconomic status of the couple but also by the characteristics of the community in which the couple live. In addition to the variations explained by socioeconomic characteristics of the couple, income destribution and the income level of community help explain variations in fertility.

Finally, further research is needed to provide a broader basis for assessing the relationship explored in this study. Different patterns of the relationship in the SMSAs and non-SMSAs of the United States suggest the differential impact of income distribution on fertility at different levels of development, and thus have broader implications for the future of Korean fertility, particularly in the urban areas. One direction of future research would be to apply the framework of this study to other countries at different stages of development and demographic transition. This expansion may provide further insights into the nature of the relationship.

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