Fertility Adaptations by Rural-Urban Migrants in Mexico and Mexican Immigrants to the U.S.*

Bun Song Lee
University of Nebraska at Omaha

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. Despite these concerns with population distribution, 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 rather than less rural-to-urban migrations. 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 the urban population rather than rapid rural-urban migration. 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 studies by Preston (1979), Simmons (1979), Mera (1978a and 1973b), 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. Todaro's rural-urban migration model (1969 and 1981) argued that the 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.

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 the detailed personal migration and pregnancy histories of 5,589 Mexican women aged 20-49 in the 1976 Mexican World Fertility Survey (MWFS). 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 controlling for the selectivity of migrants. Similar results have been obtained from the analyses of Korean data by Lee and Farber (1984). This study expands our analysis by comparing the fertility behavior of rural-urban migrants against that of urban residents and by comparing the fertility adaptation of rural-urban migrations in Mexico with that of Mexican immigrants to the U.S.

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 discusses the data in the 1976 MWFS. Section 4 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 5 presents the empirical results from the estimation of the fertility equation using the 1976 MWFS. Section 6 presents some additional analyses comparing the fertility adaptation of rural-urban migrants in Mexico with that of Mexican immigrants to the U.S. 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.[1] 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 Mexican data. Few empirical studies, however, have found that the fertility adaptation effect of rural-urban migration is significant.[2]

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 the 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 have 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 preference for family sizes. Ribe and Schultz (1980) demonstrate that the unobserved personal preference is an important selectivity characteristic distinguishing migrants from non-migrants.

In order to correct the deficiencies of previous tests for adaptation, we utilize the MWFS data on detailed personal migration and birth histories to develop a first-difference form equation of 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 for unobservable personal family size preferences by holding constant the fertilities at a previous point in time and the fertility rate during the previous period for both rural-urban migrants and rural stayers.

3. The Data

This study is based on the data contained in the 1976 Mexican World Fertility Survey (MWFS).[3] The MWFS has information for 7,310 Mexican women aged 15-49 on migration history,[4] full pregnancy history, history of marital status, employment history of the respondent, and other demographic and socioeconomic characteristics. Because the purpose of this study is to investigate the influence of rural-urban migration on migrant fertility, we are mainly interested in analyzing the data for rural nonmigrants, rural-rural migrants, urban nonmigrants, urban-urban migrants and rural-urban migrants. Therefore, we excluded from the sample 1,130 urban-rural migrants, rural-urban-rural return migrants and all the mixed multistage migrants. Furthermore, 165 women were excluded from our sample because they were either born in a foreign country (69 women) or because their migration history data was incomplete (96 women). We also excluded 407 women aged 15 to 19 from our sample because the MWFS sample for women aged 15-19 is seriously biased. The MWFS excluded from the sample those women aged 15-19 who were both single and

had never had a live birth. Therefore, the size of our initial working sample is 5,608 women. Our sample includes single women and women with marital disruptions in addition to currently married women.

The fertility data of ever married women for the years prior to the survey year, 1976, 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 dummy variables, we chose five observation years at five-year intervals, 1976, 1971, 1966, 1961, and 1956 rather than consecutive years. Whenever a woman's age was younger than 11 years in a year of observation, this woman was omitted in the regression for that year of observation. The fertility histories of women with marital disruption were treated as censored at the point of disruption, rather than at the time of the interview. The observation years coming after the last marital disruption of the currently unmarried woman are excluded from the regression. For the women who married more than once, the observation years which were preceeded by longer than two year of marital disruption during the preceeding five years were excluded from the regression. This exclusion rule for the women who married more than once and who had no qualifying five-year birth interval excluded 19 women from the sample. Therefore, our final sample size is 5,589 women.

Table 1 shows the distribution of our working sample, 5,589 women by the residence and migration status. The share of urban residents out of total sample, 67.2 percent is consistent with the share of urban population in Mexico, 60 percent in 1970 and 67 percent in 1980 which were based on census data. See Unikel (1977) Tables 8.13 and 8.14. The total number of rural-urban migrant women is 1,137 and 20.3 percent of our total sample. Urban refers to localities of twenty-five hundred or more inhabitants. Rural nonmigrants and urban nonmigrants are rural and urban residents, respectively, who never

changed their residence for more than a six month duration. Rural-rural migrants and urban-urban migrants are defined as women who changed their residence from one rural area to another rural area and from one urban area to another urban area, respectively. Rural-urban migrants are those whose current residence is urban but whose birthplace is rural and who never returned to a rural area for more than a six month duration after she left a rural area initially.[5] Therefore, our analysis includes multistage migrants with an uni-direction pattern but excludes multistage migrants who returned to a similar type of place from where she originated.

Table 2 shows the distributions of our sample women by current age groups and Table 3 by type of marriages and migration status.

4. The Basic Regression Model

The multivariate regression model which compares the fertility of rural-urban migrants with that of rural stayers (rural nonmigrants, and/or rural-rural migrants) is

$$
\begin{aligned}
1)\quad Y_t - Y_{t-1} = {} & \beta_0 (Y_{t-1} - Y_{t-2}) + a_1 DYR76 + a_2 DYR71 + a_3 DYR66 + a_4 DYR61 + a_5 DYR56 \\
& + a_6 A_t DYR76 + a_7 A_t^2 DYR76 + a_8 A_t DYR71 + a_9 A_t^2 DYR71 \\
& + a_{10} A_t DYR66 + a_{11} A_t^2 DYR66 + a_{12} A_t DYR61 + a_{13} A_t^2 DYR61 \\
& + a_{14} A_t DYR56 + a_{15} A_t^2 DYR56 \\
& + \alpha_1 M_{72-76} + \alpha_2 M_{67-71} + \alpha_3 M_{62-66} + \alpha_4 M_{57-61} \\
& + \alpha_5 M_{52-56} + \alpha_6 M_{47-51} + \alpha_7 M_{42-46} + \alpha_8 M_{41} \\
& + \gamma_{01} DU_{0-4} DS1 + \gamma_{11} DU_{5-9} DS1 + \gamma_{21} DU_{10-14} DS_1 \\
& + \gamma_{31} DU_{15-19} DS1 + \gamma_{41} DU_{20-24} DS1 \\
& + \gamma_{51} DU_{25-29} DS1 + \gamma_{61} DU_{30-34} DS1 + \gamma_{71} DU_{35-39} DS1 \\
& + \gamma_{02} DU_{0-4} DS2 + \text{----------} + \gamma_{72} DU_{35-39} DS2 \\
& + \gamma_{03} DU_{0-4} DS3 + \text{----------} + \gamma_{73} DU_{35-39} DS3 \\
& + \gamma_{04} DU_{0-4} DS4 + \text{----------} + \gamma_{74} DU_{35-39} DS4 \\
& + \varepsilon_t
\end{aligned}
$$

Where Y_t is children ever born by year t, A_t is age at time t, A_t^2 is the squared value of A_t. DYR76, DYR71, DYR66, DYR61 and DYR56 are dummy variables reflecting the calender years of observations. For example, the value of DYR76 is 1 when the year of observation is 1976, otherwise zero. M_{72-76}, M_{67-71}, M_{62-66}, M_{57-61}, M_{52-56}, M_{47-51}, M_{42-46}, and M_{41} are dummy variables reflecting migration cohorts. For example, the value of M_{72-76}, is 1 when the women migrated during the period of 1972 through 1976, otherwise zero and the value of M_{41} is 1 when the woman migrated before 1942. DU_{0-4}, DU_{5-9}, DU_{10-14}, DU_{15-19}, DU_{20-24}, DU_{25-29}, DU_{30-34} and DU_{36} are dummy variables reflecting the duration of urban residence for migrants. For example, the value of DU_{0-4} is 1 when the woman has spent between 0 and 4 years by the year of observation t, in urban areas since her migration, otherwise zero and the value of DU_{36} is 1 when the woman has spent more than 34 years in urban areas since her migration.

The dependent variable in Equation (1) is the age-specific fertility rate, $Y_t - Y_{t-1}$ instead of children ever born, Y_t. Since the years of observation are at the five year intervals, $Y_t - Y_{t-1}$ will be the additional fertility which occurred during the previous five year period. It is not unreasonable to assume that the increments to fertility levels $Y_t - Y_{t-1}$ are more influenced by the current lifestyle, say in urban areas (reflecting the adaptation effect), and less influenced by the age at marriage or education levels occurred in the earlier life-cycle (reflecting the selectivity effect) than the fertility levels by itself, Y_t. Equation (1) is the first difference form of the autoregressive model which controls for the unobserved preference for family size by equalizing the fertility levels at the previous period (say, five years ago) between rural-urban migrants and rural stayers. Due to the first difference form of Equation (1), one does not need to include the intercept term and the variables reflecting the socioeconomic characteristics

obtained in the earlier life-cycle. The changes in socioeconomic characteristics occurred after the migration should not be controlled in Equation (1) because fertility adaptation of the rural-urban migration works through the changes in these socioeconomic variables. For example, if we control for the changes in schooling or the age at marriage after the migration, we would underestimate the total fertility effect of migration.

The variable, $Y_{t-1} - Y_{t-2}$ is included in Equation (1) as an independent variable in order to control for the selectivity of the migrant. We assume that the individual's preference for the family size is reflected in the previous period's fertility rate of that person.

The calendar year of observations dummy variables, DYR_{76} ..., captures the trends in the general fertility behavior of the time. The interaction terms between age variables and the year of observation dummy variables capture the differences in the influence of age variables over the different time periods. The age variables control for four factors, namely, biological ability for pregnancy, life cycle pattern of deliberate birth control, birth cohort effect and the difference in age distributions between migrant and non-migrant samples.

The migration cohort dummy variables, M's are expected to capture the differences in the selectivity of migration among different migration cohorts. The duration of urban residence dummy variables, DU's are expected to capture the fertility adaptation effects of rural-urban migration.

DS1, DS2, DS3 and DS4 are the dummy variables reflecting the sizes of urban destinations. The value of DS1 is 1 when the woman moved to the small city with a population of 2,500 through 20,000, otherwise zero; DS2 = 1 when moved to a medium size city of 20,000 - 500,000 people; DS3=1 when moved to a large city of population with more than 500,000 but excluding Mexico City; and DS4 = 1 when moved to Mexico City Metropolitan Areas (hereafter called Mexico

City).[6] In order to investigate the influence of the size of the urban destinations on the fertility adaptation effect Equation (1) includes the interaction terms between the duration of urban residence dummy variables, DU's, and the size of urban destination dummy variables.

Tables 4-6 present the distribution of the sample observations utilized in the estimation of Equation (1) according to the year of observation by migration status, current age groups and the types of marriages, respectively. Tables 7 and 8 present the distribution of the sample observations for rural-urban migrants by the year of observation and year at migration, and for urban residents by the city size classes and migration status, respectively.

Before the regression results of Equation (1) are presented, one should discuss why Equation (1) is not over identified. If every observation for the rural-urban migrants always has the value of 1 for one of the M's dummy variable groups and the value of 1 for one of the DU's dummy variable groups, then Equation (1) will suffer from the perfect multicollinearity problem. However, Equation (1) avoids this problem because all the observations of the migrants occurred before their migration would not have the value of 1 for any of the DU's dummy variable groups which reflect the duration of urban residence since their migrations.

5. The Regression Results

The full regression results of Equation (1) are reported in the first three columns of Table 9. The first column of Table 9 shows the coefficient estimates when the rural-urban migrant sample is compared against the rural stayers sample which includes both rural-rural migrants and rural nonmigrants. The second and third colums of Table 9 show the results when the rural-urban migrant sample is compared against the rural-rural migrant or rural nonmigrant samples only.

The results for these three different comparison groups are similar. However, the results against the comparison group of rural-rural migrants (Column 2) shows the strongest fertility adaptation effect of migration. In order to simplify our discussion we will discuss the results from Column 1 only.

The coefficient estimates for the migration cohort dummy variables, M's, indicate that the selectivity of rural-urban migration favored significantly lower fertility rates for migration cohorts 1972-76, 1962-66, and 1957-61. The reasons for the selectivity of these migration cohorts are not clear to the author.

The coefficient estimates for the interaction terms between the duration of urban residence dummy variables and the size of urban destination dummy variables reveal some interesting results for the fertility adaptation effect of rural-urban migration. Rural-urban migrants to small cities with populations of 2,500-20,000 do not have any statistically significant fertility adaptation effect. Migrants to medium size cities with a population of 20,000-500,000 and to large cities excluding Mexico City with population of more than 500,000 begin to have significant fertility adaptation effects after they have spent at least 20 years in urban areas and maintain their significant adaptation effects during the succeeding 15 years. Migrants to Mexico City Metropolitan Areas show significant fertility adaptation effect after they have spent at least 15 years and maintain their significant adaptation effects during the succeeding 15 years.

The summations of the coefficient estimates for all the duration of urban residence dummy variables for each size of urban destinations reveal that migrants to small cities would have approximately .31 fewer children during their hypothetical 40 years of urban residence than they would have had if they had not migrated. This is the weakest adaptation effect of rural-urban

migration among different sizes of cities. Migrants to medium size cities and to Mexico City would have approximately 1.2 fewer children and migrants to large cities 1.0 fewer children during their 40 years of urban residence than they would have had if they had not migrated.

The above results reveal a little weaker adaptation effect than those presented in our major report, Lee et. al. (1983). In that report we showed that migrants to small cities and medium cities would have 1.3 fewer children, migrants to large cities, 1.4 fewer children, and migrants to Mexico City, 1.9 fewer children during their 40 years of urban residence than they would have had if they had not migrated. The results in the report indicated that migrants to Mexico City would reduce their fertility significantly more than migrants to smaller size cities would reduce their fertilities. These significant differences in results between the current paper and our major report are mainly due to the fact that we added the variable, $Y_{t-1} - Y_{t-2}$ to Equation (1) as an independent variable whereas the similar equation in the report did not include this variable. We prefer to include this variable because we felt that the preference for family size should be reflected in the previous fertility rates as well as in the fertility level at the previous period. Furthermore, Equation (1) is more consistent with the first difference form of the autoregressive model originally suggested by Ashenfelter (1978).

Results in the first three columns of Table 9 suggest clearly that the adaptation to urban contraints and fertility norms is a significant factor explaining the lower fertility of rural-urban migrants moved to cities of more than 20,000 people compared with rural stayers. Migrants to small cities of 2,500 to 20,000 people do not show any significant fertility adaptation effect. The small cities may be too small to provide adequate urban environments discouraging large family sizes.

The fourth column of Table 9 reports the regression results of an equation similar to Equation (1) when the rural-urban migrant sample is compared against the urban residents sample which includes both urban nonmigrants and urban-urban migrants. The fifth and sixth columns of Table 9 show the results when the rural-urban migrant sample is compared against the urban nonmigrant or urban-urban migrant sample only, respectively.

The equation estimated for the last three columns of Table 9 includes the additional interaction terms between the size of urban destination dummy variables and the dummy variables reflecting the periods before migration. DUB_{1-5}, DUB_{6-10}, DUB_{11-15} and DUB_{16-20} have the value of 1 when the observation is for the rural-urban migrant and for the year which is 1 to 5, 6 to 10, 11 to 15 or 16 to 20 years before her migration, respectively. When we use the comparison group of rural stayers, we dropped these dummy variables because our preliminary results reported in our report, Lee et al (1983) showed that coefficients for all of these dummy variables are not significantly different from zero. In other words, when we control for the fertility rates in the period of 5 to 9 years ago, $Y_{t-1} - Y_{t-2}$, there were no significant difference in fertility rates, $Y_t - Y_{t-1}$ between women who never migrated until the survey year 1976 and women who had not migrated until the year of observation but migrated later before the survey year.

When we use the comparison group of urban-born urban residents sample, we cannot drop the dummy variables reflecting the periods before migration. Our working hypothesis is that rural-urban migrants are likely to have higher fertilities than urban natives before their migration to urban areas and their fertility rates would be lowered approaching or even becoming lower than the fertility rates of urban natives after a certain duration of the exposure to urban life styles. Therefore, it is necessary to include these dummy variables for the regressions reported at the last three columns of Table 9.

In order to avoid the problem of perfect multicollinearity for the regression reported at the fourth column of Table 9 we assumed that migration cohort effects are relevant for both rural-urban migrants and urban-urban migrants but the duration of urban residence effects are relevant only for rural-urban migrants. Of course neither of these effects are relevant for the urban nonmigrants. We cannot use this method for the regressions reported in the fifth and sixth columns of Table 9 which uses only one of urban non-migrants sample or urban-urban migrants sample as the comparison group. Instead, for these regressions, we assumed that the migration cohorts effects are not relevant at all. This simplifying assumption has some theoretical justification. If the major determinant of the migration cohort effects is urban-pull factors, then the migration cohort effects may not be significant when the comparison group is the urban-born urban residents sample, though they are significant when the comparison group is the rural stayers sample. It is important to note that the coefficient estimates for the interaction terms between the duration of urban residence dummy variables and the sizes of urban destination dummy variables are not significantly different among the results reported in columns 4, 5, and 6 of Table 9. The results for the urban nonmigrants comparison group seem to reveal a little stronger fertility adaptation effect of rural-urban migration than the other two comparison groups. To simplify our discussion, we will discuss only the results in the fourth column of Table 9 in the following.

Coefficient estimates for the migration cohorts dummy variables indicate that rural-urban migrants who migrated between 1967 and 1971 had strong preferences for a large family size compared with urban residents. This result is consistent with the results at the first three columns of Table 9. The results for the rural stayers comparison group indicated that all the migra-

tion cohorts during the period 1957 through 1976 with the exception of the migration cohort of 1967-71 revealed significant selectivities in terms of lower family size preferences.

Coefficient estimates for the interaction terms between the duration of urban residence variables and the sizes of urban destinations variables at the fourth column of Table 9, show some interesting results even though they are not conclusive. Rural-urban migrants to small cities appear to have significantly higher fertility rates until they have lived in urban areas at least 14 years than the average urban born urban residents. After the 14 years of urban residence they seem to approach to the lower fertility rates of urban residents. The insignificant fertility differentials for the periods of more than 10 years before migration might be due to the fact that for most women these periods were too early in their childbearing periods to show any significant fertility differentials. The insignificant fertility differentials for the periods between 5 years before migration and 4 years after migration might be due to the disruption effect on fertility of migration right before or after the movement.

Rural-urban migrants to medium size cities appear to have higher fertility rates until they have lived in urban areas at least nineteen years compared the average urban residents. During the period of 20 to 24 years after migration, migrants have significantly lower fertility rates than the average urban residents and then maintain similar fertility rates. Rural-urban migrants to large cities appear to have significantly higher fertility rates until they have lived in urban areas at least ten years and then approach to and maintain the fertility rates of the average urban resident. Migrants to Mexico City appear to have significantly higher fertility rates until they have lived at least ten years in urban areas and then approach to the fer-

tility rates of the average urban residents. During the periods of 15 to 19 years after migration, migrants to Mexico City reveal significantly lower fertility rates than the average urban resident.

Results for the urban resident comparison groups are not conclusive like those for the rural stayers comparison groups. However, these results are somewhat interesting because this is the first attempt in the literature to do a regression analysis comparing the fertility rates of rural-urban migrants against those of urban-born urban residents. The results seem to indicate that rural-urban migrants are not highly selective in terms of lower fertility rates and that rural-urban migrants with higher fertility rates than urban residents reduce their fertility rates after they are exposed to urban lifestyles for a certain duration.

6. Comparison of the Fertility Levels of Mexican Immigrants to the United States With Those of Mexican Women in MWFS.

Table 10 compares the fertility levels of Mexican immigrants with those of Mexican women in MWFS data according to migration status. The data on children-ever-born to ever-married immigrant women to U.S. were derived from Table 2 in Bean et al. (1984). Table 10 indicates that the fertility levels of Mexican immigrants to the U.S. are very similar to those of urban-urban migrants in Mexico which have the lowest fertility levels among different women migrants in Mexico. We do not currently have information on how large the proportion of Mexican immigrants to the U.S. is from rural areas. Unless the majority of the immigrants are from urban areas in Mexico, we should infer that immigrants' fertility levels are on the average lower than those of the stayers in Mexico.

The reasons for the lower fertility levels of immigrants to the U.S. could be due to either the selectivity of the immigrant or the adaptation to the U.S. lifestyle which discourages large family sizes. In order to have some insights on the selectivity of immigrants Table 11 compares the educational distribution of immigrants to the U.S. with those of stayers in Mexico according to migration status. It is very clear that education levels of immigrants to the U.S. are much higher than those of stayers in Mexico. Only 62.2 percent of the immigrants had the lowest education level of 0 to 8 years of schooling whereas 75.1 percent of urban-urban migrants in Mexico had the lowest education level. In particular, 25.4 percent of immigrants had at least 12 years of schooling whereas only 6 percent of urban-urban migrants had at least 12 years of schooling. It is not clear whether the higher education levels of immigrants are obtained before or after the immigration. If the higher education levels were obtained before immigration, Table 11 clearly indicates that the lower fertility levels of immigrants shown in Table 10

are mainly due to the selectivity of the immigrants in terms of socioeconomic characteristics. If the higher education levels were obtained as the result of immigration, then the lower fertility levels of immigrants are due to the adaptation effect of immigration to the U.S. which works through the increased education levels. More than six times the proportion with 12 years of schooling for immigrants compared with stayers in Mexico seem to imply that the higher education levels of immigrants is the result of immigration to the U.S. where 12 years of education is compulsory.

The analysis in this section is rather simplistic. However, the results here reveal a good potential for future research in comparing the fertility levels of immigrants with those of stayers in home countries. The literature compares the fertility levels of immigrants to the U.S. with those of the U.S. natives.

7. Summary and Conclusions

In this paper we have applied an autoregressive model to the 1976 Mexican World Fertility Survey data to test our adaptation hypothesis. The advantage of the first difference form of the autoregressive model used in this paper is that it controls partially for the selectivity of migration by comparing the 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 rates during the previous five-year 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 after migrants had spent a certain period in urban areas, even after controlling for fertility rates at the beginning of each period. We found that cumulative adaptation varied across urban areas. Migrants to small cities would have approximately .31 fewer children during their hypothetical 40 years of urban residence than they would have had if they had not migrated. This is the weakest adaptation effect of rural-urban migration among different sizes of cities. Migrants to medium size cities and to Mexico City would have approximately 1.2 fewer children and migrants to large cities 1.0 fewer children during their 40 years of urban residence than they would have had if they had not migrated.

Results for the urban resident comparision groups are not conclusive like those for the rural stayers comparison groups. However, these results are somewhat interesting because this is the first attempt in the literature to do a regression analysis comparing the fertility rates of rural-urban migrants against those of urban-born urban residents. The results seem to indicate that rural-urban migrants are not highly selective in terms of lower fertility rates and that rural-urban migrants with higher fertility rates than urban residents reduce their fertility rates after they are exposed to urban lifestyles for a certain duration.

Results for the comparison of the fertility levels of immigrants to the U.S. with those of stayers in Mexico are interesting in pointing out a good potential for the future research which has been ignored so far in the literature.

Footnotes

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[1]For a detailed discussion of the adaptation hypothesis and the selection hypothesis refer to Lee and Farber (1984).

[2]The extensive review 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), Ribe and Schultz (1980), and Lee et. al. (1981).

[3]The 1976 Mexican World Fertility Survey (MWFS) data was collected during the time period July 19, 1976 through March 5, 1977, by Director General of Statistics, Mexican Department of Family Planning with the assistance of personnel from World Fertility Survey office as part of the World Fertility Survey. It is composed of three questionnaires, namely, Community, Household and Individual. The individual questionnairees included data for 7,672 women, aged 15-49, in the sample on the following items: migration history, full pregnancy history, knowledge and uses of contraceptives, maternal child care, history of marital status, employment history of the respondent, background of the husband, and other demographic and socioeconomic characteristics. Eligible women included in this survey are all women aged 20-49, and women aged 15-19 who are either ever married women or single women who have had at least one live birth.

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. The

1970 Population Census enumeration districts were used as the primary sampling units, with households in the selected primary sampling units consisting of the ultimate sampling units. Sample sizes of 14,350 households were initially drawn for the Household Survey. However, only 13,739 households were actually surveyed because some dwellings had been found to be unoccupied. Questionnaires were completed for 95.2 percent of the surveyed household sample or 13,080 households. From 13,080 households, 13,586 eligible women or 1.039 eligible women per household were identified. Out of 13,586 eligible women 7,992 women or one woman per 1.7 eligible women were selected for the Individual Survey. In fact, 7,672 or 96 percent of them were successfully interviewed for the Individual Survey. Out of 7,672 women 362 women did not provide complete information on important items such as ages. Therefore, the valid sample size for the Individual Survey is 7,310 women aged 15-49.

[4]Migration histories of women includes the information on the year of movement and the state name and size of the community for each of a maximum of six movements.

[5]An urban area for the current residence is defined as a locality with a population of more than 2,500 people in the survey year, 1976 and that for the previous residence is defined as a locality of more than 2,500 people at the time of movement.

[6]The sizes of urban destinations were measured at the time of migration.

Table 1. Distribution of Mexican Women Sample by Migration Status

Migration Status	No. of Women	Percentage
Rural Residents	1,832	32.8
Rural nonmigrant	1,020	18.3
Rural-rural migrant	812	14.5
Urban Residents	3,757	67.2
Urban nonmigrant	1,248	22.3
Rural-urban migrant	1,137	20.3
Urban-urban migrant	1,372	24.6
Total	5,589	100.0

Table 2 Distribution of Mexican Women Sample by Current Age Group

Age Group	No. of Women	Percentage
20-24	1,433	25.6
25-29	1,155	20.7
30-34	937	16.8
35-39	848	15.2
40-44	667	11.9
45-49	549	9.8
Total	5,589	100.0

Table 3. Distribution of Mexican Women Sample by the Type of Marriage and Migration Status

Type of Marriage	Migration Status: Rural Nonmigrant N	%	Rural-rural Migrant N	%	Urban non-migrant N	%	Rural-Urban Migrant N	%	Urban-Urban Migrant N	%	Total N	%
Single	154	16.9	37	4.1	339	37.1	154	16.9	230	25.2	194 (16.4%)	100
Currently Married According to Civil Law	715	19.5	598	16.3	721	19.6	736	20.0	907	24.7	3,677 (65.8%)	100
Currently Married According to Common Law	97	18.0	117	21.7	92	17.1	128	23.8	105	19.5	539 (9.6%)	100
Divorced Separated or Widowed	54	11.8	60	13.1	96	20.9	119	25.9	130	28.3	459 (8.2%)	100
Total	1,020	18.3	812	14.5	1,248	22.3	1,137	20.3	1,372	24.6	5,589 (100%)	100

Table 4. Distribution of Total Number of Observations by Year of Observation and Migration Status

Migration Status	Years of Observations					
	1956	1961	1966	1971	1976	Total
Rural nonmigrant	521	705	937	990	969	4,122
Rural-rural migrant	466	608	752	767	755	3,348
Urban nonmigrant	483	755	1,111	1,205	1,157	4,711
Rural-urban migrant	630	827	1,047	1,069	1,023	4,596
Urban-urban migrant	653	932	1,256	1,300	1,248	5,389
Total	2,753	3,827	5,103	5,331	5,152	22,166

Table 5. Distribution of Total Number of Observations by Year of Observation and Current Age Groups

Age Groups	Years of Observation					
	1956	1961	1966	1971	1976	Total
20-24	0	0	1,110	1,430	1,380	3,920
25-29	0	903	1,152	1,130	1,095	4,280
30-34	713	934	913	894	875	4,329
35-39	846	830	802	785	759	4,022
40-44	658	643	634	623	591	3,149
45-49	536	517	492	469	452	2,466
Total	2,753	3,827	5,103	5,331	5,152	22,166

Table 6. Distribution of Total Number of Observations by Year of Observation and the Type of Marriage

Type of Marriage	Years of Observations					
	1956	1961	1966	1971	1976	Total
Single	180	340	762	914	914	3,110
Currently Married According to Civil Law	2,003	2,780	3,507	3,645	3,666	15,601
Currently Married According to Common Law	266	360	482	501	526	2,135
Divorced, Separated or Widowed	304	347	352	271	46	1,320
Total	2,753	3,827	5,103	5,331	5,152	22,166

Table 7. Distribution of Observations for Rural-Urban Migrants by Year of Observation and Year at Migration

Year at Migration	Years of Observations					
	1956	1961	1966	1971	1976	Total
1972-76	19	34	68	78	74	273
1967-71	43	82	156	169	158	608
1962-66	68	123	179	187	178	735
1957-61	88	133	175	177	172	745
1952-56	124	154	174	171	162	785
1947-51	124	141	141	139	136	681
1942-46	97	96	93	88	86	460
Before 1942	67	64	61	60	57	309
Total	2,753	3,827	5,103	5,331	5,152	22,166

Table 8. Distribution of Observations for Urban Residents by City Size Classes and Migration Status

Migration Status	Small Cities (2,500 to 20,000)	Medium Cities (20,000 to 500,000)	Large Cities excluding Mexico City (500,000 +)	Mexico City	Total
Urban Nonmigrant	879	353	1,511	1,968	4,711
Rural-Urban Migrant	768	624	1,697	1,507	4,596
Urban-Urban Migrant	375	559	2,192	2,263	5,389
Total	2,022	1,536	5,400	5,738	14,696

Table 9: Regression Results of Equation (1) for Mexican Women Sample of Rural-Urban Migrants and Different Comparison Groups

COMPARISON GROUPS.

Independent Variables	Rural Nonmigrant and Rural-Rural Migrant		Rural-Rural Migrant		Rural Nonmigrant		Urban Nonmigrant and Urban-Urban Migrant		Urban Nonmigrant		Urban-Urban Migrant	
	$\hat{\beta}$	t	$\hat{\beta}$	t	$\hat{\beta}$	t	$\hat{\beta}$	t	$\hat{\beta}$	t	$\hat{\beta}$	t
$Y_{t-1} - Y_{t-2}$	.345	36.0	.319	27.05	-.381	33.96	.379	43.11	.394	35.97	.362	34.08
DYR76	-.241	-.79	.005	.01	-.076	-.22	-.031	-.12	-.401	1.22	.561	1.69
DYR71	-3.813	-16.10	-3.525	-12.86	-3.273	-13.44	-3.534	-19.60	-3.586	-16.15	-3.375	-14.73
DYR66	-3.066	-19.23	-3.264	-15.98	-2.832	-15.94	-2.537	-19.49	-2.752	-16.49	-2.732	-16.08
DYR61	-3.210	-14.71	-2.945	-10.87	-2.998	-11.82	-2.646	-14.06	-2.508	-10.98	-2.644	-11.21
DYR56	-2.508	-7.46	-3.335	-5.65	-2.345	-6.05	-1.661	-5.54	-2.005	-5.35	-1.556	-4.35
A_t * DYR76	.114	5.94	.106	4.32	.094	4.22	.073	4.34	.073	4.43	.044	2.11
A_t^2* DYR76	-.002	-8.22	-.002	-6.24	-.002	-5.95	-.002	-6.45	-.002	-5.92	-.001	-4.09
A_t * DYR71	.327	20.70	.330	16.31	.311	17.09	.318	23.17	.321	19.93	.308	17.93
A_t^2* DYR71	-.006	-20.61	-.006	-16.86	-.005	-16.98	-.005	-22.30	-.006	-19.63	-.005	-17.98
A_t * DYR66	.315	22.19	.338	19.80	.295	18.07	.261	21.02	.274	17.84	.269	17.51
A_t^2* DYR66	-.006	-19.28	-.006	-16.57	-.005	-15.53	-.006	-17.78	-.005	-15.39	-.005	-14.97
A_t * DYR61	.331	15.73	.304	11.69	.311	12.70	.264	14.09	.250	10.91	.262	11.29
A_t^2* DYR61	-.006	-12.72	-.005	-9.15	-.006	-10.30	-.005	-10.79	-.004	-8.27	-.005	-8.72
A_t * DYR56	.249	6.38	.232	5.31	.236	5.71	.148	4.55	.186	4.60	.134	3.47
A_t^2* DYR56	-.004	-4.33	-.003	-3.07	-.004	-3.57	-.002	-1.87	-.003	-2.54	-.001	-1.17
M_{72-76}	-.141*	-2.39	-.163*	-3.0	-.108*	-1.82	.020	.49				
M_{67-71}	-.049	-1.04	-.084*	-1.69	-.030	-.62	.061*	2.03				
M_{62-66}	-.112*	-2.15	-.138*	-2.49	-.108*	-2.02	.021	.72				
M_{57-61}	-.115*	-1.23	-.132*	-2.01	-.121*	-1.93	.026	.92				
M_{52-56}	-.093	-1.23	-.094	-1.23	-.102	-1.41	.007	.26				
M_{47-51}	-.120	-1.58	-.126	-1.44	-.146*	-1.77	-.009	-.30				
M_{42-46}	-.057	-.65	-.059	-.58	-.090	-.94	-.007	-.20				
M_{41}	-.036	-.35	-.041	-.35	-.065	-.58	-.042	-1.12				
DUB_{16-20} * DS1							.145	.51	.184	.65	.166	.57
DUB_{11-15} * DS1							.166	.94	.222	1.28	.222	1.25
DUB_{6-10} * DS1							.297*	2.36	.342*	2.79	.347*	2.76
DUB_{1-5} * DS1							.077	.80	.111	1.17	.115	1.18
DU_{0-4} * DS1	-.015	-.18	-.025	-.27	.007	.07	.071	.89	.108	1.37	.091	1.12
DU_{5-9} * DS1	.192	2.12	.168	1.78	.231	2.52	.312*	4.02	.341*	4.43	.317*	4.03
DU_{10-14} * DS1	.159	1.54	.130	1.20	.204	1.95	.296*	3.32	.295*	3.45	.281*	3.21
DU_{15-19} * DS1	.019	.16	-.001	-.01	.061	.51	.173	1.79	.161	1.67	.174	1.76
DU_{20-24} * DS1	-.216	-1.55	-.238	-1.61	-.171	-1.19	-.030	-.26	-.063	-.54	-.035	-.30
DU_{25-29} * DS1	-.233	-1.31	-.257	-1.37	-.187	-1.03	-.032	-.21	-.075	-.49	-.050	-.31
DU_{30-34} * DS1	-.175	-.68	-.196	-.74	-.128	-.49	.085	.36	.021	.09	.068	.29
DU_{36} * DS1	-.038	-.10	-.060	-.15	-.032	-.08	.193	.49	.096	.26	.145	.39
DUB_{16-20} * DS2							.681	1.07	.706	1.12	.705	1.09
DUB_{11-15} * DS2							.233	.96	.308	1.28	.288	1.17
DUB_{6-10} * DS2							.224	1.33	.268	1.61	.276	1.62
DUB_{1-5} * DS2							-.125	-1.0	-.083	-.67	-.084	-.66
DU_{0-4} * DS2	-.012	-.11	-.030	-.28	.017	.16	.078	.81	.114	1.19	.095	.97
DU_{5-9} * DS2	-.134	-1.34	-.152	-1.47	-.098	-.98	-.032	-.36	-.007	-.08	-.018	-.20
DU_{10-14} * DS2	.257	2.39	.224	1.99	.308	2.82	.391*	4.33	.395*	4.40	.388*	4.24
DU_{15-19} * DS2	-.079	-.68	-.103	-.83	-.032	-.27	.081	.85	.075	.80	.072	.75
DU_{20-24} * DS2	-.449*	-3.40	-.470*	-3.32	-.407*	-2.99	-.261*	-2.37	-.295*	-2.70	-.267*	-2.39
DU_{25-29} * DS2	-.313*	-1.82	-.339*	-1.86	-.278	-1.57	-.126	-.84	-.161	-1.08	-.155	-1.02
DU_{30-34} * DS2	-.403*	-1.69	-.427*	-1.72	-.350	-1.45	-.124	-.58	-.189	-.89	-.151	-.69
DU_{36} * DS2	-.055	-.16	-.083	-.23	-.028	-.08	.194	.61	.107	.34	.159	.49
DUB_{16-20} * DS3							.520	1.15	.559	1.25	.542	1.19
DUB_{11-15} * DS3							.064	.33	.109	.57	.117	.60
DUB_{6-10} * DS3							-.019	-.17	.024	.22	.022	.19
DUB_{1-5} * DS3							-.005	-.07	.035	.47	.031	.41
DU_{0-4} * DS3	-.033	-.44	-.049	-.65	-.003	-.03	.054	.85	.090	1.45	.079	1.10
DU_{5-9} * DS3	.041	.55	.014	.19	.085	1.13	.153*	2.69	.178*	3.15	.160*	2.78
DU_{10-14} * DS3	-.121	-1.54	-.146*	-1.72	-.074	-.90	-.001	-.02	.006	.11	.001	.02
DU_{15-19} * DS3	-.082	-.95	-.118	-1.24	-.018	-.20	.086	1.49	.085	1.49	.072	1.23
DU_{20-24} * DS3	-.183*	-1.65	-.216*	-1.95	-.128	-1.22	.006	.09	-.017	-.25	-.012	-.17
DU_{25-29} * DS3	-.215*	-1.84	-.235*	-1.84	-.162	-1.33	.002	.02	-.036	-.44	-.021	-.26
DU_{30-34} * DS3	-.330*	-2.30	-.350*	-2.21	-.295*	-1.94	-.088	-.79	-.153	-1.39	-.104	-.93
DU_{36} * DS3	-.068	-.32	-.091	-.40	-.062	-.28	.150	.92	.064	.35	.112	.61
DUB_{16-20} * DS4							-.173	-.33	-.150	-.29	-.150	-.28
DUB_{11-15} * DS4							-.292	-1.16	-.229	-.95	-.233	-.95
DUB_{6-10} * DS4							.062	.55	.103	.93	.099	.87
DUB_{1-5} * DS4							-.102	-1.34	-.062	-.83	-.064	-.84
DU_{0-4} * DS4	-.121	-1.68	-.140*	-1.89	-.087	-1.21	-.034	-.56	.002	.03	-.021	-.34
DU_{5-9} * DS4	-.005	-.06	-.033	-.43	.045	.61	.116*	2.08	.140*	2.55	.120*	2.14
DU_{10-14} * DS4	-.098	-1.24	-.128	-1.50	-.043	-.53	.044	.78	.054	.95	.041	.71
DU_{15-19} * DS4	-.306*	-3.37	-.339*	-3.40	-.246*	-2.59	-.137*	-2.12	-.142*	-2.22	-.144*	-2.21
DU_{20-24} * DS4	-.269*	-2.52	-.306*	-2.60	-.208*	-1.85	-.071	-.90	-.093	-1.19	-.087	-1.10
DU_{25-29} * DS4	-.241*	-1.86	-.263*	-1.95	-.191	-1.40	-.026	-.26	-.063	-.63	-.047	-.46
DU_{30-34} * DS4	-.123	-.72	-.143	-.78	-.091	-.51	.117	.82	.055	.39	.096	.66
DU_{36} * DS4	.002	.01	-.013	-.05	-.022	-.08	.177	.77	.089	.39	.140	.60
No. of Observations	12,066		7,944		8,718		14,696		9,307		9,985	
R^2	.6579		.6487		.6425		.5773		.5887		.5821	
$\bar{R}^2$	.6563		.6462		.6402		.5752		.5869		.5794	

* The critical t-value for the one-tail tests for the first three columns at the five percent level of significance is 1.645.

* The critical t-value for the two-tail tests for the last three columns at the five percent level of significance is 1.960.

Table 10: Mean Number of Children-Ever-Born to Mexican Ever-Married Women by Age, Migration Status, and Immigration Status

Age Group	Rural Nonmigrants	Rural-rural Migrants	Urban Nonmigrants	Urban-Urban Migrants	Rural-Urban Migrants	Immigrants to U.S.A.[a]
20-24	2.28	2.40	1.54	2.05	1.85	1.925
25-29	3.97	4.09	3.16	2.81	3.26	3.01
30-34	5.64	5.65	4.73	4.38	4.72	4.292
35-39	7.59	7.33	5.59	5.37	5.73	
(35-44)	(7.85)	(7.61)	(6.18)	(5.60)	(6.05)	5.637
40-44	8.26	7.91	6.99	5.93	6.44	
45-49	8.03	7.89	6.54	6.07	7.10	

[a]The fertility data for Mexican immigrants to the U.S. are from Bean et. al. (1984), Table 2 which was based on the 1970 Public Use sample (15% State Tape) of U.S. Population Census.

Table 11: Educational Distribution (in percent) of Mexican Ever-Married Women by Migration Status and Immigration Status

Mean Years of Schooling	Rural Nonmigrants	Rural-rural Migrants	Urban Nonmigrants	Urban-Urban Migrants	Rural-Urban Migrants	Immigrants to U.S.A.[a]
0-8	99.5	98.3	77.9	75.1	92.2	62.2
9-11	.5	.9	17.4	18.9	6.2	12.4
12	0	.7	2.3	2.8	1.1	18.2
13-15	0	.1	2.0	2.0	.5	5.1
16+	0	0	.4	1.2	0	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

[a]The education data for Mexican Immigrants to the U.S. are from Bean et. al. (1981) Table 11 which was based on 1970 Public Use sample of U.S. Population Census.

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