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LABOR FORCE PARTICIPATION IN RURAL NONFARM AREAS
OF NORTH CAROLINA IN 1960

by

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ABSTRACT

This paper examines, in cross-section, the labor force behavior of 12 age-sex groups in the 53 counties of North Carolina which were reported by the U.S. Census as having 50 percent or more of the county population living in places of 2500 population or less. For each group, the ratio of labor force to population (the labor force participation rate) is considered a function of the county unemployment rate, the county average hourly wage rate, and a series of theoretically plausible control variables.

The counties are ranked by a poverty index and those in the lowest one-third of the ranking are defined as "poverty counties." Through a series of interactive dummy variables, differentials are estimated between the poverty and non-poverty counties in terms of the sensitivity of the participation rate to changes in the independent variables. The effects of the unemployment rate and the wage rate are further assessed through elasticity measurements.

The results show that the labor force participation rate depends inversely on the unemployment rate, except in the case of prime-age males. The wage rate and other variables are significant determinants in some, but in no case all, age-sex groups. The observations for poor and nonpoor counties are found to be generated by the same general process in all but a few cases. The differences between poor and nonpoor counties are most pronounced with respect to the unemployment rate.

An important policy implication is that the most effective way to increase economic welfare, via increased participation in the labor force, is to expand job opportunities and to increase the efficiency of the job information network--particularly in the poor counties.

INTRODUCTION

This paper reports a cross-sectional analysis of labor force participation in the counties of North Carolina in which the majority of the population resides in areas of 2500 population or less (rural nonfarm places). The data are from the 1960 Census; the labor force participation rates (LFPR) of various age-sex groups are regressed against a number of theoretically plausible determinants of participation.[1] Particular attention is paid to unemployment rate.

The 53 counties in North Carolina in which 50 percent or more of the population resides in rural nonfarm places are ranked by a five-factor index of economic welfare developed by the United States Department of Agriculture. An explanation of this index and a listing of the counties by rank is included in Appendix B. Counties in the upper two-thirds of the ranking are classified as "nonpoor" counties; those in the lower third are classified as "poor" counties. A series of dummy variables is used in the regressions to differentiate between the groups. This technique allows us to see the effects on the determination of labor force participation which can be associated with the condition of poverty.

THE REGRESSION MODELS

Three regression models are used to explain the LFPR of 12 age-sex groups. The LFPR vary between groups; whereas the set of independent variables does not.

The regression models with j independent variables for each county i take the following forms:

Model One: $Y_{ik} = a_o + a_{id}X_{id} + \sum_{j=1}^{7} b_{ij}X_{ij} + \sum_{j=1}^{7} c_{ij}Z_{ij} + e_i$

Model Two: $Y_{ik} = a_o + a_{id}X_{id} + \sum_{j=1}^{7} b_{ij}X_{ij} + b_8(X_1X_8) + b_9(X_1X_2) + b_{10}(X_1X_3)$

$+ \sum_{j=1}^{7} c_{ij}Z_{ij} + c_8(Z_1X_8) + c_9(Z_1X_2) + c_{10}(Z_1X_3) + e_i$

Y_{ik} = labor force participation rate of age-sex group k

X_{id} = poverty dummy = 0 if non-poor county

= 1 if poor county

X_{i1} = county unemployment rate

X_{i2} = percentage of county population residing in rural nonfarm places

X_{i3} = percentage of county population residing on farms

X_{i4} = percentage of county population which is nonwhite

X_{i5} = percentage of county population age 13 or under

X_{i6} = median years of schooling completed by adults (age 25 and over) in county

X_{i7} = county average hourly wage rate (in dollars)[2]

X_{i8} = median family income (in hundreds of dollars)

$Z_{ij} = X_{id}X_{ij}$

Model One is based on the assumption that the LFPR depends on the unemployment rate (representing, in a negative manner, employment opportunities) and a group of theoretically appropriate control variables.

For each independent variable, there is, in addition, a variable (Z) defined as the interaction between X_d (the binary poverty variable) and the j independent variable. Further discussion of the individual variables is deferred to the section on interpretation of results.

Model Two adds interaction variables; the formulation of which implies that the sensitivity of the LFPR to the unemployment rate, even though subject to control variables, depends on the rural non-farm-farm mix and the level of income. The unemployment sensitivity is given by:

$$\frac{\partial Y_k}{\partial X_1} = b_1 + c_1X_d + b_8X_8 + b_9X_2 + b_{10}X_3 + c_8X_dX_8 + c_9X_dX_2$$
$$c_{10}X_dX_3.$$

For nonpoor counties this becomes:

$$\frac{\partial Y_k}{\partial X_1} = b_1 + b_8X_8 + b_9X_2 + b_{10}X_3.$$

For poor counties this is:

$$\frac{\partial Y_k}{\partial X_1} = b_1 + c_1 + (b_8 + c_8)X_8 + (b_9 + c_9)X_2 + (b_{10} + c_{10})X_3.$$

The arithmetic means for the respective groups of counties for variables X_2, X_3 and X_8 are used in estimating those sensitivities.

CONTROLLED REGRESSION RESULTS

This section reports on regression results using Model One. As shown in Table I, this model uses a series of multiplicative dummy variables which estimates, for each explanatory variable, the difference between the coefficients of poor and nonpoor counties. When significant at the 70 percent confidence level or better, the "poor" dummy variable coefficient is added to the corresponding "nonpoor" estimate to derive the coefficient for the poor county.[3] When a dummy is not significant, at the 70 percent level, the hypothesis of a zero value is accepted, since it is inferred that both poor and nonpoor counties share the same value for the corresponding coefficient.

The inclusion of many slope dummies may cause multicollinerity which decreases the reliability of the least-squares estimates. Inspection of Table I shows that most of the slope dummies have insignificant coefficients. This indicates either (1) that there is little or no difference between the slope coefficients of the poor and nonpoor groups; or (2) that multicollinerity is shielding significant differences between groups. To determine which indication is correct, a Chow Test of equality between sets of linear regression coefficients is performed using Model One without any dummy variables. The 35 nonpoor counties are taken to constitute a set of observations to which are added the 18 poor counties. The test allows us to determine whether the "poor" observations come from the same relation as the "nonpoor" observations.[4] The results show that in all but three cases the hypothesis that both sets of data are generated by the same process cannot be rejected at the 90 percent confidence level.

Since the Chow Test applies to entire sets of coefficients, the dummies are included for each age-sex group as rough indicators of which independent variables may have differential effects between poor and nonpoor counties. Table I presents the results for Model One. The estimates for each independent variable are briefly discussed and emphasis is on the unemployment and wage variables.

Unemployment Rate. Among the males (except those age 65+) the significant unemployment rate coefficients are larger in absolute terms for Model One than for a truncated model in which the unemployment rate and X_d are the only independent variables. The inference is that controlling for other factors slightly reinforces the relationship between differences in LFPR and differences in the unemployment rate. The 65+ age group shows a smaller coefficient for Model One, indicating that the control variables decrease the strength of the relationship among the oldest males.

The percentage differences between the controlled and uncontrolled unemployment coefficients give a more accurate picture of how important the other factors are in determining the sensitivity of labor supply to differences in job opportunities. These percentages are given in Table II. The control variables have the greatest impact for men age 18-24, whose unemployment sensitivity is increased by nearly 50 percent as a result of adding controls. The inference is that other factors effect the sensitivity of the LFPR to the unemployment rate. The percentage figure shows a large change in sensitivity for males age 65+ relative to that of the other groups. The

TABLE I. -- REGRESSION RESULTS FOR MODEL ONE, RURAL NONFARM COUNTIES OF NORTH CAROLINA, 1960

MALES	a_o intercept	a_d intercept dummy	b_1 unemployment rate	c_1 unemployment rate.X_d	b_2 % county pop. rural nonfarm	c_2 % rural non farm.X_d	b_3 % county pop. on farm	c_3 % farms .X_d
14-17	.002 (1) (.008)	1.278 ++ (1.900)	-1.879 ## (4.39)	1.849 ++ (2.000)	-.040 (.424)	-.500 * (2.030)	.091 (.746)	-.678 * (2.353)
18-24	.889 + (1.372)	-.145 (.094)	-3.025 (3.086)	3.795 ++ (1.792)	-.044 (.203)	-.260 (.461)	-.610 * (2.192)	.103 (.156)
25-34	1.368 # (3.548)	-.779 (.849)	-.495 (.848)	1.253 (.994)	-.196 + (1.511)	-.306 (.910)	-.370 * (2.238)	.160 (.409)
35-44	.638 * (2.059)	.771 ? (1.046)	-.347 (.740)	.941 (.928)	.022 (.212)	-.280 (1.036)	.036 (.271)	-.592 ++ (1.874)
45-64	.886 ## (3.667)	-.309 (.538)	-1.172 # (3.208)	.492 (.624)	-.053 (.656)	-.040 (.192)	.033 (.316)	-.444 ++ (1.806)
65+	.409 ? (1.243)	1.476 (1.888)	-.889 ++ (1.786)	-.429 (.399)	-.106 (.955)	-.350 ? (1.220)	.075 (.532)	-.107 (.319)
FEMALES								
14-17	.307 + (1.580)	.084 (.181)	-.535 ++ (1.820)	-.140 (.220)	-.103 + (1.581)	-.105 (.620)	-.099 ? (1.186)	.015 (.078)
18-24	1.599 # (2.942)	-.107 (.083)	-2.282 # (2.775)	-1.066 (.600)	-.299 + (1.637)	-.421 (.889)	-.239 (1.025)	.140 (.254)
25-34	1.879 ## (3.989)	-1.118 (.998)	-2.579 ## (3.618)	1.554 (1.009)	-.325 * (2.053)	-.349 (.851)	-.410 * (2.027)	-.210 (.437)
35-44	1.606 ## (3.634)	-.894 (4.112)	-3.242 ## (4.848)	1.733 ? (1.199)	-.296 ++ (1.989)	-.159 (.414)	-.551 # (2.905)	.044 (.099)
45-64	.704 * (2.122)	-.286 (.363)	-1.685 # (3.358)	1.411 ? (1.302)	-.194 ++ (1.736)	-.081 (.280)	-.449 # (3.151)	-.092 (.272)
65+	.157 (1.000)	-.054 (.925)	-.310 + (1.305)	.074 (.145)	.010 (.183)	-.098 (.712)	.--6 (.092)	-.063 (.393)

(1) "t" ratio, with 37 degrees of freedom, given in parentheses
Significance Levels: ## 99.9%; # 99%; ** 98%; * 95%; ++ 90%; + 80%; ? 70%

TABLE I. (cont'd.)

MALES	b_4 % county pop. nonwhite	c_4 % nonwhite $.X_d$	b_5 % county pop. $\leq$ age 13	c_5 % ages $\leq$13 $.X_d$	b_6 median yrs. schooling for adults 25+	c_6 median yrs. schooling $.X_d$	b_7 county ave. hourly wage	c_7 hourly wage $.X_d$
14-17	-.096 (1.035)	-.051 (.282)	.904^{++} (1.712)	.058 (.036)	.045$^{\#\#}$ (3.808)	-.106* (2.129)	-.192$^{\#}$ (3.198)	-.070 (.467)
18-24	-.397^{++} (1.873)	-.012 (.025)	2.659* (2.198)	.259 (.071)	-.008 (.282)	.016 (.136)	-.303* (2.200)	-.120 (.346)
25-34	.059 (.470)	-.012 (.040)	.032 (.044)	.452 (.208)	-.011 (.689)	.058 (.855)	-.087$^{?}$ (1.064)	.162 (.787)
35-44	-.041 (.408)	-.146 (.613)	.770^{+} (1.329)	.457 (.262)	.004 (.303)	.003 (.058)	.018 (.280)	-.448** (2.716)
45-64	.081 (1.020)	.155 (.835)	.395 (.876)	1.036 (.762)	.018^{++} (1.773)	.052$^{?}$ (1.214)	-.123* (2.390)	-.227^{++} (1.764)
65+	.133$^{?}$ (1.232)	.095 (.373)	-.233 (.380)	-1.976$^{?}$ (1.066)	.003 (.191)	-.065$^{?}$ (1.114)	.003 (.048)	-.048 (.271)
FEMALES								
14-17	-.073$^{?}$ (1.143)	.116 (.778)	.149 (.411)	-.659 (.603)	.004 (.502)	-.003 (.086)	-.108** (2.622)	.116$^{?}$ (1.124)
18-24	-.301^{++} (1.694)	.211 (.504)	-.625 (.616)	-1.995 (.652)	-.047* (2.062)	.071 (.736)	-.114 (.988)	.267 (.922)
25-34	-.025 (.162)	-.152 (.419)	-.747 (.850)	1.666 (.628)	-.064$^{\#}$ (3.213)	.087 (1.043)	-.163^{+} (1.625)	.045 (.179)
35-44	-.100 (.690)	.163 (.479)	-.083 (.100)	.050 (.020)	-.041* (2.234)	.075 (.961)	-.182^{++} (1.940)	.124 (.528)
45-64	.006 (.054)	.156 (.610)	.190 (.306)	-.033 (.018)	-.004 (.282)	-.044 (.742)	-.044 (.625)	-.082 (.462)
65+	.111* (2.157)	-.047 (.388)	-.301 (1.027)	.103 (.117)	.002 (.296)	.013 (.477)	-.010 (.303)	.000 (.000)

Significance levels: ## 99.9%; # 99%; ** 98%; * 95%; ++ 90%; + 80%; ? 70%

low percentage differences for males age 14-17 and 45-64 indicate that, either the control variables have little effect on the sensitivity, or they have cancelling effects. The results for individual controls will answer this question.

The females in the first four age groups have unemployment rate coefficients which are nearly the same in both models. Once again we cannot determine, at this point, whether the control variable effects are small or cancelling. The older women (45-64, 65+) have somewhat larger negative percentage differences, implying that their uncontrolled equations overstate the relationships between LFPR and the unemployment rate.

Table II. -- Controlled and Uncontrolled Significant Regression Coefficients for the Unemployment Rate Variable; Absolute and Percentage Differences Between the Two.

	uncontrolled coefficients (truncated model)	controlled coefficients (Model 2)	difference (2) - (1)	percentage difference (3)/(1)
MALES				
14-17	-1.877	-1.879	.002	0.1%
18-24	-2.063	-3.025	.962	46.7%
45-64	-1.151	-1.173	.022	1.9%
65+	-1.157	-.889	-.268	-23.2%
FEMALES				
14-17	-.550	-.535	-.015	-2.7%
18-24	-2.289	-2.282	-.007	-0.3%
25-34	-2.451	-2.579	.128	5.2%
35-44	-3.120	-3.242	.122	3.9%
45-64	-1.917	-1.685	-.232	-12.1%
65+	-.355	-.310	-.045	-12.7%

The conclusion can be drawn then that the truncated model does not generate biased estimates of sensitivity in six out of ten cases considered. In three cases the gross equation overestimates, and in one case it strongly underestimates, the sensitivity coefficients. It is, therefore, appropriate that the expanded model is employed.

The results for the specific age and sex groups show that a negative relation between LFPR and the unemployment rate holds throughout.

Males. The results for males show coefficients which are significant at the 90 percent level or better in all but two age groups. These two groups are comprised of prime-age males (25-44) whose attachment to the labor force is strong regardless of moderate changes in the unemployment rate.[5] The other four groups are on the ends of the age spectrum of the labor force and contain a large number of secondary workers whose attachment to the labor force is weak. For these secondary workers, the unemployment rate, as an indicator of labor demand, appears to be an important factor in the participation decision. The results show this most strongly in the case of men, age 18-24. A difference of one percentage point in the unemployment rate accounts for, on the average, a decrease of three percentage points in the participation rate.

The youngest age group shows a smaller sensitivity in the unemployment rate. This can be attributed probably to the effect of school attendance on the younger members of this group. The older males (age 45+) have the smallest significant sensitivity. This is expected since the decision to retire often depends, in part, upon the availability of employment.[6]

The coefficients of the multiplicative dummy variables (c_i) are significant for males in the two lowest age groups. This indicates that the younger men in the poverty counties have absolute sensitivities to unemployment. In fact, the slope coefficient ($b_1 + c_1$) for men 18-24 years of age is positive (although weak) in the poor counties. This may reflect a pattern of extended family ties wherein the younger men enter the labor force to seek employment in counties in which the prime-age and older males have experienced high unemployment.

Females. The results for females show negative relations between LFPR and the unemployment rate, which are significant at the 90 percent level or better in all but one age group. The slope coefficients are largest in the middle-age groups and taper off at either end of the age spectrum. The sensitivity is strongest in the 35-44 age group. A one point difference between the unemployment rates of two counties accounts for, on the average, a difference of more than three points in the opposite direction, between the LFPR in the two counties for women in this group. This high sensitivity results, in part, from the significant proportion of women in this age group who are secondary workers and who have weak attachment to the labor force. The sensitivity is lower for women in the 18-24 and 25-34 age groups. This can be explained by the fact that many women in these age groups are caring for young children; they are expected to have a lower sensitivity to change in job opportunities. From this viewpoint, the upward trend in coefficients for women from age 18 to 44 is understandable in that older married women are less likely to have young children who require full-time care.[7]

The youngest females (14-17) have a low sensitivity relative to that of the prime-age females; this may be attributed to school attendence which tends to limit participation. It is interesting to note that the sensitivity for males in this age group is higher than that for females. This is consistent with the record of a higher school dropout rate among males than among females.

The older females (45+) have significant sensitivities to the unemployment rate, which are smaller than those of the prime-age females. As with the males, we conclude that a substantial number of retirees in these groups may account for the smaller coefficients.

Two of the age groups (35-44, 45-64) show positive coefficients for the multiplicative dummy variable (c_1) which are significant at the 70 percent level of confidence. The weak inference is made that women in these age groups, living in poverty counties are less sensitive to differences in employment opportunities than are women of the same age in nonpoverty counties.

Wage Rate. The county average hourly wage rate is included to account for the monetary inducement to participate in the labor force. The direction of the relation between LFPR and the wage rate is the result of the income and substitution effects. Theoretically, the income effect operates as follows: increased wages cause an increase in incomes which allow individuals, in effect, to buy more leisure, thereby decreasing their labor supply. The substitution effect works in an opposite way: wage increases are increases in the opportunity cost (or price) of leisure; labor supply will therefore increase.

The regression coefficients for the wage variable measure the net of these two effects. The negative signs of the significant wage coefficients in Table I indicate that, for the groups in which the wage rate is a significant determinant of participation, the income effect outweighs the substitution effect. There are strong wage relationships for the LFPR of males age 14-17 and 18-24 in both the poor and nonpoor counties. This may be attributed to "structural nonparticipation": the nonparticipation of those who would become structurally unemployed were they to enter the labor market. Wages and skill level are positively related; therefore, an increased proportion of young men may stay out of the labor force in counties in which wages paid and skills demanded are high. The argument is reinforced by the provision under a North Carolina statute of 1959 of a $1.00/hr. minimum wage covering males and females, age 16-64. Men in these age categories are also likely to have less pressure upon them to seek employment than men in other age groups. This is consistent with the lower significant wage coefficients in the nonpoor counties for men age 25-34 and 45-64.

The only significant differences between the poor and nonpoor males are in the 35-44 and 45-64 age groups. The structural nonparticipation argument can be used again, as it may be that men in these age groups have working wives, thereby allowing them to exhibit strong income effects.

Among women, the wage variable has a significant effect on the LFPR in three age groups. The proportion of women in these groups whose behavior is responsible for this pattern may be those with working husbands. For these women the income effect is strong: they can afford to buy leisure with their husbands' incomes. The only significant difference between the poor and nonpoor counties is for the youngest women. The nonpoor show a relatively small negative sensitivity to the wage rate, whereas the poor show an even smaller positive sensitivity.

The coefficients for the wage rate are interpreted to mean the change in the LFPR with respect to a one dollar change in the wage rate. For nonpoor men 18-24, the -.303 coefficient means that a difference of 10 cents in the wage rate accounts, on average, for a 3 percentage point difference (in the opposite direction) in the LFPR.

Unemployment and Wage Elasticities. The point-elasticities of LFPR, with respect to the means of the unemployment rate and the wage rate for the poor and nonpoor counties, are presented in Table IV. The Chow Test indicates that the same relation holds for poor and nonpoor counties in all but three of the age-sex groups; therefore, the coefficients, generated by the version of Model One which does not employ dummies, (Model One-A), are used to compute elasticities for the age groups in which the poor and nonpoor counties share a common relation. The results for Model One-A are presented in Table III. For men ages 14-17 and 45-64, and women ages 25-34, the coefficients from the model with the dummy variables (Model One) are used. The elasticities are not computed for cases in which a zero regression coefficient cannot be rejected at the 70 percent or better confidence level. In these cases, the relevant derivative is assumed to be zero, thereby implying zero elasticity.

The reader is advised that, in all but three age-sex groups, the elasticities between the poor and nonpoor vary because of the differences in the mean values for the LFPR, the unemployment rate, and the wage rate.[8] Denoting poor and nonpoor with superscripts p and np, respectively, the elasticities for variable 1, for instance, are (for age-sex group k):

$$\eta^{np}_{Y_k \cdot X_1} = \hat{b}_{1k} \frac{\bar{X}_1^{np}}{\hat{Y}_k^{np}}$$

and

$$\eta^{p}_{Y_i X_1} = (\hat{b}_{1k} + \hat{c}_{1k}) \frac{\bar{X}_1^{p}}{\hat{Y}_k^{p}}$$

These elasticities are the percentage difference in LFPR associated with a one percent difference in the unemployment rate (moving from the mean).

The results show that the LFPR of every age-sex group but one exhibits an inelastic responsiveness to the unemployment rate (i.e.,

TABLE III. REGRESSION RESULTS FOR MODEL ONE-A, RURAL NONFARM COUNTIES OF NORTH CAROLINA, 1960

	a_o	b_1	b_2	b_3	b_4	b_5	b_6	b_7
	intercept	unemployment rate	% county pop. rural nonfarm	% county pop. on farms	% county pop. nonwhite	% county pop. ages 13-	median yrs. of schooling for adults 25+	county ave. hourly wage
MALES								
14-17	.278(1) (1.011)	1.430# (3.328)	-.081 (.822)	-.110 (.959)	-.098? (1.157)	.073 (.139)	-.040# (3.140)	-.159** (2.673)
18-24	1.023++ (2.003)	-2.086** (2.611)	-.140 (.760)	-.532** (2.503)	-.414** (2.642)	2.075** (2.126)	.006 (.240)	-.348# (3.153)
25-34	1.118## (3.549)	-.238 (.483)	-.220++ (1.973)	-.279* (2.130)	.003 (.029)	.200 (.332)	.001 (.057)	-.034 (.497)
35-44	1.143## (4.224)	-.035 (.201)	-.086 (.888)	-.139? (1.230)	.022 (.267)	-.029 (.055)	.002 (.142)	-.085+ (1.454)
45-64	1.097## (4.939)	-1.140# (3.282)	-.073 (.909)	-.148+ (1.606)	-.057 (.837)	-.088 (.208)	.017++ (1.702)	-.139# (2.990)
65+	.637** (2.466)	-.792++ (1.960)	-.169++ (1.816)	.065 (.603)	.128++ (1.617)	-.613? (1.241)	.001 (.113)	-.035 (.631)
FEMALES								
14-17	.263+ (1.647)	-.504** (2.419)	-.096+ (1.677)	-.122++ (1.834)	-.062 (1.262)	.040 (.131)	.005 (.686)	-.068++ (1.963)
18-24	1.434# (3.230)	-2.501## (3.601)	-.320++ (2.006)	-.235? (1.271)	-.330** (2.456)	-.675 (.795)	-.038++ (1.860)	.049 (.412)
25-34	1.704## (4.339)	-2.348## (3.836)	-.345** (2.438)	-.457# (2.792)	-.070 (.834)	-.805? (1.071)	-.053# (2.952)	-.095 (1.129)
35-44	1.539## (4.299)	2.975## (5.313)	-.323** (2.511)	-.590## (3.957)	-.058 (.529)	-.369 (.539)	-.034* (2.074)	-.128+ (1.664)
45-64	.878# (3.303)	-1.449# (3.482)	-.254** (2.656)	-.523## (4.721)	.105? (1.288)	-.245 (.482)	-.003 (.220)	-.063 (1.097)
65+	.146? (1.217)	-.269** (1.434)	.000 (.005)	-.003 (.062)	.089** (2.426)	-.297? (1.297)	.003 (.581)	-.005 (.204)

(1) "t" ratio, with 45 degrees of freedom, given in parentheses.

Significance Levels: ## 99.9%; # 99%; ** 98%; * 95%; ++ 90%; + 80%; ? 70%

$|\eta|<1$). In the case of males 25-34 and 35-44, the slopes are inferred to be zero, thereby implying zero elasticity of LFPR to the unemployment rates in both poor and nonpoor groups. Males, ages 14-17 and 18-24 in nonpoor counties show a higher elasticity than their counterparts in the poor counties. In fact, the poor 18-24 age group shows a virtually zero elasticity. The nonpoor males age 45-64 show a slightly higher elasticity than poor males in this age group. Men ages 65+ in the nonpoor counties show an elastic response to employment opportunity; a one percent difference in the unemployment rate elicits a one and one-half percent difference (in the opposite direction) in participation.

The unemployment elasticities for females are higher in the poor than in the nonpoor counties in four of the six age classes. The nonpoor women, age 25-34, have a higher elasticity than their counterparts in the poor counties. This is the case in which the Chow Test indicates different relationships for poor and nonpoor counties. This difference in slope coefficients, as well as in the means, causes the women of this age class in nonpoor counties to be twice as elastic as women in the same class in the poor counties. A difference in means accounts for the slightly greater elasticity among the oldest women in nonpoor counties than among those in poor counties.

We can note some important conclusions to be drawn from the unemployment elasticity estimates. Men, except the youngest and the nonpoor oldest, have low elasticities which vary slightly between poor and nonpoor county groups. Presumably their labor force attachment is strong regardless of the unemployment rate or the incidence of poverty. The youngest men have higher elasticities in the nonpoor than in the poor counties which may result from (1) better job information; or (2) higher proportions of young primary (low sensitivity) workers in poor counties than in nonpoor counties.

In elasticity terms, women in the poor counties are more sensitive, on the whole, to differences in job opportunities than women in nonpoor counties; this can be attributed to a higher proportion in poor counties of women who enter the labor market when demand is strong and seek jobs in order to supplement low family income.[9] The structure of labor demand may prevent a large proportion of these women who wish to become primary workers from doing so.

The wage rate elasticities show that the youngest age groups, male and female, poor and nonpoor, have LFPR which are negatively elastic with respect to differences in the wage rate. Among both males and females the poor are more elastic than the nonpoor. The inference can be made, if we accept the hypotheses of structural nonparticipation and minimum wage as a disincentive, that the exclusionary effect of high wages (and the demand for high skill levels) is stronger among the poor young men and women than among the nonpoor.

Among other age-sex groups, the LFPR is negatively inelastic with respect to the wage rate. The differences between the poor and nonpoor are in most cases quite small except among males ages 45-64 for whom the difference in the slope coefficients causes the elasticity to vary greatly. The slope for poor males in this group is nearly three times that of the nonpoor. This large difference in absolute sensitivity outweighs the relatively small differences in mean wage rates and LFPR.

The conslusions are (1) except for the youngest members of the population, LFPR is negatively inelastic with respect to differences in the wage rate; and (2) except for men ages 45-64, the differences in elasticity between poor and nonpoor counties is small, with the elasticities for the poor counties averaging about one-fifth smaller or larger than those for the nonpoor.[10]

Table IV. Point-Elasticities of LFPR with Respect to Unemployment Rate and the Wage Rate, Evaluated at the Means, For Poor and Nonpoor Rural Nonfarm Counties of North Carolina, 1960

	UNEMPLOYMENT RATE ELASTICITY		WAGE RATE ELASTICITY	
	Nonpoor = $\eta^{np}_{y.x_1}$	Poor = $\eta^{p}_{y.x_1}$	Nonpoor = $\eta^{np}_{y.x_7}$	Poor = $\eta^{p}_{y.x_7}$
MALES				
14-17	-.428	-.009	-1.324	-1.847
18-24	-.158	-.152	-.714	-.587
25-34	(1)	(1)	(1)	(1)
35-44	(1)	(1)	-.146	-.118
45-64	-.073	-.046	-.229	-.546
65+	-1.495	-.141	(1)	(1)
FEMALES				
14-17	-.372	-.573	-1.261	-1.482
18-24	-.323	-.460	(1)	(1)
25-34	-.335	-.167	-.637	-.780
35-44	-.357	-.452	-.462	-.449
45-64	-.217	-.271	-.285	-.271
65+	-.193	-.191	(1)	(1)

(1) Coefficients not significant; elasticity measure is invalid.

Percentage Rural Nonfarm Population. This variable (whose value is always greater than or equal to .50, by virtue of the criterion by which the counties were chosen) is included to capture the effects on LFPR, which are associated with population density. We expect the coefficients to be negative on the grounds that economic activity is positively related to population density, and that labor force participation is positively related to economic activity. This negative expectation is reinforced by the notion that, the less densely populated is an area, the smaller (in terms of possible nodes and nonredundant flows) is the job information network; this increases job search costs and thereby tends to discourage participation.

The data presented in Tables I and III verify this theory; in every case for which the coefficient is significant, it has a negative sign. Among the males, this variable does not appear to be important. It is interesting to note that the multiplicative dummy coefficients (c_2) for the poor are significant for males at the ends of the age spectrum; for these same men the nonpoor coefficient is insignificant. This implies for males that the effects, which are associated with the percentage of rural nonfarm population, operate most strongly among the oldest and youngest men in the poor counties. This is consistent with the proposition that men in these age groups tend to be secondary workers. Whereas their nonpoor counterparts are, in many cases, out of the labor force completely, poor men in these groups may be potential secondary workers who are responsive to factors other than (or as well as) the unemployment rate.

Among females, the coefficient is significant in every age group except the oldest. The dummies are all insignificant, therefore, and the inference is made that this variable affects the labor force behavior of poor and nonpoor in the same manner. We conclude that the effects, associated with the percentage of rural nonfarm population, negatively affect the LFPR of all but the oldest women in both poor and nonpoor county groups.

Percentage Farm Population. This variable is included as a complementary variable to the percentage of rural nonfarm population. A county population may be partitioned into three mutually exclusive and exhaustive subsets: urban, rural nonfarm, and farm. By including the rural nonfarm and farm proportions, we are able to deduce the individual effects on LFPR of all three proportions.[11] According to the reasoning of the previous section, we expect the coefficients for farm population percentage to be negative. This implies that the urban population proportion has a positive effect on LFPR in rural nonfarm counties.

Tables I and III verify the population density notion: all significant farm population coefficients are negative. Among the males, the poverty dummies are significant in three cases in which the actual slope coefficient is not significant. We can infer that, among males ages 14-17, 35-44, and 45-64, the farm population variable significantly affects participation in poor counties only. Among males ages

18-24 and 25-34, the same variable affects the behavior of poor and nonpoor alike. The oldest males appear unaffected in their participation by difference among counties for this factor.

The farm population proportion is strongly significant (95 percent confidence level or better) for females between 25 and 64. The dummies are insignificant in every case, indicating that, for each age-sex group, women in poor and nonpoor counties do not behave in significantly different manners with respect to this variable.

To deduce the effects of the urban population proportion, we need to combine the effects of the rural nonfarm and farm population proportions on LFPR (i.e., b_2 and b_3). This requires testing the simultaneous hypotheses that b_2 and b_3 are significantly different from zero for each pair of b_2 and b_3 coefficients. The results of the test show that in only three cases can the zero-value hypotheses be rejected, simultaneously, at the 90 percent confidence level. Two cases are women ages 35-44 and women ages 45-64. The influence of different coefficients for poor and nonpoor does not hold; therefore, Model One-A (without dummies) is used for these tests. The third case is men ages 14-17 in poor counties. For this group, both the rural nonfarm and farm variables have insignificant slopes for the nonpoor and significant slopes (from the dummy variables) for the poor. Furthermore, the slopes are significantly different from zero simultaneously. In these three cases the b_2 and b_3 coefficients may be added and their sum multiplied by minus one to deduce the urban population effect. In other cases these coefficients may be added, with a lesser degree of certainty about the result. Table V presents a comparison of the effects of population density on LFPR.

Table V. Comparison of differences in LFPR with respect to differences in rural nonfarm - farm urban population proportions; for selected age-sex groups. (Data from Tables I and III.)

	Rural nonfarm (b_2)	Farm (b_3)	Urban ($b_2 + b_3$) (-1)
Males, 14-17, poor counties	-.500	-.678	1.178
Females, 35-44, all counties	-.323	-.590	.913
Females, 45-64, all counties	-.254	-.528	.782

The conclusion from the results for these variables is that population density, in so far as it is represented by our variables, is positively related to LFPR in the rural nonfarm counties of North Carolina. Thus, the theory presented earlier of the positive relation between participation and population density (and the potential size of the job information network), is verified for the present set of data.[12]

Percentage Nonwhite Population. The percentage of the county population which is nonwhite is included to account for social differentials tending to exist in terms of investment in human capital and hiring practices. On the average, we expect nonwhites to have smaller holdings of human capital and a larger incidence of job discrimination than whites. Both of these tend to discourage participation among nonwhites. Therefore we expect the coefficient for this variable to be negative.

Table I shows that no multiplicative dummy has a variable significant coefficient (c_4) for this factor; therefore, we can consider the results for Model One-A (Table III) only. The hypothesis of a negative relation is borne out in some significant cases but not in others. The LFPR of young men (14-24) and young women (18-24) show negative responsiveness to the nonwhite variables. However, behavior of the oldest males (65+) and females (45-65+) is positively related to this factor. Asset holdings for retirement purposes are generally smaller among nonwhites than among whites. The positive relation can be explained by a larger proportion of older nonwhites than whites who participate in the labor market to supplement their smaller retirement incomes.

We can conclude that, on the whole, differences in the nonwhite proportion of the population have a small effect on differences in participation in the rural nonfarm counties of North Carolina.

The discouragement hypothesis is strongly supported for men and women ages 18-24; the oldest males and females show small positive relations, and those in the prime-age groups appear virtually unaffected. These conclusions held for poor and nonpoor counties alike.

Percentage of Population Age 13 and Under. The percentage of county population age 13 and under is included to account for the incentive effect which young children have on the labor force participation of men and the disincentive effect of children on female labor force participation. This is a crude variable since it takes no account of family size differentials. Even so, the coefficient for this variable is expected to be positive for males and negative for females. Furthermore, it may be that the negative coefficient for females will be stronger in the nonpoor than in the poor counties. In the latter group of counties, it is more likely that the male will be unemployed. (There is a fine percent difference in the mean unemployment rates for the two groups.) This could cause a positive incentive effect on the female labor supply, which may outweigh the negative influence of the females' child-care role. This would be the case especially when the husband is long-term unemployed and could assume the job of caring for children.

The results do not support these hypotheses very strongly. Model One shows a positive relation for men in three age groups, poor and nonpoor, and a negative relation among poor men, age 65+. Among women, there are no significant coefficients for this variable under Model One. The results for Model One-A are fairly consistent with those for Model One although two groups of females (25-34, 65+) have very weak significant coefficients.

Combining the results, we conclude that differences in the proportion of the population age 13 and under have small effects on differences in the LFPR in both poor and nonpoor counties. The only exception is men age 18-24 whose behavior exhibits a strong and significant positive relation to the variable. This is consistent with the hypothesis of a positive incentive of children on the participation of males; and with the notion that married men in this age group are more likely to have young children than men in other age groups.[13]

Median Years of Schooling Completed by Adults, Age 25+. The education variable is included to account for the fact that the greater one's education, the greater is the likelihood of finding employment which (1) minimizes the disutility of work, or (2) increases the nonpecuniary aspects of job remuneration. On this basis we expect the variable to be positively related to the participation rate of those age 25 and over. Educational attainment is expected to be negatively related to the participation rate of people age 14-24 and particularly of the 14-17-year-olds. A smaller proportion of these 14-17-year-olds is likely to participate in the labor force in a county in which the median educational level is, say, 10 years of schooling than in a county in which the median educational level is 5 years.[14]

The results for males are strongly significant in two age groups. The youngest males in the nonpoor counties exhibit small positive coefficients. This implies some verification of the idea that young people do not do as their parents did, because low educational attainment of adults is positively related to low participation of young men. For these men, low participation probably implies a high degree of school attendance. Males in poor counties however, show quite a different pattern.[15] Adding the coefficients yields an estimate of -.061 for the youngest men in the poor counties; for this group, the hypothesis that children follow their parents' pattern of behavior is validated.

The LFPR for males age 45-64 in the nonpoor counties exhibit a positive relation to educational attainment. This supports the hypothesis that more education increases desirable job alternatives and encourages participation. The multiplicative dummy is positively significant at the 70 percent level, allowing the weak inference to be made that, for these men, educational attainment has a greater influence on participation in poor counties than it has in nonpoor counties.

The participation rates for the women are significantly related to educational attainment in three cases (those aged 18-44). The coefficients are negative, implying that the hypothesis presented for adults does not hold for women. Furthermore, women in poor and nonpoor counties share the same relation. The inference can be made that the labor force in these groups is composed largely of secondary workers. It is presumable that a higher level of educational attainment leads to a higher <u>employment</u> rate among primary workers, which, in turn, leads to a decrease in the <u>participation</u> of secondary workers. This is consistent with the finding of no relation between educational attainment and participation among prime-age males. As the unemployment coefficients point out, most of these men are primary workers who are likely to be in the labor force whether employed or not.

CONTROLLED REGRESSION WITH INTERACTIVE VARIABLES

Model Two is employed to account for the combined effects on the LFPR of the unemployment rate and three other variables: median family income, the rural nonfarm population percentage, and the farm population percentage.

Differences in income, as a separate variable, may both cause and be a cause of differences in participation. To minimize circularity, the product of the unemployment rate and median income is used as a variable. This model also assumes that the unemployment rate is interactive with the urban-rural, nonfarm-farm mix. This is justified by the notion that the employment situations may vary with the population mix. While the X_2 and X_3 coefficients provide partial estimates along these lines, the multiplicative variables account for the hypothesized interaction between variables.

The results of the regressions are provided in Table VI for the unemployment rate and the three interaction terms only. The control variables are included in the runs, but their results parallel those of the previous section and are therefore not reported. Separate equations for poor and nonpoor were run, and Chow Tests were conducted. The results show that only in the case of males age 14-17 are the data for poor and nonpoor generated by different relations. In all other cases, poor and nonpoor share a common process; therefore, in these cases, a version of Model Two is used which omits dummy variables (Model Two-A).

From these coefficients, the partial derivatives of LFPR with respect to the unemployment rate (see 3) for each group are estimated at the means for the nonpoor and poor counties separately. [Note: for males, 14-17, different estimates of the coefficients for poor and nonpoor are used as well when the slope dummies are significant.] We assume that Models Two and Two-A are the correct descriptions of the process which generates the data. Therefore, all four coefficients are used in estimating the partial derivative, regardless of the t-ratio values of the individual coefficients; in essence, we are forecasting these derivatives for a set of mean values.

The forecast derivatives are then used to estimate the elasticities at the means of the unemployment and participation rates for poor and nonpoor groups. The results show that in two cases none of the coefficients are significant, and derivatives and elasticities are not calculated. The results are startling because, in nearly every case, both the absolute and relative sensitivity estimates are lower for the interactive models without interaction terms. There is a problem in that the median family income variable is calculated from data for 1959: the case can be made that unemployment during the Census week in 1960 is a function of income in 1959. If this is

Table VI. -- Partial Regression Coefficients for the Unemployment Rate and the Interaction Variables; Using Model Two-A.

		INTERACTIVE WITH UNEMPLOYMENT RATE						
	UNEMPLOY-MENT RATE	MEDIAN FAMILY INCOME	% POP. RURAL NONFARM	% POP. FARM	ESTIMATED AT NONPOOR MEANS	ESTIMATED AT POOR MEANS	NONPOOR ELASTICITY	POOR ELASTICITY
MALES	b_1	b_8	b_9	b_{10}	$\frac{\partial Y^{np}}{\partial X_1}$	$\frac{\partial Y^{p}}{\partial X_1}$	$\eta^{np}_{y.x_1}$	$\eta^{p}_{y.x_1}$
14-17 (1) nonpoor	-12.928# (3.276)	.128# (2.708)	10.087# (2.927)	3.174 (.618)	-.852		-.195	
poor	-53.817#	.128#	62.839#	34.009#		.050		.015
18-24	-4.173 (.491)	.268# (2.988) (2)	-9.376+ (1.137)	7.852 (.862)	.383	-.822	.026	-.00[illegible]
25-34	-6.662+ (1.322)	.209## (3.937)	-.682 (.139)	7.375+ (1.366)	.675	.507	.039	.032
35-44	-1.996 (.382)	.024 (.434)	1.139 (.225)	2.258 (.404)				
45-64	-9.197* (2.327)	.113** (2.700)	5.156+ (1.345)	7.458++ (1.761)	-.259	-.693	-.016	-.047
65+	-6.288+ (1.316)	.090++ (1.792)	3.468 (.748)	3.915 (.765)	-.110	-.866	-.012	-.154
FEMALES								
14-17	-6.800** (2.494)	.079# (2.757)	5.077++ (1.919)	3.435? (1.176)	.134	-.561	-.082	-.532
18-24	-25.911## (3.567)	.275## (3.581)	18.534** (2.63)	17.146* (2.203)	-.231	-1.853	-.030	-.341
25-34	-29.253## (4.864)	.267## (4.202)	22.546## (3.865)	20.929# (3.260)	-.397	-1.559	-.052	-.254
35-44	-14.828* (2.280)	.162* (2.372)	7.816? (1.244)	10.685+ (1.540)	-1.725	-2.376	-.207	-.361

Table VI. Cont'd.

	UNEMPLOY-MENT RATE	MEDIAN FAMILY INCOME	% POP. RURAL NONFARM	% POP. FARM	ESTIMATED AT NONPOOR MEANS	ESTIMATED AT POOR MEANS	NONPOOR ELASTICITY	POOR ELASTICITY
MALES	b_1	b_8	b_9	b_{10}	$\frac{\partial Y^{np}}{\partial X_1}$	$\frac{\partial Y^{p}}{\partial X_1}$	$\eta^{np}_{y.x_1}$	$\eta^{p}_{y.x_1}$
45-64	-11.796** (2.426)	.098++ (1.900)	8.387++ (1.778)	9.345++ (1.794)	-.828	-.992	-.149	-.155
65+	1.727 (.783)	.0182 (.811)	1.803 (.843)	-.851 (.360)				

(1) Model Two, which incorporates dummies, is used for this group; "t" ratios are for 31 degrees of freedom.

(2) "t" ratios with 42 degrees of freedom in parentheses.

Significance levels: ## 99.9%; # 99%; ** 98%; * 95%; ++ 90%; + 80%; ? 70%

the case, we are, in essence, estimating a system of simultaneous equations by single-equation ordinary least squares. The coefficients are biased to the extent that the unemployment rate is correlated with the error term in the simple linear estimation of the income relation.

If we are willing to accept this model and its attendent potential for bias, then we can conclude that, measured at the means, LFPR is inelastic with respect to differences in the unemployment rate in all age-sex groups; and that the poor are more elastic than the nonpoor in nearly every group. The reader is cautioned that this model is tentative, and its results should be interpreted with care.

CONCLUSION

The LFPR of various age-sex groups in the rural nonfarm counties of North Carolina in 1960 depend on the county unemployment rate, except among the prime-age males. The wage rate is a weaker determinant since much of its effect is accounted for by the unemployment rate. The other five variables are significant determinants of participation for some, but in no case all, of the age-sex groups. The distribution of the population between farm, rural nonfarm, and urban areas affects participation, particularly among women; this may reflect the importance of the size of the job or it may reflect the differential structure of industrial demand for female labor in these population-density areas. The "nonwhite," "children" and "education" variables have smaller effects than were originally expected.

The observations for poor and nonpoor counties are generated by the same general process in all but a few cases. The differences between poor and nonpoor responsiveness to the individual independent variables are most pronounced with respect to the unemployment rate. For all the independent variables significant poor-nonpoor differences occur more often for males than females.

If we accept the hypothesis that these relationships are valid today, and the proposition that high LFPR are desirable on a normative basis, then the following policy implications can be made with respect to rural nonfarm North Carolina:

(a) The most effective way of increasing economic welfare via increased labor force participation is to expand job opportunities (i.e., increase the demand for the existing labor resources) and to increase the efficiency of the job information network.

(b) Population control programs which decrease the proportion of the population under age 14 will not effectively increase the participation rates among women.

(c) Increases in the wage rate (or wage supplements) may decrease the participation rates of prime age males and will have virtually no effect on the participation rates of other age-sex groups.

FOOTNOTES

[1]The LFPR is the ratio of the labor force to the population; the labor force includes the employed as well as the unemployed. Therefore, the participation rate is a measure of quanitity of labor supplied. I am assuming some familiarity with this type of analysis and its motivation; therefore the theoretical discussion is kept to a minimum.

[2]This wage rate is computed from data on [1] county average yearly income for individuals from wages and salaries; [2] county average weeks worked per year; and [3] state average hours worked per week. The formula use is:

$$\frac{\$/\text{yr.}}{\text{hrs./wk.} \cdot \text{wks./yr.}} = \$/\text{hr.}$$

[3]The 70 percent confidence level is admittedly liberal. This low level is deliberately chosen in view of the multicollinearity which operates to make the standard errors large; however, this does not necessarily imply that the substantive effect of the variable is either small or inconsequential. The reader who chose to emphasize the avoidance of Type I errors may, of course, be reluctant to reject a null hypothesis of "no effect" where the confidence level is less than 90 percent.

[4]The Chow Test is an F-test which tests the simultaneous equivalence element-by-element of vectors of coefficients for the two sets of data run separately. For Model One-A the F-values are the following:

MALES	$F_{8,37}$	FEMALES	$F_{8,37}$
14-17	3.125*	14-17	1.091
18-24	.739	18-24	.872
25-34	.884	25-34	2.692*
35-44	1.267	35-44	.877
45-64	3.125*	45-64	1.267
65+	.833	65+	0

*: significant at 90 percent level.

[5]These men are likely to be heads of households who, when unemployed, will continue to search for work (i.e., remain in the labor

force) whether employment seems probable or not. By "moderate changes in the unemployment rate," I mean changes of approximately four or five percentage points; extremely high unemployment rates would undoubtedly alter the labor force attachment of prime-age males.

[6]An older male who would rather stay in the labor force with a "secondary-worker" job (part-time, seasonal, etc.) may retire instead when faced with a slack labor market. Likewise, retired workers may re-enter the labor market as labor demand increases. I speculate that a number of the demand-sensitive older males left the labor force during the recession of 1958. When the 1960 Census was taken, the aggregate unemployment rate had not returned to its pre-recession level, and those who left may not have been motivated to return. This may explain the fact that the older males have a lower sensitivity than the younger males.

[7]In rural nonfarm North Carolina the probability that a woman between 18 and 44 is married is 88 percent, and the conditional probability that a woman has children, given that she is married, is 86 percent.

[8]The mean values of the independent variables are chosen as the evaluation points for two reasons. First, if a county is chosen at random from its respective group (poor or nonpoor), it is more likely that the observed values for the relevant variables will tend toward the means than toward any other points. Therefore, we can use no better data than the means if we wish to characterize the population by a single set of values. Second, the predicted value of the dependent variable equals its mean when the independent variables are evaluated at their means. Therefore, we avoid the necessity of actually calculating the predicted value of the dependent variable.

[9]On average, in the rural nonfarm areas of North Carolina, women in the two age groups for which the nonpoor counties show the higher elasticity constitute less than a third of the (working age) population.

[10]Negative wage elasticities mean that the income effects are strong. Taking note of the transitory-permanent differences, this implies that the added worker effects are stronger relative to the discouraged worker effect in terms of the unemployment variable.

[11]Suppose x_1 is the percentage rural nonfarm population, x_2 is the percentage farm population, x_3 is the percentage urban

population, and y is the LFPR. The regression equation might take the simplified form:

$$y = a + b_1x_1 + b_2x_2 + u. \qquad (a)$$

The mutually exclusive and exhaustive partitioning may be written as:

$$x_1 + x_2 + x_3 = 1. \qquad (b)$$

Stating (a) and (b) as functions, we have:

$$y = f(x_1, x_2, u) \qquad (c)$$

$$0 = g(x_1, x_2, x_3) \qquad (d)$$

We wish to find the net change in y with respect to a change in x_3 which is:

$$\frac{\partial y}{\partial x_3} = \frac{\partial y}{\partial x_1} \cdot \frac{\partial x_1}{\partial x_3} + \frac{\partial y}{\partial x_2} \cdot \frac{\partial x_2}{\partial x_3} \qquad (e)$$

The implicit function rule is used to find:

$$\frac{\partial x_1}{\partial x_3} = -1, \frac{\partial x_2}{\partial x_3} = -1. \qquad (f)$$

Substituting (f) into (e) and finding the partial derivatives from (a), we have:

$$\frac{\partial y}{\partial x_3} = -b_1 -b_2 = (b_1 + b_2)(-1).$$

Therefore, the effect of the urban proportion of the population can be deduced from $\hat{B}_2$ and $\hat{B}_3$.

Since equation (b) is an identity, we need not be concerned with the coefficient-bias and inconsistency problems arising from the application of ordinary least-squares estimation to simultaneous systems. This is because (b) has no error terms with which the chosen exogenous variable could be correlated.

[12] I realize that population density could be measured in population per square mile. This would constitute cruder variables

Appendix C

REGRESSION RESULTS: LFPR BY AGE AND SEX AS FUNCTION OF THE COUNTY UNEMPLOYMENT RATE: 53 RURAL NONFARM COUNTIES OF NORTH CAROLINA, 1960

	nonpoor intercept	intercept dummy	poor intercept	nonpoor slope	multiplicative slope dummy	poor slope	coefficient of determination	nonpoor elasticity	poor elasticity
	$\hat{a}_o$	$\hat{a}_d$	$\hat{a}_c + \hat{a}_d$	$\hat{b}_1$	$\hat{c}_1$	$\hat{b}_1 + \hat{c}_1$	R^2	$\eta^{np}_{Y.X_1}$	$\eta^{p}_{Y.X_1}$
MALES									
14-17	.331$^{\#\#}$ (12.142)(1)	-.121* (2.284)	.210	-1.877$^{\#\#}$ (3.913)	1.387^{+} (1.531)	-.490	.33	-.428	-.159
18-24	.880$^{\#\#}$ (17.922)	-.127$^{?}$ (1.248)	.762	-2.063* (2.246)	2.117$^{?}$ (1.229)	-.054	.19	-.157	.004
25-34	.954$^{\#\#}$ (31.625)	-.046 (.779)	(2)	-.619 (1.165)	.317 (.316)	(2)	.07	(3)	(3)
35-44	.944$^{\#\#}$ (37.882)	-.010 (.219)	(2)	-.236 (.526)	.194 (.229)	(2)	.09	(3)	(3)
45-64	.920$^{\#\#}$ (42.152)	-.037 (.876)	(2)	-1.151$^{\#}$ (2.998)	.157 (.216)	(2)	.25	-.071	-.078
65+	.341$^{\#\#}$ (12.862)	.056$^{?}$ (1.035)	.397	-1.157** (2.478)	-.313 (.354)	(2)	.22	-.219	-.206
FEMALES									
14-17	.115$^{\#\#}$ (7.846)	-.017 (.593)	(2)	-.550* (2.132)	-.139 (.285)	(2)	.24	-.339	-.522
18-24	.533$^{\#\#}$ (10.861)	-.173^{++} (1.822)	.357	-2.288** (2.662)	1.337 (.823)	(2)	.28	-.296	-.421
25-34	.537$^{\#\#}$ (13.777)	-.125^{+} (1.649)	.412	2.451$^{\#\#}$ (3.570)	1.225 (.945)	(2)	.30		-.329
35-44	.683$^{\#\#}$ (17.102)	-.116^{++} (1.686)	.491	-3.120$^{\#\#}$ (4.992)	.932 (.790)	(2)	.45	-.374	-.474

Appendix C Cont'd.

	nonpoor intercept	intercept dummy	poor intercept	nonpoor slope	multiplicative slope dummy	poor slope	coefficient of determination	nonpoor elasticity	poor elasticity
	$\hat{a}_o$	$\hat{a}_d$	$\hat{a}_o + \hat{a}_d$	$\hat{b}_1$	$\hat{c}_1$	$\hat{b}_1 + \hat{c}_1$	R^2	$\eta^{np}_{Y.X_1}$	$\eta^{p}_{Y.X_1}$
45-64	.454## (14.743)	-.060 (.996)	(2)	-1.917# (3.535)	.234 (.228)	(2)	.32	-.288	-.358
65+	.093## (7.753)	-.019 (.809)	(2)	-.355++ (1.681)	-.235 (.590)	(2)	.11	-.253	-.167

(1) "t" ratio, with 49 degrees of freedom, given in parentheses.

(2) dummy coefficient not significant at 70 percent level; poor and nonpoor share same coefficient.

(3) insignificant slope coefficients; elasticity measure is invalid.

Significance levels: ##99.9%; #99%; **98%; *95%; ++90%; +80%; ?70%