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January 18, 1984

Dr. Eric Chetwynd, Jr.
Division Chief
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Washington, D.C. 20523

Dear Dr. Chetwynd:

I have enclosed copies of publications resulting from the current migration-fertility research project sponsored by your office. Ms. Pamula Mandel requested that I send these to her. I will appreciate relaying these copies to her.

With best regards.

Sincerely,

Bun Song Lee

Bun Song Lee
Associate Professor of Economics

Enc.

BSL:sh

# THE INFLUENCE OF RAPID RURAL-URBAN MIGRATION ON KOREAN NATIONAL FERTILITY LEVELS*

Forthcoming in Journal of Development Economics

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and

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Abstract: We apply an autoregressive model to personal migration and pregnancy histories recorded in the 1974 Korean World Fertility Survey to assess the adaptation effect of rural-urban migration on migrant fertility and national fertility levels. The results support the hypothesis that there is a substantial adaptation effect which increases as the size of the destination city increases. The effect of rural-urban migration on national fertility levels is significant. It was estimated that the 945,400 rural-urban women migrants who moved between 1965 and 1970 would avoid, on average, 71,300 births annually during their 24 years of urban residence.

## 1. Introduction

In the past few decades many developing countries have witnessed an increasing concentration of people in urban areas as a result of both rapid natural population growth and the movements of people from villages to cities. The majority of developing countries are experiencing annual rates of urban growth between 4 and 6 percent. [United Nations (1981)], Therefore, it is not surprising that developing countries currently consider population distribution a major population problem, exceeding that of fertility and natural growth. A United Nations report states that in 1976, 62 percent of the governments of less developed countries considered their spatial population distribution to be "extremely unacceptable," whereas only 5 percent of governments of LDCs viewed their distribution as "entirely acceptable." [United Nations (1981)]. Despite these concerns with population distribution

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little is known about urbanization and population redistribution. [Goldstein and Goldstein (1983), Stark (1982)].

Several recent studies have challenged our understanding of rural-urban migration and the population redistribution policies in LDCs. Preston (1979) argues that many common views concerning issues of urban growth and rural-urban migration in LDCs appear to be seriously misleading and unnecessarily alarmist. Urbanization in LDCs is not exceptionally rapid by historical standards. Rapid rural-urban migration is not necessarily due to absolute deprivation in rural areas nor to urban biases of government policies but rather to better job opportunities in urban areas resulting from agglomeration economies. He also points out that the rapid growth of large metropolitan areas in LDCs results primarily from the natural increase of the urban population rather than from rapid inmigration, with the exceptions of some economically successful countries such as Korea. Studies reviewed by Rhoda (1979) question whether development activities in rural areas slow rural-to-urban migration and, therefore, help alleviate problems of urban poverty. Rhoda concludes that policies suggested by Todaro (1969 and 1981), which attempt to increase the relative attractiveness of rural areas by improving rural roads and access to cities, increasing commercialization of agriculture, or improving rural education and skill levels, will stimulate more rapid rural-to-urban migration. Simmons (1979) argues that direct policy measures encouraging urban residents to move to rural areas or preventing rural migrants from entering large cities through various administrative measures such as registers, control cards, cash deposits and transmigration, etc., are neither economically nor administratively feasible.

Several studies have proposed ways of achieving national objectives of population distribution which are more efficient than the direct policy instruments currently used by many LDCs for spatial redistribution. Preston (1979)

proposes that it may be more efficient to devote resources to family planning programs rather than attempting to retard rural-urban migration. This is because the main cause of the rapid growth of large metropolitan areas in most LDCs is the rapid natural increase of urban population rather than rapid rural-urban migration and attempts to improve the rural standard of living are not effective in slowing the rural-urban migration. Simmons (1979) suggests that direct policy measures which encourage urban residents to move to rural areas or prevent rural migrants from entering large cities are neither economical nor administratively feasible. Instead, he suggests accommodating families who move to large metropolitan areas through improved housing, social services, employment, and income conditions. Stark (1982) emphasizes that rural-urban migration carries with it a large array of potentially desirable repercussions, often realized and manifested. He then suggests that good policies should employ effective means to minimize or eliminate the few undesirable consequences of migration but not eliminate migration itself. Finally, Mera (1978a and 1978b) argues that maintaining rapid economic growth will bring decreases in income disparities between regions and reduce population concentrations.

The above discussions appear to indicate that the literature on rural-urban migration has come full cycle. The Lewis (1954) rural-urban migration model assumed that industrialization in urban areas would induce surplus labor in rural areas to move to urban areas to earn higher earnings. As long as there was surplus labor in rural areas, urban wages would not go up due to the continuous supply of labors from rural areas. Constant wages would result in higher profits for the owners of the firms and more investment. Rural-urban migration was a necessary way of utilizing surplus labor. Todaro's rural-urban migration model (1969 and 1981) argued that this Western inspired urban-

industrial model is not applicable to LDCs. Increased rural-urban migration would cause rapidly rising urban unemployment and the solution to this situation was to discourage rural-urban migration by devoting resources to rural development projects. Now, studies by Preston (1979), Simmons (1979), Mera (1978a and 1978b), and Stark (1982) argue that policy prescriptions of the Todaro model do not work in LDCs and emphasize the positive net effect of the rural-urban migration on economic development.

Policy makers, in the middle of this controversy, require information on the costs and benefits of rapid rural-to-urban migration. Unfortunately, the following statement made by Simmons, et al (1977) remains true.

> "Programs to reinforce metropolitanization and encourage rural people to move to the large cities by providing special housing and employment opportunities have scarcely been tried in developing countries, due in great part to fears about the negative impact of such settlement patterns on the quality of human life and the cost of social services. Yet, in many countries the net impact of government investments and programs is (unintentionally) designed to encourage urbanization. Since the negative impact of the continued growth of large cities is largely hypothetical and has not yet been tested empirically, we shall have the opportunity to see whether in fact it is correct as evidence is collected in the future."

The objective of this study is to provide policy makers in developing nations a model that will enable them to quantify the effects of rapid urbanization on the fertility level of migrant women and thus on national fertility levels. To the extent that rural-urban migration helps reduce the overall rate of population growth, then the potential strain that migration may place on urban educational facilities, employment, housing, and other services may be offset by lower population growth. If the fertility adaptation effect of rural-urban migration is significant, then, under some conditions, migration might be encouraged as a mechanism for achieving lower national fertility levels.

In this study we utilize the data on detailed personal migration and birth histories of approximately 5,000 currently married women aged 20-49 in

the 1974 Korean World Fertility Survey (KWFS). We can trace the changes in fertility differentials between rural-urban migrants and a control group of rural stayers over the duration of migrants' urban residence. Our study provides evidence that rural-urban migration is important in lowering national fertility, and suggests that the adaptation to urban constraints and fertility norms is a significant factor explaining the lower fertility of rural-urban migrants compared with rural stayers even when the selectivity of migrants is controlled. Our results are consistent with the Korean experience showing the virtual disappearance of rural-urban fertility differentials in recent periods in spite of the fact that Korea has had an extremely large volume of rural-urban migration during the last two decades.[1] This contradicts the mainstream prediction in the literature that continued rural-urban migration is likely to slow the usual reduction of the rural-urban fertility gap because of selectivity of migration. [Holmes (1976)].

In section 2 we present a brief review of the literature and discuss the problems of measuring fertility adaptation resulting from rural-urban migration. Section 3 proposes a fertility estimating equation which attempts to control for changes in constraints which result from rural-urban migration and for child-goods preferences in a life-cycle fertility context. Section 4 presents the empirical results of estimating the fertility equation for the 1974 KWFS. Section 5 presents results of tests for the relationship between the city size of the migration destination and fertility adaptation, and the relationship between woman's education level and fertility adaptation. Section 6 reports the estimates of the aggregate effect on national fertility levels of the rapid rural-urban migration which occurred during the decade of 1965-1975. Section 7 summarizes the results.

## 2. Problems of Measuring Fertility Adaptation Effect of Rural-Urban Migration

There has long been evidence that the fertility of rural-urban migrants is on average lower than that of rural stayers. What is not clear is whether this is a result of a true causal effect of rural-urban migration, the "adaptation" effect, or simply reflects the fact that those people with lower fertility, particular socioeconomic characteristics, or personal preferences for small family size are more likely than others to migrate, the "selectivity" effect.[2] This study proposes a procedure to separate these two effects, and estimates the causal effect of rural-urban migration *per se* on the migrant's subsequent fertility, the adaptation effect, using Korean data.

Few empirical studies have found that the fertility adaptation effect of rural-urban migration is significant.[3] Potential exceptions are two studies of rural-urban migration in Manila by Hendershot (1971 and 1976). His studies reveal that fertility of the older rural-urban migrants, who most likely have had a longer duration of urban residence, is lower than similar-aged urban natives. Conversely, the fertility of the younger migrants, who most likely have had less exposure to urban life, is higher than similar-aged urban natives. However, he suggets that only highly selected migrants would adapt to the urban environments through smaller family sizes. Hendershot implies that rural-urban migration has become less selective over time. According to his model, the adaption effect will become less significant as urbanization progresses.

The absence of studies supporting the adaptation hypothesis may be due to limitations of previous studies rather than to the actual insignificance of the adaptation effect of rural-urban migrations. First, data for many previous studies did not provide information on the year of migration. Only two studies, Goldstein and Tirasawat (1977) and Ribe and Schultz (1980), used data on the year of migration. However, neither of these studies utilized both

migration history data and pregnancy history data. Therefore, it is possible that previous studies were not able to find adaptation effects because insufficient data on migration and pregnancy histories did not allow them to trace the adaptation behavior of migrants. Second, previous studies were not successful in controlling for the selectivity of migration. Unless one has a good control for selectivity, the adaptation effect of migration cannot be distinguished. Previous studies attempted to control for selectivity by using various socioeconomic and demographic characteristics of migrants. This approach has a serious drawback because various socioeconomic or demographic characteristics are only crude controls for selectivity. One must also control for the unmeasurable preference for family sizes. Ribe and Schultz (1980) demonstrate that unobserved personal preference is an important selectivity characteristic distinguishing migrants from non-migrants.

In order to correct these deficiencies of previous tests for adaptation we utilize the KWFS data on detailed personal migration and birth histories to develop an autoregressive model similar to that suggested by Ashenfelter (1978), who assessed the influence of manpower training programs on participants' post-program earnings. We use it to control unobservable per sonal family size preferences by holding constant the fertilities at a previous point in time for both rural-urban migrants and rural stayers.

## 3. Model Specification and Data

A tool for isolating the effect of rural-urban migration on the fertility of migrants is an autoregressive, or lagged variable, model in which fertility at a given time, t, is a function of fertility at previous times and other variables. Analogous to Ashenfelter (1978), an autoregressive fertility function can be defined as:[4]

$$Y_{it} = \beta_0 + \beta_1 Y_{i,t-5} + \gamma_1 A_{it} + \gamma_2 A_{it}^2 + \sum_{j=1}^{7} \alpha_j M_{ij} + \varepsilon_{it} \quad (1)$$

where $Y_t$ and $Y_{t-5}$ are children ever born to women by year t and t-5, respectively; $A_t$ is the woman's current age at year t; $\varepsilon_t$ is an error term; and $M_j$ are dummy variables for women who migrated during a given five-year-migration interval, j, with j = 1, 2, 3, 4, 5, 6 and 7 for the migration periods 1970-74, 1965-69, 1960-64, 1955-59, 1950-54, 1945-49, and before 1945, respectively. We estimate Equation (1) separately for each of t = 1974, 1969, 1964, 1959, and 1954.

Equation (1) states that when the fertility levels five years prior to time t of both rural-urban migrants and rural stayers are equal, the current fertility levels are a function of age, the square of age and the migration status. The coefficients of the migration dummy variables, $\alpha_j$, represent the difference between 5-year fertility rates of rural stayers and rural-urban migrants who migrated during the jth period after controlling for women's age and fertility level at the beginning of the five-year period. The selectivity of the rural-urban migrants is expected to be captured by the fertility level at the beginning of the period, $Y_{t-5}$.[5] The changes in fertility over the life cycle due to the biological factors that are not influenced by deliberate birth control behavior are expected to be captured by a nonlinear function of the age. This paper uses Equation (1) to test the following strong hypothesis concerning the adaptation effect of rural-urban migration on migrant fertility:[6]

> Hypothesis 1: A rural-urban migrant has fewer additional births after migration during <u>each</u> 5-year-period over her remaining post-migration life cycle than a comparable rural stayer when fertility levels at the beginning of each period are controlled.

This study is based on data contained in the 1974 Korean World Fertility Survey.[7] The fertility data for the years prior to the survey year, 1974,

were obtained from the individual woman's lifetime fertility history. To cover the entire period of a woman's lifetime fertility pattern with a limited number of regressions, we chose observation years at five-year intervals, 1974, 1969, 1964, 1959, and 1954 rather than consecutive years.[8] All women in the sample were currently married in 1974, had been married only once, had at least one live birth by 1974, and were aged 20 to 49. Women who never had a live-birth are excluded because a substantial proportion of such women in many societies in which incomes are low, such as Korea, are childless because of sub-fecundity rather than by choice. Whenever a woman was not married or had no children ever born in a year of observation, this woman was omitted in the regression for that year of observation.

Rural stayers, which include rural-rural migrants as well as rural non-migrants, are the individuals whose birthplace, previous residence, and current residence were all rural areas; while the rural-urban migrants are those whose current residence is urban but whose birthplace and previous residence were both rural.[9] "Rural" is defined as town (eup) or village (myun); whereas "urban" is defined as city (shi), which is an administrative unit with more than 50,000 people.

The distribution of total rural-urban migrants and rural stayers by year of observation and migration status is presented in Table 1. In our working sample of 2,871 currently married women, 1,641 women are rural stayers and 1,230 women are rural-urban migrants. Table 1 reveals that only 651 women (448 rural stayers and 203 rural-urban migrants) appear in each of the regressions for all five years of observation since 1954.[10]

## 4. Regression Results

Table 2 shows the full OLS regressions of Equation (1) for the five different years of observation. To aid in interpreting our test of Hypothesis 1,

the coefficient estimates for the migration cohort dummy variables in Table 2 are rearranged by the calendar year of migration and the duration of urban residence in Table 3. The interpretation of Tables 2 and 3 can be illustrated as follows. Suppose the year of observation is 1954. A woman who is known to migrate during 1970-74, j=1, had .210 fewer children during the interval 1949-54 than a rural stayer of identical age and fertility in 1949, as the coefficient in the row for $M_1$ shows. Since 1954 was anywhere from 20 to 16 years prior to this woman's migration in 1970-74, the value -.210 is placed in row 1, column 1 of Table 3.

Table 3 supports the adaptation hypothesis and indicates that rural-urban migrants experienced a significant reduction in five-year fertility rates below those of comparable rural stayers after migration to the urban area. Only seven of 25 cells for the post-migration periods, i.e., positive urban residence durations, show an insignificant difference at the .05 level in incremental fertility rates between rural-urban migrants and rural stayers and only four have the wrong sign; whereas only two of 10 cells for the periods prior to migration, i.e., negative urban residence durations, show significantly negative coefficients.[11] There is an apparent calendar time effect in Table 3. There appears to be little migration effect on fertility prior to the 1959 observation as regressions in Table 2 show. This could be partially explained by the fact that active family planning programs sponsored by the Korean government had started in 1962.[12]

Using an analysis of variance technique similar to that used by Cooley, McGuire and Prescott (1979), we model the estimated differential between rural-urban migrants and the rural stayers in additional births during a five year period, $\hat{\alpha}_j = \partial Y_t/\partial M_j$ (the estimated coefficients of the migration cohort dummy variables in Table 2 or 3) as a function of the duration of urban residence and the year of migration:

$$\hat{\alpha}_{tj} = \sum_{j=1942}^{1972} \phi_j YM_j + \sum_{t-j=-18}^{-3} \tau_{t-j} D_{t-j} + \sum_{t-j=2}^{32} \tau_{t-j} DP_{t-j} + \varepsilon_{tj} \qquad (2)$$

where $\alpha_{tj}$ is obtained from Table 3. $YM_j$ is a dummy variable reflecting the jth migration cohort. For example, $YM_{72} = 1$ if the dependent variable is for the migration cohort which migrated during 1970-74, zero, otherwise. Other dummy variables are similarly defined for the migration cohorts migrating during 1965-69, 1960-64, 1955-59, 1950-54, 1945-49 and before 1945 ($YM_{67}$, $YM_{62}$, $YM_{57}$, $YM_{52}$, $YM_{47}$ and $YM_{42}$). t indexes the observation year, 1954 through 1974. $D_{t-j}$ are dummy variables reflecting the duration prior to urban residence. For example, $D_{18}$ is 1 if the dependent variable is for the period of observation 15-19 years prior to migration, otherwise zero. Other dummy variables are similarly defined for the duration of residence -10 to -14, -5 to -9, -1 to -4, and are labeled $D_{13}$, $D_8$, $D_3$, respectively. Similarly, $DP_{t-j}$ are dummy variables reflecting the post-migration duration of urban residence. $DP_2$, $DP_7$, $DP_{12}$, $DP_{17}$, $DP_{22}$, $DP_{27}$ and $DP_{32}$ are 0-1 variables for the observation periods 0-4, 5-9, etc., after migration, respectively. To avoid singularity we drop the intercept term and $YM_{72}$ in the regression. As a result, the coefficients of the year of migration are relative to the 1970-74 migration cohort effect. The full OLS regression of Equation (2) using the estimated coefficients of the migration cohort dummy variables in Table 3 as the values for the dependent variable is:

$$\begin{aligned}\alpha_{tj} = {} & \underset{(.77)}{.081}\, YM_{67} + \underset{(.53)}{.059}\, YM_{62} + \underset{(.70)}{.085}\, YM_{57} + \underset{(1.38)}{.180}\, YM_{52} + \underset{(2.0)}{.281}\, YM_{47} + \underset{(2.11)}{.317}\, YM_{42} \qquad (3)\\ & - \underset{(-1.35)}{.210}\, D_{18} - \underset{(-1.36)}{.166}\, D_{13} - \underset{(-1.35)}{.149}\, D_8 - \underset{(-1.88)}{.199}\, D_3 - \underset{(-2.43)}{.254}\, DP_2 - \underset{(-1.69)}{.206}\, DP_7\\ & - \underset{(-2.60)}{.341}\, DP_{12} - \underset{(-3.87)}{.548}\, DP_{17} - \underset{(-3.98)}{.615}\, DP_{22} - \underset{(-3.86)}{.673}\, DP_{27} - \underset{(-2.35)}{.509}\, DP_{32}\\ & R^2 = .8036,\ F = 4.33,\ N = 35.\end{aligned}$$

where the t-values are in parentheses. Remembering that $\hat{\alpha}_j$ is typically negative, the regression results reported in Equation (3) show the adaptivity of rural-urban migrants has generally increased over time. When the duration of migration is controlled, rural-urban migrants who migrated before 1950 seem to have adapted significantly less than women migrating between 1970 and 1974 (i.e., coefficients for $YM_{47}$ and $YM_{42}$ are significantly larger than that for the 1972 base period). Equation (3) also indicates that the rural-urban migrants continue to reduce fertility rates relative to rural stayers with time spent in urban areas. The values of coefficients for the positive duration of urban residence variables, DP's, are increasingly negative with duration of urban residence, and all except $DP_{-}$ are significantly less than zero.

We can use estimated Equation (3) to measure the effect of prior rural-urban migration on current Korean population. From Table 1, Column 1, we see the actual distribution of migrants by year of migration. For example, 30.8 percent (379 ÷ 1,230) of the migrants observed in 1974 migrated during 1965-69; 15.6 percent migrated during 1960-64; etc. We assign these percentage values to $YM_{67}$, $YM_{62}$, etc. in Equation (3), yielding an intercept term for a migrant with the "typical" year of migration. The coefficient estimates of the DP's in Equation (3) can then be used to estimate the fertility reduction of a typical migrant by duration of urban residence. For example, the intercept in Equation (3) is .082 and the coefficient of $DP_2$ is -.254. The estimated fertility reduction of a migrant with 0-4 years of urban residence is then -.172 (.082 - .254). Table 4, Column 1, shows the estimates of fertility reduction attributable to adaptation to urban areas among all migrants by duration of urban residence. Columns 2-4 use a similar procedure to estimate fertility reductions for migrations to Seoul, Busan, and smaller cities.

The method used in estimating expected fertility reductions in Table 4 is similar to that used by Bowen and Finegan (1969) in estimating their adjusted mean differentials. The last row of Table 4 shows the sums of these fertility differentials for the post-migration period. Table 4 indicates that if a rural-urban migrant woman spent her entire 34 childbearing years in urban areas, her completed fertility will be lower by 2.57 children than that of a comparable rural stayer. Since the childbearing period in urban areas for most migrant women is less than 34 years, the value of 2.57 children is the hypothetical maximum of fertility differentials due to migration.

## 5. Tests of Additional Hypotheses

In this section we present the test results of the following two additional hypotheses:

> Hypothesis 2: The differential in completed fertility between the rural stayer and a comparable rural-urban migrant during the period after migration increases with the size of the destination city.
>
> Hypothesis 3: The differential in completed fertility between the rural stayer and the rural-urban migrant during the period after migration is greater for individuals with higher education than for individuals with lower education.

Table 5 shows the distribution of rural-urban migrants by year of migration cohort and destination of migration in 1974. Approximately 40 percent of our migrant sample moved from rural areas to Seoul (capital city of Korea, 6.9 million people in 1975), 36 percent to Busan (another metropolitan special city, 2.5 million) or other large cities such as Taegu (1.3 million), Inchun (.8 million) and Kwangju (.6 million); and the remainder moved to medium and small cities (fewer than .5 million). Table 5 also reveals that the rural-urban migration destination has shifted from Seoul to medium and small cities over time. The drop in migration to Seoul (31.3 percent of total rural-urban

migration) and the rise in migration to Busan and other large cities from 1945-49 to 1950-54 are due to the refugee movements to Busan during the Korean War period.

The last three columns of Table 4 report estimates of expected fertility differentials for each of the three city size classes. The last row of Table 4 reveals a striking relationship between fertility reduction due to adaptation and the city size class. Rural-urban migrants to Seoul would have completed fertility of 3.4 fewer children than comparable rural stayers if they spent their 34 childbearing years in Seoul. The migrants to Busan and other large cities would have 2.2 fewer children, and migrants to medium and small cities would have only 1.8 fewer children. Hypothesis 2 cannot be rejected.

The city-specific effects of migration on fertility are of considerable importance. One might argue that results in Table 4 are not conclusive because the data from this table are based upon a fertility equation that does not control for education. Our results are not dramatically affected by controlling for education levels. When we include woman's education and education-squared as variables in Equation (1) we obtain results very similar to those shown in Table 4. The problem with the education variable is that it measures education completed in 1974. Some migrants may have obtained additional education in the urban area. In this case, education may be a result of adaptation and not an exogenous variable.

As mentioned earlier, Hendershot (1971 and 1976) suggested that only highly selected migrants would adapt to the urban environment through smaller family sizes. He implied that rural-urban migration had become less selective over time in many countries. Therefore, it is important to test Hypothesis 3.

The nature of rural-urban constraint changes for a household may depend on socioeconomic characteristics of that household. Education is one socioeconomic variable that may affect the magnitude of changes in the rural-urban constraint as well as responses to those changes. Education may be more adequately compensated in urban areas than rural areas, implying expected urban-rural earnings differentials (inclusive of the probability of employment) increase with the individual's education level. Education may also have effects of increasing the change in perceived constraints in addition to the above rural-urban wage differential effect. Job search costs may be lower for more educated persons. Given a distribution of urban opportunities, more educated persons would be more likely than less educated persons to have found urban opportunities with high rewards prior to the rural-urban migration. Education may also improve the ability to decode information about urban life and the ability to control fertility [Schultz (1975)]. Finally, education may increase the substitutability between goods and children. Urban life may appear richer to the more educated person and the goods necessary for urban life become more perfect substitutes for children. Also, more educated persons may be more willing to substitute child quality for quantity, and higher urban child prices force them to make this substitution. All the above effects should result in more educated migrants adapting more and faster to the urban life than less educated migrants.

Unfortunately, our data do not tell us whether current education levels of migrants are completed before migration or result from increased education obtained in urban areas. The pre-migration education level is the legitimate selectivity control but the post-migration education compounds the adaptation and selectivity effects of migration on education. Until recently, few Korean women continued their education after marriage. Therefore, by restricting the

test of Hypothesis 3 to women who migrated after their marriage, we can be reasonably sure that their current education levels were not influenced by migration.

Restricting our sample of rural-urban migrants to those who migrated after marriage also requires us to restrict the rural stayer comparison group for each migration cohort group to those who had been married for at least as long as the migrants. Since women who migrated after marriage must have been married at least as long as their duration of current residence, the range of duration of marriage is limited in any one migration cohort. Because of this duration of marriage restriction, comparing the additional fertility of various migration cohorts with those of all rural stayers is no longer useful. For each observation year, each migration cohort should be compared with a separate rural stayer sample tailored to the appropriate minimum durations of marriage restriction. The estimating equation becomes:

$$Y_{itj} = \beta_0 + \beta_1 Y_{it-5,j} + \gamma_1 A_{itj} + \gamma_2 A_{itj}^2 + \alpha_1 M_{ij} + \varepsilon_{itj} \qquad (4)$$

Equation (4) can be estimated separately for each migration cohort and year of observation allowing the implicit duration of marriage restriction to determine the rural stayer sample.

Table 6 presents the distribution of post-marital, rural-urban migrants by year of migration and education level. The first and last rows of Table 6 also present the educational distribution of rural stayers and total rural-urban migrants, including pre-marital and post-marital migrants. Post-marital rural-urban migrants in our 1974 sample constituted 645 out of all 1,230 migrants. A comparison of the first row with the second row of Table 6 indicates that post-marital migrants are highly selective in terms of education level. Only eight percent of rural stayers had schooling beyond the com-

pulsory education of six years in 1974, whereas 23 percent of post-marital migrants had at least this level of schooling. However, the above comparisons exaggerate the selectiveness of migrants by education levels because migrants are much younger than the rural population in general and recent birth cohorts in Korea generally obtain higher educational levels than their predecessors.

Table 7 reports the expected fertility reductions for each of the three woman's education levels. The results in Table 7 were obtained in a manner similar to those in Table 4. First, Equation (4) was regressed for each migration cohort and observation year using the post-marital migrants and rural stayers sample separately for each of the three women's education levels, i.e., less than 4 years, 4 to 6 years, and more than 6 years of schooling. Next, Equation (2) was regressed for each of three education levels using as the dependent variable the estimated coefficients for the migration dummy variable obtained from the regression estimates of Equation (4). Regression results similar to Equation (3) were obtained for each schooling level. Finally, the expected fertility reductions by duration of urban residence were then calculated as explained above. The sum of values for the post-migration period in Table 7 suggests that the completed adaptation by post-marital, rural-urban migrants is largest among migrants who are least educated. We expect migrants with less than four years of schooling to have completed fertility of 1.9 fewer children than rural stayers with the same level of education. Migrants with schooling of four to six years would have only one fewer child than similar rural stayers. The sum of expected fertility reductions for migrants with schooling of more than six years is -.8 children. This suggests that an inverse relationship between the education level of migrants and adaptation. This is contrary to the results of Hendershot (1976). Evidence in Table 7 indicates that one should reject

Hypothesis 3, that the higher the education level of the migrant woman, the more she adapts to urban norms.

One could argue that the fetility in rural and urban areas is lower for women with greater education and so the decline in fertility associated with the rural-urban migration for women with more education may be larger in relative terms than the decline recorded for less educated women. The mean fertility in the rural stayer group within each schooling group is presented in the last row of Table 7. This was derived from the 1970 Population Census data. Table 7 reveals fertility declines of 29.9, 16.2, and 17.6 percent, respectively, for each group. Measured in relative terms, least educated migrant women reveal the most adaptation.[13] However, the comparison in absolute terms should be more useful to policy decision makers who try to assess the influence of rural-urban migrations by different levels of education on the national average fertility level.

## 6. The Effects of Rural-Urban Migration on National Fertility Level

Using the values in Table 4 we now attempt to estimate the aggregate effect on national fertility levels of rural-urban migration occurring during the decade of 1965-75. The purpose for doing this is to determine whether the high volume of rural-urban migration that occurred during this decade contributed significantly to the remarkable fertility decline experienced by Korea during the last two decades. Table 8 shows that Korean total fertility rate has declined from 6,540 births per 1,000 women in 1960 to 4,272 births in 1970 and to 2,790 births in 1980. This dramatic 36 percent decline in the total fertility rate during 1960-70 is recognized as one of the most rapid population changes in the history of mankind.

Table 9 presents cumulative fertility reduction per woman migrant by the current age and maximum duration of urban residence possible during her child-

bearing period for each of three destination sizes, Seoul, Busan and other cities. The maximum duration of urban residence during childbearing period is assigned for each current age group with the assumption that childbearing does not start until the age of 15 and ends at the age of 49. For example, the first three youngest age groups under the age of 20 are assigned an identical maximum duration of 30-34 years. For these three youngest age groups cumulative reductions of births are 3.388, 2.207, and 1.784 for Seoul, Busan and other urban areas, respectively. The cumulative reductions of births for the age group 20-24, whose maximum duration is 25-29 years, are obtained by subtracting the expected fertility reductions for the duration of urban residence 30 to 34 years in Table 4 from the values for the 15-19 age group. The cumulative reductions for other age groups are similarly assigned.

Table 10 shows the distribution of the total number of migrant women who moved from rural to urban areas between 1965 and 1970 by age and the current residence in 1970. These values are available from the 1970 Population Census. Table 10 also reports aggregate fertility reductions due to adaptation by destination sizes obtained by applying the cumulative fertility reduction coefficient in Table 9 to the total number of migrant women in Table 10.[14] Table 10 indicates that the 434,000 women who migrated from rural areas to Seoul during 1965-1970 would reduce their fertility by 1,008,100 births due to adaptation to urban life during their childbearing period in urban areas. This represents an average fertility reduction of 2.32 births per woman migrating to Seoul. The 108,100 women who migrated to Busan would reduce their fertility by 177,400 births or 1.63 births per woman. These numbers compare favorably with Park and Park (1976). They found from their study of the 1970 Korean Population Census that total (completed) fertility rates of the rural to metropolitan migrants were two children fewer than those of rural

nonmigrants. Finally, 402,600 women who migrated to other cities excluding Seoul and Busan would reduce their fertility by 506,200 births or 1.26 births per woman. This number also compares favorably with Park and Park's estimate of 1.4 fewer children for total fertility rate of the rural-to-nonmetropolitan urban areas than that of rural nonmigrants. Overall, from the data in Table 10 for all three types of destinations, 945,400 rural-urban female migrants who moved during 1965-1970 would reduce their fertility by 1.69 million births or 1.79 births per migrant woman during the rest of their childbearing years.

Taking the next five-year-period, 1970-75, the 1975 Population Census shows that 949,000 women migrated from rural to urban areas. Therefore it is not unreasonable to assume that approximately another 1.7 million births would be averted during the remaining childbearing years of this migration cohort due to the rural-urban migration occurring during 1970-1975. These results indicate that approximately 1.9 million female rural-urban migrants during the decade 1965-1975 would avoid approximately 3.4 million births.

In order to assess the significance of the aggregate fertility reductions to annual population growth in 1970, we must estimate the average duration of urban residence during the childbearing period for the 945,400 rural-urban female migrants who moved between 1965 and 1970. The average duration of urban residence during childbearing period were 23.93, 23.60 and 23.50 years, respectively, for Seoul, Busan and other cities among women who migrated to these areas between 1965 and 1970.[15] Using the distribution of total migrant women by the city size in Table 10 we obtain 23.7 years as the weighted average duration of urban residence for the total female migrants who moved from rural to urban areas between 1965 and 1970. This means that the 945,400 rural-urban female migrants who moved during 1965-70 would avoid, on average, 71,300 births annually over these 24 years. This impact is significant. For

example, in 1970 the population grew annually at a rate of 2.18 percent or 685,500 persons as shown in Table 8.

## 7. Summary and Conclusions

In this paper we have applied an autoregressive model to the 1974 Korean World Fertility Survey data to test our adaptation hypothesis. The advantage of the autoregressive model is that it controls partially for the selectivity of migration by comparing rural-urban migrant incremental fertility within a given period to that of a comparable rural stayer with the same fertility level at the beginning of the period under observation. In principle, the remaining differential in fertility between rural-urban migrants and rural stayers is a measure of the rural-urban migrant's adaptation to urban norms and constraints. In technical terms, we have controlled the fertility level at the beginning of the observed period and have assumed that this is a proxy for family size preferences.

The major conclusion of this study is that adaptation of rural-urban migrants is a significant phenomenon. We found that incremental rural-urban migrant fertility in successive five-year post-migration periods was significantly lower than that of comparable rural stayers, even after controlling for fertility at the beginning of each period. We found that cumulative adaptation varied across urban areas. Migrants to larger cities were found to adapt more over their lifetime than migrants to smaller cities. For example, migrants to Seoul would have 3.4 fewer children over a 34-year childbearing period spent in Seoul than comparable rural stayers, while migrants to Busan and other large cities would have 2.2 fewer children and migrants to medium and small cities would have only 1.8 fewer children than rural stayers over a comparable period.

We tested whether or not the fertility adaptation of migrants varied with level of education. Since we were not concerned with the effects of adaptation to urban life on education, we concentrated on post-marital migrants, who were more likely to have completed their education before migrating. When we looked at the effect of education on completed fertility differentials between rural-urban migrants and rural stayers, we found an inverse relation. For example, we found that completed fertility of migrant women with less than four years of school was 1.9 children fewer than that of comparable rural stayers, 1.0 child fewer for migrant women with four to six years of school, and .8 children fewer for migrant women with at least six years of school. In relative terms, these fertility declines were 30, 16, and 18 percent, respectively, for these eduational levels.

For Korea, the overall effects on national fertility of the rural-urban migration are estimated to represent a reduction of 1.79 births per woman or 1.69 million births among 945,400 rural-urban women migrants of the period 1965-70 during the remainder of their childbearing years. Among 949,000 rural-urban women migrants of the 1970-75 period a similar number of births are expected to be averted bringing the total births that would be averted during the remainder of their childbearing years for migrants during one decade to 3.4 million. It was estimated that the 945,400 rural-urban women migrants of the period 1965-70 would avoid, on average, 71,300 births annually for their expected average 24 years of urban life. This impact is significant when it is compared with the 685,500 natural increase in Korean population in 1970.

FOOTNOTES

*The research reported was partially supported by the U.S. Agency for International Development, Contract No. AID/Otr-C-1769. Any opinions, findings, conclusions or recommendations expressed herein are those of the authors and do not necessarily reflect the view of the Agency for International Development of the United States.

[1]The rural total fertility rate per woman was about 2 births higher than the urban TFR during 1960's in Korea, but the differential has been lessened drastically in recent periods (i.e., the differential is less than .5 births in 1980 and is projected to disappear virtually after 1990). Korea has experienced an extremely large volume of rural-urban migration since the early 1960's (i.e., about 1.9 percent of rural population annually left rural areas to move to urban areas during 1965-1975).

[2]For a detailed discussion of the adaptation hypothesis and the selection hypothesis refer to Lee and Farber (forthcoming).

[3]The extensive reviews of literature on the influences of rural-urban migration on migrant's fertility can be found in Zarate and Zarate (1975), Goldstein and Tirasawat (1977), Wolowyna (1980), and Ribe and Schultz (1980).

[4]A detailed discussion on the derivation of Equation (1) may be found in Lee and Farber (forthcoming).

[5]In order to avoid possible misunderstandings of our model it is important to emphasize that we <u>do not</u> use family size before migration as a proxy variable for unobserved family size preferences in the fertility regression of a single year cross-section of migrants and rural stayers. Premigration fertility does not necessarily demonstrate family size preferences. For example, a woman who has a large number of children immediately prior to migration in anticipation of that migration may actually have lower family

size preferences than a non-migrant woman with a smaller family. However, family size in a previous period for (both pre- and post-migration) years other than the period immediately preceding migration may act as a control for family size preferences.

[6]However, as long as the completed fertility of the rural-urban migrant is lowered due to the adaptation to urban lifestyle, national fertility rates will be lower even if the migrant does not have lower incremental fertility during <u>each</u> 5-year-periods after migration. This is why we call Hypothesis 1 a strong hypothesis.

[7]The 1974 KWFS is composed of two surveys undertaken jointly: households and individuals. The individual sample which this study uses was, like most national fertility surveys, complex, multi-stage, stratified and clustered. The sample design for the survey aimed for a self-weighting, nationally representative probability sample, using basically a two-stage design for the household survey with a further sampling stage for the individual survey. Census enumeration districts were used as the primary sampling units, with households in the selected primary sampling units constituting the ultimate sampling units. Sample sizes of 21,248 and 6,849 households for the household and individual surveys were drawn, respectively, the latter being a sub-sample of the former. An overall sampling fraction was approximately 1/340 for the household survey. In fact, 5,724 ever-married women aged 15-49 were identified in the 6,849 households sampled for the individual survey.

[8]Furthermore, as pointed out by Hiday (1978) in her Philippine study, a measure of fertility based on five-year intervals rather than one-year intervals makes the child-woman ratio more stable.

[9]The 1974 KWFS provides the following migration history information for both the wife and husband: years of residence in the current location; the

places of current residence, previous residence, and birth, and the type of community resided in during growth to age twelve.

Our sample excluded multistage migrants. The number of the rural-urban multistage migrants whose birth places were rural, but whose residences before the last movements were urban areas is 298 women. This subsample was excluded in our study because the 1974 KWFS does not provide information on the duration of urban residence which is the most crucial variable in assessing the effect of urban exposure on migrant's fertility. The years of residence in the current location underestimate the true duration of urban life for the multistage, rural-urban migrants.

[10]It is tempting to pool time series and cross-sectional data rather than to do a separate regression of Equation (1) for each of the five years of observation. However, this is not acceptable due to period effects. In rapidly developing societies such as Korea, the general fertility pattern at the different calendar years varies substantially due to the increased family planning programs sponsored by government, economic development and other things that are independent of birth cohort, age, and the individual woman's socioeconomic characteristics.

[11]Lee and Farber (forthcoming) investigated whether these measured adaptation effects are sensitive to different specifications of the model. An OLS first difference form and a Seemingly Unrelated Regression (SUR) specification of the autoregressive model similar to Equation (1) were estimated. All these methods resulted in accordance with expectation. All models suggested that adequate controls for selection had been made in our autoregressive model and that adaptation is a significant phenomenon.

[12]The fact that the incremental fertility rates for the 1970-74 migration cohort during the periods of 6 to 10 years and 1 to 5 years prior migration

were significantly lower than those for rural stayers suggests an anticipatory effect of migration on fertility prior to migration. This is also an adaptation phenomenon.

[13]There may be some behavioral reasons why less selected migrants might adapt more than highly selected migrants. Migrants with higher education may not face cultural shocks after migration to urban areas because they were well prepared before migration. Conversely, migrants with lower education may face a completely unexpected lifestyle and be forced to change their ways of thinking and lifestyle even though the required changes are much harder to make for these lower class migrants. Also, migrants with lower education may be more heavily influenced by their environment and be more affected by other people's behavior in their current communities.

[14]Obviously, some migrant women in Table 10 were not married in 1970. But by age 30-34 relatively few Korean women remain single (1.4 percent in the 1970 Census) [Lee and McElwain (1981, Table 2.41)]. Therefore, our estimate of aggregate fertility reductions will not be much affected by including unmarried migrants.

[15]The average duration is calculated for each destination as $\frac{\Sigma N_i D_i}{\Sigma N_i}$ where $N_i$ is the number of migrant women for age group i and $D_i$ is the duration of urban residence during childbearing period of age group i.

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Table 1. Distribution of Total Rural-Urban Migrants and Rural Stayers by Year of Observation and Migration Status

| Migration Status | Year of Observation | | | | |
|---|---|---|---|---|---|
| | 1974 | 1969 | 1964 | 1959 | 1954 |
| Rural Stayers | 1,641 | 1,379 | 1,113 | 795 | 448 |
| Migrants | 1,230 | 887 | 591 | 395 | 203 |
| 1970-74 | 323 | 159 | 96 | 54 | 30 |
| 1965-69 | 379 | 264 | 122 | 73 | 30 |
| 1960-64 | 192 | 163 | 113 | 67 | 34 |
| 1955-59 | 135 | 113 | 103 | 71 | 22 |
| 1950-54 | 112 | 104 | 85 | 70 | 40 |
| 1945-49 | 61 | 56 | 45 | 35 | 25 |
| Before 1945 | 28 | 28 | 27 | 25 | 22 |
| Total | 2,871 | 2,266 | 1,704 | 1,190 | 651 |

Table 2. Regression Results for Equation (1) for Korean Currently Married Women, Rural-Urban Migrants and Rural Stayers

| Variable Names | Year of Observation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1974 | | 1969 | | 1964 | | 1959 | | 1954 | |
| | b | t | b | t | b | t | b | t | b | t |
| Intercept | 1.458 | (5.01) | -1.304 | (-3.12) | -3.906 | (-6.74) | -4.164 | (-5.23) | -.133 | (-.79) |
| $Y_{t-5}$ | .950 | (94.17) | .935 | (69.53) | 1.017 | (62.69) | .991 | (44.00) | 1.003 | (25.07) |
| $A_t$ | .046 | (2.73) | .221 | (8.50) | .403 | (10.20) | .403 | (6.63) | .207 | (1.46) |
| $A_t$ | -.001 | (-6.23) | -.004 | (-9.89) | -.007 | (-10.52) | -.007 | (-5.87) | -.004 | (-1.24) |
| $M_1$ | -.202 | (-4.68) | -.206 | (-3.27) | -.209 | (-2.89) | -.151 | (-1.63) | -.210 | (-1.68) |
| $M_2$ | -.094 | (-2.35) | -.267 | (-5.19) | -.105 | (-1.61) | -.001 | (-.02) | -.101 | (-.80) |
| $M_3$ | -.212 | (-4.04) | -.274 | (-4.41) | -.243 | (-3.62) | -.026 | (-.31) | -.096 | (-.81) |
| $M_4$ | -.358 | (-5.84) | -.276 | (-3.77) | -.173 | (-2.46) | -.084 | -1.02) | -.233 | (-1.61) |
| $M_5$ | -.324 | (-4.83) | -.424 | (-5.58) | -.361 | (-4.72) | .112 | (1.36) | -.068 | (-.62) |
| $M_6$ | -.299 | (-3.34) | -.260 | (-2.55) | -.595 | (-5.77) | .094 | (.83) | .084 | (.62) |
| $M_7$ | -.192 | (-1.46) | -.449 | (-3.13) | -.484 | (-3.63) | .050 | (.37) | -.025 | (-.17) |
| # of OBS | 2871 | | 2266 | | 1704 | | 1190 | | 651 | |
| F Stat | 2643.52 | | 1662.73 | | 1280.26 | | 658.07 | | 161.52 | |
| $R^2$ | .90 | | .88 | | .88 | | .85 | | .716 | |



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Table 3. Fertility Differentials Due to Migration When Fertility of 5 Years Ago is Controlled for: Total Rural-Urban Migrants and Rural Stayers*

| Period of Migration | DURATION OF URBAN RESIDENCE (IN YEARS) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | -20 to -16 | -15 to -11 | -10 to -6 | -5 to -1 | 0 to 4 | 5 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 to 29 | 30 to 34 |
| 1970-74 ($M_1$) | -.210 | -.151 | -.209* | -.206* | -.202* | | | | | | |
| 1965-69 ($M_2$) | | -.101 | -.001 | -.105 | -.267* | -.094* | | | | | |
| 1960-64 ($M_3$) | | | -.096 | -.026 | -.243* | -.274* | -.212* | | | | |
| 1955-59 ($M_4$) | | | | -.233 | -.084 | -.173* | -.276* | -.359* | | | |
| 1950-54 ($M_5$) | | | | | -.068 | .112 | -.361* | -.424* | -.324* | | |
| 1945-49 ($M_6$) | | | | | | .084 | .094 | -.595* | -.260* | -.299* | |
| before 1945 ($M_7$) | | | | | | | -.025 | .050 | -.484* | -.449* | -.192 |

Source: Table 2.

*Significant at the .05 level (critical t-value = 1.96)

Table 4. Expected Fertility Reduction of a Typical Rural-Urban Migrant by Duration of Urban Residence: All Migrants and by Destination of Migration

| Duration of Urban Residence | Destination of Migration | | | |
|---|---|---|---|---|
| | All Migrants | Seoul | Busan and Large Cities | Medium and Small Cities |
| 0 to 4 | -.172 | -.095 | -.196 | -.186 |
| 5 to 9 | -.124 | -.140 | -.137 | .018 |
| 10 to 14 | -.259 | -.285 | -.253 | -.223 |
| 15 to 19 | -.466 | -.50 | -.511 | -.363 |
| 20 to 24 | -.533 | -.778 | -.389 | -.40 |
| 25 to 29 | -.591 | -.905 | -.486 | -.312 |
| 30 to 34 | -.427 | -.685 | -.235 | -.318 |
| Sums of post-migration period values | -2.572 | -3.388 | -2.207 | -1.784 |

Table 5. Distribution of Total Rural-Urban Migrants by Year of Migration and Destination of Migration in 1974

| Year of Migration | Migration Destination | | | |
|---|---|---|---|---|
| | Seoul | Busan and Large Cities | Medium and Small Cities | Total |
| 1970-74 | 95 (29.4%) | 119 (36.8%) | 109 (33.8%) | 323 (100%) |
| 1965-69 | 175 (46.2%) | 126 (33.3%) | 78 (20.6%) | 379 (100%) |
| 1960-64 | 86 (44.8%) | 70 (36.5%) | 36 (18.8%) | 192 (100%) |
| 1955-59 | 60 (44.4%) | 50 (37.0%) | 25 (18.5%) | 135 (100%) |
| 1950-54 | 35 (31.3%) | 52 (46.4%) | 25 (22.3%) | 112 (100%) |
| 1945-49 | 29 (47.5%) | 20 (32.8%) | 12 (19.7%) | 61 (100%) |
| Before 1945 | 10 (35.7%) | 10 (35.7%) | 8 (28.6%) | 28 (100%) |
| Total | 490 (39.8%) | 447 (36.3%) | 293 (23.8%) | 1,230 (100%) |

Table 6. Distribution of Post-Marital Rural-Urban Migrants and Rural Stayers by Year of Migration and Education Level in 1974

| Migration Status and Year of Migration | Education: 3 or less years | 4 to 6 years | More than 6 years | Total |
|---|---|---|---|---|
| Rural stayers | 773 (47.1%) | 739 (45.0%) | 129 (7.9%) | 1641 (100%) |
| Total post-marital migrants | 161 (25.0%) | 336 (52.1%) | 148 (22.9%) | 645 (100%) |
| 1970-74 | 39 (16.7%) | 124 (53.0%) | 71 (30.3%) | 234 (100%) |
| 1965-69 | 53 (25.1%) | 117 (55.5%) | 41 (19.4%) | 211 (100%) |
| 1960-64 | 34 (34.0%) | 46 (46.0%) | 20 (20.0%) | 100 (100%) |
| 1955-59 | 14 (30.4%) | 22 (47.8%) | 10 (21.7%) | 46 (100%) |
| 1950-54 | 15 (36.6%) | 21 (51.2%) | 5 (12.2%) | 41 (100%) |
| 1945-49 | 3 (33.3%) | 5 (55.6%) | 1 (11.1%) | 9 (100%) |
| Before 1945 | 3 (75.0%) | 1 (25.0%) | 0 (0.0%) | 4 (100%) |
| All migrants, including pre-marital migrants | 230 (18.7%) | 611 (49.7%) | 389 (31.6%) | 1230 (100%) |

Table 7. Expected Fertility Reduction of a Typical Post-Marital Rural-Urban Migrant by Duration of Urban Residence and Wife's Education Level

| Duration of Urban Residence | Schooling: less than 4 years | 4 to 6 years | more than 6 years |
|---|---|---|---|
| 0 to 4 | -.192 | -.099 | - .177 |
| 5 to 9 | -.309 | -.281 | - .008 |
| 10 to 14 | -.393 | -.40 | - .188 |
| 15 to 19 | -.679 | -.206 | - .154 |
| 20 to 24 | -.348 | .004 | - .289 |
| 25 to 29 | NA | NA | NA |
| Sum of values for post-migration period | -1.921 | -.982 | - .816 |
| Children ever born to rural stayer women aged 45-49* | 6.42 | 6.08 | 4.64 |

*From Table A.9.1 in Lee at al (1981).

Table 8. Distribution of Korean Population, Crude Birth Rates, Crude Death Rates, Net Population Growth Rates, and Total Fertility Rate by Residence

| Year | Census Population (in millions) | | | | | Average Annual Rates per 1000 persons | | Annual Crude Rate of National Population Increase (%) | Total Fertility Rate Per 1,000 Women | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | National | Seoul | Busan | Other Cities | Rural | Crude Birth Rate | Crude Death Rate | | National | Urban | Rural |
| 1960 | 24.99 | 2.45 | 1.16 | 3.39 | 18.0 | 42.0 | 13.0 | — | 6,540 | 5,475 | 7,160 |
| 1961 | | | | | | 42.0 | 13.0 | 2.97 | 6,020 | 4,895 | 6,725 |
| 1962 | | | | | | 41.0 | 13.0 | 2.86 | 5,610 | 4,535 | 6,235 |
| 1963 | | | | | | 40.0 | 12.0 | 2.78 | 5,860 | 3,850 | 6,750 |
| 1964 | | | | | | 39.0 | 11.0 | 2.61 | 5,140 | 3,850 | 5,990 |
| 1965 | | | | | | 37.0 | 10.0 | 2.55 | 4,590 | 3,465 | 5,365 |
| 1966 | 29.19 | 3.80 | 1.43 | 4.57 | 19.93 | 35.0 | 9.1 | 2.51 | 5,050 | 3,730 | 5,990 |
| 1967 | | | | | | 32.0 | 8.9 | 2.34 | 4,295 | 3,465 | 4,895 |
| 1968 | | | | | | 29.0 | 8.6 | 2.32 | 4,690 | 3,555 | 5,560 |
| 1969 | | | | | | 28.0 | 8.5 | 2.26 | 4,555 | 3,725 | 5,205 |
| 1970 | 31.44 | 5.53 | 1.88 | 5.53 | 18.51 | 27.0 | 7.6 | 2.18 | 4,272 | 3,680 | 4,715 |
| 1971 | | | | | | 29.4 | 6.8 | 1.97 | 4,553 | 3,861 | 5,211 |
| 1972 | | | | | | 25.5 | 7.9 | 1.87 | 4,077 | 3,548 | 4,585 |
| 1973 | | | | | | 25.3 | 7.2 | 1.77 | 3,736 | 3,043 | 4,440 |
| 1974 | | | | | | 24.6 | 7.0 | 1.71 | 3,497 | 3,267 | 4,743 |
| 1975 | 34.71 | 6.89 | 2.45 | 7.45 | 17.91 | 23.1 | 7.0 | 1.68 | 3,224 | 2,928 | 3,417 |
| 1980 | 38.12 | | | | | 23.3 | 5.3 | — | 2,790 | 2,680 | 3,108 |
| 1990 | | | | | | 19.7* | | | 2,100* | 2,100* | 2,152* |
| 2000 | 50.07* | | | | | 17.2* | | | 2,100* | 2,100* | 2,100* |

Source: Korean Institute for Family Planning - Statistics on Population and Family Planning in Korea, 1978.

*Projected by Korean Development Institute (unpublished).

Table 9. Cumulative Reduction of Births After Migration by Age and Maximum Possible Duration of Urban Residence

| Ages | Maximum Duration of Urban Residence Possible During Migrant's Childbearing Period | Cumulative Reduction of Births After Migration | | |
|---|---|---|---|---|
| | | Seoul | Busan | Other Urban Areas |
| 5-9 | 30-34 | -3.388 | -2.207 | -1.784 |
| 10-14 | 30-34 | -3.388 | -2.207 | -1.784 |
| 15-19 | 30-34 | -3.388 | -2.207 | -1.784 |
| 20-24 | 25-29 | -2.703 | -1.972 | -1.466 |
| 25-29 | 20-24 | -1.798 | -1.486 | -1.154 |
| 30-34 | 15-19 | -1.02 | -1.097 | - .754 |
| 35-39 | 10-14 | - .520 | - .586 | - .391 |
| 40-44 | 5-9 | - .235 | - .333 | - .168 |
| 45-49 | 0-4 | - .095 | - .196 | -. 186 |

Source: Table 4

Table 10. Number of Female Rural-Urban Migrants, 1965-1970, and Aggregate Reduction in Births Due to Adaptation (Thousands)

| | Seoul | | Busan | | Other Cities | |
|---|---|---|---|---|---|---|
| Age | a Migrant Women | b Reduction in Births | a Migrant Women | b Reduction in Births | a Migrant Women | b Reduction in Births |
| 5-9 | 36.9 | 125.0 | 10.7 | 23.6 | 42.7 | 76.2 |
| 10-14 | 46.0 | 155.8 | 11.0 | 24.3 | 50.7 | 90.4 |
| 15-19 | 104.2 | 353.0 | 21.9 | 48.3 | 82.5 | 147.2 |
| 20-24 | 83.3 | 225.2 | 21.0 | 41.4 | 65.6 | 96.2 |
| 25-29 | 56.0 | 100.7 | 16.6 | 24.7 | 50.7 | 58.5 |
| 30-34 | 33.0 | 33.7 | 9.5 | 10.4 | 32.6 | 24.6 |
| 35-39 | 20.4 | 10.6 | 5.3 | 3.1 | 22.5 | 8.8 |
| 40-44 | 13.0 | 3.1 | 3.3 | 1.1 | 14.5 | 2.4 |
| 45-49 | 10.0 | 1.0 | 2.5 | .5 | 10.0 | 1.9 |
| 50 & up | 31.2 | 0.0 | 7.0 | 0.0 | 31.0 | 0.0 |
| Total | 434.0 | 1,008.1 | 108.8 | 177.4 | 402.6 | 506.2 |
| Fertility Reduction Per Migrant Woman* | -- | 2.323 | --- | 1.631 | --- | 1.257 |

Source: a) Tables 3.14, 3.15, 3.16 in Lee et al (1981).
b) Column a x comparable cell in Table 9.

*Column b divided by column a.