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Mr. Avrom Bendavid-Val
Regional and Rural Development Division
Office of Multisectoral Development
Bureau for Science and Technology
Agency for International Development
Washington, D.C. 20523

Dear Mr. Bendavid-Val:

For your reference, I have enclosed a copy of my paper, entitled "The Effect of Marital Dissolution and Rural-Urban Migration on Fertility in Cameroon," to be presented at the Western Economic Association Meeting, Anaheim, California, on July 3, 1985. This paper is a sequel to my paper on the migration-fertility relationship in Cameroon, presented at the PAA meeting in Boston in March, 1985, which I sent to you earlier. I have also enclosed reprints of two of my recently published papers.

Sincerely yours,

Bun Song Lee (C.K.)

Bun Song Lee
Professor of Economics

BSL:ck

Enclosures

The Effect of Marital Dissolution and Rural-Urban Migration on Fertility in Cameroon

Bun Song Lee and Louis Pol*

1. Introduction

In a recent paper by Lee (1985b), it was reported that the adaptation effect of rural-urban migration on fertility was relatively small in Cameroon. Compared with studies of Korea (Lee and Farber, 1985; Lee and Farber, 1984; Farber and Lee, 1984) and Mexico (Lee, 1985a; Lee and Pol, 1985) where the adaptation effect was calculated to be a reduction of 2.57 and 1.2 births, respectively, adaptation in the Cameroon resulted in a decline in only .23 births. The reasons cited for this smaller decrease in fertility centered on the pro-natal effect that rural-urban migration had through a reduction in infertility and the stabilization of marital relationships. These factors nearly offset the fertility depressing effects of rural-migration on the demand for children in Cameroon. In other words, rural-urban migration improved the supply conditions for births about as much as it reduced demand.

The purpose of the present paper is to focus more closely on the relationship between marital instability and fertility in the context of rural-urban migration. The results have potentially important policy implications. First, a further look at the cause-effect relationship between rural-urban migration and marital stability is needed. If the subsequent stabilization of marriages brought about by rural-urban migration as suggested by Lee (1985b) has a positive effect on fertility, then the net effect of this movement may be much smaller than anticipated. However, if the resulting stabilization of marriage results in lowered fertility as has been reported in some studies (i.e. Ram and Ebanks, 1973; Ebanks, George and Nobbe, 1974), then the net effect of migration on fertility reduction may be greater than originally thought. In either instance, the indirect effect of rural-urban migration on fertility through an increase in marital stability as well as other factors needs better understanding. Second, there is an interesting question concerning increases in marital stability over time resulting from economic development and/or governmental policy which in turn brings about an increase or decrease in fertility rates. If there is a positive relationship between marital instability and fertility rates, then an increase in marital stability over time will contribute to a reduction in population growth rates in countries such as Cameroon. If the opposite is true, then an increase in marital stability over time will bring about the increase of population growth rates.

2. Literature Review

Results of studies focusing on the relationship between marital instability and fertility are mixed in that some studies show a fertility depressing effect of marital instability while others show a positive effect. Some of the variation in results is statistically and/or methodologically artifactual in that a range of operationalizations, controls and statistical procedures are represented in these works. How much of the variation is artifactual is unknown. Nevertheless, the relationship between marital instability and fertility is a complex one confounded by a host of other factors such as age at first marriage, time spent between unions, present age, race and education, as well as the unobservable preference for family size, all of which qualify the original relationship. At the core of the complexity are the two counteracting forces identified by Downing and Yaukey (1979): the negative effect on fertility of the reproductive time lost while a woman is in between unions and the pro-natalist effect of establishing a new union. Even these forces are affected by some of the factors listed above. However, there is a third factor, the negative effect of the number of marriages on fertility. This is the pure form of the disruption effect of multiple marriages when the length of reproductive time lost is controlled.

Furthermore, there is the issue of the net effect of marital stability on fertility versus the contribution of various components (e.g. time spent between unions) to the relationship. That is, much of the research focusing on this topic has been directed toward identifying the contribution of a host of independent variables, including marital instability, on childbearing in part in an attempt to decompose the instability effect into the two factors - time spent between unions and the desire to "cement" a new union - identified by Downing and Yaukey (1979). Nevertheless, if one is mainly interested in the net effect, an increase or decrease in fertility, then the relative contribution of the two components is less important. And, little attention has been focused on the third factor, the disruption effect of multiple marriages, listed above.

In general, research on U.S. samples of women yield the result that marital instability reduces fertility especially for women who do not remarry. (c.f. Lauriat, 1969; Cohen and Sweet, 1974; Thornton, 1978; Gurak, 1978). For women who do not remarry, the finding is not surprising given the fact that even with the relatively recent increase in out-of-wedlock fertility in the U.S., four out of five births still occur to women who are married (Thornton and Freedman, 1983: 20-21). For women who remarry, the fertility effect is most influenced by the time spent between unions and the psychological desire to "cement" new marriages by having children. Lauriat (1969) found that holding age and age at first marriage constant, women in discontinuous marriages have only 79 percent of the children they would have had if they had (hypothetically) remained continuously married. Increasing the number of controls by including education, type of residence, whether or not the woman was premaritally pregnant, religion and race as well as current age and age at first marriage, Cohen and Sweet (1974) generated the same basic finding. However, when total months in a married state -excluding periods of time between separation and remarriage - is added to their list of controls, the fertility difference is minimized. They concluded that about two-thirds of the fertility difference between remarried and continuously married women is explained by time spent out of a married state. Thornton's (1978) results once again support the general reduction in fertility finding. However, the pattern of fertility after remarriage showed marked differences by race. Controlling for time since first marriage, Thornton found that for white women the increased fertility following a remarriage was enough to offset the time spent outside marriage. In other words, continuously as well as discontinously married white women ended up with about the same number of children seventeen years after first marriage. The same relationship did not hold up for black women. For a variety of reasons, one being more time spent between marriages, they did not make up for the time lost between marriages. Thornton's findings were in general reproduced by Kalwat (1983), though it was found that white women who married early in life showed the highest fertility levels in second marriages. White women first-married later in life did not make up for their time lost between marriages. Finally, Gurak (1978), controlling for education, occupation, income (husband's), current age and age at first marriage found that divorce and remarriage had a negative effect on completed fertility for six racial/ethnic groups in the U.S. The negative impact on completed fertility was greatest for Blacks and least for Cubans, with Anglos, Puerto Ricans, Mexican Americans and Japanese having intermediate effects.

Studies of women in less developed countries yield some supporting and some conflicting findings. Utilizing two different datasets, Swee-Hock (1967) and Palmore and Marzuki (1969) found that for Malaysia, divorce without remarriage and divorce followed by remarriage reduced levels of fertility below those of continuously married women. Controlling for age, age at marriage, place of current residence, race and education, Palmore and Marzuki determined that the effect of being divorced and remarried lowered completed fertility .5 births when compared to continuously married women. Conversely, Ram and Ebanks (1973), Chen, Wishik and Scrimshaw (1974), Ebanks, and George and Nobbe (1974) and Downing and Yaukey (1979) found that instability increased fertility in Barbados, Guayquil, Ecuador, Barbados, and five Latin American cities, respectively, though in two of these studies the results of the net effect of marital instability on fertility are not reported.

Ram and Ebanks (1973) cross-classified age adjusted fertility rates by the number of sexual unions (partners) and produced a positive relationship between the two variables. That is, as the number of partners increased so did fertility rates. Chen et al (1974) standardized children ever born by years of reproductive time lost and determined that people with two unions had fertility 14 percent higher than people with one union. A third union increased fertility an additional 15 percent over that of women in a second union. However, the authors do not present results looking at rates without controlling for time lost, so that conclusions about the net effect are not possible. In confirming the results of Ram and Ebanks, Ebanks, et al (1974) presented a series of tables cross-classifying number of partnerships (unions) by fertility, controlling for one or two factors at a time: age at first pregnancy, present age, age at first partnership, number of years spent in unions, and type of sexual union at first pregnancy. In each table, fertility increased as the number of partners increase. Downing and Yaukey (1979) showed that for Buenos Aires, San Jose, Mexico City, Bogota and Caracas, mean live births per woman, standardized by the interval since first marriage and by the length of weighted reproductive time lost, increased as the number of marriages increased. However, when controlling for socioeconomic status (education), the pro-natalist effect is reduced. Women with higher levels of education who had been married more than once had lower levels of fertility than women with the same level of education but had been married only once. Nevertheless, the net effects - not controlling for reproductive time lost - were not presented.

Overall, it is not possible to make general cross-cultural statements about the relationship between marital instability and fertility. Of the nine studies which include the net effects reported here, two find a positive net effect of marital instability on fertility. More recent World Fertility Survey data show that for 29 developing countries fertility declines as the number of partners increase or the percentage of time in union since the first marriage decreases (Lightbourne, Singh and Green, 1982:28). Joint controls for factors appearing in the studies cited above, nevertheless, are not instituted. Furthermore, the results may be weighted toward Latin American countries where "marital" dissolution has always been common and fertility is now lower than in other countries. Therefore, the relationship between marital dissolution and fertility cannot be specified.

In the remainder of this paper, the results of a study focusing on the relationship between marital instability and fertility in the rural-urban migration context are presented utilizing Cameroon World Fertilty Survey data To the authors' knowledge, no other study has focused on the relationhip between marital instability and fertility in an African nation. Following a brief description of the dataset, comparisons of rate of marital dissolutio and fertility are presented for rural stayers. rural-urban migrants and native urban subpopulations.

3. Data

This study is based on the data contained in the 1978 Cameroon World Fertility Survey (CWFS). Information on migration history, full pregnancy history, history of marital status, employment history, and other demographic and socioeconomic characteristics for 8,219 Cameroonian women, aged 15 to 54, is included in the data.[1] The dataset is described in more detail elsewhere (International Statistical Institute, 1983).

Table 1 shows the distribution of our total sample, 8,219 women, cross-tabulated by the community of childhood residence and community of current residence. The share of urban residents in our total sample, 26.8 percent, indicates that the level of urbanization is relatively low in Cameroon. The 1976 Cameroon Population Census showed that 28.1 percent, or 2.01 million people out of total population 7.13 million, lived in urban areas. As can be seen, rural stayers, rural-urban migrants and native urbanites comprise 67.1, 11.4 and 14.5 percent of the population, respectively.

(Table 1 about here)

Table 2 presents the sample cross-classified by age and the number of marriages. Excluding single persons, about 86 percent of the female population is currently in a first marriage. Not surprisingly the percentage varies by age from a high of 98 percent at the ages 15 to 19 to a low of 69 percent at the ages 50 to 54. Comparing these results to those from Mexico, the second percentage in the table, it can be seen that while at the younger ages Mexican and Cameroonian marriages are comparably stable, at the older ages about 10 percent fewer women are still in their first marriage in Cameroon

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than in Mexico. While dissolution is relatively frequent in Cameroon, remarriage is common too. Sixty-five percent of the women whose first union ended in divorce remarried (International Statistical Institute, 1983:4).

(Table 2 about here)

The total sample may be classified as: rural non-migrants; rural-rural migrants; rural-urban migrants; urban-urban migrants; urban non-migrants; and urban-rural migrants, and within the urban category it is possible to identify the specific urban area in question. In Table 3, we present some descriptive statistics for Cameroonian ever-married women included in the Cameroon World Fertility Survey, classified by age and migration status.

In all age cohorts, women who spent more time in cities tended to be significantly better educated. For example, among women in the age group 20-24, rural stayers had only 2.9 years of schooling whereas urban natives currently residing in Yaounde and Douala had 7.6 and 6.7 years of schooling, respectively. Yaounde, the capital city in Cameroon, has a population of 291,000 and Douala, the other major city, has a population of 396,000 people. Education levels of Cameroonian women in the age group of 45-49 are 0.1 and 2.0 years of schooling for rural stayers and urban natives currently residing in Yaounde, respectively are substantially lower than those of women in younger age groups.

For all birth cohorts, education levels of rural-urban migrant women are substantially higher than those of rural stayers, but substantially lower than those of urban natives. This phenomenon may be due to both the selection process in terms of education of rural-urban migration and the adaptation effect of urban residence on women's education. These data also show that husband's education level is higher by approximately one year than that of the women for most age groups and migration statuses.

By age 35-39, relatively few women remain single (1.3 percent) in Cameroon. Therefore, we analyze the mean ages at the first marriage only for ever-married women older than 34. As expected, urban native women married at later ages (19.2 - 20.0 years for the women aged 35-39) than rural stayer women (17.8 years). For most birth cohorts, the mean age at the first marriage for rural-urban migrant women (for example, 18.6 - 19.6 years for the age group 35-39) is substantially higher than that of rural stayer women, but is almost equal to those of urban natives. The mean age at marriage of Cameroonian women is substantially lower than those of Korean women, 20.9 and 22.3 years for rural residents and urban residents aged 35-39, respectively, but it is not much different from those of Mexican women, 18.2 and 20.3 years for rural non-migrant and urban non-migrant women aged 35-39, respectively. Also of interest is the observation that age at first marrige for younger birth cohorts has not increased significantly over that of older cohorts, regardless of migration status. This is in direct contrast to the observations based upon Korean data (Lee et al, 1981) but very similar to the results of our study of Mexico (Lee et al, 1983).

Dissolution, separation, and remarriage are more frequent in Cameroon, particularly in rural areas, than in some other less developed countries. Mean numbers of marriages were 1.27, 1.08 - 1.16, and 1.06 - 1.16 for rural stayers, rural-urban migrants, and urban native women aged 35-39 in Cameroon, respectively. In Mexico corresponding mean numbers of marriages were 1.10, 1.12 and 1.10 for rural non-migrant, rural-urban migrant and urban non-migrant women aged 35-39, respectively. In Korea, the number of dissolutions, separations, and remarriages is still quite small. In Cameroon, marriage is least stable in rural areas and much more stable in urban areas. Rural-urban migration seems to increase the stability of marriages. In Mexico, neither the type of residence nor migration status appears to influence the stability of marriages. Palmore and Marzuki (1969) generated consistent results in their Malaysian data analysis. Rural women, Malay ethnic women, women with no formal education, and women whose husband farmed showed the highest proportion of women married more than once. These were the groups with the youngest age at first marriage. In Cameroon early marriages in rural areas might be also the main cause of the high instability of marriages in rural areas.

The mean number of children-ever-born to women aged 45-49, 5.2, 4.8 - 6.0, and 4.2 - 5.7 for rural stayers, rural-urban migrants and urban natives, respectively, were relatively low in Cameroon compared to those of Korea and Mexico. The mean number of children-ever-born to rural stayers, rural-urban migrants and urban native women aged 45-49 were 7.0, 5.8, and 5.0 in Korea and 8.4, 7.3, and 6.7 in Mexico, respectively. Furthermore, unlike the cases of Korea and Mexico, neither the type of residence nor migration status appeared to influence the mean number of children-ever-born to Cameroonian women. This surprising result may be explained by two factors: infertility is extremely high, specifically 15 percent of women aged 45-49 had never had a child, and marriages are relatively unstable in Cameroon. It seems reasonable to assume that a substantial proportion of women who have never had a live birth in many societies in which incomes are low, such as Cameroon, are childless because of infecundity and subfecundity, rather than by choice. In Cameroon, the supply constraint of births seems to be more dominating than the demand aspect. It is not unreasonable to anticipate that the fertility level of urban natives or rural-urban migrants is equal to, or even higher than that of rural stayers, even if the desired fertility level of the former is significantly lower than that of the latter, as long as urban residence reduces infertility and improves the stability of marriages. As will be shown in Section 5, the instability of marriage substantially reduces fertility rates in Cameroon.

(Table 3 about here)

4. Major Hypotheses

Four major hypotheses concerning the influence of marital instability on fertility behavior are tested using the basic model presented in section 5:

> Hypothesis 1: The fertility of women with at lease one disrupted marriage is significantly lower than the fertility of continuously married women, even before the dissolution of the first marriage.
>
> Hypothesis 2: When the number of marriages is controlled, the greater the reproductive time lost, the lower the fertility level.
>
> Hypothesis 3: When the length of the reproductive time lost is controlled, the greater the number of marriages, the more the fertility rate is reduced.
>
> Hypothesis 4: The fertility level of women with disrupted marriages is significantly reduced due to the instability of marriage after the dissolution of the first marriage compared to the fertility level of the continuously married women.

Hypothesis 1 concerns the selection effect of marital instability. The most serious drawback of the studies reviewed earlier, with the exception of Cohen and Sweet (1974), is that none adequately controlled for the effect of the selectivity of women with marital disruptions in assessing the causal effect of marital instabilty on the fertility behavior. There are several reasons why women with marital disruptions might show a lower fertility rate than the continuously married women even before the dissolution of the first marriage.

First, women with marital disruptions could be a (negatively) selected group with different socioeconomic and demographic characteristics such as education, occupational experience, and age at first marriage, than those of continuously married women. In addition, the former's preferred family sizes might be also different from those of the latter. As Table 4 shows, mean years of women's and husband's education are substantially lower for women with disrupted marriages than the continuously married women. In particular, women married more than twice, along with their husbands, have very low levels of education.[2] Furthermore, women married more than twice had first married at substantially younger ages, 15.9 and 14.5 years than the continuously married women who married at the age of 17.3 Table 4 also shows that the mean number of children-ever-born to women who married three times and more than three times, 2.67 and 1.83, respectively, are substantially lower than those to the continuously married women, 3.48. However, at this point we do not know what proportion of the fertility differentials is due to the causal effect of marital instability after the selection effect is controlled. There does not appear to be any special reason why women with marital disruptions might have a stronger or weaker unmeasurable preference for the large family size than the continuously married women. Second, women with marital disruptions might be a negatively selected group in terms of fecundity. The lower fecundity of women might have led to the increase in marital disruptions. In sum, the above two selection effects, which will be assessed through the tests of Hypothesis 1, are the selectivity effect of marital disruptions. In order to estimate the causal effect of marital disruption on fertility rates, this selectivity effect should be controlled.

However, there are other reasons why women with marital disruptions might have lower fertility rates even before the dissolution of the first marriage. First, the anticipation of unstable marriages might have caused the lower fertility of the women with disrupted marriages even before the dissolution of first marriage. Second, women with more children may be less attractive marriage partners or may be more constrained in the search for a second husband, thus making remarriage selective of women with lower fertility.

These latter two effects which we call the 'simultaneity effect' are quite distinctive from the former two effects which we call the 'pure selectivity effect.' As discussed above, according to the pure selectivity effect the fact that women with marital disruptions have lower fertility rates even before the dissolution of the first marriage signals us that the observed lower fertility levels (children-ever-born) or fertility rates for the maritally disrupted women after the dissolution of first marriage exaggerate the causal effect of marital disruption on fertility. On the other hand, according to the simultaneity effect the lower fertility rates of maritially disrupted women before the dissolution of first marriage does not imply that the observed lower fertility rates for the disrupted women after the dissolution of first marriage exaggerate the causal effect of marital disruption. This is because women who happened to have lower fertility rates by coincidence or due to the anticipation of the marriage breakdown would not necessarily maintain their lower fertility rates after the beginning of their second marriage. The above discussion implies that the testing of Hypothesis 1 for the selection effect is very important, though caution in interpretation should be exercised because of the potential effect of simultaneity.

Hypothesis 2 was tested in most previous research and not rejected in any study. A very serious shortcoming of previous studies is that they did not decompose the completed (or children-ever-born) fertility level into the fertility level before the dissolution of first marriage and the change in the level after the dissolution. Previous studies simply investigated the relationship between the weighted reproductive time lost and the children-ever-born data.[3] This approach can lead to erroneous conclusions for two reasons.

First, the fertility levels before the dissolution of first marriage cannot be influenced by the reproductive time lost which occurred later. Second, as discussed above, because of the pure selectivity effect the whole differential in fertility levels between women who lost a great deal of productive time and those who lost little or none at all should not be considered as the causal effect of longer reproductive time lost.

Tests of Hypothesis 3 from previous studies have produced conflicting findings. Results for Latin American data by Downing and Yaukey (1979) and Chen et. al. (1974) showed that the greater the number of marriages, the greater the level of fertility. This result was explained by the incentive on the part of remarried women trying to cement" their new marriage by having children. However, results for Malaysian data by Swee-Hock (1967) and Palmore and Marzuki (1969) showed that as the number of marriages a woman has had increases, her number of births decreases. This finding can be explained by the disruption effect of unstable marriages on woman's fertility behavior. Table 4 indicates that the net effect of marital disruption on Cameroon fertility is significantly negative. Therefore, we anticipate a similar result for Cameroonian data.

Hypothesis 4 pertains to the net effect of marital instability on fertility behavior. If Hypothesis 3 is not rejected, then Hypothesis 4 will not be rejected. However, if Hypothesis 3 is rejected as in the case for Latin American data, then the outcome for Hypothesis 4 cannot be predicted a priori. In many previous studies Hypothesis 4, which should have the most important bearing on the policy decision making, has been underemphasized.

The remainder of Table 4 contains cross-tabulations of the number of marriages by several marital, fertility and contraceptive use variables. Of greatest interest is the marked decline in number of children ever-born which occurs as the number of marriages increases. This observation, coupled with the decline in contraceptive use that also accompanies an increase in the number of marriages, suggests that there is an important impact of subfecundity and infecundity on overall fertility rates.

(Table 4 about here)

5. The Basic Regression Model

The multivariate regression model, which compares the fertility rate of women with marital disruption with that of continuously married women, can be expressed as:

$$
\begin{aligned}
1)\quad Y_t - Y_{t-1} = {} & a_1 DYR78 + a_2 DYR73 + a_3 DYR68 + a_4 DYR63 \\
& + a_5 DYR58 + a_6 DYR53 + a_7 DYR48 + a_8 A_t DYR78 + a_9 A_t^2 DYR78 \\
& + a_{10} A_t DYR73 + a_{11} A_t^2 DYR73 + a_{12} A_t DYR68 + a_{13} A_t^2 DYR68 \\
& + a_{14} A_t DYR63 + a_{15} A_t^2 DYR63 + a_{16} A_t DYR58 + a_{17} A_t^2 DYR58 \\
& + a_{18} A_t DYR53 + a_{19} A_t^2 DYR53 + a_{20} A_t DYR48 + a_{21} A_t^2 DYR48 \\
& + \beta_1 S + \beta_2 S^2 + \beta_3 AGEFM \\
& + \alpha_{01} DGAP_0 \cdot DNMR1 + \alpha_{11} DGAP_{1-5} \cdot DNMR1 \\
& + \alpha_{21} DGAP_{6-10} \cdot DNMR1 + \alpha_{31} DGAP_{11-15} \cdot DNMR1 \\
& + \alpha_{41} DGAP_{16-20} \cdot DNMR1 + \alpha_{51} DGAP_{21-25} \cdot DNMR1 \\
& + \alpha_{61} DGAP_{30} \cdot DNMR1 \\
& + \alpha_{02} DGAP_0 \cdot DNMR2 + \text{---} + \alpha_{62} DGAP_{30} \cdot DNMR2 \\
& + \alpha_{03} DGAP_0 \cdot DNMR3 + \text{---} + \alpha_{63} DGAP_{30} \cdot DNMR3 \\
& + \alpha_{04} DGAP_0 \cdot DNMR4 + \text{---} + \alpha_{64} DGAP_{30} \cdot DNMR4 \\
& + \varepsilon_t
\end{aligned}
$$

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. DYR78, DYR73, DYR68, DYR63, DYR58, DYR53, and DYR48 are dummy variables reflecting the calendar years of observation. For example, the value of DYR78 is 1 when the year of observation is 1978, otherwise zero.

The calendar year of observations dummy variables, DYR78, DYR73..., capture the trends in general fertility behavior over time. The interaction terms between age variables and the year of observation dummy variables reflect 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 women with marital disruption and continuously married women. S is the women's years of schooling, S^2 is the squared value of S, and AGEFM is the women's age at first marriage. These three variables control for the (negative) selectivity of women with marital disruptions. Unlike the case of assessing the influence of rural-urban migration on migrant's fertility behavior as seen in Lee (1985b), the woman's schooling and age at first marriage cannot be influenced by the disruption of woman's marriage because in most developing countries adult schooling is not prevalent. Therefore, the inclusion of these variables does not underestimate the causal effect of marital disruption on fertility behavior.

$DGAP_o$, $DGAP_{1-5}$, $DGAP_{6-10}$, $DGAP_{11-15}$, $DGAP_{16-20}$, $DGAP_{21-25}$, $DGAP_{30}$ are dummy variables reflecting the years of reproductive time lost between marriages by year t. For women who have been married but are currently unmarried, the years of reproductive time lost include the interval between the dissolution of the last marriage and the year t. The value of $DGAP_o$ is 1 when the observation is for the woman who dissolved her marriage though had not yet experienced marital disruption by the year t. Otherwise the value is zero. $DGAP_{1-5}$, $DGAP_{6-10}$, $DGAP_{11-15}$, $DGAP_{16-20}$, $DGAP_{21-25}$ and $DGAP_{30}$ have the value of 1 when the observation is for the woman who lost reproductive time of 1 to 5, 6 to 10, 11 to 15, 16-20, 21-25, and more than 25 years by the year t, respectively. The reproductive time lost, 1, 6, 11, 16 and 21 years include any values which are greater than 0, 5, 10, 15 and 20, and less than 1, 6, 11, 16 and 21, respectively. The years of reproductive time lost dummy variables, DGAP's, are expected to capture the causal effect of marital disruptions on fertility behavior.

DNMR1, DNMR2, DNMR3 and DNMR4 are dummy variables reflecting the number of marriages for the women with marital disruption by the survey year, 1978, not by the year t. DNMR1 is 1 when the woman's first marriage was dissolved but she has never remarried. Otherwise the value is zero. DNMR2 and DNMR3 have the value of 1 when the woman married 2 and 3 times, respectively. DNMR4 has the value of 1 when the woman married either 4 or 5 times. As Table 2 shows, there are four women who married more than five times. We excluded these four women from our analysis. The number of marriages (for women with disruption) dummy variables, DNMR's, are expected to reflect the causal effect of the number of marriages on the level of fertility for women with marital disruptions. The interaction terms between the years of reproductive time lost dummy variables and the number of marriage dummy variables capture the differences in the influence of the years of reproductive time lost on fertility rates among the women with different number of marriages. Specifically, the coefficients for $DGAP_o \cdot DNMR1$, $DGAP_o \cdot DNMR2$, $DGAP_o \cdot DNMR3$ and $DGAP_o \cdot DNMR4$ show how the fertility rates for women who married once but are currently unmarried, married twice, married three times, and married either 3 or 4 times, respectively, are different from the fertility rates of continuously married women before the dissolution of the former women's first marriages.

The dependent variable in Equation (1) is the age specific fertility rate, $Y_t - Y_{t-1}$ instead of children ever born, Y_t. Because the years of observation are at the five year intervals, $Y_t - Y_{t-1}$ is 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 influenced more by current circumstances, say, during the new remarried life (reflecting the causal effect of marital disruptions), and less affected by the age at marriage or education levels which occurred earlier in the life-cycle (reflecting the selectivity effect) .

The fertility data for ever married women for the years prior to the survey year, 1978, were obtained from the individual woman's lifetime fertility history. In order to account for the entire period of a woman's lifetime fertility with a limited number of dummy variables, we chose seven observation years at five-year intervals, 1978, 1973 1968, 1963, 1958, 1953 and 1948, rather than consecutive years. Whenever the woman had never married by the year of observation, t, this woman was omitted in the regression for that year of observation.

Marital histories of women in the 1978 Cameroon World Fertiity Survey include information on the month and year of each marriage up to eight marriages, current status of these marriages, and the month and year of each dissolution of marriage. From this information we computed the cumulative years of the reproductive time lost up to each year of observations, 1948, 1953, 1958, 1963, 1968, 1973 and 1978.

Overall, our model is unique in two aspects. First, we use five-year fertility rates throughout the woman's lifetime history rather than the children-ever-born data at the survey year as the measure of fertility. Second, we compare the five-year fertility rates at different points in a woman's lifetime against the total reproductive time lost up to that point of time for the same woman.

Table 5 shows the distribution of total number of observations used in the regression of Equation (1) by the year of observations and the number of marriages. Table 6 shows the distribution of this total number of observations by the number of marriages and the years of the reproductive time lost.

(Tables 5 and 6 about here)

6. Regression Results

Table 7 shows ordinary least squares estimates of the coefficients for the interaction terms between the number of marriages dummy variables and the years of reproductive time lost dummy variables from Equation (1). The regression results in Table 7 were obtained using the continuously married women as the comparison group.

The results in the first row of Table 7 reveal that the fertility rate of women who married more than once is significantly lower than that of continuously married women even before the dissolution of their first marriage. This should be due to the selectivity and simultaneity effects of women of multiple marriages discussed in section 4. The finding indicates that we should not reject Hypothesis 1. However, it is important to note that the fertility rate of women whose first marriage was dissolved and did not remarry until the survey year, 1978, is not significantly lower than that of continuously married women during the period before the dissolution of their first marriage. This significant difference in pre-dissolution fertility rates between women whose first marriage was dissolved and did not remarry, and women who married more than once seems to indicate that women with a small number of children are more attractive for remarriage than those with larger numbers of children. This is one of the factors which we called the simultaneity effect.

The rows 2 through 5 in Table 7 show that the coefficients for most interaction terms are significantly negative. This implies that the disruptions of marriages significantly reduce the fertility rates after the dissolution of first marriages, and gives us reason not to reject Hypothesis 2. For a given number of marriages, as reproductive time lost increases, the level of fertility decreases.

The last four rows of Table 7 show the sums of fertility differentials due to years of reproductive time lost of more than 25 years, 25 years, 20 years, and 15 years. The comparison of these sums across different number of marriages clearly indicates that even though the length of the reproductive time lost is controlled, the greater the number of marriages, the lower the fertility level of women. There is no significant difference in fertility differentials between once married, currently divorced and twice married women. Nevertheless, there is a substantial difference in fertility differentials between twice married and more than twice married women. When the number of marriages exceeds two, the frequency of marriage reduces the fertility rate of women with disrupted marriage even though the length of reproductive time lost does not increase. For example, looking at the row for a 20 year loss in reproductive time, the decrease from once married but not currently remarried to two marriages is small, -1.591 to -1.664 or 4.6 percent. However comparing twice married women with women married three times (-2.079) and four and five times (-2.467) yields declines of 24.9 and 48.3 percent, respectively. There is no indication for the positive relation between the number of marriages and the completed fertility levels as found in Ram and Ebanks (1973) and Downing and Yaukey (1979).

Finally, the coefficient estimates - data not shown in Table 7 - for schooling variables, S and S^2 in Equation were .038 (4.66) and -.004 (-3.64), where the t-values are in parenthesis. There is a significant positive relationship between education level and fertility rates in Cameroon . The coefficient estimate for the age at first marriage variable, AGEFM, was -.0006(-.33) which shows an insignificant negative influence.

Overall, the results for Table 7 show that fertility rates for women married more than once are significantly lower than those for continuously married women even before the dissolution of their first marriage. Furthermore, marital disruption significantly reduces fertility after the dissolution of the first marriage. Finally, even after length of reproductive time lost is controlled, there is an inverse relationship between the number of marriages and fertility.

7. Summary and Conclusions.

Preliminary descriptive analysis of Cameroon World Fertity Survey data generated some interesting observations. Cameroonian marriages are less stable than Mexican marriages, though remarriage rates are high. Among migration categories, urban native women marry later, have a higher level of education, have fewer marriages and have about the same number of children as rural stayers. With the exception of fertility, which is about the same for urban and rural stayers, rural-urban migrants have values intermediate to urban and rural stayers for these variables of interest. Comparisons across number of marriages groups shows that as the number of marriages increase, education, age at first marriage, children-ever-born, and contraceptive use decreases.

Our regression model is unique in two aspects. We use five-year fertility rates throughout the woman's lifetime history rather than the children-ever-born data at the survey year as the measure of fertility. We compare the five-year fertility rates at different points in a woman's lifetime against the total reproductive time lost up to that point in time for the same women. Previous studies simply investigated the relationship between the weighted reproductive time lost and children-ever-born data for the survey year in question.

The major findings from the regression analysis can be summarized as follows. Fertility rates for women married more than once are significantly lower than that for continuously married women, even before the dissolution of their first marriage. This is due to the selectivity and simultaneity effects of women in multiple marriages. Marital disruption significantly reduces fertility after the dissolution of the first marriage. For example, women who married once but are currently unmarried, and women married twice, would have 2.24 and 2.57 fewer children, respectively, due to 25 years marriage gaps than comparable continuously married women. Even after length of reproductive time lost is controlled, an increase in the number of marriages reduces fertility levels. For example, women who are: married once but are not currently married, married twice, married three times and married either four or five times would have 1.59, 1.66, 2.08 and 2.47 fewer children, respectively, due to a 20 year loss in reproductive time, than comparable continuously married women. Now we turn to why some of these relationships may exist as well as some of the implications of the results.

The marriages of rural residents are more likely to be dissolved and remarried than urban residents in part because rural residents marry at earlier ages than urban residents. Marital instability markedly reduces fertility levels of women with marital disruption because of the reproductive time lost and the disruption effect of multiple marriages. Rural-urban migration increases the age at first marriage and so improves the stability of marriages. The increased stability of marriage due to rural-urban migration increases the fertility level of rural-urban migrant women. Therefore, even though rural-urban migrants desire fewer children due to the adaptation effect of urban lifestyles which discourage large families, the increased supply of children due to improved stability of marriages offsets the demand effect producing the insignificant overall fertility effect of rural-urban migration in Cameroon.

This study also indicates that delayed marriage in Cameroon, which might be brought about by increased women's schooling and job opportunities in the future, would reduce the instability of marriages, and in turn could increase the supply of children. Again, economic development, bringing increased education, urbanization, and women's job opportunities over the time, may not produce a significant fertility depressing effect in Cameroon as in the case of other LDC's, at least over the short run. As the results of our regression equation showed, education has a positive effect on fertility.

One final point is worthy of consideration. While the negative (adapting to urban fertility norms) and positive (decrease in subfecundity, infecundity and an increase in marital stability) impacts of rural-urban migration imply a complex relationship, the interaction of these factors is made perhaps even more complex when one considers the macro level changes over time which may occur. One might speculate that as urbanization and economic development progress in Cameroon in the future, the balance between the positive and negative fertility factors as a result of rural-urban migration will change. At some future point in time it is possible that demand will be reduced to the extent that adaptation will result in much lower levels of fertility.

Footnotes

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[1]The 1978 Cameroon World Fertility Survey data were collected during the time period of January 15 through September 15, 1978. It was composed of two questionnaires, namely, Household and Individual. The individual questionnaires included data for 8,219 women, aged 15-54, 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 respondent, background of the husband, and other demographic and socioeconomic characteristics.

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 Household Survey was carried out in all the households found within the 267 sub-areas, which were selected to limit the size of the sample of households. A household questionnaire was completed for each of 40,392 households. At the final stage, a number of households were selected within each sub-area, in which all women aged 15-54 would be interviewed. The sampling rate for this final stage was calculated for each sub-area so as to ensure a self-weighted sample of women in all the main strata. A total of 9,137 women aged 15-54 were identified for interview.

[2]As will be shown in our regression results, there is a strong positive relationship between education level and fertility level unlike other countries. This might be due to the improvement of fertility supply conditions by the higher education level.

[3]A weight was assigned to each five-year interval since first marriage based on the relative fertility rates occurring during that interval in the population to which the sample belongs (see Downing and Yaukey, 1979 and Chen et.al., 1974).

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Table 1

Distribution of Total Sample by Community of Childhood Residence and Community of Current Residence[a]

	Community of Current Residence		
Childhood Residence	Rural	Urban	Total
Rural	5,512 (67.1%)	933 (11.4%)	6,445 (78.4%)
Urban	371 [illegible].5%)	1,188 (14.5%)	1,559 (19.0%)
No Answer	133	82	215
Total	6,016 (73.2%)	2,203 (26.8%)	8,219 (100%)

[a]percent of grand total is in parentheses.

Table 2
Distribution of Sample by Age and Number of Marriages
for Cameroon and Mexico[a]

Age Group	Single	Number of Marriages 1	2	3	4	5	6	7	8	Total (Married Women)
15-19	788	741 (98.4%)[b] (99.2%)	12	0	0	0	0	0	0	753
20-24	216	1,297 (93.6%) (96.2%)	82	6	0	0	0	0	0	1,385
25-29	58	1,080 (87.7%) (94.1%)	125	20	6	1	0	0	0	1,232
30-34	26	868 (83.7%) (92.2%)	135	25	6	3	0	0	0	1,037
35-39	12	731 (80.3%) (88.3%)	140	22	9	6	0	0	2	910
40-44	12	670 (80.7%) (89.7%)	126	23	9	2	0	0	0	830
45-49	13	447 (78.0%) (88.3%)	103	17	3	2	1	0	0	573
50-54	6	254 (69.0%)	86	18	5	4	0	1	0	368
Total	1,131	6,088 (85.9%) (92.5%)	809	131	38	18	1	1	2	7.088

a second percentage in parenthesis is for Mexico
b percentages for Mexico and are derived from an analysis of 1976 Mexican World Fertility Survey data (see Lee et. al., 1983).

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Table 3

Descriptive Statistics for Total Ever-Married Women by Age and Migration Status in the 1978 CWFS

Variables and migration status*	Age Group						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Mean years of women's schooling							
R/R	2.7	2.9	1.9	1.0	0.5	0.3	0.1
R/D	5.2	5.8	5.0	3.0	0.8	0.9	0.1
R/Y	6.1	6.3	6.0	4.9	4.3	1.6	1.5
D/D	5.8	6.7	6.3	4.7	4.2	4.2	2.5
Y/Y	7.7	7.6	6.6	5.9	4.6	3.1	2.0
Mean years of husband's schooling							
R/R	3.7	3.9	3.0	2.2	1.8	1.6	1.2
R/D	6.9	7.1	6.5	5.9	3.7	3.4	0.8
R/Y	8.0	7.9	7.8	7.2	7.6	4.5	4.5
D/D	7.4	8.6	8.5	6.7	6.6	6.7	6.5
Y/Y	8.5	9.6	7.6	9.0	7.4	5.8	3.8
Mean age at first marriage							
R/R	15.0	16.1	16.5	16.8	17.8	18.1	19.2
R/D	16.0	17.8	18.3	17.8	18.6	18.1	16.9
R/Y	16.4	17.1	18.6	19.1	19.6	18.5	21.4
D/D	16.3	17.9	18.6	19.0	20.0	19.9	20.1
Y/Y	15.9	17.6	18.2	17.1	19.2	20.1	20.4
Mean number of marriages							
R/R	1.02	1.08	1.18	1.23	1.27	1.27	1.29
R/D	1.04	1.05	1.04	1.08	1.16	1.04	1.21
R/Y	1.00	1.00	1.02	1.03	1.08	1.08	1.25
D/D	1.00	1.01	1.02	1.14	1.16	1.04	1.07
Y/Y	1.00	1.00	1.00	1.05	1.06	1.07	1.00
Mean number of children-ever-born							
R/R	0.7	1.7	3.1	4.2	4.8	5.4	5.2
R/D	0.8	1.7	2.9	4.3	5.6	5.1	6.0
R/Y	0.4	1.7	2.9	4.5	5.0	6.8	4.8
D/D	0.3	1.4	3.1	4.1	5.8	4.0	5.7
Y/Y	0.3	1.5	3.3	3.7	4.2	5.3	4.2

*R/R = Rural stayers (rural migrants and rural non-migrants); R/D = Rural-urban migrants moved to Douala; R/Y = Rural-urban migrants moved to Yaounde; D/D = Urban stayers at Douala; Y/Y = Urban stayers at Yaounde.

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Table 4. Major Characteristics of Total Sample Women According to the Number of Marriages

Variables	Once married and currently married (0)	Once married but currently unmarried (1)	2	3	4&5
	Number of Marriages				
Current age	30.1	38.5	36.4	38.9	38.6
Mean years of women's schooling	2.06	1.33	.78	.20	.17
Mean years of husband's schooling	3.33	2.54	2.11	1.35	.50
Mean age at first marriage	17.3	18.0	17.2	15.9	14.5
Years since the year of first marriage	12.8	20.5	19.2	22.9	23.9
Years of marriage gap s	0.0	7.61	2.96	4.93	4.0
Fraction of disrupted marriage years	0.0	.376	.160	.215	.156
Mean number of children ever-born	3.48	4.21	3.34	2.67	1.83
Percentage of women who ever used any contraceptive method	.133	.121	.126	.065	.028
Number of women	4,379	479	641	92	36

Table 5. Distribution of Total Number of Observations in the Regression of Equation (1) by the Year of Observation and the Number of Marriages

Number of Marriages	Year of Observation							
	1948	1953	1958	1963	1968	1973	1978	Total
Continuously married (0)	247	578	1,077	1,708	2,430	3,401	4,379	13,820
Once, but currently unmarried (1)	109	186	260	329	396	450	479	2,209
2	07	197	290	404	535	619	641	2,793
3	19	40	54	78	89	90	92	462
4 or 5	10	15	25	32	36	36	36	190
Total	492	1,016	1,706	2,551	3,486	4,596	5,627	19,474

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Table 6. Distribution of Total Number of Observations Used in the Regression by the Number of Marriages and the Years of the Reproductive Time Lost

Years of reproductive time lost (marriage gap) between marriages (including the years between last dissolution and the year, t for currently unmarried women)	Number of Marriages					
	Once married and currently married (0)	Once married but currently unmarried (1)	2	3	4 & 5	Total
0 years (before the first marriage dissolution)	13,820	1,283	1,517	188	97	16,905
0 < gap ≤ 5	0	454	967	189	69	1,679
5 < gap ≤ 10	0	221	211	50	18	500
10 < gap ≤ 15	0	128	69	24	5	226
15 < gap ≤ 20	0	68	20	5	1	94
20 < gap ≤ 25	0	35	7	6	0	48
25 < gap	0	20	2	0	0	22
Total	13,820	2,209	2,793	462	190	19,474

Table 7. Coefficient Estimates for the Interaction Terms Between the Number of Marriages Dummy Variables and The Years of Reproductive Time Lost Dummy Variables in Equation (1)

Years of reproductive time lost between marriages (including years between the last dissolution and the year, t for currently unmarried women)	Number of Marriages			
	Once married but currently unmarried	2	3	4 & 5
0 years (before the first marriage dissolution) (0)	-.0008 (-.03)	-.224* (-8.72)	-.438* (-6.33)	-.571* (-5.97)
0 < gap < 5 (1)	-.301* (-6.69)	-.280* (-8.88)	-.476* (-6.91)	-.832* (-7.35)
5 < gap < 10 (2)	-.397* (-6.20)	-.456* (-6.98)	-.733* (-5.52)	-.441* (-2.00)
10 < gap < 15 (3)	-.440* (-5.25)	-.420* (-3.70)	-.547* (-2.86)	-.563 (-1.34)
15 < gap < 20 (4)	-.453* (-.395)	-.508* (-2.42)	-.323 (-.77)	-.631 (-.67)
20 < gap < 25 (5)	-.387* (-2.43)	-.518 (-1.46)	-.641* (-1.67)	NA NA
25 < gap (6)	-.265 (-1.26)	-.383 (-.58)	NA	NA
Sum of fertility differentials due to more than 25 years of reproductive time lost (sum of (1) through (6))	-2.243	-2.565	NA	NA
Sum of fertility differentials due to 25 years of reproductive time lost (sum of (1) through (5))	-1.978	-2.182	-2.720	NA
Sum of fertility differentials due to 20 years of reproductive time lost (sum of (1) through (4))				
Sum of fertility differentials due to 15 years of reproductive time lost (sum of (1) through (3))	-1.138	-1.156	-1.756	-1.836

* significant at the 5 percent level for the one-tailed test. The figures in parenthesis are the usual t-values.