

INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.
2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.
3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of "sectioning" the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.
4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.
5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.

**University
Microfilms
International**

300 N. Zeeb Road
Ann Arbor, MI 48106

8501139

DETERMINANTS OF FERTILITY IN THE UNITED STATES: AN
ANALYSIS BASED ON THE 1980 CENSUS OF POPULATION

Horowitz, Avery M., Ph.D.
City University of New York, 1984

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106



PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark .

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) 339-345 lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received _____
16. Other _____

U·M·I



DETERMINANTS OF FERTILITY IN THE UNITED STATES
AN ANALYSIS BASED ON THE
1980 CENSUS OF POPULATION
by
AVERY M. HOROWITZ

A dissertation submitted to the graduate
Faculty in Economics in partial
fulfillment of the requirements for the
degree of Doctor of Philosophy, The City
University of New York.

1984

COPYRIGHT BY
AVERY M. HOROWITZ
© 1984

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

8/23/84

date

Michael Grossman

Chairman of Examining Committee

8/23/84

date

Michael Grossman

Executive Officer

Professor Michael Grossman

Professor Harold Hochman

Professor Salih Neftci

Supervisory Committee

The City University of New York

ABSTRACT

DETERMINANTS OF FERTILITY IN THE UNITED STATES

AN ANALYSIS BASED ON THE 1980 CENSUS OF POPULATION

by

Avery M. Horowitz

Advisor: Professor Michael Grossman

This paper explores the demand for children in the United States by analyzing race-specific SMSA grouped data taken from the 1980 Census of Population.

Starting with Malthus, the paper discusses the different major theories of fertility. The development of modern fertility theory is traced through Becker's landmark 1960 article, Mincer's contributions (the opportunity cost of time, relative income) and Becker's 1965 theory of household production. Some key issues (quality vs. quantity, income effects, the use of static models) are then explored. The paper then surveys some of the major alternatives to the Becker model--Leibenstein, Easterlin, Turchi, etc.

The second part of the paper looks in detail at the variables that affect fertility in a developed country. The variables explored include various measures of income,

female labor market activity, education, the quality of children, tastes, degree of urbanization, infant mortality, abortion, and the costs of contraception.

Finally, the paper explores the empirical results of regressions run using all 318 SMSA's for whites and 225 SMSA's for blacks. Despite differences in fertility rates, the same factors prove to be significant determinants of fertility for both races.

Female earnings consistently showed up as a significant variable with the expected negative coefficient. This reflects the importance of the opportunity cost of a woman's time spent in childraising. Overall family income, however, generally proved to be statistically insignificant.

The percentage of females who were high school graduates proved to be statistically significant with an unexpected positive sign for whites and the expected negative sign for blacks.

The other statistically significant variables in this study were industrial structure, the female unemployment rate, the percentage foreign born, and the percentage Hispanic. In almost all specifications of the model, the "quality of children" tended to be statistically insignificant.

The study also includes regressions that limited the sample to each of the four census regions of the country and to the 50 largest SMSA's in the country. In addition, regressions were run with "quality of children" as the dependent variable.

The study tends to confirm and add important evidence to the argument that the demand for children can be analyzed using a traditional neoclassical approach as in the household production model.

ACKNOWLEDGEMENTS

I have been extremely fortunate in having a diverse committee to advise, assist, and critique my thesis. The topic for the paper was originally suggested to me by Michael Grossman. It was his interest and his encouraging me to complete my doctoral work that is most responsible for my having undertaken this project. Throughout the project, Prof. Grossman brought his expertise in the field to bear on my behalf. His suggestions of areas to explore and his keeping me on the right track are what made this thesis doable.

The other members of the committee also provided much assistance, each in his own special way. Salih Neftci provided the statistical advice and explanations that were needed all along the way. He was the person responsible for introducing me to and forcing me to become friends with VAX, SAS, EDT, and all of those other acronyms for computers and their programs.

Harold Hochman read through the entire draft and, as usual, forced me to think like an economist but write so a non-economist could understand the message. More importantly, he, more than anyone else, has been my mentor over the years I spent at the Graduate Center.

The results of their combined efforts on my behalf are apparent to all who read this paper.

Ilene Klinghoffer typed the entire paper, entered most of the original data, and helped me survive the entire process. To her I am especially grateful. Finally, the people at the third floor computer center were most helpful and deserve much thanks for making the time spent in their facility pleasant and productive.

The acknowledgements presented here must, by necessity, go beyond this one paper. My father liked to quote from the sages, "One learns from his teachers, more from his colleagues, but most of all from his students."

I have been very fortunate on all three counts. Both at the Graduate Center and before that at Brooklyn College, I was fortunate in having a long list of caring and distinguished instructors both inside and outside the classroom.

My colleagues, my fellow students at the Graduate Center, have been both helpful and supportive over the years. Special note must be made of Frank Scalisi, who spent long hours teaching me whatever little statistics I can claim to know, and of Ed Saueracher, who has been a loyal friend.

In my case, the term colleagues must also include my fellow instructors at the various colleges where I have taught. I have been fortunate to have a teaching position since the day I entered the Graduate Center. To colleagues and chairmen at Brooklyn College, St. Francis College, Long Island University, and for the last five years, New Jersey Institute of Technology, I am most grateful. While the list of those deserving mention is long, special thanks must go to Roy Helfgott and David Geithman at N.J.I.T., and Louis Fier at Brooklyn College.

To the students at those schools, I am more convinced than ever that the best way of really understanding a subject is being forced to teach it and to answer probing questions from sometimes doubting students.

I entered the Graduate Center at about the same time I got married. I leave with a wife, Esta, who has endured all that goes with being the wife of a perpetual student, and four children, Peri, Jeremy, Robin, and Ira, who have missed having their father with them on numerous occasions.

From copying much of the original data to proofreading finished chapters, my mother, Helen Horowitz, has played an important part in producing this paper. Much of the drive to finish this project comes from her. To her I am eternally grateful. Without my entire family's consistent support, this project would not have been possible.

My father spent many years as a demographer, statistician, and economist. To him, the three fields fit together. In writing this paper, I am hopefully following in his footsteps. He would have certainly approved of the topic if not necessarily the methodology.

TO THE MEMORY OF MY FATHER
PROFESSOR C. MORRIS HOROWITZ

TABLE OF CONTENTS

Abstract.....	iv
Acknowledgements.....	vii
List of Tables.....	xiv
List of Figures.....	xiv
List of Tables in Appendices.....	xv
CHAPTER I. INTRODUCTION.....	1
CHAPTER II. DEVELOPMENT OF THE MODEL	10
A. Early History.....	10
B. The Household Production Approach.....	20
C. Fertility Decisions.....	26
D. The Use of Static Models.....	36
CHAPTER III. OTHER ECONOMIC MODELS OF FERTILITY.....	40
A. The Pennsylvania Approach.....	41
B. The Leibenstein Approach.....	46
C. The Turchi Model.....	54
D. Other Views of Fertility Behavior.....	55
CHAPTER IV. THE VARIABLES BEING EXPLORED.....	64
A. Fertility.....	64
B. Income and Wage Rates.....	70
C. Quality of Children.....	79
D. Female Labor Market Behavior.....	83
E. Education.....	89
F. Out of Pocket Costs.....	95
G. Tastes for Children.....	98
H. Miscellaneous Variables.....	109
CHAPTER V. THE CURRENT STUDY.....	119
A. Race.....	119
B. The Units of Observation.....	122
C. Cross Sectional Data.....	125
D. Data Sources.....	127
CHAPTER VI. EMPIRICAL RESULTS.....	129
A. The Variables.....	129
B. Descriptive Measures.....	132
C. Correlation Results.....	144
CHAPTER VII. REGRESSION RESULTS FOR FERTILITY.....	158
A. Methodology.....	158
B. Female Education.....	164
C. The Role of Income.....	168

D. Female Labor Market Activity.....	181
E. The Other Variables.....	188
F. Race Differences.....	192
CHAPTER VIII. OTHER EMPIRICAL RESULTS	203
A. Regression Results for Quality of Children...	203
B. Results by Region	212
C. Results for Fifty Largest SMSA's.....	216
CHAPTER IX. FACTOR ANALYSIS.....	218
A. Methodology.....	218
B. Results Using White Data.....	222
C. Results Using Black Data.....	227
CHAPTER X. CONCLUSIONS.....	231
A. Summary of Key Results.....	232
B. Recommendations for Further Study.....	236
APPENDICES	
A. Alternative Specifications	242
B. Regression Results Using Logs.....	254
C. Results by Region (For Whites).....	262
D. Results by Region (For Blacks.....	276
E. Results for the Fifty Largest SMSA's.....	302
F. Factor Analysis.....	318
G. Residuals of Regressions.....	328
BIBLIOGRAPHY.....	336

LIST OF TABLES

I	Decade Census and Projected Population.....	5
II	Population Estimates and Projections by Race....	7
III	Population of the United States and SMSA's, 1940-1980	124
IV	Means of White Variables.....	135
V	Weighted Means of White Variables.....	136
VI	Means of Black Variables.....	137
VII	Weighted Means of Black Variables.....	138
VIII	Simple White Correlations.....	146
IX	Weighted White Correlations.....	149
X	Simple Black Correlations.....	152
XI	Weighted Black Correlations.....	155
XII	Full White Regression.....	160
XIII	Weighted Full White Regression.....	161
XIV	Full Black Regression.....	162
XV	Weighted Full Black Regression.....	163
XVI	Summary of Regressions for Family Income.....	174
XVII	Regression Results for Various Income Measures.....	179
XVIII	White Income Correlations.....	180
XIX	Black Income Correlations.....	180
XX	White Regression with YEXP.....	183
XXI	Weighted White Regression with YEXP.....	184
XXII	Black Regression with YEXP.....	185
XXIII	Weighted Black Regression with YEXP.....	186
XXIV	Full Regression for Combined Sample When Race is the Only Independent Variable.....	194
XXV	Weighted Full Regression for Combined Sample When Race is the Only Independent Variable....	195
XXVI	Full Regression for Combined Sample.....	200
XXVII	Weighted Full Regression for Combined Sample..	201
XXVIII	Correlations of Race with Other Variables.....	202
XXIX	White Quality Regression.....	205
XXX	Weighted White Quality Regression.....	206
XXXI	Black Quality Regression.....	207
XXXII	Weighted Black Quality Regression.....	208
XXXIII	F Statistics and Adjusted R Squares by Region.	215
XXXIV	Standardized Scoring Coefficients for White Data.....	223
XXXV	Standardized Scoring Coefficients for Black Data.....	227

LIST OF FIGURES

1	Scree Plot of Eigenvalues for White Data.....	221
2	Scree Plot of Eigenvalues for Black Data.....	222
3	Plot of Key Factors for White Data.....	226
4	Plot of Key Factors for Black Data.....	230

LIST OF TABLES IN APPENDICES

APPENDIX A

I	Reduced Form White Regression.....	242
II	Weighted Reduced Form White Regression.....	243
III	Reduced Form Black Regression.....	244
IV	Reduced Form Weighted Black Regression.....	245
V	White Regression Results with Female Income Excluded.....	246
VI	Weighted White Regression Results with Female Income Excluded.....	247
VII	Black Regression Results with Female Income Excluded.....	248
VIII	Black Weighted Regression Results with Female Income Excluded.....	249
IX	White Regression Results with Unemployment Excluded.....	250
X	White Weighted Regression Results with Unemployment Excluded.....	251
XI	Black Regression Results with Unemployment Excluded.....	252
XII	Black Weighted Regression Results with Unemployment Excluded.....	253

APPENDIX B

I	Full White Log Regression.....	254
II	Weighted Full White Log Regression.....	255
III	Full Black Regression.....	256
IV	Weighted Full Black Log Regression.....	257
V	White Quality Log Regression.....	258
VI	Weighted White Quality Log Regression.....	259
VII	Black Quality Log Regression.....	260
VIII	Weighted Black Quality Log Regression.....	261

APPENDIX C

I	Means of Variables and Weighted Means of Variables (Northeast).....	262
II	Means of Variables and Weighted Means of Variables (South).....	263
III	Means of Variables and Weighted Means of Variables (North Central).....	264
IV	Means of Variables and Weighted Means of Variables (West).....	265
V	Full White Regression (Northeast).....	266
VI	Full White Regression (South).....	267
VII	Full White Regression (North Central).....	268
VIII	Full White Regression (West).....	269

IX	Weighted Full White Regression (Northeast)	270
X	Weighted Full White Regression (South)	271
XI	Weighted Full White Regression (North Central)	272
XII	Weighted Full White Regression (West)	273
XIII	White Quality Regression (Northeast)	274
XIV	White Quality Regression (South)	275
XV	White Quality Regression (North Central)	276
XVI	White Quality Regression (West)	277
XVII	Weighted White Quality Regression (Northeast)	278
XVIII	Weighted White Quality Regression (South)	279
XIX	Weighted White Quality Regression (North Central)	280
XX	Weighted White Quality Regression (West)	281

APPENDIX D

I	Means of Variables and Weighted Means of Variables (Northeast)	282
II	Means of Variables and Weighted Means of Variables (South)	283
III	Means of Variables and Weighted Means of Variables (North Central)	284
IV	Means of Variables and Weighted Means of Variables (West)	285
V	Full Black Regression (Northeast)	286
VI	Full Black Regression (South)	287
VII	Full Black Regression (North Central)	288
VIII	Full Black Regression (West)	289
IX	Weighted Full Black Regression (Northeast)	290
X	Weighted Full Black Regression (South)	291
XI	Weighted Full Black Regression (North Central)	292
XII	Weighted Full Black Regression (West)	293
XIII	Black Quality Regression (Northeast)	294
XIV	Black Quality Regression (South)	295
XV	Black Quality Regression (North Central)	296
XVI	Black Quality Regression (West)	297
XVII	Weighted Black Quality Regression (Northeast)	298
XVIII	Weighted Black Quality Regression (South)	299
XIX	Weighted Black Quality Regression (North Central)	300
XX	Weighted Black Quality Regression (West)	301

APPENDIX E

I	Means of White Variables	302
II	Weighted Means of Variables	302
III	Simple White Correlations	303
IV	Full White Regression	306
V	Weighted Full White Regression	307

VI	White Quality Regression.....	308
VII	Weighted White Quality Regression.....	309
VIII	Means of Black Variables.....	310
IX	Weighted Means of Black Variables.....	310
X	Simple Black Correlations.....	311
XI	Full Black Regression.....	314
XII	Weighted Full Black Regression.....	315
XIII	Quality Black Regression.....	316
XIV	Weighted Black Quality Regression.....	317

APPENDIX F

I	Initial Factor Method: Principal Factors for White Data.....	318
II	Eigenvalues of the Reduced Correlation Matrix for White Data.....	318
III	Factor Patterns for White Data.....	319
IV	Orthogonal Transformation Matrix for White Data.....	320
V	Rotated Factor Pattern for White Data.....	321
VI	Other Factor Analysis Data for White Data..	322
VII	Initial Factor Method: Principal Factors for Black Data.....	323
VIII	Eigenvalues of the Reduced Correlation Matrix for Black Data.....	323
IX	Factor Patterns for Black Data.....	324
X	Orthogonal Transformation Matrix for Black Data.....	325
XI	Rotated Factor Pattern for Black Data.....	326
XII	Other Factor Analysis Data for Black Data..	327

APPENDIX G

I	Residuals of White Regression.....	328
II	Residuals of Weighted White Regression.....	330
III	Residuals of Black Regression.....	332
IV	Residuals of Weighted Black Regression.....	334

CHAPTER I INTRODUCTION

"Reproduction is a private act, but it is not a private affair. It has far-reaching social consequences."¹

--Lincoln Day

. . . And, one might add, economic consequences. Not only are the consequences of reproduction social and economic in nature, but so are the determinants of reproduction at least partially social and economic in nature.

What this paper attempts to do is to analyze some of these social and economic determinants of fertility behavior. It will look at data taken mainly from the 1980 United States Census of Population. The units of observation will be the roughly 300 Standard Metropolitan Statistical Areas (SMSA's) in the United States.

The economic analysis used here was developed by Gary Becker and others. The economics of the household is used to explain fertility in terms of the demand for children as inputs into a household utility production function.

1. Quoted in G. Tyler Miller, Jr., Living in the Environment, Third Edition (Belmont, California: Wadsworth Publishing Company, Inc., 1982), page 136.

Children enter the function both in terms of the quantity and "quality" of children. The latter is produced in the household by combining quantity of children with (a mother's) time and other goods. The household is limited in its production of children and other goods by both income and time constraints.

The paper begins with a brief historical survey of the theory of fertility going back to the time of Malthus. After discussing the development of what has been referred to as the Chicago-Columbia model, we survey some of the other theoretical work being done in the field by Richard Easterlin, Harvey Leibenstein, and others. The paper then develops in detail in both theoretical and empirical form the many variables that are thought to affect the demand for children.

The variables used in the empirical section of the study will consist of measures of income, female labor market opportunity and activity, the opportunity costs of children, the quality of children, and several measures of taste. Because of the importance of race in many of the variables, and because blacks and whites in the United States are known to have different fertility rates, the study will look separately at data for blacks and whites in each of the SMSA's.

The data will be analyzed in three ways: in simple form, using weights (the number of women age 35-44 by race in each SMSA), and finally in log form so that the results can be expressed as elasticities. Regressions will also be run with "quality of children" as the dependent variable and with samples limited to specific regions of the country and the largest SMSA's in the country. Finally, the paper compares the results found in this study with those reported in other studies of United States fertility determinants.

The importance of fertility and of finding the determinants of fertility is clear. World population is growing at about two percent per year, a rate that implies a doubling in size every thirty-five years. "Now that death control on the scale that has long been familiar in the more advanced industrial societies has spread to more developing areas, and that international migration is accounting for less and less of the variation in any population, fertility rates have become critical."²

Put another way, since "fertility is the only major component of population change not subject to effective policy control, it is the main source of uncontrolled population growth or decline and of instability in aggregate rates of population growth."³ What that means for the

2. Geoffrey Hawthorne, The Sociology of Fertility (London: Collier-MacMillan Limited, 1970), pages 2-3.

United States population can be illustrated by Census Bureau projections. The Bureau has set up three different series of projections, each reflecting different assumptions about the fertility rate. The rates are assumed to move toward the following levels:

Series I -- 2.7 children ever born per woman

Series II -- 2.1 children ever born per woman

Series III -- 1.7 children ever born per woman

The Census Bureau considers the Series II projection to be its best estimate, with the assumed level of future fertility corresponding closely to that suggested by recent survey data. The fertility assumptions of Series I and III were chosen by the Bureau to provide a range which appears likely to encompass future fertility.

The results of the three fertility estimates on the U.S. population are shown in Table I.

3. Boone A. Turchi, The Demand for Children: The Economics of Fertility in the United States (Cambridge, Mass.: Ballinger Publishing Company, 1975), page 2.

TABLE I
 DECADE CENSUS AND PROJECTED POPULATION
 THE U.S. 1960, 1970, 1980, 1990, 2000*

YEAR	POPULATION		
1960 population	180,671		
1970 population	205,052		
1980 population	227,002		
	Series I	Series II	Series III
1990 population	254,715	243,513	236,264
Change 1980-1990			
Number	27,713	16,511	9,262
percent	12.2	7.3	4.1
2000 population	282,837	260,378	243,876
Change 1990-2000			
Number	28,122	16,865	7,621
percentage	10.0	6.9	3.2

* all numbers in thousands. Data as of July 1 of respective years.

Source: George Sternlieb, James W. Hughes, and Connie O. Hughes. Demographic Trends and Economic Reality: Planning and Markets in the '80's, (New Brunswick, N.J.: Center for Urban Policy Research, Rutgers, The State University, 1982), page 9.

As can be seen from the Table, the difference between a fertility rate for the United States of 2.7 and 1.7 over the next twenty years is about 39 million people--or the difference between a U.S. population of 244 million or 283 million in the year 2000.

Other more recent Census Bureau projections show how the differences in fertility rates of blacks and whites will affect the racial composition of the country in future years. The results of these projections are illustrated in Table II. The table shows that the percentage of "black and other" births is consistently above the percentage of total population that is in that category. The result is that the percentage of the total population that is "black and other" will rise from about 14% in 1980 to about 23% in 2040. Roughly 90% of the "black and other category" is made up of blacks.

TABLE II
POPULATION ESTIMATES AND PROJECTIONS BY RACE

YEAR	% OF BIRTHS THAT ARE BLACK AND OTHER RACES	% OF TOTAL POPULATION THAT IS BLACK AND OTHER RACES
1960	15.7	11.4
1970	17.3	12.4
1980	19.9	14.1
1990	20.1	15.6
2000	22.0	16.9
2010	22.9	18.3
2030	24.7	20.7
2040	25.2	23.0

Source: adopted from U.S. Bureau of the Census, Current Population Reports Series P-25, Number 952, Projections of the Population of the United States by Age, Sex and Race: 1983 to 2080, U.S. Government Printing Office, Washington, D.C., 1984, Tables H and I, page 10.

Data based on the Census Bureau's Series II projections.

At the same time we look at the projections, the relevancy of fertility and population size to the field of economics is clear and straightforward. "The first and most important determinant of the labor supply is the size of the total population of the nation."⁴ A number of researchers, for example, have done studies that seem to show that the unemployment rate of a given age group is related to its relative size in the labor force or to the rate of increase of its size. These analyses show an effect beyond the

purely compositional. In other words, the unemployment rates for young people today are higher than for young people in other years. In general, these studies compare the unemployment rate for specific age groups with that of prime age males, thus controlling for variations in the demand for labor.⁵

Besides labor supply, a changing population also has important implications for social security and pension systems, the educational system, consumption levels, the provision of health care, and the spatial distribution of population, including problems of the central cities. To that list we might add such issues as population pressure on natural resources, the notion of an optimum population, and the role, if any, for the government in influencing population growth. The changing racial composition of the country has equally important implications for the future of the country.⁶

4. Roy B. Helfgott, Labor Economics, Second Edition (New York: Random House, 1980), page 25.

5. Ronald D. Lee, "Current Issues in Economic Demography: An Overview," in Robert Schoen and David Landman (editors) Population Theory and Policy (Urbana, Illinois: The University of Illinois, 1982).

6. For a survey of the literature on the effects of changing population growth on the United States, see: William J. Serow and Thomas J. Espenshade, "The Economics of Declining Population Growth: An Assessment of the Current Literature, in The Economic Consequences of Slowing Population Growth, edited by Thomas J. Espenshade and William J. Serow (New York: Academic Press, 1978), pages 13-40.

Yet how much do we know about the determinants of fertility and how much can we learn? Clyde V. Kiser, a long-time demographer, has remarked that "The quest for knowledge of factors affecting human fertility is a little like the search for the Holy Grail. The goal is elusive, but apparently the periodic rewards are sufficient to encourage new generations of students to continue the search."⁷

7. Clyde V. Kiser, "Comment on Bagozzi and Van Loo. Fertility as Consumption: Theories from the Behavioral Sciences. Journal of Consumer Research, Volume 5, (March 1979), page 284.

CHAPTER II

DEVELOPMENT OF THE MODEL

EARLY HISTORY

The study of population and population growth by social scientists dates back at least to 1798 and the Rev. Thomas Robert Malthus' "Essay on the Principle of Population."¹ Malthus started with two basic premises: "First that food is necessary to the existence of man. Secondly, that the passion between the sexes is necessary and will remain nearly in its present state."² The result, according to Malthus, is that population increases in geometric progression of such a nature as to double itself every

1. There were even notable predecessors of Malthus, such as Richard Cantillon and Giammarici Ortes in Europe and Benjamin Franklin and Thomas Jefferson here in the United States. Cantillon, for example, believed that the number of inhabitants of a nation is conditioned by the means of subsistence and that an increase in food supply will prompt an increase in the population. Cantillon believed that a higher customary living standard was associated with a lower population density. People in Europe apparently felt, said Cantillon, that if they could not guarantee to their descendants the customary living standard, deferment of marriage or celibacy were the proper response. Marriage patterns and not mortality therefore functioned as the crucial factor in the regulation of population. (Johannes Overbeek, The Evolution of Population Theory Westport, Conn.: Greenwood Press, 1977).

twenty-five years, while food, the means of sustenance, could not possibly be made to increase faster than in arithmetic ratio.

Malthus' deduction is that "by that law of our nature which makes food necessary to the life of man, the effects of these two unequal powers must be kept equal. This implies a strong and consistently operating check on population from the difficulty of subsistence."³

Malthus distinguished between what he described as positive and preventive checks. The first are all causes of mortality--what Malthus called "vice and misery." These included such things as war, disease, and lastly and ultimately, mortality from starvation.

The preventive checks are voluntary limitations on births. As a minister, Malthus did not believe in birth control or abortion. Malthus could therefore "with some justification assume that fertility was determined primarily by two primitive variables, age at marriage and the frequency of coition during marriage."⁴

2. Thomas Robert Malthus, Population: The First Essay (Ann Arbor Paperbacks, 1959), page 4.

3. *ibid*, page 5.

4. Gary S. Becker, "An Economic Analysis of Fertility," in Demographic and Economic Change in Developed Countries, Universities--National Bureau Conference Series Number 11 (Princeton, New Jersey: Princeton University Press for the NBER, 1960), page 209.

Malthus concluded that an increase in income would lead to a relatively large increase in family size. His conclusion was based on two arguments: "First an increase in income would cause a decline in child mortality, enabling more children to survive childhood. If a decrease in births did not offset the decrease in child mortality, the number of children in an average family would increase. His second argument is less mechanical and takes greater account of motivation. An increase in income increases fertility by inducing people to marry earlier and abstain less while married."⁵

Over the years, Malthus made many revisions and amplifications on his original theory. He was strongly influenced by what he saw in early nineteenth century England as well as by what he reasoned. His original essay on population went through no less than six editions in his own lifetime and through a seventh edition published in 1872. In final form, Malthus concentrated less on the possibility of populations controlling their numbers with positive checks and more on the reality that he began to notice in early industrial England of couples controlling their fertility to maintain or improve their standard of living. Empirically it became clear that preventive checks were intervening long before the ultimate tragedy of death

5. *ibid*, page 212.

by starvation. Towards the end of his life, Malthus predicted that the price of food would fall relative to other commodities, that the lower classes would restrict their families to keep the same nutritional level, and that, moreover, they would acquire a taste for other commodities that would further serve to limit their fertility.

Other classical economists, most notable Mill, shifted the emphasis away from population and concentrated instead on the food supply--formalizing what is now referred to as the Law of Diminishing Returns. As Hawthorne points out, "it is not surprising that no one now accepts the Malthusian contention that people will breed at a constant rate until the resources are extinguished since Malthus himself abandoned it except as a theoretically possible limiting case."⁶

The historical alternative to Malthus is what is usually referred to as the "standard of living" theory. This theory argues that people will have children at a rate which is consistent with maintaining or improving their standard of living.

So, for example, Nassau Senior, a second generation classical economist, suggested that in a progressive society man's desire to better his position in the world would

6. Hawthorne, op. cit., page 5.

induce him to limit his procreativity. Delayed marriage ("prudence" in Senior's words) guaranteed the maintenance and even the improvement of customary living standards.

Later in the nineteenth century, a French writer, Arsene Dumont, argued that man's ambition to improve his relative position is strong enough to bring about a significant decline in fertility. A small family, Dumont claimed, facilitates a man's ascent, and in a situation of increasingly social mobility, ambitions are fostered and family size decreases.⁷

This theory certainly fits more easily with the facts for a developed country like the United States. As Becker has pointed out, "the development and spread of knowledge about contraceptives during the last century greatly widened the scope of family decision-making."⁸

But how does one interpret the standard of living? If we use a narrow monetary standard, then the theory does not really account for those couples who decide to have a certain number of children to satisfy an emotional need or religious prescription. If, on the other hand, we interpret the standard of living in a broader sense, such as 'quality of life' or perhaps 'utility,' then the contention becomes

7. Johannes Overbeek. The Evolution of Population Theory (Westport, Conn.: Greenwood Press, 1977), page 21.

8. Becker, (1960), op. cit., page 209.

effectively vacuous. "It begs the questions of what standards, among what groups in what societies in what points in time. The particular meaning of 'standard of living' in any situation demands empirical illustration."⁹

A third explanation for changing fertility patterns is what is known as the Theory of Demographic Transition. The theory can be divided into three stages. Stage I starts with the assumption that prior to modernization, life was brutish, means were scarce, and longevity was short--all resulting in high death rates. Because of the high mortality, only those societies that developed institutions and social mores consistent with high birth rates were able to survive.

Stage II was a period of gradually falling death rates--explained by modernization, improved diet, improved public health methods, etc. "No one resists good health and increased longevity. Hence, mortality fell, but fertility was resistant to the early blandishment of modernization. Ergo, mortality fell, fertility remained constant, and population growth rates increase."¹⁰

In Stage III, fertility finally responds to

9. Hawthorne, op. cit., page 5.

10. Harvey Leibenstein, "An Interpretation of the Economic Theory of Fertility: Promising Path or Blind Alley?" Journal of Economic Literature, Volume 12, Number 2 (June 1974), page 459.

modernization and begins to fall. The suggested connections between modernization and falling fertility rates are both economic and social. They include:

- (1) a sustained reduction in infant mortality rate;
- (2) the increase in female participation in the nonagricultural labor market;
- (3) increases in the education and rights of women and changes in their roles outside the home;
- (4) an increase in compulsory education along with a decrease in child labor;
- (5) the breaking up of the extended family concept along with the development of old age and other security systems outside the extended family;
- (6) a decline in traditional religious beliefs which supported high fertility norms;
- (7) urbanization with its secularizing influences and alternatives to traditional behavior patterns;
- (8) the introduction of new and improved birth control methods;

(9) increases in socio-economic mobility.

This is only a partial list, but the argument is that any of these factors can be used to make a plausible case for a reduced level of fertility.

Like the other theories, the theory of the demographic transition was originally a macro theory used to explain the relationship between population and economic growth. The writers who popularized the theory placed great emphasis on the simultaneous occurrence of economic development, industrialization, and urbanization. These factors were expected to lead to an initial decline in mortality and then to a decline in fertility. The relationship of development to the fall in mortality was, however, always spelled out in much greater detail than was the relationship between development and fertility.

Both the demographic transition and standard of living theories suggest that people can pick the number of children they choose to have and that social scientists can study such decisions. How are these decisions made? "Psychologists have tended to place these decisions within a framework suggested by psychological theory; sociologists have tried one suggested by sociological theory. . ." but, according to Becker, "most persons would admit that neither framework has been particularly successful in organizing the information on fertility."¹¹

Even the field of demography, the scientific study of population, has had questionable success in such endeavors. Easterlin, for example, claims that "the great bulk of work in demography to date has aimed to establish the facts of population change--an essential first step in any field of science. But demographic work on the causes and effects of population change is still in a very early state."¹²

Leibenstein, on the other hand, argues that "the demography profession was not devoid of theory or theorists. Indeed, there was a profusion of theories as well as a vast amount of empirical information about the determinants of fertility prior to the descent of economists into this particular arena. . . .As social scientists go, they had a pretty good record."¹³

In a more general context, Hannan has recently written that "despite the obvious importance of the family in human social life, theoretical analysis of the family has received scant attention in modern social sciences. While much has been written about the family, leading theorists and researchers in the social sciences have typically not studied family processes."¹⁴

11. Becker (1960), op. cit., page 209.

12. Richard A. Easterlin, "Population," in Neil W. Chamberlin (editor) Contemporary Economic Issues (Homewood, Illinois: Richard D. Irwin, Inc., page 242.

13. Liebenstein, (1974), op. cit., page 458.

This situation was probably worst in economics. Ben-Porath (1982), for example, argues that with the emergence of Post-Marshallian micro-economics, the scope of questions dealt with by most mainstream economists narrowed considerably and topics which the classical economists regarded as their legitimate domain, including population and the family, suffered neglect if not outright abandonment. In general, most recent economists have tended to view their subject matter narrowly as involving the production and distribution of valued material goods that change hands in the marketplace. The family plays no important role in these theories other than as a unitary consumer and supplier of labor (Hannan, 1982).

The population/fertility theory that survived from all this by the 1950's was a tradition of neo-Malthusianism based on some anti-natal preferences and a belief that "real life could be described by a model such that as family real income rose so would a family's size."¹⁵ The independent variable was seen as the family's real income and the dependent variable (the response) was demographic behavior, principally a fluctuating fertility rate. Important studies by Dorothy Swaine Thomas (1925) and Dudley Kirk (1946) seemed to empirically document this conclusion.

14. Michael T. Hannan, "Families, Markets, and Social Structures: An Essay on Becker's A Treatise on the Family," Journal of Economic Literature, Volume XX (March 1982), page 65.

THE HOUSEHOLD PRODUCTION APPROACH

All of this changed as we entered the 1960's. It had become increasingly difficult to ignore the family in recent years. The demography of family life has changed greatly over the past thirty years in all Western societies. For example, birth rates have generally dropped, the mean age at first marriage has increased, and divorce rates have soared.

One of the results has been a new or at least revived interest in the economics of the family--in what has become known as "the new household (or home) economics." (The term 'economics' itself comes from the Greek for home management.) In this approach, virtually any activity involving scarce resources can be systematically analyzed within an economic framework. This interest has shown up in economic studies of such issues as marriage, divorce, health, fertility, education, and mobility.

At the same time, the concept of the household as a production unit is not really new. Thirty years ago, Schumpeter wrote that "The idea that commodities and services do not leave the economic process for good as soon as they enter the sphere of the households that consume them, but that they produce there the productive services of

15. Mark Perlman, "Population and Economic Change in Developing Countries: A Review Article," Journal of Economic Literature, Volume XIX (March 1981), page 74.

the members of these households turns up again and again. In our day it has been adopted by Leontief, in whose system households are treated as an industry that consumes productivity like any other."¹⁶

A comprehensive treatment of the household as a production unit can be found in Margaret G. Reid's Economics of Household Production (New York, John Wiley and Sons, 1934). Reid discussed changes that took place over time in the nature and methods used in household production and emphasized the importance of good decision making by the housewife as a manager in the household. Others have argued that the origins of household production theory date back to Wesley Mitchell's famous if somewhat sexist in today's context essay on "The Backward Art of Spending Money" (1912).¹⁷

Because this modern framework has evolved from classical supply and demand analysis, it is often referred

16. Schumpeter, 1954, page 631 quoted in Larry J. Smith, Black-White Reproductive Behavior: An Economic Interpretation (San Francisco, R and E Research Associates, Inc., 1977), page 4.

17. See Marc Nerlove, "Toward a New Theory of Population and Economic Growth," in Theodore W. Schultz (editor), Economics of the Family: Marriage, Children, and Human Capital, National Bureau of Economic Research (1974), page 528, and Robert T. Mitchell and Gary S. Becker, "On the New Theory of Consumer Behavior," Swedish Journal of Economics, Volume 75, Number 4 (December 1973), pages 384-386, for a discussion of the antecedents of household production theory.

to as the neoclassical theory. Alternatively, because it emphasizes that costs incurred while acquiring marketable skills can be regarded as investments, this theory has been called the human capital approach. "The proponents of the theory regard it as essentially a positive theory of the labor market. It is designed to explain how things are, not how things should be; the latter is the subject of normative economics. It is not the view of human capital theorists that the labor services of people should be regarded as commodities in any legal or ethical sense. Rather they assert that if one wants to understand how the labor market works and proceeds on the assumption that employers treat their workers as commodities, the implications of this assumption would square rather closely with the patterns of earning and employment one observes in the labor market."¹⁸

The same kind of argument can be used if one wishes to get a better understanding of why children are brought into this world. It seems clear that married couples (and some non-married ones as well) have a strong and clear preference to have their own children. Indeed, children are an important part of the standard of living of most families.

18. F. Ray Marshall, Vernon M. Briggs, Jr., and Allan G. King, Labor Economics: Wages, Employment, Trade Unionism and Public Policy, Fifth Edition (Homewood, Ill.: Richard D. Irwin, Inc., 1984), pages 316-317.

"Given the state of the birth control technology and the various classes of uncertainty associated with contraception, infant mortality, the health and fecundity of the parents, and the income and wage rates parents expect to realize over their life cycles, these preferences (for children) are constrained by the parents' resources and the associated alternative economic opportunities in using their resources. In turn, these resources imply sacrifices, measured in terms of opportunity costs (of time and money) the parents must be prepared to make in acquiring the future satisfaction and productive service they expect to realize from children."¹⁹

This kind of analysis is relatively new to economics. Until about twenty-five years ago, economists tended to believe that the determinants of fertility behavior (at least on the cost side) were largely non-economic in nature or at least that the analysis of fertility is outside the scope of traditional economic theory.²⁰

All of that changed in the 1960's. Gary Becker (1960) argued that fertility could be analyzed within an economic framework. He emphasized the connection between income and

19. Theodore W. Schultz, "Fertility and Economic Value" in Theodore W. Schultz (editor), Economics of the Family: Marriage, Children, and Human Capital, (New York: National Bureau of Economic Research 1974), page 4.

20. The benefits of children--as workers on the family farm or as security for old age--have long been discussed.

fertility as well as the distinction between the cost and quality of children. The demand for children was, according to Becker, a function of the price of other goods and services. The price of children themselves was assumed to be the same for all families.²¹

Jacob Mincer moved the discussion forward in two important ways. First, following Milton Friedman, he suggested that couples base their choices as to family size on permanent income rather than current income. Mincer's second contribution was in studying the relationship between fertility and the cost of time as measured by a wife's wage rate. Specifically, Mincer argued that, for certain products, including children, "market prices do not provide sufficient information on the theoretically relevant opportunity costs."²² The opportunity cost should be measured, Mincer argued, by the wages that could have been obtained by the mother in the labor market.

21. Becker's work can, in his own words, "be viewed as a generalization and development of Malthusian theory (Becker, 1960, page 209)." According to Keeley (1975), page 462, this early paper by Becker "should be regarded as an insightful, exploratory, and suggestive study, rather than a definitive formulation of the conceptual framework of the economics of fertility."

22. Jacob Mincer, "Market Prices, Opportunity Costs, and Income Effects" in Measurement in Economics: Studies in Mathematical Economics and Econometricians in Memory of Yehuda Grunfeld (Stanford: Stanford University Press, 1963), page 67.

In Mincer's view, the regression coefficient on a husband's earnings should be interpreted as an estimate of the income effect. The difference between the coefficients of the wife's and husband's earnings should be interpreted as an estimate of an income constant price effect associated with a wife's opportunity cost of time in raising children. Four sets of U.S. cross-sectional data were tested by Mincer. In general, the absolute value of the negative price elasticity exceeded the positive income elasticity.

A more general formal theory of household production incorporating the concept of time allocation was then provided by Becker (1965). In the Becker model of the allocation of time, the household is viewed as a producer as well as a consumer. The model stresses that many, if not most, market goods and services are not demanded in and of themselves but are demanded as inputs into the production of more basic household commodities. Health, nutrition, education, companionship, and prestige are examples of commodities that are not typically available for direct purchase in the market place.

The household produces these "commodities" which when consumed provide the household with utility. The household produces commodities by combining market-produced goods, the time of household members and other inputs. The total time available to household members is not only fixed but also

has alternative uses: it can be used in market activities (work) so as to purchase market-produced goods, as well as in the production and consumption of household commodities.

A utility maximization model of the allocation of time leads us to consider the best uses of household members' time, as well as to predict how household members will adjust time spent in the various activities as the price of time (the wage rate) changes.

Obviously, no real world household is presumed to have explicitly run through the optimizing calculus. "It is merely that when it is postulated that households do apply those rules, predictive statements can be made about the behavior of aggregates of individuals. Empirical work has revealed that these statements are fruitful in the sense that they are frequently upheld by experience."²³

FERTILITY DECISIONS

The choices that families make as to family size can be analyzed within that same framework. As economic goods,

23. Simon Rottenberg, "Comment on Contraception and Fertility: Household Production and Uncertainty," in Nestor E. Terlickyj (editor), Household Production and Consumption (New York: Columbia University Press for the National Bureau of Economic Research, 1975), page 94. For an alternative view, see Harvey Liebenstein, "An Interpretation of the Economic Theory of Fertility: Promising Path or Blind Alley?" Journal of Economic Literature, Volume XII, Number 2 (June 1974).

children yield a flow of benefits or utility to their parents. This flow of benefits is itself a combination of some number of children and some distribution of what has become known as the "quality" embedded in those children. Parents also incur a flow of costs in having and raising children. In deciding to have children, parents are assumed to take into consideration the expected benefits from having children relative to the expected costs.

The household is assumed to maximize utility or joint household satisfaction subject to a constraint in both prices and resources.²⁴ Resources are measured by what Becker calls "full income which is the sum of money income and that foregone or 'lost' by the sum of the costs of their goods and time inputs."²⁵

Becker assumes that households behave rationally with

24. The assumption that households consider joint satisfaction means that each household member's satisfaction is independent of that level of the other members. This assumption has been called unrealistic in view of sociological and psychological theories of fertility (see Hunt and Kiker, page 381). Sociological theories generally argue that family size depends on variables denoting expectations of family size, child-rearing practices, peer pressures, husband and wife roles and other norms. Households are thought to respond to these norms and peer pressures based on an "implicit internal calculus learned through socialization (Bagozzi and Van Loo, 1978, page 224)." Social-psychological models of fertility usually extend the model to include, among other things, active competitive behavior among spouses in decision making regarding family size.

25. Becker (1965), op. cit., page 124.

regard to utility maximization decisions. This basic economic assumption precludes nonrational behavior due to custom, habit, anxiety, external coercion, chance, and decision making based on nonmaximizing rules such as "satisficing" (i.e., the household would be assumed to be striving for a level of consumer goods, including children, which is satisfactory rather than maximum), elimination by aspects, etcetera.²⁶

Leibenstein has argued that for an economic theory to be valid, one need not assume that typical behavior is "rational." Rather, it is sufficient to assume that typical behavior is rational. It also, according to Leibenstein, is not required that all households behave rationally. If a significant proportion do, then an economic theory that depends on rationality is significant.²⁷

It is clear that both the benefits and costs of

26. The assumption of rationality is especially questioned in the cases of the growing numbers of premarital pregnancies. For example, in the 1972-1976 period, "almost one quarter of all newlyweds under 25 years of age began their marital careers with an already existing or developing family which could potentially strain their financial and emotional resources (Current Population Report (June 1977), page 4)."

27. Harvey Leibenstein, "The Economic Theory of Fertility Decline," Quarterly Journal of Economics, Volume LXXXIX, Number 1 (February 1975), page 3. Leibenstein's own theory argues that only behavior at critical junctures (age at marriage and birth of the final child) are rational. If the starting points are determined by calculation, then clearly fertility is determined, despite the fact that spacing will have a random component.

children have changed as market wages and incomes have risen over time. In particular, the benefits of children have fallen and the costs have risen. Just as had been predicted by Malthus in his later revisions, individuals have chosen on the basis of changes in the benefit cost structure to reduce the desired numbers of children. At the same time the technology and available information about birth control (and more recently legalized abortion) have made such choices easier to implement.

Children yield a flow of utility and productive services to their parents. In low income (mainly agricultural) economies, children are important sources of income for the family because of the contribution to real output of the family farm, and because of other productive services in the home. The children may also be a source of income to the parents in their old age.

"Children are in a very important sense the 'poor man's capital.' It is becoming clear that the investment in children is in many ways akin to the investment in home-grown trees for their beauty and fruit. A very young child is highly labor-intensive in terms of cost and the rewards are wholly psychic in terms of utility. As a child becomes a teenager, the additional cost borne by the parents involves less labor intensiveness and the rewards, especially in agricultural countries, consists in increasing

part of useful work that the teenager performs."²⁸

As an economy grows and develops over time, these productive services of children become minimal (and perhaps nonexistent) and the demand for children (or fertility rates) falls. For example, Costa Rica between 1963 and 1973 had a high rate of economic growth, rising levels of female labor force participation, increasing urbanization and an improving quality of housing for its population. Costa Rica also experienced a dramatic lowering of its fertility rates.²⁹

In all economies (high and low income) children provide utility to their parents which is similar in many ways to the utility received from other types of durable consumption goods. At least one study, for example, has found that children are the primary source of satisfaction in the marriages of many couples.³⁰

The cost of children includes a money price (the cost of goods 'consumed' by the child) as well as a time price. This latter price has risen dramatically in recent years

28. Schultz (1974), op. cit., page 7.

29. Manuel J. Carvajal and David T. Geithman. "Socioeconomic Fertility Determinants in Costa Rica 1963-1973." in Smithsonian Institution, New Perspectives on the Demographic Transition, Occasional Monograph Series, Number 4 (Washington, D.C.: 1976), page 96.

30. Luckey and Bain, quoted in Carvajal and Geithman, *ibid*, page 105.

because of the rise in women's wage rates.

Like the demand for other goods, the demand for children is in part the function of income levels. It would seem that, assuming children are a "normal" good, rising income over time would lead to an increasing demand for children. Although positive, many cross sectional studies have found that the elasticity of family size with respect to income is apparently quite low, even when birth control knowledge is held constant. Becker, however, points out that "the small elasticity found for children is not so inconsistent with what is found for goods as soon as quantity and quality income elasticities are distinguished. Increased expenditures on many goods largely take the form of increased quality--expenditure per pound, per car, etc.--and the increase in quantity is modest. Similarly, increased expenditures on children largely take the form of increased expenditures per child, while the increase in number of children is very modest."³¹

Why this should be so is not clear. It is possible that decreasing marginal utility of numbers of children sets in much before decreasing marginal utility of quality of children. This would be consistent with parents wanting to "reproduce themselves--only better."

31. Becker (1965), op. cit., page 119.

Becker believes that parents' pursuit of quality in their children is the major reason for inconsistencies in observed income effects. When the quality embedded in children is included in a parent's utility function, the shadow price of the number of children depends on the expenditure on quality and the shadow price of quality depends on the number of children. This means that anything that increases the expenditure on quality of children would also raise the cost of the number of children, generating an additional substitution effect away from quantity of children to quality of children. Put another way, "Quantity and Quality are closely related, because the shadow price of quality depends on quantity and the shadow price of quantity depends on quality."³²

What this means is that an increase in quality of children is more expensive if there are more children because the increase must apply to more units. On the other hand, if the children are of high quality, then an increase in quantity costs more because high quality children are more expensive.

This relationship has been used by economists to explain many observations, including "the negative correlation between schooling and family size, the lower

32. Gary S. Becker and H. Gregg Lewis, "On the Interaction between the Quality and Quantity of Children," in Schultz, op.cit., page 86.

fertility and higher schooling of Jews, the changes in rural/urban fertility differentials, the relationship between child mortality and fertility, and the recent decline in fertility and rise in schooling of blacks."³³

The low income elasticity of demand for children is also explained by the increase in foregone earnings with income. Child care activities would seem to be time intensive. Since the value of time is measured by wage rates (particularly female wage rates) Becker's analysis predicts that the relative price of children would be higher to high-income families. (There is presumably a positive correlation between wages and incomes.)

Even if women in higher income groups did not work for cultural or other reasons, that would not make the value of their time costless. In fact, in the women's own view, the value of their time in the household must exceed the value of their time in the market. Labor supply theory suggests that women married to high wage men will be less likely to work precisely because the cost of their time in the home is so valuable. Thus, the shadow price of a non-working woman's time may exceed the cost of time of a working woman.³⁴

33. Ben-Porath (1982), op. cit., page 55.

It is important to note that in theoretical form, the theory predicts that when all (shadow) prices are held constant, the income effect on "child services" will be positive. Child services might be thought of as a vector of attributes of children that enter their parents utility function. According to Keeley, unless other attributes of quality per child are held constant, the number of children ever born is a poor proxy for child services. "Child services," per se, are however generally not an empirically observable measure.

Based on the theoretical developments just outlined, various economists then proceeded to do empirical work on fertility behavior, testing various hypotheses and using various sets of economic and demographic data. Notable among the studies were work by Robert J. Willis for the United States population, Robert T. Michael for the U.S. suburban population, Bruce L. Gardner for U.S. farm women, Yoram Ben-Porath for Israel, and T. Paul Schultz for Taiwan.

Probably the most explicit statement of the model was made by Willis. According to him:

"The family's desired level of fertility (N), child quality (Q), and the parent's standard of living (S) depend on the interaction of the family's tastes and on

34. Michael C. Keeley, "A Comment on an Interpretation of the Economic Theory of Fertility," Journal of Economic Literature, June 1975, Volume XIII (Number 2), page 464.

the constraints that it faces. More precisely, the family's optimal consumption of N , Q , and S , and the product of $C (= NQ)$ and S are determined simultaneously by maximizing utility subject of the production-possibility constraint...

"According to the model, changes in family (fertility) behavior are in response to changes in the family's lifetime income (i.e., husband's lifetime earnings and the family's non labor wealth) H , the wife's initial stock of human capital (usually measured by a wife's education) K , or her lifespan after marriage, T . Changes in these variables (1) change the family's full wealth, I , by shifting the production possibilities curve, (2) change the opportunity cost of children, C , by changing its slope, and (3) if the wife's labor status is altered change the form of the constraint the family faces...It follows that the effect of a change in a given exogenous variable on each endogenous variable may be resolved into the sum of a wealth effect caused by the change in I ³⁵ and a substitution effect caused by a change in C ."

As previously discussed, Willis and others usually make several simplifying assumptions necessary to obtain analytically usable results. The most notable ones are:

* Child-bearing decisions are made at a single point in time and not changed as a result of new information, new events, or otherwise changed preferences.

* The wife specializes in home production and the husband in market production.

* The time offered by husband and wife are simply

35. Robert J. Willis, "Economic Theory of Fertility Behavior," in Theodore W. Schultz (editor), Economics of the Family: Marriage, Children, and Human Capital, National Bureau of Economic Research (1974), pages 51-52. Words in parentheses added by the author.

inputs into the household production process and are not produced or influenced by the production process itself.

* The husband and wife have one combined utility function that can be maximized.

* Each basic commodity produced in the household is produced by a separate production process.³⁶

THE USE OF STATIC MODELS

In almost all cases, these models are presented in a single period decision making framework. At the outset of marriage, the family (husband and wife) are assumed to choose a family size that will maximize its satisfaction. Once this decision is made, it is not altered over the course of their lifetimes. This assumption has been the subject of much discussion. For example, it is argued that the assumption requires a "distinction between results perceived or anticipated when the decisions are made and actual outcomes. The distinction reflects the fact that families may not correctly perceive the constraints of the maximization problem."³⁷

Bagozzi and Van Loo assert that static models of

36. Allan C. Kelley "Book Review of Economics of the Family: Marriage, Children, and Human Capital." Journal of Economic Literature Volume XIV, Number 2 (June, 1976) page 518.

fertility fail to capture the dynamic sequential nature of the reproductive process. They argue that Becker's assumption that households make a family size decision at one point in time runs counter to research indicating that fertility decisions are invariably a dynamic process with changing economic, child rearing, and general life cycle conditions playing an important part.

In the same vein, Heckman and Willis argue that an important shortcoming of these models is "their failure to deal with the implications of the simple fact that reproduction is a stochastic biological process in which the number and timing of births and the traits of children (e.g. sex, intelligence, health and so forth) are uncertain and not subject to direct control."³⁸ And Ben-Porath has concluded that "the proper framework for dealing with all the theoretical considerations (involved in analyzing fertility) is a dynamic programming utility maximizing model with the various risks explicitly included."³⁹

Yet Turchi (not a Beckerite) argues that "the evidence supporting the necessity for a dynamic or sequential analysis of completed family size is not strong; moreover

37. Richard A. Easterlin, Robert A. Pollak, Michael L. Wachter, "Toward a More General Model of Fertility Determination: Endogenous Preferences and Natural Fertility," in Easterlin, Richard A. (editor), Population and Economic Change in Developing Countries (Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980) page 82.

it is clear from the reproductive behavior of most Americans that couples do reach something very much like a long run static equilibrium family size long before the onset of subfecundity."⁴⁰ Turchi argues that final reproductive decisions are made long before the major economic consequences of these decisions are felt, but that this is the result of the biological decline in fecundity experienced by women in their thirties.

Nerlove and Schultz claim that for each individual household, decisions may be sequential, albeit with the understanding of the dependencies of future alternatives on past choices; but for social aggregates observed at a point in time, the proportion making one type of decision is jointly determined with the proportion making another.⁴¹

Despite these generally accepted limitations, the

38. James Heckman and Robert Willis. "Estimation of a Stochastic Model of Reproduction: An Econometric Approach." in Nestor E. Terlickyj (editor), Household Production and Consumption (New York: Columbia University Press for the National Bureau of Economic Research, 1975).

39. Yoram Ben-Porath, "Short Term Fluctuations in Fertility and Economic Activity in Israel," Demography, Volume 10 (May 1973), page 187.

40. Boone A. Turchi, "Comment on Bagozzi and Van Loo. Fertility as Consumption: Theories from the Behavior Sciences," Journal of Consumer Research, Volume 5, (March 1979) page 294.

41. Marc Nerlove and T. Paul Schultz, Love and Life Between the Censuses: A Model of Family Decision Making in Puerto Rico, 1950-1960, (Santa Monica, CA: Rand Corporation, September 1970, RM-6322-AID), page vii.

static approach is utilized in most fertility studies including this one. It is an approach that allows us to use the available grouped data and allows for much simplification in the analytical discussion.

CHAPTER III
OTHER ECONOMIC MODELS OF FERTILITY

The model that has just been discussed is what has often been called the Chicago-Columbia model (and what Mincer has referred to as the Morningside Heights model). But the framework of this study and of most other recent research in fertility behavior is somewhat broader than the original Chicago-Columbia model.

During the past thirty years, economists outside the Chicago-Columbia axis have been anything but dormant in this field. Indeed, there has been much fertility research by economists with other orientations and much of what has been done by the Chicago-Columbia group has been subject to a great deal of discussion and criticism. Specifically, the works of Richard Easterlin and others at the University of Pennsylvania, Harvey Leibenstein, and Boone Turchi stand out. It is to some of these other models that we now turn.¹

THE PENNSYLVANIA APPROACH

Probably the most widely accepted alternative model is what has been called the Pennsylvania model as presented by Richard A. Easterlin and others--most notably in Easterlin, Pollak, and Wachter. Like the Chicago-Columbia model, Easterlin's work has been described as neo-Malthusian because Easterlin views fertility as a dependent variable in a situation where changes in real income are the independent variables. This model develops four major features that distinguish it from the Chicago-Columbia model.

The first unique aspect of the Pennsylvania model is its emphasis on tastes. Easterlin, et. al., argue that there is "an interdependent preference mechanism which allows for the transmission of aspirations from one family to another and from generation to generation."² Past

1. Since this paper is focused on the micro aspects of fertility, this brief survey will ignore those studies which seem to have an exclusively macro/growth orientation. Mention must be made, however, of the works of Simon Kuznets (most notably in Population Change and Aggregate Output in the 1960 Becker volume). Kuznets argued that economic growth has been in many historical instances largely a function of an expanding population rather than vice versa. For a survey of the historical literature on the relationship between growth and population policy from Malthus until the 1970's, see Mark Perlman, "Some Economic Growth Problems and the Part Population Policy Plays," Quarterly Journal of Economics, Volume LXXXIX, Number 2 (May 1975), pages 247-256. This survey also ignores the great amount of fertility reserach done in the fields of sociology and psychology. For a brief survey of that literature see Richard P. Bagozzi and Francis M. Van Loo, "Fertility as Consumption: Theories from the Behavioral Sciences," Journal of Consumer Research, Volume 4, pages 199-228.

behavior patterns from both inside and outside the family unit determine a family's tastes. "It is through tastes or subjective preferences that some of the attitudinal considerations and measures stressed by sociologists operate such as norms regarding family size and the 'quality' of children (that is, standards of child care and rearing)."³ Tastes together with income and price variables determine the demand for children.

The second distinguishing aspect of the Pennsylvania model is its concern with the biological aspects of fertility behavior--what might be called the supply side or the potential supply of children. Easterlin argues that attention must be focused on the fertility production function. This function expresses the number of live births as a function of frequency of intercourse, reproductive span of the household, fertility regulation practices, and the commodities, goods, and practices that govern the probability of conception.

Reproductive behavior differs, however, from other production behavior in an important respect. "Babies, since they are a product of sexual intercourse, tend to be

2. Easterlin, Pollack and Wachter, op. cit., page 83.

3. Richard A. Easterlin, "The Economics and Sociology of Fertility: A Synthesis," in Charles Tully (editor), Historical Studies of Changing Fertility (Princeton, N.J.: Princeton University Press, 1978), page 130.

produced whether or not they are wanted whereas rice and wheat do not. Hence a decision to limit fertility typically requires conscious action such as abstinence, contraception or induced abortion."⁴

Put another way, "without reference to sexual intercourse one is hard put to explain why households would engage in the 'production' of children once the desired number is reached and consequently why excess fertility would ever occur."⁵ Any empirical analysis of fertility should therefore, according to Easterlin, be divided into two data groups--those that practice fertility and those that don't--with the latter group being analyzed by a model that focuses on natural fertility.

It is the interaction between supply and demand that determine the demand for children. If the demand exceeds potential supply, then there is no need or desire for fertility control. Such a situation would result in a demand for ways to enhance fertility and for children to adopt. While these possibilities are usually not significant in the aggregate, on a family level there is certainly much demand for adoption (at least of "normal" white babies) and for fertility clinics by those unable to have their own children.

4. Easterlin, Pollak and Wachter, op. cit., pages 104-5.

5. Easterlin (1978), op. cit., page 59.

If potential supply exceeds demand, then, according to Easterlin, parents would be motivated to regulate their fertility--actions which are certainly not costless either in psychic or monetary terms.

Easterlin argues that fertility conditions in premodern societies more nearly approximate an excess demand situation than an excess supply situation. This is because mortality and fertility are high and widely fluctuating in those societies. As a result, the concern is whether a family will be able to have as many children as it wants. Actual fertility will therefore depend on the supply side. Income and price constraints would only affect fertility through their impact on the potential output of children, but not through the demand side.

In modern society, the typical household is, according to Easterlin, facing excess supply. This is because potential supply has gone up through improved health of mothers, reduced infant mortality, etc., while demand has gone down due to changed tastes and reduced costs of fertility control. To study fertility in modern society one must therefore concentrate on the demand side including the role of tastes.

The third point of emphasis in the Pennsylvania model is the consideration of behavior under imperfect information. Each couple is viewed as adopting a pattern of goods consumption, time allocation, fertility, and infant mortality that, subject to resource and technology constraints, maximizes their utility. The problem is that couples are often ignorant of the consequences on fertility and infant mortality of various seemingly unrelated aspects of their behavior. Easterlin, et. al., suggest that couples be treated as if they maximized their utility subject to their resources, household technology, and possibly incorrect beliefs about the determinants of their experience of fertility and infant mortality. These couples are then assumed to maintain all other aspects of their behavior invariant even though the resulting family size is different from the one they anticipated.⁶

Finally, Easterlin makes several contributions towards the discussion of the appropriate income variable for a fertility mode. He argues that we should look at the potential income flow through time--meaning both permanent

6. Warren C. Sanderson, "Comment on Richard A. Easterlin, Robert A. Pollak, Michael L. Wachter, Towards a More General Model of Fertility Determination: Endogenous Preferences and Natural Fertility," in Easterlin, Richard A. (editor), Population and Economic Change in Developing Countries, (Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980), page 142. Sanderson offers a concise comparison of the Pennsylvania and Chicago-Columbia models.

income and foregone income traded "in order to have time for other pursuits." The greater this potential income, suggests Easterlin, the greater will be the demand for children.

Building on the work of Deborah Friedman (discussed later in this chapter), Easterlin claims that both relative and absolute income have effects on fertility. Easterlin believes that fertility for a particular family will be influenced by the standard of living of that couple compared to that of their childhood. If the couple have a higher income than they expect (as Easterlin claims happened in the 1950's), they would have large families. Alternatively, if the job market is tight and incomes are relatively low (as in the 1970's), couples will choose to have fewer children.

THE LEIBENSTEIN APPROACH

Another model of some note was developed by Harvey Leibenstein. Leibenstein's theory was first presented in the mid-1950's as part of a book on economic development, and later revised in the mid-1970's as part of a complete theory of consumption. The theory addresses itself primarily to the possible explanation of fertility decline in the course of sustained per capita economic growth.⁷

Rather than look at the actual total demand for children, Leibenstein tries to explain the marginal decision to have an additional child given that the family already has three or more children. "The essence of the model is the presumption that families would balance utilities against disutilities ascribed to an nth child in order to determine whether a family wanted an nth child."⁸ The emphasis was on the higher birth orders. This is consistent with Leibenstein's belief that one need not assume that the entire realm of fertility behaviors embodies rational calculations but that only decisions at "critical junctures" in one's life are rational.

Leibenstein analyzes the role of income effects by exploring the relationship of utility and disutility to income. He argues that an nth child is wanted for three types of utility:

(1) consumption utility, meaning the child is wanted for itself rather than the goods, services, or income it can provide for the household. This is assumed to be constant with respect to income;

7. See A Theory of Economic Demographic Development, (1954), and Economic Backwardness and Economic Growth, (1957), for the early version of Leibenstein's theory, and "The Economic Theory of Fertility Decline," Quarterly Journal of Economics, Volume LXXXIX, Number 1 (February 1975) for the revised form.

8. Leibenstein, "An Interpretation of the Economic Theory," op. cit., page 460.

(2) work or production utility, meaning at some point the child may be expected to enter the labor force and contribute to family earnings. This utility declines with income and is probably relevant only in underdeveloped countries; and

(3) security utility, which also declines with income and which again is mainly relevant in underdeveloped countries where social security systems are nonexistent.

Two types of disutility were considered:

(1) the disutility arising out of the direct costs involved in housing, feeding, clothing, and schooling a child. According to Leibenstein, these costs rise with rising income because the style in which a child is maintained depends on the position and income of the parents.

(2) The disutility arising out of the indirect costs which involve income earning and other opportunities foregone by the parents in raising the nth child--utilities which, according to Leibenstein, "probably" do not decline as income increases.

Leibenstein concludes from these categories that rising income increases the cost (or disutility) of children by more than it increases the benefit (or utility) of children. The result is a negative income effect for children.

Leibenstein's theory extends traditional microeconomic theory in a number of ways. First, it allows for the possibility that certain goods will demonstrate increasing marginal utility to a certain level and then exhibit diminishing marginal utility beyond that level.⁹

Leibenstein believes there are four possible categories of such goods:

(1) Status or lifestyle goods. These goods are sensitive to the household's relative as well as absolute level of consumption. Households consume some goods as a consequence of their actual or desired status and not necessarily for the absolute level of satisfaction that can be derived from them. Thus utility is not based solely on the individual households' personal standards or expectations but includes a social comparison with significant others and with their level of consumption. Leibenstein suggests that such goods would be highly inelastic in price.

(2) Commitment goods. Increasing marginal utility is also explained by Leibenstein in terms of a long-term commitment on the part of the purchasers. "Initiation of

9. Keeley (1975), page 467, points out that diminishing marginal utility is not an assumption of household production theory and that for each utility function with diminishing marginal utility of income there exists another one equally consistent with behavior with increasing marginal utility of income.

the commitment tends to ensure that interim consumption of components of the commitment (or goods related to it) will have increasing marginal utility until realization of the final commitment. The demand for children is thought to reflect a major commitment in this sense."¹⁰

(3) There are certain consumer durables subject to physical indivisibilities or significant economies of scale.

(4) Target goods. There are some goods where a specific target quantity or expenditure is especially significant for some reason and anything less than the target amount is of little utility.

"These categories and the characteristics they emphasize are not distinct. Some expenditures may fall into all four categories to some degree."¹¹

Another dimension of Leibenstein's theory is that it specifies the mechanism leading to status emulation including an account of interhousehold and intrahousehold processes.

The Chicago-Columbia school argues that every couple considers itself totally free to choose any combination of quantity of children, quality of children, and other goods

10. Bagozzi and Van Loo, op. cit., page 209.

11. Leibenstein, Quarterly Journal of Economics, page 8.

and services. "But given their educational level, occupation, and perhaps a few other factors, the couple might (according to Leibenstein) act as though it possesses a narrow range of meaningful choice over (1) expenditures on some nonchild goods and (2) expenditures per child, for example, the quality of its children. The existence of such taste-shaping factors as the consumption standards of the couple's SORG (socio-economic reference group) might transform the consumption of certain groups and expenditures on child quality from the category of purely voluntary to almost obligatory behavior."¹²

In this view, the population is divided into social status groups that have different tastes, who may to some degree have different desires for children (but not simply because of differences in income) and who see the whole cost structure of their expenditures (including those made on children) from the viewpoint of vastly different preference structures. Among the elements that enter into a person's socio-economic status are signs of wealth, housing, education, occupation, residential location, political or military power, and hierarchical and other titles. Some of these elements are given at birth, while others are achieved.

12. Carvajal and Geithman, op. cit., page 107.

According to Leibenstein, the main difference between the Chicago approach and his own is the matter of motivation of parents. In Leibenstein's view, "group influences whether they be the extended family of a status group or an ethnic group, etc., are very important in many cultures in determining the lifestyles of those who see themselves as primarily members of the social group involved. Thus if household economic and reproductive behavior reflect group membership, then. . .this should be a basic part of the theory."¹³

Leibenstein further suggests that "a good deal of behavior within social influence groups is likely to be of an emulative character, and the theory of bandwagon effects as part of consumption theory could be used to work out the details of a model of this sort. In other words the social influence groups to which one belongs are determined by the degree to which the bandwagon effects are significant. What is important is that the increased demand for commitment goods can be one of the sources of pressure that induces a reconsideration directly or indirectly of family size decisions."¹⁴

13. Leibenstein, "A Reply to Keeley," (1975), op. cit., page 470.

14. Harvey Leibenstein, "Comments on Fertility as Consumption: Theories from the Behavioral Sciences," Journal of Consumer Research, Volume 5 (March 1979), page 290.

Leibenstein's model has been criticized on several grounds, both by the Chicago-Columbia school, which feel he has strayed too far from economics, and by others who believe he hasn't strayed far enough. Keeley (1975), for example, argues that the use of a threshold theory by Leibenstein is an ad hoc nonexplanation unless a testable explanation of the threshold is given. More generally, Keeley argues that Leibenstein's theory is built on many complex assumptions and is in general untestable.

Bagozzi and Van Loo (1978) complain that the concept of social influence groups (SIGs) has not been fully explicated. They point to two problems:

(a) Leibenstein has not specified the historical or sociocultural factors which influence a SIG; and

(b) no mechanism has been offered to explain how SIG's actually influence decision making.

Finally, Bagozzi and Van Loo argue that the conceptualization of status goods is weak. No criteria are provided for determining how goods operate in this sense.

THE TURCHI MODEL

Still another attempt to explain fertility within an economic context was made by Turchi.¹⁵ Turchi has developed a model that combines principles from the microeconomic theory of consumer behavior with normative and other noneconomic variables. Turchi's theory "places a particular emphasis on the role of social and psychological factors in shaping family size decisions. Great pains have been taken to emphasize that the consumer theory approach is not incompatible with the analysis of fertility based in other disciplines." According to Turchi, "economists have traditionally paid insufficient attention to differential social, institutional and psychological influences on the couple, while other social scientists have undervalued the advantages of a well developed theory of choice."¹⁶

In the Turchi theory, it is assumed that the utilities of individual family members are independent of each other and the cost of children is taken as a "datum." According to Turchi, the demand for children is influenced by social forces in two senses. First, normative and other noneconomic variables are first posited as direct determinants of fertility through their influence on the

15. See Boone A. Turchi, The Demand for Children: The Economics of Fertility in the United States, (Cambridge, Mass.: Ballinger Publishing Company, 1975).

16. *ibid*, page 129.

family's utility function. The effect of income on fertility, for example, is believed to vary systematically depending on the influence of norms, level of education, and so on.

The second way in which noneconomic variables affect fertility is indirect--through the family's perception of the price of children. According to Turchi, expectations arising from friends, parents, peers, and reference groups affect the family's perception of the cost of children and the amount of resources available to the household for child services. "Rather than assuming that the price of children is a decision variable under a conscious quality versus quantity choice, Turchi asserts that households approach the fertility decision process with a preconceived notion of the cost of a child based on normative and other noneconomic pressures. In this sense, Turchi's approach is similar to the normative school in sociology."¹⁷

OTHER ECONOMIC VIEWS OF FERTILITY

A survey of alternatives to the Chicago-Columbia model should also mention James Duesenberry and Bernard Okun, who in reviewing Becker's work were early critics of a too facile transfer of economic theory to a field they perceived to be dominated by noneconomic considerations. Okun, for

17. Bagozzi and Van Loo (1978), op. cit., page 212.

example, contended that the expenditure per child which parents consider a minimum increases with income. Unlike Becker, Okun argues that this is not a matter of voluntary choice, but rather a constraint on fertility decisions.

According to Okun, "it is almost impossible to conceive of a child who is raised at a much lower level of living than that of his parents...The child cannot be sent to live in the slums of the Lower East Side while his parents dwell in a penthouse on Park Avenue. Thus automatically when parents raise their own level of living, their child's is also raised..."¹⁸

Duesenberry extends the same argument to time costs. He argues that "the time parents spend on children is largely determined by social conventions. Those conventions differ among social class."¹⁹

Also, in a 1963 paper, Deborah Freedman sketched out a theory suggesting that the opportunity cost of child rearing is influenced by social and institutional considerations and

18. Bernard Okun, "Comment on An Economic Analysis of Fertility by Gary S. Becker," in Demographic and Economic Change in Developed Countries (Princeton, N.J: National Bureau of Economic Research, Princeton University Press, 1960), page 236.

19. James S. Duesenberry, "Comment on An Economic Analysis of Fertility by Gary S. Becker" in Demographic and Economic Change in Developed Countries (Princeton, N.J: National Bureau of Economic Research, Princeton University Press, 1960), page 234.

presented some interesting empirical results to support that hypothesis.

Specifically, Freedman argued that it is important to consider not only the husband's actual income but how his income compares with the average income attained by men of his age, occupation, and education status. Her empirical research found that a husband's income which is above the average for one's status is associated with more children. She also found that being in a higher absolute income class means fewer children if the higher income is only what is usual for the husband's age and occupation status.²⁰

Like Duesenberry and Okun, Freedman argued that the costs of rearing children are related to the socio-economic reference group of the parents. Given the social status of the family, it only has limited control over the costs of its children.²¹

Freedman also suggests that there is a certain minimum number of children that parents consider essential (irrespective of size of income) but that additional children do not necessarily continue to add equal utility and that, indeed, past a certain point, an additional child might be a source of disutility.

20. Deborah Freedman, "The Relation of Economic Status to Fertility," American Economic Review, page 422.

21. *ibid*, page 415.

Finally, a critique by Judith Blake of Becker's original 1960 article expressed a sociologist's misgivings about the value of microeconomic theory as applied to fertility research. Blake's main objection was Becker's almost total "disregard of the social context of reproduction. She argued forcefully that differences in social status affect both parental perceptions and their freedom to separate their children's living standards from their own. Blake went to some lengths to emphasize the institutional constraints on parenthood that restrict a couple's ability to make a family size decision independently of the social milieu within which it exists.

Besides, questioning Becker's empirical evidence of a positive income effect, Blake questioned two features of his analysis.

(1) The analogy of children to consumer goods is limited. According to Blake, income serves as a constraint when it comes to purchasing consumer durables. Acquisitions are limited by credit and not by choice. In the case of children, the income constraint is absent. "In fact, one must recognize that the sociology of the family is such that freedom to choose the number of children one wishes is sacrosanct...The 'consumption' of a family by individuals who cannot 'afford' one is regarded quite differently from their decision to purchase a consumer durable that they

cannot afford."²² However, as Namboodiri points out, Blake seems to be contrasting the views of money lending agencies with those of people engaged in formulating social and economic welfare policies. What is relevant, though, is the feelings of family members who make the fertility decisions.

Blake also argues that the analogy to consumer goods is limited since the consumer of children does not have the flexibility available to the consumer of other goods to optimize his equilibrium position by a dynamic reshuffling of his consumption. "If the parents miscalculate and find that the marginal utility they actually derive from an additional child is less than they would have had from an expenditure on something else, they cannot, normally, adjust the situation."²³

(2) Like Okun and Duesenberry, Blake argues that parents find it hard to separate the level of living of their children from their own, since they normally eat the same food, and live in the same place. In addition, "the way of life of the poor leads them to accept low standards of child quality--standards that do not greatly transcend the actualities of the moment, whereas the pressures on the more well-to-do contribute to standards in children that

22. Judith Blake, "Are Babies Consumer Durables?" Population Studies, Volume XXII, Number 1 (March 1968), page 16.

23. *ibid*, page 16.

will both conserve present advantages and secure added ones for the child."²⁴

An attempt to incorporate Blake's and other criticism into a Becker type model has been made by Namboodiri. He argues "that most of the objections advanced against the model can be met by suitably modifying it and that the required modifications can be effected by employing strategies and conceptual schemes similar to those used in the demand analysis of consumer behavior."²⁵

Namboodiri claims that the Chicago-Columbia economists fail to fully exploit the available tools of economics in building their models. He suggests that economic models recognize the sequential features of the decision making process and the lexicographic nature of the individual preference structure. Namboodiri proposes that the following be added to the model:

(a) a child-quality standard as characteristic of each social stratum and to which individual couples conform (this would be similar to the Leibenstein approach);

(b) the time orientation of the parents. Fertility decisions depend on whether parents look at just the

24. ibid, page 19.

25. N. Krishnan Namboodiri, "Some Observations on the Economic Framework for Fertility Analysis," Population Studies, Volume 26, Number 2 (July 1972), page 185.

relatively short term implications of their decisions or consider the long term commitments of time, energy, and money involved in having a child. By nature, some people tend to emphasize the short run while others emphasize the long run.

(c) Priority ordering of consumption activities (including having children); and

(d) the factor 'opportunity costs' of childbearing and raising.

He also would stipulate (again similar to Leibenstein and others) that the appropriate decision problem is the sequential addition of each child and the timing thereof. This would make the model consistent with the expected-utility theory of decision making. Namboodiri would also recognize in the model the interdependence between the utilities of children of different parities.

Finally, Namboodiri stresses that husbands and wives might have differences in their preferences for children and in the spacing of children. The fertility outcome of the household would therefore depend in part on the relative dominance of the spouses. Among the factors which determine this are the following:

1. The competence of the spouse in the specific area of the decision being discussed.

2. The social and economic contributions of the particular spouse toward the family's ongoing activities.

3. The cultural roles, values, etc., which determine the legitimate dominance of the individual in question.

4. Desires of the other members of the family for affiliation (the need to be loved by someone) or to keep the family together (the fear that exerting counter-pressures might endanger family unity.²⁶

A final, more general criticism of the Chicago-Columbia approach (and of most other economic explanations of fertility) is that they have not succeeded in explaining the major changes in fertility that have occurred in the United States over the past thirty-five years. In general, fertility rose in this country beginning in the late 1940's (the post-war baby boom) and reached a maximum in 1957. Since 1960, there has been a substantial decline in fertility to its present historical low.

As Keeley points out, "real income was rising

26. ibid, page 193. Namboodiri bases his discussion of family decision processes on James N. Morgan, "Household Decision Making," in N.N. Foote (editor), Household Decision Making: Consumer Behavior. Volume IV, (New York: 1961).

throughout the period (with minor fluctuations) and it is difficult to demonstrate that any variables that are commonly regarded as proxies for the price of children fell during the forties and fifties and then rose during the sixties and seventies."²⁷

27. Keeley (1975), op. cit., page 466.

CHAPTER IV
THE VARIABLES BEING EXPLORED

A large group of variables, in both their empirical and theoretical forms, are considered possible measures or determinants of fertility. The variables, each to be discussed in turn, are fertility itself, measures of income and wage rates, the quality of children, female labor market characteristics, education, and tastes.¹

FERTILITY

The measure of fertility being used in the study is children ever born per 1,000 women aged 35-44 and expressed per 1,000 such women. This age group is being used because of the argument that women of this age are most likely to have completed their child bearing years. Because of several demographic developments (later marriages, more

1. Not all of the specific variables considered here are included in the empirical work that follows. In addition, several potential variables (presence of an extended family, participation in a social security system, sanitation facilities in the household, etc.) are excluded from the current discussion since their relevance is limited to less developed countries.

women having careers, etc.) this assumption is probably less true today than it was twenty or thirty years ago. Nevertheless, "women ages 35-44" is the oldest age category for which the Census Bureau provides such fertility data grouped by SMSA. The use of this age category as a measure of fertility is therefore well accepted in fertility studies.

Fertility is defined by the Census Bureau as children ever born--excluded were still births, stepchildren, and adopted children. Ever married women were asked to include all children born to them before and during their most recent marriage, children no longer living, and children away from home, as well as children still living at home. Never married women were instructed to include all children born to them.

In the 1980 census, a terminal category of "12 or more" was used for recording the number of children ever born. For purposes of computing the total number of children ever born, the terminal category was given a mean value of 13.

The use of "children ever born" as a measure of the demand for children is standard in the economics literature on the subject. A major drawback of the concept, however, is that it makes no distinction between desired fertility and natural fertility. Desired fertility is usually defined as "the number of births a family would choose in a

situation termed by demographers a 'perfect competitive society,' that is, one in which a family has access to a contraceptive technology with no economic costs and free of preference drawbacks."²

Michael and Willis point out that "the definition of 'desired fertility' depends critically on what is assumed about fertility control costs, the variance in actual fertility, and so on." This is especially relevant to their study, since they emphasize that the household's optimal number of children is affected by fertility control costs and the relation between mean and variance of fertility. Nevertheless, Michael and Willis then proceed to use the distinction and to consider "unwanted" fertility.³

Natural fertility is defined as the number of births a family believes it would have if it made no deliberate attempt to influence its fertility. Natural fertility is

2. Richard A. Easterlin, Robert A. Pollak, Michael L. Wachter, "Toward a More General Model of Fertility Determination: Endogenous Preferences and Natural Fertility," in Easterlin, Richard A. (editor), *Population and Economic Change in Developing Countries* (Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980), page 83.

3. They find a strong negative relation between the number of "unwanted" births and the wife's education and "a somewhat systematic relationship between the number of 'unwanted' births and the use of good contraception. Robert T. Michael and Robert J. Willis, "Contraception and Fertility: Household Production and Uncertainty," in Nestor E. Terlickyj (editor) Household Production and Consumption (New York: Columbia University Press for the National Bureau OF Economic Research, 1975) pages 73,74.

less than fecundity, the maximum biological capacity for reproduction, which is probably fifteen or twenty children for the average human female.⁴ Natural fertility is uncontrolled fertility only in the sense that the family itself takes no deliberate actions to influence its fertility. Natural fertility is therefore consistent with the existence of social controls on fertility. As such, it may reflect such factors as observance of an intercourse taboo, coital frequency, the consumption bundle chosen by the family, health conditions (Romanivc, 1968), lactation practices (Jain and Sun, 1972), occupational circumstances, e.g., fishing or a nomadic life (Chen et. al., 1974), and altitude above sea level (Heer, 1967, James, 1966). Easterlin, et. al., argue that natural fertility is independent of the household's preferences for children.⁵

Natural fertility may be greater than, less than, or equal to desired fertility. Neither term is necessarily the same as the number of children ever born. For example, in a 1960 study, Kiser, et. al., found that 17% of the white

4. Dennis H. Wrong. Population and Society, Third Edition (New York: Random House, Inc., 1967), page 43. The Hutterite population, members of a small communalistic Christian sect in the Western United States and Canada are reported to have a birth rate at or near the biological maximum. See for example J.W. Eaton and A.J. Mayer, "The Social Biology of Very High Fertility Among the Hutterites," Human Biology, Volume XXV (1953) pages 206-263.

5. The studies mentioned above are all cited in Easterlin, Pollack, and Wachter, op. cit., pages 79, 100.

couples had excess fertility, while 31% of the nonwhite couples had excess fertility. They define excess fertility as a case where one or both partners did not want any more children shortly before their last conception occurred, and where the conception was not deliberately planned by stopping contraception to conceive.⁶

To equate "children ever born" with "the demand for children" also assumes that the utility parents get from children's services can be produced only by one's own children. This is, of course, not necessarily true. "If utility is derived from the presence of children, or from observing them, or from their being the object of one's tenderness, or love, or care, or from forming them physically or morally, then utility can be procured from the children of others as well as from one's own."⁷

There are many ways of achieving this substitution. Adoption and foster parenthood are obviously the closest substitutes for having one's own children. But a person could also be a schoolteacher, a Little League coach, scout den mother or scoutmaster, a worker in a day care center, a babysitter, a pediatrician, and so on.⁸ There are many

6. Clyde V. Kiser, Wilson H. Grabill, and Arthur A. Campbell, Trends and Variations in Fertility in the United States (Cambridge, Mass., Harvard University Press, 1968), page 46.

7. Rottenberg, op. cit., page 95.

forms of association with children both in markets and nonmarkets, and therefore, many forms of consumption of children's services. By measuring one's own children, we ignore such possibilities.

It has been suggested that in one important way--freedom of choice--the consumption of children's services might even be more flexible when the children are not one's own.

Parents usually keep their own children, whatever their quality. Indeed, parents spend much time making a child over in the form that will give them most pleasure. A teacher or babysitter can know very quickly whether she has a good group. If not, it is relatively easy to switch classes or jobs.

This freedom of choice also applies to the allocation of time. A parent is a parent twenty-four hours a day, seven days a week. An outsider has choices: consumption may take place during the day (a day care center) but not at night (a babysitter), in winter but not in summer, during later years of life, but not earlier.

8. One is tempted to add a grandparent--a position that is reputed to have most, if not all, the benefits of parenthood without the costs; when the kids act up, just send them home.

INCOME AND WAGE RATES

The first group of independent variables that were explored is made up of several key measures of income. They are:

1. median income of all year around full-time male workers.

2. median income of all year around full-time female workers.

3. median family income.

4. median income when the age of the family householder is thirty-five to forty-four. This age group was picked because it corresponds to the age group of females for whom we are measuring fertility.

Year around full-time workers are persons sixteen and over who usually worked thirty-five hours or more per week for fifty to fifty-two weeks in 1979.

Income refers to income earned in calendar year 1979 (and reported in the 1980 Census) from people age fifteen and up. Income includes wage or salary income, farm and nonfarm self-employment income, interest, dividends, net royalty or rental income, social security or railroad retirement income, public assistance or welfare income, and all other income. Not included as income were such things

as the value of income "in kind" from food stamps, public housing subsidies, medical care, employer contributions to pensions, etc., money received from the sale of property (unless the recipient was engaged in the business of selling such property) and various lump sum payments, such as tax refunds, gifts, lump sum inheritances, insurance payments, and borrowed money.

The median income concept for persons is based on persons with income, while for families and households it is based on the distribution of the total number of units including those with no income.

The first two median income variables are being used as proxies for wage rates. Wage rates--particularly female wage rates--are in turn being used to measure the opportunity cost of children. An increase in wage rates increases the relative price (including opportunity costs) of time intensive goods, including children. It will also encourage substitution in home production (washing machines, microwave ovens, etc.) such that all commodities become less time intensive. But this cannot change the sign of the overall substitution effect unless the elasticity of substitution between time and goods is so much greater for children than for other commodities that children change from relatively time intensive to goods intensive, an extremely unlikely prospect.⁹ The female wage rate

therefore would have a predicted negative value based on the argument that the substitution effect dominates in such a case.

The use of a women's wage rate (as opposed to all wage rates) has been criticized (by Ferber and Birnbaum) for tacitly endorsing the status quo regarding sex roles in which women are shown to specialize in home production and men are shown to specialize in market work. Although it is true that tradition may determine specialization, and this division of labor becomes rational as opportunity costs and marginal productivities of spouses change, we are measuring the reaction to these opportunity cost and productivity differences and not the initial division of labor.¹⁰

If there are increasing returns to scale, then we would predict that one member will specialize completely in household production while the other would specialize completely in market work. Becker argues that such is the case even if both partners are identical, "Because people accumulate skills by performing work, small, arbitrary initial differences in time allocations determine large differences in equilibrium. Of course, this situation does

9. Bruce Gardner, "Economic Aspects of the Fertility of Rural-Farm and Urban Women," Southern Economic Journal, Volume XXXVII, 1-64 (April 1972), page 518.

10. Hunt and Kiker, op. cit., page 382.

not dictate whether husbands or wives will eventually specialize in market work."¹¹

The expected sign for male wage rates and other measures of income is indeterminate since in those cases, income effects might well dominate and result in a positive sign. (Higher income increasing the demands for 'normal' goods--one of which is presumably children.)

The use of income data as a proxy for wage rates is well established in the literature. According to DeTray (1974), male earnings and male wage rates are sufficiently highly correlated at both the aggregate and the household levels so that earnings are a respectable proxy for wage rates.

The same is unfortunately not true for female earnings and wage rates. Smith's (1972) work points toward virtually no correlation between wages and earnings for individual women over their lifetimes because of the differences in the degree of attachment of women to the labor market. However, at the highly aggregate state level this correlation is almost as strong for females as it is for males. DeTray reports that the simple correlation for the 48 contiguous states between male earnings and male wage rates is 0.91. That same correlation for women is 0.88.¹²

11. Hannan, op. cit., page 67.

The SMSA data being used in the current study should more closely approximate state data than Smith's individual data, thus mitigating if not solving the problem.

For both males and females, the use of full-time year around workers should also serve to help alleviate the above problem.

Note that we do not assume that the market alternative for wives must be full-time year around work, but only that the full-time earnings rate has a high correlation with the market wage rate actually available for the "typical" wife in each SMSA (Cain and Weininger).

The female wage rate largely reflects the industrial structure of the SMSA. High wages are available in a city like Washington, D.C., where the demand for clerical and professional work is high, and low wages are available to women in cities dominated by heavy industries where the demand for female labor is low (we will attempt to separately measure industrial structure--see below). A good example of the latter is Pittsburgh, Pennsylvania, with employment in that SMSA being dominated by the heavy metal industry and mining. Historically, Pittsburgh has also had a relatively low female labor force participation rate and a

12. Quoted in DeTray. These figures come from Social Security full-time four-quarter earning data (U.S. Department of Health, Education, and Welfare, 1968). See DeTray (in Schultz), op.cit., for full citations.

low proportion of women to men in its population.¹³

The advantages of grouped data are apparent in the income variable. With individual data, even the current wage rate is only available for working women. Although it is possible to obtain predicted values for nonworking wives by means of a regression fitted to working wives, "this procedure can lead to biased parameter functions for wage functions and hence for labor supply functions."¹⁴

The second two income variables (median family income and age 35-44 median income) are proxies for permanent income. Cain and Weininger argue that transitory components of income are minimal in an income measure that is averaged over a large number of persons so that the median should represent the normal or permanent or long run income of the group in question.

Family income is used since it is more likely to be limited to the relevant population than household income. The census defines a family as consisting of a householder and one or more other persons living in the same household who are related to the householder by birth, marriage, or

13. Pittsburgh Regional Planning Association, Region in Transition: Report of the Economic Study of the Pittsburgh Region (Pittsburgh, Penn.: University of Pittsburgh Press, 1963), pages 340-341.

14. James Heckman, "Shadow Prices, Market Wages, and Labor Supply," Econometrica, Volume 42, Number 4 (July 1974), page 679.

adoption. In the 1980 Census, 73.2% of all households were made up of families.¹⁵

Again, the use of the age 35-44 bracket should also make this variable a better proxy for permanent income.

Economic theory predicts a positive relationship between income and the consumption of a commodity. There are, however, several reasons why a negative relationship might appear-- especially in a cross sectional study:

1. tendencies for high income families to substitute quality for numbers of children (This study will be measuring quality separately and will present regression results for fertility both with and without a quality variable--see below);

2. the possibility of differential tastes for children by income level;

3. as income rises, families may substitute some goods unavailable to them at lower incomes (due to indivisibilities) for children; and

4. possible differences by income level in the degree of bias of current income as a proxy for permanent income.¹⁶

15. United States Census of the Population, Chapter B, Part 1, page 15.

In his 1960 article, Becker proposed several explanations for the low (and sometimes negative) relationship observed between income and fertility. The first suggested that a negative relationship could be explained by differential knowledge of contraceptives. Becker argued that wealthier families have greater knowledge of contraceptives and use them at an earlier point in their marriages and more frequently than do poorer families. Becker tested this hypothesis on data from an Indianapolis survey. While the sample showed a negative relationship between income and fertility, when Becker tested a subsample consisting of only those couples who had planned all their children, he found a positive income elasticity of 0.42. For this subsample, the richest families (averaged) more than twice as many children as the poorest families.^{17U}

Becker also suggested that fertility and income should be more positively related for those more interested in rational informed consumption than for the U.S. population as a whole. To test this hypothesis, Becker selected a sample of subscribers to Consumers Union. He found a substantial positive relationship between income and fertility.¹⁸

Other income/fertility relationships have also been

16. See Simon (1974) and Easterlin (1969), especially pages 141-145.

suggested. Easterlin, et. al., for example, suggests that an increase in nonlabor income might cause an unintended and unanticipated increase in births through the following chain of causation: the increase in nonlabor income causes an increase in consumption of health care services or food, which leads to an improvement in health or nutrition; these in turn cause an increase in fecundity.¹⁹ Easterlin, however, argues that such an increase in fertility is an unintended result of the improved health/nutrition of the parents. Such a chain of events is also a much more likely sequence in an underdeveloped country than it is in the United States.

Considering all of the above possibilities, the direction of change in fertility with an increase in income is somewhat ambiguous.

17. Becker (1960), op. cit., page 219.

18. *ibid*, page 222. Both of Becker's studies were strongly criticized by Judith Blake. Blake argues that "when we examine the few instances in which (Becker) claims that contraception has been 'equalized,' we find that the positive relationships between family size and income...result either from sample biases that he ignores or from factors quite irrelevant to his analogy of children to consumer durables (Blake, op. cit., page 7)."

19. Easterlin, Pollack, Wachter, op. cit., page 86.

QUALITY OF CHILDREN

The second group of independent variables considered looks at measures of the quality of children. Generally, child quality variables fall into three broad categories: health related variables, school attainment, and expenditures on children as a measure of investment in human capital. The two variables we consider here are limited in that they capture only the investment in children that occurs outside the home. The assumption implicit in using these two variables is that total child quality is highly positively correlated with these two variables. The two variables are:

1. The number of children in private elementary school as a fraction of the number of children enrolled in all elementary schools. Since attendance at private elementary schools involves an additional tuition expense to the parents, this variable should tell us something about quality, at least from the parents' perspective. It is not necessary to argue that private schools are in any sense 'better.' Public schools might in some cases be superior--especially in the suburbs, where they are generally considered to be both good and "safe."

DeTray (1975) uses the percentage of students in private schools as a proxy for percentage Catholic in an area. This is based on his data that about 80% of all private school students are in Catholic parochial schools. That percentage is believed to have been somewhat lower in 1980. In addition, at the current time, more than 10% of the students in Catholic schools are not Catholic, up from 2.7% in 1970.²⁰

2. The percentage of people aged 20-21 enrolled in school. Since elementary and high school attendance are mandated by law in most if not all states, the age group 20-21 tells us something about voluntary extra education. Again, there is presumably a major expense involved in sending a student to college.

This measure also has certain drawbacks. First, it ignores the quality of schooling (some "college expenditure" variable might pick up quality). Second, the schooling of individuals may take place after they have become financially independent of their parents. Since delaying educational investment until after the child becomes independent reduces the returns to such investment, *ceteris paribus*, children receiving less parentally-financed schooling will achieve a lower level of completed schooling.²¹

20. USA Today, Monday, April 23, 1984, page 1.

Because of the high expense in both private elementary education and college education, we would expect some correlation between parents' income and the percentage of children in each of the two categories.

An alternative measure of quality is used by DeTray. Using county data, DeTray calculates the county public educational investment each child is expected to get. Such information is not, to the best of my knowledge, available by SMSA (and certainly cannot, by definition, be available by race). Wide variations within SMSA's and the grouping of capital and operating expenses would also be problems using DeTray's variable. In addition, as DeTray himself points out, educational expenditures are poor indicators of the quality of education being produced by schools. This is at least partly because of economies of scale that exist in the educational process. Parents purchase these public inputs indirectly, primarily through payment of property taxes. That parents actually make such decisions can be illustrated by application of the "Tiebout process," otherwise referred to as "voting with one's feet."

It is worth noting here that my measures of quality (as well as DeTray's) define quality in terms of inputs rather than outputs. The expenditure on private school education is also thought of as investment in quality as opposed to an

21.Tomes (1981) op.cit., page 218.

attempt to maintain a religious tradition (in the case of parochial schools), an attempt to have longer hours of school (a convenient babysitter for working mothers), or an attempt to separate a child from other "undesirable" children.

The use of parental expenditures on children as a measure of child quality is consistent with the Becker (1960) model. Tomes points out that such expenditures "may take on a number of forms such as child care, schooling, and medical care--which are dimensions of human capital, or gifts and bequests of material wealth--which are components of non-human capital."²² This distinction is important since the former might be more subject to quality/quantity tradeoffs than the latter.

Other measures of quality have been suggested by other economists. Leibowitz (1974) argues that the quality of children is linked directly to the time parents devote to teaching children basic skills. Ben-Porath and Welch argue that other attributes of children, such as sex, genetically determined physical characteristics, and intelligence are beyond parental control but can affect the amount of satisfaction parents obtain from individual children.²³ Lewit makes a similar argument for the risk of infant

22. Nigel Tomes, "A Model of Fertility and Children's Schooling," Economic Inquiry, Volume XIX (April 1981), page 210.

mortality affecting fertility decisions.²⁴

FEMALE LABOR MARKET BEHAVIOR

The next group of variables that were considered looks at labor force behavior and work opportunities for females. The variables being used are:

1. The unemployment rate for females. This is defined as unemployed females over employed plus unemployed females. Employed persons comprise:

(a) all civilians who during the specified week did any work at all as paid employees or in their own business or profession, or who worked 15 hours or more as unpaid workers in a family business or farm, and

(b) all those who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, or labor-management dispute, or because they were taking time off for personal reasons.

Excluded from the employed group are persons whose only activity consists of work around their own home or volunteer

23. Yoram Ben-Porath and Finis Welch, "Do Sex Preferences Really Matter," Quarterly Journal of Economics, Volume XC (1976), pages 285-307.

24. Eugene M. Lewit, "Experience with Pregnancy, the Demand for Prenatal Care and the Production of Surviving Infants" (unpublished Ph. D. dissertation, Graduate School, City University of New York, 1977), page 26.

work for religious, charitable, and similar organizations.

Unemployed persons are those persons without jobs who are actively seeking work, persons who would have been seeking work except that they were temporarily ill, individuals on temporary layoff awaiting a call to return to work, and persons who are waiting to start new jobs.

2. The percentage of women age sixteen and over who are in the labor force (the labor force participation rate). This consists of the employed plus the unemployed population over the total non-institutional above age sixteen population.

We can expect fertility to be negatively related to the labor force participation of women. The argument can work two ways. "The greater responsibility of child care prevents women with more children from entering or re-entering the labor force. Conversely, women who are in the labor force deliberately restrict the size of their families."²⁵

Nerlove and Schultz have argued that the composition of a woman's family is strongly associated with her participation in the labor force. "Typically the number of own children under the age of 18 and age of youngest child are both strong predictors of participation and have been

25. Mincer, op. cit., page 78.

interpreted...as measures of the opportunity cost of a mother's time in the home."²⁶

The relationship between past fertility activity and current labor force participation rates of women can also be interpreted as partially biological in origin. To some extent, sterile and subfecund women may be found in the labor force because they cannot bear children. On the other hand, the desire to work or for a "career" may lead to family restrictions while the desire for a large family may lead to restricted labor force participation. It has also been suggested that participation primarily affects the time of family formation rather than completed family size.

Mincer suggests that "the choices of labor and family size are not causally related to one another. Rather, these choices are simultaneously determined by the same economic variables. The higher the female wage rate and the lower the husbands' earning power, the higher the labor force rate and the smaller the fertility rate. The relation between fertility rate and labor force is not autonomous; it does not provide new insight once the two structural relations are specified."²⁷ Based on this argument, labor force participation rates are not included in the regressions presented here.

26. Nerlove and Schultz, op.cit., page 5.

3. Industrial structure of the SMSA. This is being defined as the number of females who are employed in three given occupations as a percentage of all employed persons aged sixteen and over.

The three given occupations were picked as being historically "women's" occupations. They are:

a) Teachers, elementary and secondary schools. This includes prekindergarten kindergarten, elementary, and secondary school teachers but excludes principals and supervisors. (Data which also excluded secondary school teachers would be even more female-dominated, but do not exist.)

b) Secretaries, stenographers, and clerks.

c) Health assessment and treating occupations. This includes registered nurses, pharmacists, dieticians, therapists, and physicians' assistants. The category does not include physicians, dentists, veterinarians, optometrists, and podiatrists, all of which occupations tend to be predominately male.

Current data indicate that women make up 81% of the nation's clerical workers, 96% of its nurses, and 82% of the elementary school teachers, all historically low-paid

27. Mincer, op. cit., page 79.

occupations.²⁸

Other available 1980 data on female-dominated occupations show that:

(a) in education, women made up 75.4% of the nation's elementary school teachers but only 56.5% of secondary school teachers;

(b) in office work, women were 98.8% of the secretaries, 89.7% of the bookkeepers, 82.1% of the office clerks, 96.8% of the typists, and 95.8% of the receptionists;

(c) in the health care occupations, women were 95.9% of the registered nurses, 96.6% of the practical nurses, and 87.8% of the nursing aides; and

(d) in other occupations dominated by women, women were 83.5% of the nation's cashiers, 94.1% of its sewing machine operators, 93.2% of its child care workers, and 91.1% of its bank tellers.

In reporting on occupational segregation in employment in the 1970's, Rytina and Bianchi report that such segregation declined largely because the proportion of both men and women in sex-neuter occupations increased. Men were no more apt to be employed in female-intensive industries in

28. New York Times, Thursday, April 5, 1984.

1980 than in 1970, but fewer of them were in occupations which were less than 20% female. More importantly for our study, the proportions of women employed in male-intensive occupations did not change during the decade.²⁹

The expected value of this variable is negative. The greater the availability of "female-oriented" work in an SMSA, the lower we would expect the fertility rate in that SMSA to be).

4. The percentage of the female civilian population age sixteen and over who are veterans. A "veteran" is defined by the Census Bureau as a person who has served but is not now serving on active duty in the Armed Forces of the United States. Persons in the National Guard or in military reserve units are classified as veterans only if they were ever called to active duty.

This variable will hopefully show us two things. First, the military is another occupation which is becoming increasingly open to females--especially those of relatively low income and education levels.

Second, more so than in other occupations, joining the military generally means putting off getting married and having children--and as such is a taste variable.

29. Nancy F. Rytina and Suzanne M. Bianchi. "Occupational Reclassification and Changes in Distribution by Gender," Monthly Labor Review (March 1984), page 16.

(This variable was included in early regressions and proved to be very statistically significant--much beyond its theoretical importance. It was excluded from the final regressions actually reported in this paper.)

EDUCATION

The fourth group of variables looks at education levels of the population. We use two variables to measure education.

1. The percentage of females who are high school graduates.

2. The percentage of males who are high school graduates. (This variable was used in early regressions but was left out of the final regression results reported in this paper because of the very high correlation found between male and female high school graduates.)

Included in these two categories are persons who completed four years of high school by graduation or by an equivalency test, and persons who reported that they had attended some level of college.

Education can be viewed as having six possible effects on fertility.

1. Contraception. According to a general assumption, the level of education attained by females is related to the level of contraceptive knowledge. The educated woman will presumably have a better ability to control the number of children she has. The use of percentage female high school graduates (as opposed to total out of school) can be explained by the rationale that contraceptive knowledge is achieved by some minimum level of education. DeTray (1974) uses the percentage of women who have completed five years of schooling as his education variable based on the same rationale.

There has been considerable evidence that, standardized for such variables as age or religion, more-educated couples use contraceptive techniques more extensively, approve of their use more thoroughly, and adopt contraception at an earlier birth interval. These findings show up in such sociological surveys in the United States as the Growth of American Families (GAF) studies conducted in 1955 and 1960, and the sequel to the National Fertility Studies (NSF).

Similar relationships between education and the use of contraceptive devices were found in other countries as well. Yaukey found, in a study of 900 Lebanese women, that the use of contraception and particularly the use of appliance methods rises with education. In a Barbados study, Roberts found that general knowledge of contraception, the average

number of contraceptive methods known per woman who knew of at least one method, and the percentage who had ever used contraception rose with the women's education level. Other studies of India, Puerto Rico, Japan, and Ghana offer similar evidence of greater use and acceptance of contraception among the relatively better educated.³⁰

Michael's own study of the United States found that more educated couples select contraceptive techniques which are on the average more effective in preventing pregnancy. Michael offers three possible interpretations for his results:

(a) education lowers contraceptive costs by reducing information costs;

(b) education lowers contraceptive costs by raising the marginal product of the couple's time used in conjunction with any specific contraceptive device; and

(c) on the benefit side, "unwanted children" represent a bigger loss to more educated couples and therefore "the more educated are induced to make a greater effort to prevent timing and quantity failures."³¹

As pointed out by Michael (1973) and others,

30. All of the above studies are cited in Michael, op.cit., page 132.

31. Michael, op. cit., page 151.

educational attainment of the parents can affect fertility behavior through a variety of channels. Differences in tastes and preferences for children may be associated with parental education, as may the efficiency of the parents (especially the wife) in home production.

2. Education might raise the age at marriage or reduce the proportion of women who are married and thus reduce exposure to conception (at least within marriage). We can probably eliminate this possibility since our variable is looking at high school graduates.

3. By exposing individuals to new ideas, education may affect a person's tastes towards children and desired standard of living. More specifically, education can affect tastes in the following ways:

First, education may broaden interests which may decrease the demand for children by creating other interests, such as reading, cultural activities, travel, etc., which require competing time and resources. Alternatively, education can increase the demand for children by increasing interest in child development and related topics.

Second, education may change one's perspective on the desired standard of living. When an individual becomes aware of others' standards of living, he may revise his own

standards--either upward or downward. If the desired standard of living increases, it might be at the expense of having additional children, while if the desired standard decreases, extra children might become affordable.

Third, connected to the contraception issue above, education may increase exposure to the attitudes of others toward contraception and thereby reduce or change the psychic costs associated with it. This is likely to reach a saturation point early in post-high school education.³²

Fourth, the group norms for family size may change through education from those of one's earlier environment, and these norms may change desired family size. Examples of such norms might include exposure through education to concepts of zero population growth on the one hand, and to the need to maintain or propoagate a specific race or social group on the other.

4. Education can increase a woman's efficiency and productivity in child care, thereby reducing the costs of a given quality child. This may have a positive or negative effect on fertility. "To the extent parents have a desired level of child services and quantity and quality are alternative ways of achieving these levels, reduced cost of

32. Barbara L. Wolfe, "Childbearing and/or Labor Force Participation: The Education Connection," in Julian L. Simon, Julie DaVanzo (editors), Research in Population Economics, Volume 2, JAI Press, Inc. (1970), page 369.

quality may decrease fertility. Alternatively, the reduced cost--if education leads to greater efficiency--may increase fertility."³³

5. Parents' education can have an effect on the quality of children. Leibowitz has found that a mother's education was significantly related to a child's I.Q. while the father's education was not, indicating that home investments rather than wholly genetic factors underlie the relationship. Leibowitz also reported that education achieved by children depended on parents' education.³⁴

6. Following Easterlin's supply side emphasis, education is associated with better health and therefore greater fecundity; that is a higher probability of conceiving. Again this is probably a relevant consideration in developing countries.

7. Income Levels. There is thought to be a high positive correlation between levels of education and levels of income. The husband's education can act as a proxy for permanent income, and the wife's education is likely to be positively correlated with the cost of her time, i.e., the

33. *ibid*, page 370.

34. Arlene S. Leibowitz, "Home Investments in Children," in Theodore W. Schultz (editor), Economics of the Family: Marriage, Children, and Human Capital (New York: Columbia University Press for the National Bureau of Economic Research, 1974), pages 449-450.

time cost of child services.

In the present study, variables representing income and children's education are included in the model; it is assumed, therefore, that the magnitude and sign of the coefficients for parental education reflect the net effect of contraceptive knowledge, taste differences, and differences in productivity.

OUT OF POCKET COSTS

Other cost variables, except for the urban-rural distinction discussed later, generally receive no attention because prices are considered fixed in cross section. Mincer, for example, justifies his exclusion of the money expenditure or direct cost of children on the grounds that: "except for the obvious cases of geographical diversity and price discrimination, it is reasonable to assume that market prices do not vary systematically in cross section."³⁵ Otherwise, an increase in the price of goods that are substitutes for children or a decrease in the price of goods that are complements for children will result in an increase in the demand for children.

It might be relevant here to distinguish between actual as opposed to perceived costs (whether out-of-pocket expenses or opportunity costs). To actually calculate costs is an expensive proposition, and probably "economically

unprofitable since its costs exceed the expected value of the information to the average couple." Lindert points out that "it took a research assistant and myself (Lindert) hundreds of hours to settle on a satisfactory set of estimates for urban United States families in 1960. I would not embark on such a task just before a fertility-relevant bedtime, and I doubt any peasants would either."³⁶

That is not to say such costs are insignificant.³⁷ A recent study by Espenshade found that it will cost \$142,700 (in 1981 dollars) to rear a child who now is three years old to age eighteen. In addition, a college education is found to add \$53,300 to \$167,300 to the cost, depending on the choice of school.

The figures are based on rearing a child in a middle-income family with one other child and a mother working part time. The major costs were found to be food (\$32,600), housing (\$32,200), transportation (\$36,600), and

35. Mincer, op. cit., page 67.

36. Peter H. Lindert, "Child Costs and Economic Development," in Richard A. Easterlin (editor), Population and Economic Change in Developing Countries (Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980), page 24.

37. Attempts at estimating the total "out of pocket" costs of a child go back at least to the time of Ernst Engel (1821-1896). For a survey of the literature on the subject, see Thomas J. Espenshade, "The Price of Children and Socio-Economic Theories of Fertility," Population Studies, Volume 26, Number 2 (July 1972), pages 207-221.

recreation (\$15,000). Among the major conclusions found by Espenshade were:

* If incomes and family size are the same, blacks and whites spend the same amounts.

* There are economies of scale in raising children. One child requires 30% of family spending, two use up 40% of family spending, and three take up 50%.

* Homes with two parents working full time spend 23% more on each child in out-of-pocket expenses than those with one parent working.

* Parents tend to spend more if pregnancy is later in the mother's life.

* Children become more expensive as they grow older, with 40% of spending concentrated in ages 12-17.

* Families in the Northeast and West will spend more than those in the Midwest and South.³⁸

Another income/cost variable that is of some interest, but not directly included in the current data set, is the role of positive and negative taxes. To the extent that tax exemptions for children are different across states and SMSA's, and to the extent negative taxes (for example,

38. USA Today, Thursday, May 31, 1984, page 1.

welfare payments) per child differ across the country, these might be important determinants of fertility. Our percentage urban data might pick up some of this relationship.

TASTES FOR CHILDREN

The next group of variables looks at factors which are thought to affect tastes. It should be noted that Cain and Dooley (1976) argue that, when using grouped data, the averaging of individual observations for each SMSA tends to eliminate the within-SMSA variations in tastes and the between-SMSA variations in taste may be assumed to be negligible (see also Cain and Weininger).

Michael and Becker further argue that "for economists to rest a large part of their theory of choice on differences in tastes is disturbing since they admittedly have no useful theory on the formulation of taste."³⁹ And Keeley argues that "the household production model lessens the reliance on tastes by incorporating socio-economic variables in the technology of household production and thus provides a framework where the effects of socio-economic variables on the shadow prices of home-produced commodities can be systematically analyzed."⁴⁰

T.P. Schultz argues that "however conceptualized and quantified, the influence of these 'taste' factors can be properly assessed only after the tangible pecuniary returns have also been isolated and taken into account."⁴¹ Easterlin, on the other hand, places much of his discussion of fertility within the context of tastes. In Easterlin's framework, more children increase the satisfaction of couples, although some couples have a greater taste for children than others. Quality of children is also considered a taste variable. These child-taste variables are balanced against the taste for additional consumer goods--given an income constraint.(Thornton,1978)

Ryder suggests that economists must look even further than tastes and preferences--at what sociologists call norms. Norms "are properties of organized groups which individuals pay heed to in their actions to the extent that they have been successfully socialized into membership in the group...they vary from culture to culture, from subculture to subculture (and) from class to class."⁴²

39. Robert T. Michael and Gary Becker. On the New Theory of Consumer Behavior. Swedish Journal of Economics. (Volume 75, Number 4, December 1973) page 380.

40. Michael C. Keeley, "A Comment on An Interpretation of the Economic Theory of Fertility," Journal of Economic Literature, Volume XIII, Number 2, (June 1975) page 462.

41. Quoted in Easterlin, et. al., op. cit., page 116.

Various socio-demographic characteristics will be used in this study to measure taste. They are:

1. Foreign Born. This is defined as a ratio of foreign born to total persons in each SMSA. The category "native" comprised persons born in the United States, Puerto Rico, or an outlying area of the United States. Also included as native are the small number of people who were born at sea or in a foreign country but who have at least one American parent. Persons not classified as "native" were classified as foreign born.

It can be argued that foreign born persons might have different fertility behavior based on sociological differences. It can also be hypothesized that the family structure of the foreign born is different (a closer knit family, for example) and thus an extended family is more prevalent. This would reduce the costs of child care and thus tend to increase fertility.

2. Hispanic origin. This is defined as the ratio of Hispanic origin to Hispanic origin and non-Hispanic origin.

The Census Bureau defines people of Spanish origin or descent as those who classified themselves in one of the specific Spanish origin categories listed on the census questionnaire (Mexican, Puerto Rican, or Cuban) as well as

42. Ryder, in Schultz, op. cit., page 77.

those who indicated that they were of other Spanish/Hispanic origin.

Persons reporting "other Spanish/Hispanic" origin are those whose origins are from Spain or the Spanish-speaking countries of Central or South America, or they are Spanish origin persons identifying themselves generally as Spanish, Spanish American, Hispano, Latino, etc. Origin or descent can be viewed as the ancestry, nationality group, lineage, or country in which the person or person's parents or ancestors were born before their arrival in the United States. Persons of Spanish origin may be of any race.

Persons of more than one Spanish origin and persons of both a Spanish and another origin who were in doubt as to how to report a specific origin were classified according to the origin of the person's mother. If a single origin was not provided for the person's mother, the first reported origin of the person was used.

In 1980, people of Spanish origin made up 6.4% of the population. Of that group, 60% were of Mexican origin, 14% of Puerto Rican origin, 5% of Cuban origin, and 21% of other Spanish/Hispanic origin. Hispanics in the United States are concentrated in several states. 31% of the Hispanics lived in California, 20% in Texas, 11% in New York, 6% in Florida, and 4% in Illinois. Arizona, Colorado, and New Mexico account for 9% of the Hispanics in the United States, with

the other 18% spread over the remaining forty-two states.

The data used for this variable are based on 100% tabulations, while almost all other data used in the study was based on a sample.⁴³

3. The percentage of people inside the urban area of the SMSA.

The urban/rural distinction in fertility is one that has often been accepted as almost a definition.⁴⁴ The economic explanation is usually given in terms of lower cost and greater pecuniary returns to child rearing in rural areas. "Since farmers have a comparative cost advantage in raising children as well as in raising foodstuffs, they would tend to be more fertile even without any differences in tastes."⁴⁵

At the same time, the urban/rural differential has sharply eroded since World War II. Bruce Gardner offers several possible explanations. "The decline in the value of

43. See 1980 U.S. Census of the Population, Volume B, page 14 for the data quoted here, and the appendix to the same volume for discussion of issues involved in using sample as opposed to 100% tabulations.

44. Kiser (1960), page 78, points to data that shows that as early as 1703, the fertility ratios were substantially lower in New York County (on the southern tip of Manhattan Island) than in the remainder of the Colony of New York (which was practically all rural).

45. Becker (1960), op. cit., page 229.

farm children as old age support resulting from the extension of Social Security to farm operators, increasing opportunities for labor-force participation by farm women (and) the general relaxation of those characteristics of rural life traditionally conducive to larger family size" are all reasonable economic arguments. "Other social scientists would probably agree by and large, though some might want to put more weight on cultural or 'taste' factors--for example, more rapid and complete diffusion of urban norms and attitudes into rural areas via television and cheaper communication and transportation generally."⁴⁶

Becker (1960) argues that the rural cost advantage might not be the same for all qualities of children, and is presumably less at higher qualities where child labor and food are less important. The movement over time to higher quality children by farm and nonfarm families may have therefore contributed to the narrowing of urban-rural fertility differentials in recent years.

Although the concepts of urbanized areas and SMSA's are closely related, they are not identical. The urbanized area consists of the contiguous built-up territory around each larger city, and thus generally corresponds to the core of the SMSA. SMSA's are generally larger than their core urbanized area because they include discontinuous urban and

46. Gardner, op. cit., pages 160, 161.

suburban development beyond the periphery of the continuously built-up territory. SMSA's may also include rural territory while urbanized areas do not. However, "occasionally a portion of an urbanized area extends across the SMSA into a nonmetropolitan county or another SMSA. Such portions are usually quite small in area and population.⁴⁷ In 1980, the U.S. Census identified 366 urbanized areas in the United States. They contained 139 million people or 61% of the country's population.⁴⁸

To a certain extent, the inverse relationship between fertility and urbanization may be due to a conscious selection in the urbanization process. In other words, people who prefer small families and females who desire to work outside the home may be more likely to move to cities than those who prefer large families and household employment. For example, the time cost of travel to an in city job is higher for a two worker family.⁴⁹

Since the data in the current study refers only to Standard Metropolitan Statistical Areas, we would expect urban/rural differentials to be very small.

47. U.S. Census of the Population, General Social and Economic Characteristics, page A-4.

48. Mills and Hamilton, op. cit., page 5.

49. Cain and Weininger, op. cit., page 208.

4. Religion. Probably the most important taste variable affecting fertility is religion. However, such data is generally not available for the United States since the U.S. Census has never asked any questions pertaining to religion.⁵⁰ However, a question of religion was included in the Current Population Survey of March, 1957. Results, as given in the 1958 Statistical Abstract of the United States, are reported by Kiser (1960). The data shows that in the United States as a whole, the standardized fertility rate for women ever married was almost precisely the same for Protestants as for Catholics. Kiser points out, however, that other studies have "affirmed the relatively high fertility of the Catholics and low fertility of the Jews relative to that of urban white Protestants. However, the fertility of Catholic-Protestant mixed marriages tends to be lower than that of Protestant couples."⁵¹

50. The best source for data on religious membership is probably "Churches and Church Membership in the United States: An Enumeration by Region, State, and County by D. Johnson, P. Richard, and B. Quinn (Washington: 1974). For a look at the problems involved in counting the Jewish population, see "The Estimated Jewish Population of the New York Area, 1900-1975," by C. Morris Horowitz (Federation of Jewish Philanthropies of New York, 1959).

51. Kiser, *ibid*, page 109. (See also Kiser's citations). For a discussion of the origins of religious beliefs on having children, the importance of children, and birth control, see Chapter 4 of Lincoln H. Day and Alice Taylor Day, "Too Many Americans," (Boston: Houghton Mifflin Co., 1964) pages 77-102. The Days trace the development of the Judaeo-Christian doctrines which bear on fertility.

Various other variables that are explored in this study, such as percentage in private school and percentage Hispanic, do pick up at least some measure of the Catholic population.

Because the psychic marginal cost of using efficient birth control measures to prevent conception may be higher for Catholics (and various other religious groups) than for the population as a whole, the cost of having children is lower for Catholics than for non-Catholics.

Besides being a taste variable, there is some indication that religion might have other effects on fertility. Tomes (1983), for example, argues that rates of return on human capital differ across religious groups.

5. Other taste variables. Various studies have found a significant relationship between the size of the community and fertility rates. It is obvious, however, that the size of the family is also likely to influence the size of the community in which one lives. The predicted value of the relationship between size of community and fertility is negative (see, for example, Ruggles and Ruggles, 1960).

City size might also affect the demand for children by affecting marital behavior. Keeley (1977) argues that larger cities with greater population densities should have better marriage markets which lower the transaction costs of

finding a partner, and therefore people enter the marriage market earlier.

Another taste variable not included is age at marriage. "The timing of marriage has many implications for the allocation and accumulation of resources in the household sector and the transfer of resources between generations. Its effects on fertility are unmistakable. As a starting point, decomposition of cohort fertility into an age of marriage and a marital fertility rate may help to sort out sources of fertility change over time and to clarify how social institutions respond to environmental concerns."⁵²

In a noncontraceptive population, postponement of marriage can serve as a method of birth prevention. If families can control fertility within marriage, postponement of marriage is a relatively costly way to control fertility (assuming that people derive utility from marriage). If couples do not control fertility within marriage, the fertility will be inversely related to age at marriage. If married couples do control their fertility, then the negative relationship between completed fertility and age at marriage might not exist.

If there is a distribution of tastes and preferences for children, then those people who desire more children (at

52. T. Paul Schultz in Easterlin, page 244.

any given price) would tend to marry earlier. On the other hand, holding tastes constant, people who have lower costs of producing children because of unmeasured traits or aspects of their environment also marry earlier. Thus, completed family size should be negatively related to age at first marriage. "Since marriage is in part a derived demand for children, the variables that tend to increase the demand for children should increase the demand for marriage. The variables that increase the cost of children should reduce the demand for marriage and lead to later marriage."⁵³ No data on the timing of marriage was available for this study.

Related to this variable is one that measures the interaction between the ages of the parents. Becker's theories of marriage and specific investment under uncertainty suggest the inclusion of variables reflecting the degree of assortive mating between parents in terms of various traits. Greater marriage specific investments may be reflected in either greater numbers of children or greater investments per child, or both. Since the greatest "period of risk" of divorce or separation occurs in the initial years of marriage, one might expect these factors to be reflected to a greater degree in the choice of family size, since this variable would be determined before children's schooling variables (Tomes, 1981).

53. Michael C. Keeley, "The Economics of Family Formation," Economic Inquiry, Volume XV (April 1970).

Another taste variable not included in the current study is one that distinguishes families in which at least one of the spouses had been married more than once. The fertility of such couples may differ from once-married couples, owing to their divergent past experiences. For example, the presence of children from a previous marriage may affect fertility in subsequent marriages. The children of others may be viewed as lower quality than children by one spouse, which may raise the total fertility of a remarried spouse. On the other hand, the period between marriages and the deterrent effect of children from previous marriages on the probability of remarriage would tend to reduce the fertility of remarried individuals (Robinson and Tomes).

MISCELLANEOUS VARIABLES

The last category of variables to be discussed is made up of three miscellaneous variables. They are:

1. Infant mortality rates. Since our fertility measure (children ever born) looks at all children ever born, it has been argued that infant mortality rates will affect a person's decision to have additional children.

The predicted value for the infant mortality variable is positive based on the argument that high infant mortality causes parents to bear a relatively large number of children to ensure that a given number survive to adulthood. In other words, for a given desired number of grown children, the required number of births will decline with reductions in infant and child death rates.

Several different relationships have been suggested to explain the association between fertility and infant or child mortality.

(a) Biological. The "death of a child truncates breast-feeding and thus shortens the sterile period following a birth; exposure to the risk of conception increases, therefore, when infant deaths are higher."

(b) Biological. "The probability of an infant's death may be biologically affected by the number of prior births; that is birth order or the mother's cumulative fertility may directly affect the infant's health."⁵⁴

(c) Fertility and household investments in infant health are choices that jointly reflect the environment of the household--prices, resource constraints, and health conditions.

54. Rosenzweig and Schultz, op.cit., page 38.

(d) Hoarding. Parents' fertility behavior may be responsive to the expected level of child survival. This assumes that parents desire the same number of surviving children, regardless of the infant mortality levels that they expect.

(e) Replacement. Parents respond to the actual level of infant deaths by increased fertility. If children die very young and the mother can have another child, the same life cycle can be approximated by replacement. "Where the age profile of deaths is such that replacement can reconstitute the family life cycle, replacement is superior to hoarding as a reaction, since the latter involves deviations from what would be the optimum family life cycle in the absence of mortality."⁵⁵

(f) The presence of a newborn in the household is likely to be associated with exhaustion of the mother and with sleeping arrangements that reduce the frequency of intercourse and consequently fertility.⁵⁶

It has also been suggested, by Marc Nerlove, that infant mortality data might be a proxy for child quality.

55. Yoram Ben-Porath, "Fertility Response to Child Mortality: Microdata from Israel," in Samuel H. Preston (editor), *The Effects of Infant and Child Mortality on Fertility* (New York: Academic Press, 1978), page 162.

56. *ibid*, page 166.

Good health care and nutrition can increase children's chances of survival and "may also affect their ability to absorb future investments in intellectual capital." To the extent that such investments in better health and nutrition result in a reduction in infant mortality, they increase "the satisfactions accruing to parents from other forms of investment which also raise child quality, for the returns to these investments may then be expected to be enjoyed over a longer period of time on average."⁵⁷

An argument has been made (Meeker, 1977) that a higher infant mortality rate raises the average cost (in terms of both time and goods) of grown children and therefore would reduce the quantity of them demanded. Fertility, or the demand for infants, can be thought of as being derived from the demand for surviving children.

There are two components of infant mortality: neonatal mortality and post-neonatal mortality. Neonatal mortality refers to deaths within the first twenty-seven days of birth. Post-neonatal mortality refers to deaths of infants between the ages of 28 and 364 days. Neonatal deaths are usually caused by congenital abnormalities, prematurity, and complications of delivery, while post-neonatal deaths are usually caused by infectious diseases and accidents.

57. Nerlove, *op.cit.*, page 542.

A rate representing all infant deaths per 1,000 live births is used here. These data are not race specific. Black infant mortality rates are, however, known to be much higher than white rates.⁵⁸

2. Abortion. This is defined as the states which allowed abortions before the Roe decision in 1973. For those SMSA's which are in more than one state, the legalization of abortion in any one of those states led to the SMSA being classified as allowing abortion. The argument used was that women desiring an abortion would go to the section of the SMSA where it was legal to obtain one.

Before 1967, all states in the United States had laws which permitted abortion only when it was necessary to preserve a pregnant woman's life. This began to change in 1967, when three states enacted statutes which increased the number of circumstances under which abortions could be performed. The reformed laws generally allowed abortion if there was a substantial risk that continuance of the pregnancy would seriously impair the physical or mental health of the woman, or that the child resulting from the pregnancy would be born with a serious physical or mental defect, or in cases of pregnancy resulting from rape or

58. Michael Grossman and Steven Jacobowitz, "Variations in Infant Mortality Rates Among Countries of the United States: The Roles of Public Policies and Programs," *Demography*, Volume 18, Number 4 (November 1981), page 698.

incest.

Two additional states enacted such laws in 1968, four in 1969, and three more in 1970. Also, in 1970, four additional states (Alaska, Hawaii, New York, and Washington) enacted extremely liberal abortion laws. The statutes of these four states placed no restriction on the reasons for which an abortion may be obtained prior to the viability of the fetus. This process of liberalization culminated in 1973, when the Supreme Court ruled that most restrictive state abortion laws were unconstitutional.

According to the Court, "a state criminal abortion statute...that excepts from criminality only a life saving procedure on behalf of the mother, without regard to pregnancy stage and without recognition of the other interests involved is violative of the Due Process Clause of the Fourteenth Amendment."⁵⁹

Concurrent with these changes in law and judicial interpretation, the United States rate of legal abortions per 1,000 live births rose from four in 1969 to 180 in 1972, and to 400 per 1,000 live births in 1980.⁶⁰

59. Supreme Court of the United States, Number 70-18, January 22, 1973: Jane Roe et. al. Appellants vs. Henry Wade, reprinted in Philip Appleman (editor), "An Essay on the Principle of Population by Robert Thomas Malthus" (New York: W.W. Norton and Company, 1976), pages 222-3.

60. Grossman and Jacobowitz, op.cit., page 699.

Abortion reform can affect fertility in several ways:

- Abortion is a form of contraception--one with very different "psychic" if not monetary costs than other forms of contraception.

- Abortion can also affect the costs of children by preventing specific high risk births. This is especially true for laws which allow a woman to terminate a pregnancy if she suffered an illness during the period. Improved detection techniques may aid parents in determining if a birth is likely to result in an unhealthy infant and thus affect fertility rates and infant mortality rates.

- Abortion reform may cause the birth rate to rise by increasing the level of sexual activity in general.

- Abortion also affects fertility by changing (presumably lowering) the infant mortality rate.

3. The costs of fertility control.⁶¹ These costs are the amounts of other desirables foregone in achieving the control. Fertility control techniques have rising costs and consequently for any given couple, different techniques are optimal for different family sizes. The higher the contraceptive cost, the less control will be desired and the larger the resulting family size. The fertility control costs include not only money, but also time, loss of pleasure, sacrifice of moral principles, risks to health,

and other factors. These costs can be broken down into two components:

(a) a fixed or one time cost incurred if a given fertility technique is used at all, and

(b) a variable cost that is associated with the degree of usage of a given technique or the number of births averted by the technique.

The classification of a cost as fixed or variable is separate from the classification of costs by their sources. An economic (money or time), psychological (fear of effects on health), or sociological (religious teachings or deviation from social norms) cost may be fixed, variable, or have components of both.

For example, the cost to a Catholic of violating the Church's precepts with respect to the use of contraceptives might be a once and for all cost incurred the first time contraceptives are purchased or used. Alternatively, a Catholic may experience greater guilt the more often the technique is used, in which case the variable cost is higher to Catholics than to non-Catholics.

The cost to an individual Catholic of violating the Church's precepts may also depend on the behavior of other

61. This discussion is based on Michael and Willis, op.cit., pages 44-48.

Catholics or other members of the society at large. Thus, the dynamics of diffusion of the pill use among Catholics might be interpreted, in part, as the progressive lowering of the cost of contraceptives as he sees others using the pill.

The equivocation within the Church itself also presumably lowers the costs of using forbidden techniques. As such, we would expect a "percentage Catholic" variable to have less importance in a 1980 study than in a 1950 study.

The loss of sexual pleasure occasioned by contraception almost surely affects only the variable costs of contraception. "The most ancient contraceptive techniques--abstinence or reduced coital frequency and withdrawal--probably have zero fixed costs and rather high (psychological) marginal costs."⁶² To the extent that modern contraceptives such as the pill require education or information, we can categorize those costs as fixed.

We can conclude that for a given set of costs, a couple that determined they wanted no children would practice a form of birth control that had relatively high fixed costs but lower variable costs. Sterilization would presumably be the extreme example.

62. Michael and Willis, op. cit., page 46.

Michael and Willis argue that the birth control pill has (or at least had in 1960-65) a lower variable cost than other techniques. Since there are many variable costs connected with the pill (side effects on health, money costs), Michael and Willis argue that "the major component of the marginal cost of contraception for most people stems from the conflict between effective use of a method and sexual pleasure. The fixed cost of the pill includes the cost of acquiring information about its existence, characteristics, and method of distribution in addition to the money cost of visiting a doctor to obtain a prescription and various psychic costs (e.g., religious principles) that are not related to information acquisition."⁶³

A couple that wished a large number of children would, on the other hand, use a method of contraception that had relatively low fixed costs and high variable costs. By definition, couples who avoided all the costs of fertility control have an expected level of fertility that is the natural rate of fertility.

This variable is not directly included in the current study. But both the female education and abortion variables that are included should pick up at least some fertility control costs.

63. *ibid*, page 76.

CHAPTER V

THE CURRENT STUDY

This study is an extension of the previously cited works. This study will analyze fertility from the perspective of the newly available 1980 census data. Because race is acknowledged to be a major determinant of fertility behavior, because economic conditions (income levels, unemployment rates, etc.) and social conditions (most notably levels of education) are very different for blacks and whites in the United States, and because fertility rates are known to be different for blacks and whites in the United States, the study is being conducted in distinct parts. First, white fertility is being analyzed as a function of white variables and then black fertility will be analyzed as a function of black variables.

RACE

The concept of race as used by the Census Bureau reflects self-identification by respondents; it does not denote any clear-cut scientific definition of biological stock. Since the 1980 census obtained information on race

through self-identification, the data represent self-classification by people according to the race with which they identify.

For persons who could not provide a single response to the race question, the race of the person's mother was used; however, if a single response could not be provided for the person's mother, the first race reported by the person was used.

The category "White" includes persons who indicated their race as White, as well as persons who did not classify themselves in one of the specific race categories listed on the questionnaire, but entered a response such as Canadian, German, Italian, Lebanese, or Polish. In the 1980 census, persons who did not classify themselves in one of the specific race categories but marked "Other" and wrote in entries such as Cuban, Puerto Rican, Mexican, or Dominican were included in the "Other" race category. In the 1970 census, most of these persons were included in the "White" category. In 1980, Whites made up 83.1% of the U.S. population.¹

The category "Black" includes persons who indicated their race as Black or Negro, as well as persons who did not classify themselves in one of the specific race categories

1. Summary statistics and definitions reported here are from the United States Census of the Population, Chapter B.

listed on the questionnaire but reported entries such as Jamaican, Black Puerto Rican, West Indian, Haitian, or Nigerian. In 1980, Blacks made up 11.7% of the U.S. population. The other 5.2% of the population were classified as Indian, Asian, and "other."

The demographic literature offers two explanations for the observed differences in fertility by race in the United States. The first suggest that blacks and whites have different tastes and preferences for children. While tastes and preferences cannot be easily measured; available evidence indicates differences by race in people's subjective evaluation of their preferences for children or of their desired family size that are the opposite of the observed patterns of fertility. In other words, blacks have a higher amount of "excess fertility" than do whites. This is true even when results are standardized for wife's education or family income.²

This observation leads to the second explanation. It has been argued that if blacks could control their reproductive behavior, they would certainly do so. This study takes the position tht both blacks and whites have access to the same birth control technology, although

2. See Larry J. Smith, *Black-White Reproductive Behavior: An Economic Interpretation* (San Francisco: R and E Research Associates, 1977), Appendix A for a summary of evidence on racial differences in excess fertility.

probably not at the same shadow price, and that the choice of birth control technology as well as its effectiveness in use is determined largely by socio-economic circumstance.

THE UNITS OF OBSERVATION

The units of observation consist of the 318 Standard Metropolitan Statistical Areas (SMSA's) in the United States, including Alaska and Hawaii, as defined in the 1980 United States Census. This consists of 283 SMSA's as included in the 1970 census, and 35 additional SMSA's created based on the results of the 1980 census.

The SMSA is a concept introduced by the United States Census Bureau in 1960. It is defined in the following way. Its core is one central city larger than 50,000 people or contiguous cities with a combined population of more than 50,000 (with the smaller city larger than 15,000). Added to this nucleus are the county of the central city and adjacent counties determined to be metropolitan in character and integrated economically and socially with the central-city county. In the New England states, SMSA's are officially defined in terms of cities and towns rather than counties, as is the case for SMSA's in other parts of the country.

"Metropolitan in character" means fulfilling certain criteria: containing 10,000 non-agricultural workers, or 10% of the SMSA's non-agricultural work force, or having 50% of its population living in areas with a population density greater than 150 persons per square mile and contiguous to the central city. In addition, at least two-thirds of the labor force must be non-agricultural. Integration criteria are based on commuting (15% of the resident labor force working in the central-city county) and communications (an average of four telephone calls per subscriber to the central city county). An SMSA may cross state lines but is built up from whole counties.

In 1980, SMSA's accounted for 74.8% of the total U.S. population of 226.5 million people, up from 68.6% of the population in 1970 (see Table III). All but fifteen states had 50% or more of their population in SMSA's in 1980. While the SMSA is an important (if not the most important) statistical concept in defining urban areas and an integrated economic area, it is not a governmental unit. The Chicago SMSA, for example, has more than 1100 local governments and the New York, Philadelphia, and Pittsburgh SMSA's have more than 500 local governments in each.³

3. Edwin S. Mills and Bruce W. Hamilton, *Urban Economics*, Third edition (Glenview, Ill.: Scott Foresman and Company, 1984), page 263.

TABLE III

POPULATION OF THE UNITED STATES AND SMSA'S, 1940-1980

(population in millions)

YEAR	U.S. POPULATION	SMSA POPULATION	SMSA POPULATION AS A PERCENTAGE OF U.S. POPULATION
1940	131.7	72.8	55.3
1950	150.7	89.3	59.3
1960(a)	179.3	112.9	63.0
1970	203.2	139.4	68.6
1980	226.5	169.4	74.8

(a) The 1960 and subsequent data include Alaska and Hawaii.

Source: Edwin S. Mills and Bruce W. Hamilton. Urban Economics, Third Edition, page 45.

CROSS SECTIONAL DATA

Several comments about the data set and about the use of cross sectional grouped data in general should be kept in mind:

* Hannan, for one, argues that the theory we are using will "better describe aggregate distributions (in stable institutional environments) than even the average features of the sample paths describing individual histories."⁴

* There is a great deal of mobility within the United States.

About 17% of the population moves to a different residence each year. This mobility raises important questions about using current residences in cross-section studies. At the same time, only about 6% of the population reported that they moved between counties in the March 1981-1982 year, and some of those might have been different counties in the same SMSA. In the sample year, a total of 5,212,000 people (including 227,000 females age 35 to 44 years old) moved between SMSA's. Another 2,217,000 people (including 95,000 females age 35-44) moved from outside SMSA's into SMSA's, and 2,366,000 (including 98,000 females age 35-44) moved from inside SMSA's out of SMSA's.⁵

4. Hannan, op. cit., page 71.

* As pointed out by Cain and Dooley (1976), cross sectional data generally offers more observations than time series data.

* Cross sectional data fail to capture the dynamic nature of the decision making process (DeTray).

* Individual data samples tend to limit their population to "reliable data observations." For example, Candalario limited his study of Puerto Rican fertility to families where the husband, wife, and at least one child were present in the household. He points out that due to the exclusion of broken homes, poor families may be underrepresented. Group data eliminate this type of problem.⁶

* For women who make up the sample (women ages 35-44), relevant values of the variables are those of 10-20 years prior to 1980. This problem may not be too severe given that, as suggested by DeTray (1974), the relative values of the variables used in this study have not changed much over time.

* Time series data (the alternative) often correspond

5. Current Population Reports--Geographic Mobility, page 1.

6. Carlos Candalario, "The Economics of Fertility: The Puerto Rican Experience" (unpublished Ph.D. dissertation, City University of New York, 1980) page 30.

with trends in hard to measure institutional, technological, and lifestyle changes that often affect women's labor participation, wages, and fertility. Thus, Cain and Dooley argue that "time series estimates of income and price effects on labor supply or fertility are often questionable because no variables were included to represent the effects of the feminist movement or of changes in the legal environment, in birth control technology, and so on."⁷

DATA SOURCES

As previously noted, the data in this study use Standard Metropolitan Statistical Areas as the units of observation. As such, generally only data that were available for all SMSA's in race specific form were used. The data come almost exclusively from the United States Census Bureau. With several exceptions noted below, all data come from the respective state volumes of the 1980 Census of the Population, Part C, General Social and Economic Characteristics, and apply to 1980. Data for whites are from Tables 126 to 130 and data for the black population are from Tables 132 to 136. Median family income and median female income as well as the other income measures that are considered are 1979 data as collected and

7. Glen G. Cain and Martin D. Dooley, "Estimation of a Model of Labor Supply, Fertility, and Wages of Married Women," *Journal of Political Economy*, Volume 84, Number 4 (1976), page S184.

reported in the 1980 census.

The percentage of the population that is of Hispanic origin is taken from the U.S. Summary book of Part B, General Population Characteristics, Tables 69. Data on the percentage of the population in the urbanized area of the SMSA comes from the same volume, Table 70. The latter two data sets are based on 100% tabulations while the data cited above were based on a Census Bureau sample.

The data on infant mortality are from the 1982 edition of the State and Metropolitan Area Data Book and refer to infant mortality in 1978. The abortion data were provided by Professor Michael Grossman, who received them from Elaine Rhodenhizer of the Family Planning Evaluation Branch, Center for Disease Control, U.S. Department of Health, Education, and Welfare.

CHAPTER VI

THE EMPIRICAL RESULTS

THE VARIABLES

The regression sample consists of the 318 Standard Metropolitan Statistical Areas in the United States. For whites, all 318 SMSA's are being used, while for blacks, only the 225 SMSA's which contained over 5,000 blacks in 1980 were used.

The use of all 318 SMSA's and of 225 SMSA's for blacks is a significant expansion over other such studies. Most other fertility studies that have used SMSA's restricted themselves to those with over 250,000 population. So, for example, Cain and Dooley (1976) and Dooley (1982) look at 1970 data for a total of 124 SMSA's--and only 79 for blacks.¹ Cain and Weininger, in a 1960 study, looked at about 100 SMSA's of which only 66 had separate data available for the nonwhite population. The tradeoff of a larger sample is that certain specific detailed variables are only grouped by the Census Bureau for large (over 250,000 population) SMSA's, and thus were not available for the current study.

The variables actually included in the final calculations were:

A = the number of children ever born per 1,000 women age 35-44

F = the percentage of females who were high school graduates;

UNEM = the female unemployment rate;

YPERM = median family income when the age of the family householder was 35-44 (a proxy for permanent income);

YFEM = median income of all year around full-time female workers (a proxy for female wage rates);

EL = the percentage of elementary school children who are enrolled in private elementary schools (a "quality of children" variable and also a proxy for percentage Catholic);

FOR = the percentage of the population that was foreign born;

INDF = the percentage of the employed population who were female employees in three specified industries (elementary and secondary school teachers, secretaries,

1. The Census provided 1970 data on whites for 125 SMSA's; the authors excluded Honolulu from their study.

stenographers, and clerks, and health assessment and treating occupations);

AA = the abortion dummy. The dummy variable is defined as 1 if the SMSA's state had liberalized abortion law by 1970;

SP = the percentage of the population that was of Hispanic origin;

URB = the percentage of the population residing in the urbanized area of the SMSA;

IN = the infant mortality rate, defined as the number of deaths per 1,000 live births in 1978;

D = the percentage of the age 20-21 population that was enrolled in school (This variable is being used as a "quality of children" variable);

In addition, several other measures of income are reported on in the study. They are:

YHOU = median family income;

YMALE = median income of all year around full-time male workers (a proxy for male wage rates);

YEXP = expected female wages (calculated as one minus the female unemployment rate times female earnings.)

As previously noted, all the data being utilized in the study is race specific except for infant mortality rates and the abortion dummy variable. In addition, the New England infant mortality rates are reported for NECMA's rather than SMSA's.²

DESCRIPTIVE MEASURES

The means, standard deviations, and other measures of central tendency and dispersion for the white data are given in Table IV. The means, standard deviations, etc., for the black data are given in Table VI. Tables V and VII give weighted measures for the white and black data, respectively, where the weight is equal to the number of women of that race age 35-44.

In general, our weighted results should be most similar to the Census reported "inside SMSA" results. They will not be identical because our weight is the number of women 35-44 (parallel to our dependent variable of children ever born to

2. NECMA's or New England County Metropolitan Areas are defined in terms of whole counties following the same criteria used to define SMSA's in the other states. As previously noted, in New England, SMSA's are defined in terms of cities and towns rather than counties. See Chapter IV for complete definition of all the variables just mentioned.

women of that age group) as opposed to the total population of the SMSA. Our black weighted results will also suffer in comparisons with overall "inside SMSA" since we have limited our study to the 225 SMSA's which had over 5,000 blacks in 1980.

TABLE IV
MEANS OF WHITE VARIABLES

VARIABLE	LABEL	MEAN	STANDARD DEVIATION
A	FERTILITY	2586.912	248.948
D	COLLEGE (QUALITY)	33.332	15.386
F	FEMALE HS GRADS	68.858	8.125
UNEM	FEMALE UNEMP	5.921	2.061
YFEM	FEMALE INCOME	10064.733	1275.273
YPERM	AGE 35/44 INCOME	24216.000	3076.704
XEL	%PRIVATE EDUC	11.772	7.848
XFOR	%FOREIGN BORN	4.130	5.423
XINDF	INDUST STRUCT-F	8.940	1.127
AA	ABORTION	0.321	0.468
SP	%HISPANIC	3.986	9.889
URB	%URBAN	68.096	17.422
IN	INFANT MORT	13.332	2.855

VARIABLE	LABEL	VARIANCE	STD ERROR OF MEAN	C.V.
A	FERTILITY	61975.046	13.960	9.623
D	COLLEGE (QUALITY)	236.740	0.863	46.161
F	FEMALE HS GRADS	66.012	0.456	11.799
UNEM	FEMALE UNEMP	4.246	0.116	34.800
YFEM	FEMALE INCOME	1626319.995	71.514	12.671
YPERM	AGE 35/44 INCOME	9466105.192	172.533	12.705
XEL	%PRIVATE EDUC	61.597	0.440	66.669
XFOR	%FOREIGN BORN	29.413	0.304	131.316
XINDF	INDUST STRUCT-F	1.271	0.063	12.608
AA	ABORTION	0.219	0.026	145.751
SP	%HISPANIC	97.799	0.555	248.091
URB	%URBAN	303.542	0.977	25.585
IN	INFANT MORT	8.152	0.160	21.416

TABLE V

WEIGHTED WHITE MEANS STATISTICS

VARIABLE	LABEL	MEAN	STANDARD DEVIATION	
A	FERTILITY	2466.233	244.903	
D	COLLEGE (QUALITY)	33.254	10.310	
F	FEMALE HS GRADS	70.781	7.037	
UNEM	FEMALE UNEMP	5.412	1.703	
YFEM	FEMALE INCOME	10894.422	1455.723	
YPERM	AGE 35/44 INCOME	25683.033	3004.503	
XEL	%PRIVATE EDUC	14.426	7.519	
XFOR	%FOREIGN BORN	6.242	6.253	
XINDF	INDUST STRUCT-F	9.181	1.046	
AA	ABORTION	0.427	0.495	
SP	%HISPANIC	5.263	8.661	
URB	%URBAN	75.143	17.211	
IN	INFANT MORT	13.305	2.497	

VARIABLE	LABEL	VARIANCE	STD ERROR OF MEAN	C.V.
A	FERTILITY	61975.046	13.960	9.623
D	COLLEGE (QUALITY)	236.740	0.863	46.161
F	FEMALE HS GRADS	66.012	0.456	11.799
UNEM	FEMALE UNEMP	4.246	0.116	34.800
YFEM	FEMALE INCOME	1626319.995	71.514	12.671
YPERM	AGE 35/44 INCOME	9466105.192	172.533	12.705
XEL	%PRIVATE EDUC	61.597	0.440	66.669
XFOR	%FOREIGN BORN	29.413	0.304	131.316
XINDF	INDUST STRUCT-F	1.271	0.063	12.608
AA	ABORTION	0.219	0.026	145.751
SP	%HISPANIC	97.799	0.555	248.091
URB	%URBAN	303.542	0.977	25.585
IN	INFANT MORT	8.152	0.160	21.416

TABLE VI
MEANS OF BLACK VARIABLES

VARIABLE	LABEL	MEAN	STANDARD DEVIATION
A	FERTILITY	3302.511	377.391
D	COLLEGE (QUALITY)	28.316	11.348
F	FEMALE HS GRADS	52.925	9.715
UNEM	FEMALE UNEMP	12.028	4.637
YFEM	FEMALE INCOME	9243.609	1732.483
YPERM	AGE 35/44 INCOME	16298.564	3112.144
XEL	%PRIVATE EDUC	4.777	3.410
XFOR	%FOREIGN BORN	2.151	2.668
XINDF	INDUST STRUCT-F	6.850	1.439
AA	ABORTION	0.338	0.474
SP	%HISPANIC	1.366	0.866
URB	%URBAN	86.727	15.220
IN	INFANT MORT	13.795	2.746

VARIABLE	LABEL	VARIANCE	STD ERROR OF MEAN	C.V.
A	FERTILITY	142423.840	25.159	11.427
D	COLLEGE (QUALITY)	128.784	0.757	40.077
F	FEMALE HS GRADS	94.389	0.648	18.357
UNEM	FEMALE UNEMP	21.503	0.309	38.553
YFEM	FEMALE INCOME	3001498.534	115.499	18.742
YPERM	AGE 35/44 INCOME	9685441.845	207.476	19.095
XEL	%PRIVATE EDUC	11.630	0.227	71.388
XFOR	%FOREIGN BORN	7.120	0.178	124.037
XINDF	INDUST STRUCT-F	2.072	0.096	21.014
AA	ABORTION	0.225	0.032	140.331
SP	%HISPANIC	0.750	0.058	63.421
URB	%URBAN	231.640	1.015	17.549
IN	INFANT MORT	7.541	0.183	19.906

TABLE VII

WEIGHTED BLACK MEANS STATISTICS

VARIABLE	LABEL	MEAN	STANDARD DEVIATION
A	FERTILITY	3052.041	348.133
D	COLLEGE (QUALITY)	29.012	7.097
F	FEMALE HS GRADS	55.570	7.454
UNEM	FEMALE UNEMP	11.122	3.515
YFEM	FEMALE INCOME	10066.486	1800.127
YPERM	AGE 35/44 INCOME	16437.184	2624.375
XEL	%PRIVATE EDUC	7.680	3.946
XFOR	%FOREIGN BORN	4.185	5.913
XINDF	INDUST STRUCT-F	8.084	1.484
AA	ABORTION	0.461	0.499
SP	%HISPANIC	1.615	1.361
URB	%URBAN	92.987	10.521
IN	INFANT MORT	14.332	2.459

VARIABLE	LABEL	VARIANCE	STD ERROR OF MEAN	C.V.
A	FERTILITY	142423.840	25.159	11.427
D	COLLEGE (QUALITY)	128.784	0.757	40.077
F	FEMALE HS GRADS	94.389	0.648	18.357
UNEM	FEMALE UNEMP	21.503	0.309	38.553
YFEM	FEMALE INCOME	3001498.534	115.499	18.742
YPERM	AGE 35/44 INCOME	9685441.845	207.476	19.095
XEL	%PRIVATE EDUC	11.630	0.227	71.388
XFOR	%FOREIGN BORN	7.120	0.178	124.037
XINDF	INDUST STRUCT-F	2.072	0.096	21.014
AA	ABORTION	0.225	0.032	140.331
SP	%HISPANIC	0.750	0.058	63.421
URB	%URBAN	231.640	1.015	17.549
IN	INFANT MORT	7.541	0.183	19.906

As can be seen from the tables, the mean number of children ever born per 1,000 white women is 2,586.9, with a standard deviation of 248.9, while the mean for black women was 3302.5, with a standard deviation of 377.4. These numbers are consistent with other studies which show higher levels of fertility for black women than for white women. When weighted values are used, the means and standard deviations are 2,466.2 and 244.9 for whites, and 3,052.0 and 348.1 for blacks. For whites, the cities with the lowest fertility rates were New York City, with 1,979 children ever born per 1,000 women age 35-44, and San Francisco, with 1,981 children per 1,000 women. For blacks, the low city was Madison, Wisconsin, with a fertility rate of 2,257. The cities with the highest fertility rates were Provo, Utah, for whites (4,107) and Benton Harbor, Michigan (4,426) for blacks.³

These numbers compare with overall census data that show fertility rates of 2,544 for whites and 3,185 for blacks.

The standard deviations, at least to the extent they reflect individual observation standard deviations, have some importance here. Michael and Willis point out that an important trend over time in the U.S. has been a reduction

3. The high fertility rate for Provo presumably reflects the concentration of Mormons there.

in the dispersion of fertility. So, for example, the percentage of women with seven or more children declined from 36% to under 6% in the period 1835-1930.⁴

The full-time earnings of white females in 1979 (\$10,065) was 8.9% greater than the full-time earnings (\$9,244) of black females. When the weighted data are used, the percentage is 8.2%. Overall income measured when the head of the household was age 35-44 shows that white income was 48.6% higher than black income. The weighted data in this case indicate similar results (56.3%).

The median income of all full time year around female workers in 1979 was \$10,512 for whites and \$9,583 for blacks. These nationwide figures are, as expected, lower than the weighted SMSA data found in this study. The highest white female earnings were in Anchorage, Alaska (\$16,249) and the lowest were in Las Cruces, New Mexico (\$4,364). For black females, the highest earnings were in Flint, Michigan (\$15,131) and the lowest in Memphis, Tennessee (\$3,546).⁵

Using our general measure of income, the highest overall median income for whites was in Stamford, Connecticut (\$40,179) and the lowest in McAllen, Texas (\$13,513). For blacks, the highest median income SMSA was

4. Michael and Willis, op. cit., pages 27-29.

Oxnard, California (\$26,275) and the lowest was Waco, Texas (\$9,675).

The (unweighted) mean percentage of white females who are high school graduates is 68.9 compared to an (unweighted) mean for black women of 52.9. Data for males calculated at the same time but not shown in Tables IV to VII indicate that 70.56% of white males had completed high school, while only 53.70% of black males had done so. Weighted results for these variables are very similar to the unweighted results.

The percentage of white elementary school students who were in private schools was 11.77% (unweighted) and 14.43% (weighted). This compares with Census SMSA data that shows that 14.66% of elementary school students were in private schools. The Census also reports that about 88% of the private school students were in church related schools. For blacks, our study shows that only 4.78% (unweighted) and 7.68% (weighted) of elementary school students were in private schools. The comparable overall Census-SMSA statistic was 7.22%. The Census reports that about 84% of

5. The income data used in this study have not been adjusted for differences in price levels, since such data are not available for most SMSA's. Anchorage, however, is known to have a very high cost of living. Dooley (1982), page 504, used a cost of living index that was available for 61 of the 124 SMSA's in his study. He reports that there were "generally very minor differences between the coefficients obtained with real versus nominal measures of wages and income when the model was estimated."

the black private school students were in church related schools.⁶

Female unemployment rates that were calculated from this data set show that the unemployment rate was 5.9% for whites, and 12.0% for blacks, when counting the weight of each SMSA equally. When using weighted data, the results were 5.4% and 11.1% for whites and blacks, respectively.

According to Census Bureau data for the United States as a whole (including areas outside of SMSA's), the female unemployment rate in 1980 was 5.7% for white women and 11.3% for black women. These rates compare to the overall rates of 5.8% for whites and 11.8% for blacks, as reported by the Bureau.

5.3% of the white SMSA population was reported to be of Hispanic origin in 1980, compared to 1.6% of the black SMSA population (using weights). These results compare with those reported elsewhere in this study that 6.4% of the total U.S. population was of Hispanic origin. The differences in numbers indicate that a large number of Hispanics apparently live outside of SMSA's.

The industrial structure variable yields a mean of 8.9% for whites (9.2% when weights were used) and 6.9% for blacks

6. Similar data on enrollment in church related schools is not available separately, by race, for each SMSA.

(8.1% when weights were used). The cities with the highest value of the industrial structure variable were Tallahassee, Florida, for whites and Washington, D.C., for blacks. An informal look at the data suggests that many state capitals with their white collar government jobs are near the top of this list. Numbers calculated from Census Bureau data show the industrial structure variable to have a nationwide value of 8.9% for whites and 7.6% for blacks.

Because of overlaps in geographic areas, the data on urbanized areas within SMSA's must be interpreted with some caution. The data indicate that 68.1% of the whites and 86.7% of the blacks lived within the urbanized portions of SMSA's. This compares with results of 75.1% and 93.0% for whites and blacks, respectively, when using weighted data. The higher percentages for blacks are consistent with other available data.

The infant mortality and abortion data were the only data not reported separately for whites and blacks. Since different numbers of observations and different weights were used, there will still be separate statistics for whites and blacks. The white data yielded a mean of 13.3 deaths per 1,000 live births, with a standard deviation of 2.9. When weights were used, the white mean was 13.3 and the standard deviation was 2.5. For blacks, the mean was 13.8 with a standard deviation of 2.7. When weights were used, the

black results were a mean and standard deviation of 14.3 and 2.5, respectively.

It is worth contrasting this data with that reported for other developed countries. The United States ranks very low in such comparisons, and its ranking has fallen in recent years. During the 20-year period from 1950 to 1970, the U.S. rate dropped from a position of seventh lowest among fifteen countries to highest. Over the same period, the U.S. experienced a decline in the infant mortality rate significantly lower than the decline in almost any other developed nation, despite the fact that over 98% of births in the U.S. are in hospitals.⁷

In 1973, the United States reported an infant mortality rate of 17.7%. This rate can be subdivided into a rate for whites of 15.8% and a rate for blacks and others of 26.2%.

The abortion dummy variable for whites yielded a mean rate of 0.3 for 1970. When weights were used, the value was 0.4. For blacks, the unweighted mean was 0.3 and the weighted mean was 0.5. This compares to 0.4 as reported for the entire U.S. population.

7. Lewit, op. cit., page 13.

CORRELATION RESULTS

The results of the Pearson correlation coefficients are given in Tables VIII and X for whites and blacks, respectively. Of particular note in the correlation tables is the negative relationship between fertility and income. Available data indicate that the gross empirical relationship between income and fertility in the United States is "U" shaped--being negatively inclined at low levels of income and positively inclined at higher levels, with the poor having greater fertility than the rich.⁸

The highest levels of correlations for whites are between:

* age 35-44 income and the percentage of females who are high school graduates (0.5825);

* the two income measures: age 35-44 income and female earnings (0.7366);

* the percentage foreign born and the percentage of Hispanic origin (0.5776);

* the industrial structure variable and the female unemployment rate (0.4191).

8. Michael C .Keeley, "A Comment on 'An Interpretation of the Economic Theory of Fertility,'" Journal of Economic Literature (Volume XIII, Number 2, June 1975), page 463.

For blacks, the highest correlations are between:

* age 35-44 income and the percentage of females who are high school graduates (0.6533);

* the two income variables: age 35-44 income and female earnings (0.7148);

* the percentage of females who are high school graduates and female earnings (0.5473);

* fertility and the percentage of female high school graduates (-0.5649);

* the percentage foreign born and the percentage Hispanic (0.6327).

Weighted results of the Pearson correlation coefficients for whites and blacks are given in Tables IX and XI. In general, the weighted results are similar to the unweighted ones just discussed.

TABLE VIII
SIMPLE WHITE CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
PROB) R UNDER H0:RHO=0/N=318

	A	D	F	UNEM	YFEM
A FERTILITY	1.00000 0.0000	-0.17307 0.0020	-0.16677 0.0029	0.33055 0.0001	-0.34184 0.0001
D COLLEGE(QUALITY)	-0.17307 0.0020	1.00000 0.0000	0.27001 0.0001	-0.29008 0.0001	0.03156 0.5750
F FEMALE HS GRADS	-0.16677 0.0029	0.27001 0.0001	1.00000 0.0000	-0.23903 0.0001	0.45998 0.0001
UNEM FEMALE UNEMP	0.33055 0.0001	-0.29008 0.0001	-0.23903 0.0001	1.00000 0.0000	-0.12063 0.0315
YFEM FEMALE INCOME	-0.34184 0.0001	0.03156 0.5750	0.45998 0.0001	-0.12063 0.0315	1.00000 0.0000
YPERM AGE 35/44 INCOME	-0.33728 0.0001	0.10151 0.0707	0.58246 0.0001	-0.36292 0.0001	0.73663 0.0001
XEL %PRIVATE EDUC	-0.10040 0.0738	-0.05104 0.3643	-0.00744 0.8948	-0.08392 0.1354	0.15858 0.0046
XFOR %FOREIGN BORN	0.00940 0.8674	0.04073 0.4692	-0.05378 0.3391	0.08222 0.1435	-0.00193 0.9726
XINDF INDUST STRUCT-F	-0.29746 0.0001	0.29011 0.0001	0.27958 0.0001	-0.41910 0.0001	0.18013 0.0013
AA ABORTION	-0.24126 0.0001	-0.03564 0.5265	0.04529 0.4209	0.14120 0.0117	0.12134 0.0305
SP %HISPANIC	0.33816 0.0001	-0.02077 0.7121	-0.27086 0.0001	0.04588 0.4148	-0.16432 0.0033
URB %URBAN	-0.11906 0.0338	-0.00297 0.9579	0.28323 0.0001	-0.32929 0.0001	0.13934 0.0129
IN INFANT MORT	-0.04699 0.4037	-0.19586 0.0004	-0.28502 0.0001	-0.03482 0.5362	-0.10100 0.0721
	YPERM	XEL	XFOR	XINDF	AA
A FERTILITY	-0.33728 0.0001	-0.10040 0.0738	0.00940 0.8674	-0.29746 0.0001	-0.24126 0.0001

SIMPLE WHITE CORRELATIONS (continued)

	YPERM	XEL	XFOR	XINDF	AA
D	0.10151	-0.05104	0.04073	0.29011	-0.03564
COLLEGE (QUALITY)	0.0707	0.3643	0.4692	0.0001	0.5265
F	0.58246	-0.00744	-0.05378	0.27958	0.04529
FEMALE HS GRADS	0.0001	0.8948	0.3391	0.0001	0.4209
UNEM	-0.36292	-0.08392	0.08222	-0.41910	0.14120
FEMALE UNEMP	0.0001	0.1354	0.1435	0.0001	0.0117
YFEM	0.73663	0.15858	-0.00193	0.18013	0.12134
FEMALE INCOME	0.0001	0.0046	0.9726	0.0013	0.0305
YPERM	1.00000	0.18691	-0.04209	0.28658	-0.03619
AGE 35/44 INCOME	0.0000	0.0008	0.4545	0.0001	0.5202
XEL	0.18691	1.00000	0.10443	0.17279	-0.14070
%PRIVATE EDUC	0.0008	0.0000	0.0629	0.0020	0.0120
XFOR	-0.04209	0.10443	1.00000	-0.00837	0.08454
%FOREIGN BORN	0.4545	0.0629	0.0000	0.8818	0.1325
XINDF	0.28658	0.17279	-0.00837	1.00000	-0.06294
INDUST STRUCT-F	0.0001	0.0020	0.8818	0.0000	0.2631
AA	-0.03619	-0.14070	0.08454	-0.06294	1.00000
ABORTION	0.5202	0.0120	0.1325	0.2631	0.0000
SP	-0.25645	-0.06266	0.57775	-0.02778	-0.00157
%HISPANIC	0.0001	0.2653	0.0001	0.6216	0.9778
URB	0.25974	0.17615	0.19620	0.22006	-0.13526
%URBAN	0.0001	0.0016	0.0004	0.0001	0.0158
IN	-0.06451	0.01936	-0.10700	0.14299	-0.00355
INFANT MORT	0.2514	0.7309	0.0566	0.0107	0.9497
	SP	URB	IN		
A	0.33816	-0.11906	-0.04699		
FERTILITY	0.0001	0.0338	0.4037		

SIMPLE WHITE CORRELATIONS (continued)

	SP	URB	IN
D	-0.02077	-0.00297	-0.19586
COLLEGE (QUALITY)	0.7121	0.9579	0.0004
F	-0.27086	0.28323	-0.28502
FEMALE HS GRADS	0.0001	0.0001	0.0001
UNEM	0.04588	-0.32929	-0.03482
FEMALE UNEMP	0.4148	0.0001	0.5362
YFEM	-0.16432	0.13934	-0.10100
FEMALE INCOME	0.0033	0.0129	0.0721
YPERM	-0.25645	0.25974	-0.06451
AGE 35/44 INCOME	0.0001	0.0001	0.2514
XEL	-0.06266	0.17615	0.01936
%PRIVATE EDUC	0.2653	0.0016	0.7309
XFOR	0.57775	0.19620	-0.10700
%FOREIGN BORN	0.0001	0.0004	0.0566
XINDF	-0.02778	0.22006	0.14299
INDUST STRUCT-F	0.6216	0.0001	0.0107
AA	-0.00157	-0.13526	-0.00355
ABORTION	0.9778	0.0158	0.9497
SP	1.00000	0.17268	-0.05638
%HISPANIC	0.0000	0.0020	0.3163
URB	0.17268	1.00000	-0.08559
%URBAN	0.0020	0.0000	0.1277
IN	-0.05638	-0.08559	1.00000
INFANT MORT	0.3163	0.1277	0.0000

TABLE IX
WEIGHTED WHITE CORRELATIONS

		PEARSON CORRELATION COEFFICIENTS				
/ PROB)		R UNDER H0:RHO=0 / N = 318/ WEIGHT VAR=W				
		A	D	F	UNEM	YFEM
A		1.00000	-0.27613	-0.17041	0.35596	-0.50365
FERTILITY		0.0000	0.0001	0.0023	0.0001	0.0001
D		-0.27613	1.00000	0.21331	-0.21417	0.12660
COLLEGE (QUALITY)		0.0001	0.0000	0.0001	0.0001	0.0240
F		-0.17041	0.21331	1.00000	-0.32976	0.41727
FEMALE HS GRADS		0.0023	0.0001	0.0000	0.0001	0.0001
UNEM		0.35596	-0.21417	-0.32976	1.00000	-0.18549
FEMALE UNEMP		0.0001	0.0001	0.0001	0.0000	0.0009
YFEM		-0.50365	0.12660	0.41727	-0.18549	1.00000
FEMALE INCOME		0.0001	0.0240	0.0001	0.0009	0.0000
YPERM		-0.30956	0.04250	0.60236	-0.38426	0.70802
AGE 35/44 INCOME		0.0001	0.4501	0.0001	0.0001	0.0001
XEL		-0.36194	0.06794	-0.13907	-0.03419	0.32302
%PRIVATE EDUC		0.0001	0.2270	0.0131	0.5435	0.0001
XFOR		-0.41082	0.17583	-0.00827	0.03584	0.32500
%FOREIGN BORN		0.0001	0.0016	0.8832	0.5242	0.0001
XINDF		-0.36252	0.35224	0.13740	-0.38229	0.27121
INDUST STRUCT-F		0.0001	0.0001	0.0142	0.0001	0.0001
AA		-0.41734	0.14321	0.19124	0.06019	0.32976
ABORTION		0.0001	0.0106	0.0006	0.2846	0.0001
SP		-0.04273	0.02356	-0.13318	-0.01260	0.04613
%HISPANIC		0.4476	0.6755	0.0175	0.8228	0.4123
URB		-0.15675	-0.02309	0.41748	-0.34326	0.20595
%URBAN		0.0051	0.6817	0.0001	0.0001	0.0002
IN		-0.06147	-0.19096	-0.29874	-0.03046	-0.02104
INFANT MORT		0.2744	0.0006	0.0001	0.5884	0.7086
		YPERM	XEL	XFOR	XINDF	AA
A		-0.30956	-0.36194	-0.41082	-0.36252	-0.41734
FERTILITY		0.0001	0.0001	0.0001	0.0001	0.0001

WEIGHTED WHITE CORRELATIONS (continued)

	YPERM	XEL	XFOR	XINDF	AA
D	0.04250	0.06794	0.17583	0.35224	0.14321
COLLEGE (QUALITY)	0.4501	0.2270	0.0016	0.0001	0.0106
F	0.60236	-0.13907	-0.00827	0.13740	0.19124
FEMALE HS GRADS	0.0001	0.0131	0.8832	0.0142	0.0006
UNEM	-0.38426	-0.03419	0.03584	-0.38229	0.06019
FEMALE UNEMP	0.0001	0.5435	0.5242	0.0001	0.2846
YFEM	0.70802	0.32302	0.32500	0.27121	0.32976
FEMALE INCOME	0.0001	0.0001	0.0001	0.0001	0.0001
YPERM	1.00000	0.10191	0.01712	0.22438	0.07778
AGE 35/44 INCOME	0.0000	0.0695	0.7611	0.0001	0.1664
XEL	0.10191	1.00000	0.39120	0.33867	0.01490
%PRIVATE EDUC	0.0695	0.0000	0.0001	0.0001	0.7912
XFOR	0.01712	0.39120	1.00000	0.07334	0.24344
%FOREIGN BORN	0.7611	0.0001	0.0000	0.1921	0.0001
XINDF	0.22438	0.33867	0.07334	1.00000	0.03259
INDUST STRUCT-F	0.0001	0.0001	0.1921	0.0000	0.5626
AA	0.07778	0.01490	0.24344	0.03259	1.00000
ABORTION	0.1664	0.7912	0.0001	0.5626	0.0000
SP	-0.14995	0.07864	0.66617	-0.06945	0.12740
%HISPANIC	0.0074	0.1618	0.0001	0.2168	0.0231
URB	0.37964	0.10858	0.23369	-0.00763	-0.09543
%URBAN	0.0001	0.0531	0.0001	0.8923	0.0893
IN	0.05129	0.18672	-0.13653	0.31170	-0.15319
INFANT MORT	0.3620	0.0008	0.0148	0.0001	0.0062
	SP	URB	IN		
A	-0.04273	-0.15675	-0.06147		
FERTILITY	0.4476	0.0051	0.2744		

WEIGHTED WHITE CORRELATIONS (continued)

	SP	URB	IN
D	0.02356	-0.02309	-0.19096
COLLEGE (QUALITY)	0.6755	0.6817	0.0006
F	-0.13318	0.41748	-0.29874
FEMALE HS GRADS	0.0175	0.0001	0.0001
UNEM	-0.01260	-0.34326	-0.03046
FEMALE UNEMP	0.8228	0.0001	0.5884
YFEM	0.04613	0.20595	-0.02104
FEMALE INCOME	0.4123	0.0002	0.7086
YPERM	-0.14995	0.37964	0.05129
AGE 35/44 INCOME	0.0074	0.0001	0.3620
XEL	0.07864	0.10858	0.18672
%PRIVATE EDUC	0.1618	0.0531	0.0008
XFOR	0.66617	0.23369	-0.13653
%FOREIGN BORN	0.0001	0.0001	0.0148
XINDF	-0.06945	-0.00763	0.31170
INDUST STRUCT-F	0.2168	0.8923	0.0001
AA	0.12740	-0.09543	-0.15319
ABORTION	0.0231	0.0893	0.0062
SP	1.00000	0.24117	-0.20973
%HISPANIC	0.0000	0.0001	0.0002
URB	0.24117	1.00000	-0.18345
%URBAN	0.0001	0.0000	0.0010
IN	-0.20973	-0.18345	1.00000
INFANT MORT	0.0002	0.0010	0.0000

TABLE X
SIMPLE BLACK CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER HO:RHO=0 / N = 225

	A	D	F	UNEM	YFEM
A FERTILITY	1.00000 0.0000	-0.12983 0.0518	-0.56499 0.0001	0.23059 0.0005	-0.35345 0.0001
D COLLEGE (QUALITY)	-0.12983 0.0518	1.00000 0.0000	0.07338 0.2731	-0.19541 0.0032	0.13060 0.0504
F FEMALE HS GRADS	-0.56499 0.0001	0.07338 0.2731	1.00000 0.0000	-0.07253 0.2787	0.54727 0.0001
UNEM FEMALE UNEMP	0.23059 0.0005	-0.19541 0.0032	-0.07253 0.2787	1.00000 0.0000	0.14933 0.0251
YFEM FEMALE INCOME	-0.35345 0.0001	0.13060 0.0504	0.54727 0.0001	0.14933 0.0251	1.00000 0.0000
YPERM AGE 35/44 INCOME	-0.42983 0.0001	0.14108 0.0344	0.65330 0.0001	-0.01363 0.8388	0.71495 0.0001
XEL %PRIVATE EDUC	-0.32559 0.0001	0.12223 0.0672	0.31477 0.0001	0.01691 0.8009	0.41516 0.0001
XFOR %FOREIGN BORN	-0.34856 0.0001	0.10452 0.1180	0.31954 0.0001	-0.22250 0.0008	0.23599 0.0004
XINDF INDUST STRUCT-F	-0.29511 0.0001	0.30256 0.0001	0.31926 0.0001	-0.16614 0.0126	0.18753 0.0048
AA ABORTION	-0.23433 0.0004	-0.02209 0.7418	0.08793 0.1888	-0.13228 0.0475	0.01393 0.8354
SP %HISPANIC	-0.25362 0.0001	0.00064 0.9924	0.32128 0.0001	-0.13833 0.0381	0.19137 0.0040
URB %URBAN	-0.19493 0.0033	-0.02617 0.6963	0.38230 0.0001	0.02004 0.7650	0.34767 0.0001
IN INFANT MORT	0.29831 0.0001	-0.08690 0.1940	-0.39554 0.0001	0.05845 0.3829	-0.25613 0.0001
	YPERM	XEL	XFOR	XINDF	AA
A FERTILITY	-0.42983 0.0001	-0.32559 0.0001	-0.34856 0.0001	-0.29511 0.0001	-0.23433 0.0004

SIMPLE BLACK CORRELATIONS (continued)

	YPERM	XEL	XFOR	XINDF	AA
D	0.14108	0.12223	0.10452	0.30256	-0.02209
COLLEGE (QUALITY)	0.0344	0.0672	0.1180	0.0001	0.7418
F	0.65330	0.31477	0.31954	0.31926	0.08793
FEMALE HS GRADS	0.0001	0.0001	0.0001	0.0001	0.1888
UNEM	-0.01363	0.01691	-0.22250	-0.16614	-0.13228
FEMALE UNEMP	0.8388	0.8009	0.0008	0.0126	0.0475
YFEM	0.71495	0.41516	0.23599	0.18753	0.01393
FEMALE INCOME	0.0001	0.0001	0.0004	0.0048	0.8354
YPERM	1.00000	0.25795	0.18271	0.11049	0.06350
AGE 35/44 INCOME	0.0000	0.0001	0.0060	0.0983	0.3430
XEL	0.25795	1.00000	0.31047	0.23570	-0.08506
%PRIVATE EDUC	0.0001	0.0000	0.0001	0.0004	0.2037
XFOR	0.18271	0.31047	1.00000	0.24285	-0.02769
%FOREIGN BORN	0.0060	0.0001	0.0000	0.0002	0.6796
XINDF	0.11049	0.23570	0.24285	1.00000	0.00620
INDUST STRUCT-F	0.0983	0.0004	0.0002	0.0000	0.9263
AA	0.06350	-0.08506	-0.02769	0.00620	1.00000
ABORTION	0.3430	0.2037	0.6796	0.9263	0.0000
SP	0.13922	0.27134	0.63272	0.10891	0.13578
%HISPANIC	0.0369	0.0001	0.0001	0.1032	0.0419
URB	0.25998	0.37366	0.22134	0.24351	-0.27814
%URBAN	0.0001	0.0001	0.0008	0.0002	0.0001
IN	-0.31589	-0.13418	-0.19033	-0.03730	0.03488
INFANT MORT	0.0001	0.0444	0.0042	0.5778	0.6027
	SP	URB	IN		
A	-0.25362	-0.19493	0.29831		
FERTILITY	0.0001	0.0033	0.0001		

SIMPLE BLACK CORRELATIONS(continued)

	SP	URB	IN
D	0.00064	-0.02617	-0.08690
COLLEGE (QUALITY)	0.9924	0.6963	0.1940
F	0.32128	0.38230	-0.39554
FEMALE HS GRADS	0.0001	0.0001	0.0001
UNEM	-0.13833	0.02004	0.05845
FEMALE UNEMP	0.0381	0.7650	0.3829
YFEM	0.19137	0.34767	-0.25613
FEMALE INCOME	0.0040	0.0001	0.0001
YPERM	0.13922	0.25998	-0.31589
AGE 35/44 INCOME	0.0369	0.0001	0.0001
XEL	0.27134	0.37366	-0.13418
%PRIVATE EDUC	0.0001	0.0001	0.0444
XFOR	0.63272	0.22134	-0.19033
%FOREIGN BORN	0.0001	0.0008	0.0042
XINDF	0.10891	0.24351	-0.03730
INDUST STRUCT-F	0.1032	0.0002	0.5778
AA	0.13578	-0.27814	0.03488
ABORTION	0.0419	0.0001	0.6027
SP	1.00000	0.14572	-0.22158
%HISPANIC	0.0000	0.0289	0.0008
URB	0.14572	1.00000	-0.21407
%URBAN	0.0289	0.0000	0.0012
IN	-0.22158	-0.21407	1.00000
INFANT MORT	0.0008	0.0012	0.0000

TABLE XI
WEIGHTED BLACK CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER H0:RHO=0 / N = 225 / WEIGHT VAR=W

	A	D	F	UNEM	YFEM
A FERTILITY	1.00000 0.0000	-0.32937 0.0001	-0.61520 0.0001	0.31785 0.0001	-0.64357 0.0001
D COLLEGE (QUALITY)	-0.32937 0.0001	1.00000 0.0000	0.25986 0.0001	-0.24527 0.0002	0.17169 0.0099
F FEMALE HS GRADS	-0.61520 0.0001	0.25986 0.0001	1.00000 0.0000	-0.26464 0.0001	0.69336 0.0001
UNEM FEMALE UNEMP	0.31785 0.0001	-0.24527 0.0002	-0.26464 0.0001	1.00000 0.0000	0.04678 0.4851
YFEM FEMALE INCOME	-0.64357 0.0001	0.17169 0.0099	0.69336 0.0001	0.04678 0.4851	1.00000 0.0000
YPERM AGE 35/44 INCOME	-0.28974 0.0001	0.05501 0.4116	0.63727 0.0001	-0.07544 0.2598	0.65161 0.0001
XEL %PRIVATE EDUC	-0.57458 0.0001	0.17867 0.0072	0.41547 0.0001	0.04013 0.5493	0.59754 0.0001
XFOR %FOREIGN BORN	-0.57123 0.0001	0.27935 0.0001	0.20163 0.0024	-0.31358 0.0001	0.25549 0.0001
XINDF INDUST STRUCT-F	-0.62660 0.0001	0.35640 0.0001	0.47375 0.0001	-0.22432 0.0007	0.51734 0.0001
AA ABORTION	-0.40364 0.0001	0.30043 0.0001	0.21349 0.0013	-0.30433 0.0001	0.11098 0.0968
SP %HISPANIC	-0.49949 0.0001	0.26981 0.0001	0.19925 0.0027	-0.29100 0.0001	0.19572 0.0032
URB %URBAN	-0.45870 0.0001	0.00962 0.8859	0.50424 0.0001	-0.00814 0.9034	0.50976 0.0001
IN INFANT MORT	0.16692 0.0122	-0.16086 0.0157	-0.41271 0.0001	0.13984 0.0361	-0.15089 0.0236
	YPERM	XEL	XFOR	XINDF	AA
A FERTILITY	-0.28974 0.0001	-0.57458 0.0001	-0.57123 0.0001	-0.62660 0.0001	-0.40364 0.0001

WEIGHTED BLACK CORRELATIONS (continued)

	YPERM	XEL	XFOR	XINDF	AA
D	0.05501	0.17867	0.27935	0.35640	0.30043
COLLEGE (QUALITY)	0.4116	0.0072	0.0001	0.0001	0.0001
F	0.63727	0.41547	0.20163	0.47375	0.21349
FEMALE HS GRADS	0.0001	0.0001	0.0024	0.0001	0.0013
UNEM	-0.07544	0.04013	-0.31358	-0.22432	-0.30433
FEMALE UNEMP	0.2598	0.5493	0.0001	0.0007	0.0001
YFEM	0.65161	0.59754	0.25549	0.51734	0.11098
FEMALE INCOME	0.0001	0.0001	0.0001	0.0001	0.0968
YPERM	1.00000	0.08254	-0.21299	0.29501	0.04077
AGE 35/44 INCOME	0.0000	0.2175	0.0013	0.0001	0.5429
XEL	0.08254	1.00000	0.48520	0.51921	0.06363
%PRIVATE EDUC	0.2175	0.0000	0.0001	0.0001	0.3420
XFOR	-0.21299	0.48520	1.00000	0.38907	0.34192
%FOREIGN BORN	0.0013	0.0001	0.0000	0.0001	0.0001
XINDF	0.29501	0.51921	0.38907	1.00000	0.24618
INDUST STRUCT-F	0.0001	0.0001	0.0001	0.0000	0.0002
AA	0.04077	0.06363	0.34192	0.24618	1.00000
ABORTION	0.5429	0.3420	0.0001	0.0002	0.0000
SP	-0.26430	0.47166	0.94464	0.28445	0.38649
%HISPANIC	0.0001	0.0001	0.0001	0.0001	0.0001
URB	0.25605	0.56860	0.30229	0.40180	-0.07533
%URBAN	0.0001	0.0001	0.0001	0.0001	0.2605
IN	-0.16827	-0.01241	0.00497	0.09044	-0.13057
INFANT MORT	0.0115	0.8532	0.9409	0.1764	0.0505
	SP	URB	IN		
A	-0.49949	-0.45870	0.16692		
FERTILITY	0.0001	0.0001	0.0122		

WEIGHTED BLACK CORRELATIONS (continued)

	SP	URB	IN
D	0.26981	0.00962	-0.16086
COLLEGE (QUALITY)	0.0001	0.8859	0.0157
F	0.19925	0.50424	-0.41271
FEMALE HS GRADS	0.0027	0.0001	0.0001
UNEM	-0.29100	-0.00814	0.13984
FEMALE UNEMP	0.0001	0.9034	0.0361
YFEM	0.19572	0.50976	-0.15089
FEMALE INCOME	0.0032	0.0001	0.0236
YPERM	-0.26430	0.25605	-0.16827
AGE 35/44 INCOME	0.0001	0.0001	0.0115
XEL	0.47166	0.56860	-0.01241
%PRIVATE EDUC	0.0001	0.0001	0.8532
XFOR	0.94464	0.30229	0.00497
%FOREIGN BORN	0.0001	0.0001	0.9409
XINDF	0.28445	0.40180	0.09044
INDUST STRUCT-F	0.0001	0.0001	0.1764
AA	0.38649	-0.07533	-0.13057
ABORTION	0.0001	0.2605	0.0505
SP	1.00000	0.25053	-0.08292
%HISPANIC	0.0000	0.0001	0.2153
URB	0.25053	1.00000	-0.15166
%URBAN	0.0001	0.0000	0.0229
IN	-0.08292	-0.15166	1.00000
INFANT MORT	0.2153	0.0229	0.0000

CHAPTER VII
REGRESSION RESULTS FOR FERTILITY

METHODOLOGY

The regressions for fertility were run in several versions. First, each SMSA was assigned equal weight, and then the SMSA's were weighted by the square root of the number of white or black women age 35-44 in the area. (The regressions were also run using logs, but the results were found to be not much different than those obtained in linear form. Log results can be found in the Appendix.)

The functional form of the regression equations is linear--a simplifying assumption that seems reasonable considering the somewhat restricted range of values of market averages and a form generally accepted and used in this type of study. Because the observations used in this study are usually sample means, the variances are inversely related to the sample size. We therefore correct for heteroscedasticity by weighing the variables by the square root of the number of race specific women age 35-44 in each SMSA. This will adjust for the fact that the units of observation are not compatible, and is the same approach that

has been used by Cain and Dooley (1976) and others. An alternative weight, also tried, but not reported on in this study, is to use the square root of the entire (race specific) SMSA population. This latter approach was used by Nerlove and Schultz (1970) in their study of Puerto Rico.

Ordinary least square regressors of white and black fertility rates in weighted and unweighted form are contained in Tables XII through XV, respectively. Reduced form equations that omit the quality variable are presented in the Appendix (Tables A-I to A-IV) and are referred to briefly in the following discussion. In general, the results for both versions are the same.

The basic regressions were also tested for outliers by looking at the residuals for each observation. Plots of the residuals for both the white and black regressions are to be found in Appendix G.

In general, the results were the expected ones. Almost all the SMSA's that had large residuals were unique in terms of religion (Provo and Salt Lake City, Utah), ethnicity (Honolulu), or Hispanic origin (Miami and several Texas SMSA's). It was, however, decided to keep these cities in our sample.

TABLE XII
FULL WHITE REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	8771910	730992.5	20.503	0.0001
ERROR	305	10874179	35653.05		
C TOTAL	317	19646090			
ROOT MSE		188.8201	R-SQUARE	0.4465	
DEP MEAN		2586.912	ADJ R-SQ	0.4247	
C.V.		7.299056			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2896.923	169.5227	17.089
F	1	8.240565	1.882769	4.377
UNEM	1	31.29924	6.477032	4.832
YFEM	1	-0.0521102	0.01301645	-4.003
YPERM	1	-0.000757049	0.006230836	-0.122
XEL	1	1.057945	1.469817	0.720
XFOR	1	-11.4897	2.525299	-4.550
XINDF	1	-37.8701	11.33865	-3.340
AA	1	-138.867	23.99437	-5.787
SP	1	12.89521	1.456172	8.856
URB	1	-1.61047	0.72329	-2.227
IN	1	0.6549117	4.157982	0.158
D	1	-1.57003	0.7916688	-1.983

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YFEM	1	0.0001		FEMALE INCOME
YPERM	1	0.9034		AGE 35/44 INCOME
XEL	1	0.4722		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0009		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.0267		%URBAN
IN	1	0.8749		INFANT MORT
D	1	0.0482		COLLEGE (QUALITY)

TABLE XIII
WEIGHTED WHITE FULL REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	272544259116	22712021593	36.769	0.0001
ERROR	305	188396895947	617694741		
C TOTAL	317	460941155063			

ROOT MSE	24853.47	R-SQUARE	0.5913
DEP MEAN	2466.233	ADJ R-SQ	0.5752
C.V.	1007.75		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2654.872	171.8664	15.447
F	1	5.978969	2.005254	2.982
UNEM	1	49.38437	6.583367	7.501
YFEM	1	-0.0381687	0.01100421	-3.469
YPERM	1	0.002351371	0.005684063	0.414
XEL	1	-1.83831	1.551204	-1.185
XFOR	1	-17.4699	2.390685	-7.307
XINDF	1	-17.4129	11.54773	-1.508
AA	1	-166.381	20.92609	-7.951
SP	1	10.00053	1.580128	6.329
URB	1	-1.30386	0.6935753	-1.880
IN	1	-4.04568	4.52915	-0.893
D	1	-1.74507	1.032066	-1.691

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
F	1	0.0031	FEMALE HS GRADS
UNEM	1	0.0001	FEMALE UNEMP
YFEM	1	0.0006	FEMALE INCOME
YPERM	1	0.6794	AGE 35/44 INCOME
XEL	1	0.2369	%PRIVATE EDUC
XFOR	1	0.0001	%FOREIGN BORN
XINDF	1	0.1326	INDUST STRUCT-F
AA	1	0.0001	ABORTION
SP	1	0.0001	%HISPANIC
URB	1	0.0611	%URBAN
IN	1	0.3724	INFANT MORT
D	1	0.0919	COLLEGE (QUALITY)

TABLE XIV
FULL BLACK REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	14463991	1205333	14.653	0.0001
ERROR	212	17438949	82259.19		
C TOTAL	224	31902940			
ROOT MSE		286.8086	R-SQUARE	0.4534	
DEP MEAN		3302.511	ADJ R-SQ	0.4224	
C.V.		8.684562			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4094.741	235.8591	17.361
F	1	-13.2607	3.074255	-4.313
UNEM	1	10.61806	4.58184	2.317
YFEM	1	0.004428782	0.01778231	0.249
YPERM	1	-0.0133993	0.01034117	-1.296
XEL	1	-18.3712	6.669426	-2.755
XFOR	1	-25.2104	9.947399	-2.534
XINDF	1	-22.828	15.64527	-1.459
AA	1	-165.965	44.59269	-3.722
SP	1	43.53151	30.2158	1.441
URB	1	0.6620738	1.544112	0.429
IN	1	14.0125	7.803272	1.796
D	1	0.1265949	1.860762	0.068

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
UNEM	1	0.0214		FEMALE UNEMP
YFEM	1	0.8036		FEMALE INCOME
YPERM	1	0.1965		AGE 35/44 INCOME
XEL	1	0.0064		%PRIVATE EDUC
XFOR	1	0.0120		%FOREIGN BORN
XINDF	1	0.1460		INDUST STRUCT-F
AA	1	0.0003		ABORTION
SP	1	0.1511		%HISPANIC
URB	1	0.6685		%URBAN
IN	1	0.0740		INFANT MORT
D	1	0.9458		COLLEGE (QUALITY)

TABLE XV
WEIGHTED FULL BLACK REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	109616481901	9134706825	47.226	0.0001
ERROR	212	41006340623	193426135		
C TOTAL	224	150622822524			

ROOT MSE	13907.77	R-SQUARE	0.7278
DEP MEAN	3052.041	ADJ R-SQ	0.7123
C.V.	455.6876		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4195.366	222.9035	18.821
F	1	-8.67912	3.253846	-2.667
UNEM	1	13.76842	4.471162	3.079
YFEM	1	-0.0692471	0.0148956	-4.649
YPERM	1	0.01784071	0.009191098	1.941
XEL	1	-9.36944	5.376892	-1.743
XFOR	1	-30.5165	7.606576	-4.012
XINDF	1	-34.0316	12.57267	-2.707
AA	1	-139.886	30.17147	-4.636
SP	1	91.30566	33.00295	2.767
URB	1	-1.22971	1.659937	-0.741
IN	1	7.186149	6.270354	1.146
D	1	-0.246604	2.034398	-0.121

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0082		FEMALE HS GRADS
UNEM	1	0.0023		FEMALE UNEMP
YFEM	1	0.0001		FEMALE INCOME
YPERM	1	0.0536		AGE 35/44 INCOME
XEL	1	0.0829		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0073		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0062		%HISPANIC
URB	1	0.4596		%URBAN
IN	1	0.2531		INFANT MORT
D	1	0.9036		COLLEGE (QUALITY)

FEMALE EDUCATION

In both the white and black regressions, the same variables tend to be statistically significant. The percentage of females who were high school graduates yielded significant results for both whites and blacks, but with different signs. The weighted black parameter estimate was -8.679 with a T statistic of -2.667. The negative sign is the expected one. For whites, the weighted parameter estimate was +0.5979 with a T statistic of +2.982. The sign here is unexpected. The addition or subtraction of other variables (such as female income and/or the percentage age 20-21 enrolled in school) led to changes in the magnitude of this variable, but the sign remained consistently positive. Results of regressions that excluded female earnings are reported in the Appendix (see Appendix A, Tables A-V to A-VIII).

Both Willis (1974), using U.S. data and Ben-Porath (1973), using Israeli data, found a negative relationship between a mother's education and fertility. Both, however, found that the relationship became positive for levels of mother's education above twelve years. Most attempts to explain this nonlinearity have focused upon the multicollinearity or simultaneity of determination among the various independent variables (particularly family income and female education).

Smith (1977) has argued that a given number of years of schooling for adult blacks in the United States represents less human capital than the same number of years of education for whites. Thus, the reversal of sign at relatively high income levels of mother's education should either be weaker for blacks or it should occur at a higher number of years of mother's education for blacks than for whites. This explanation would be consistent with the difference in signs found in the current study.

Most other studies have found the expected negative relationship between education and fertility. DeTray (1974), for example, found the female education coefficient (differently defined) to be strongly negative, with an elasticity at the mean of approximately -0.3.

Cain and Weininger (1973) also found that female education (again defined differently) had a negative and usually significant effect on fertility rates. Gardner's (1972) results for rural fertility show that female schooling has a negative but insignificant effect on fertility. Rosenzweig (1977), also looking at rural fertility, found opposite results. He reports that female education was positively related to fertility and was statistically significant using a GLS estimation technique (but insignificant when OLS was used).¹

Yamada, using still a different measure of education, found that the effect on education was positive and significant. He explains this result in terms of the correlation he found between female education and male income, which was higher in his data than between female education and female income. Yamada hypothesizes that "since the educated female is married to the educated male whose earnings are reliably high, she could stay at home for bearing and rearing children. This shows that the educated female receives a small income and more children in an aggregate sense."² Turchi (1975), in tests using two different samples of individual data and different combinations of variables found that female education varied positively with fertility. Expressing surprise, he concluded that any negative impact on fertility exerted by the wife's education is exerted indirectly through the opportunity cost (women's wage rate) variable.

When Tomes (1981) looked at female education in a reduced form equation (excluding quality), he found it to be not significantly different from zero. When quality was entered into his equation, female education had a positive

1. Rosensweig also found that increases in male education reduced fertility. Increases in both male and female schooling levels at the same percentage rate, on net, served to lower farm fertility.

2. Tadashi Yamada, "Fertility Differentials of White Women in the United States" (unpublished master's thesis, Brooklyn College, City University of New York, 1978), page 25.

relationship to fertility. When quality (the percentage age 20-21 enrolled in school) was dropped as a variable in this study, no change was found in the significance or sign of the female education variable (see Appendix A).

Wolfe (1980) reported mixed results for a female education variable. When no female wage variable was included, the relationship between education and fertility was found to be strongly negative. However, when a female wage rate and various taste variables were included, Wolfe found a positive relationship between a woman's education and fertility levels. When female income was dropped as a variable in the current study, the magnitude of the female education variable changed, but not the sign.

In a report summarizing dozens of studies done throughout the world, Cochran concludes that, "Many studies relating national or regional levels of education and fertility showed significant inverse relations. Many other studies, however, showed no significant relation, mixed evidence of significantly inverse and significantly direct relations or evidence only of a significant positive relation...Mason and others (1971) noted eight such atypical cases in a review of thirty-two studies; Simon (1974) and McGreevey and Birdsall (1974) cite additional ones..."³

3. Susan Hill Cochran, Fertility and Education: What Do We Really Know? (Baltimore: The Johns Hopkins University Press for the World Bank, 1979), pages 6,4.

THE ROLE OF INCOME

Several different measures of income were explored in this study. The female income variable yielded negative results. The weighted results were significant for whites (-0.0382 with a T of -3.469 and were the most statistically significant result for blacks (-0.069 with a T of -4.649). Surprisingly, the unweighted results for whites were significant (-0.0521 with a T of -4.003), but for blacks were not significant (0.004 with a T of 0.249). Since female income was used as a proxy for female wage rates, the strong negative result was expected. It shows that the opportunity cost of a woman's time is a significant determinant of fertility.

The observed effect of female earnings includes its own (presumed) positive income effect on the demand for children. The earnings coefficient will be negative only if the negative substitution effect is larger in absolute value than the positive income effect. Since we are including in our regression a separate family income variable, our female earnings variable would be expected to reflect the negative substitution effect.

The significant negative results for female earnings are consistent with those found by most other researchers. Cain and Weininger, for example, report that in their study, the effect of the female wage variable "is negative and

statistically significant for each group tested for in 1960 and 1940." Their results indicate that "fertility declines by about 19 to 29 births per 1,000 women for each \$100 increase in the wives' annual earnings potential."⁴ DeTray, using 1960 county data, also found that an increase in female earnings "had a strong negative effect" with an elasticity of -0.30. ⁵

Devaney, in running a time series study using U.S. data, found that "increases in the average female wage rate exert a negative and significant effect on fertility rates."⁶ Gardner (1972), in comparing urban and rural farm populations, found that, for both groups, female wage rates have a negative and significant effect on fertility. On the other hand, in a study limited to registered nurses, Link and Settle found that the estimated effect of the nurses' earnings opportunities on fertility were statistically insignificant. They did, however, find the wage coefficient to be negative, as expected, with an elasticity of fertility with respect to wage rate of approximately -0.2, which is very similar to the Cain and Dooley findings for white women.⁷

Very different results were found by Robinson and

4. Cain and Weininger, op. cit., pages 211, 215. This translates to roughly \$300 in 1984 dollars.

5. DeTray, op. cit., page 110.

6. Devaney, op. cit., page 153.

Tomes. In a study using Canadian data, they report that when their sample is apportioned according to the lifetime labor force status of the wife, an increase in the wife's wage rate increases family size, albeit with a significance level of 10%. These unique results remain when they used education as a lifetime wage proxy, i.e., years of schooling up to college and the presence of a college degree have a positive but insignificant effect on fertility.⁸

Robinson and Tomes therefore argue that husband's and wife's time is complementary and that children are not female-time intensive. In particular, they conclude that while pre-school children are time intensive, "observation suggests that as children mature they become increasingly goods intensive; so that in a lifetime context, the factor intensity of children is not obvious a priori."⁹

Another exception to the negative female wage rate/fertility relationship was found by McCabe and Rosenzweig (reported in Robinson and Tomes). In regressions based on Puerto Rican data, they found that an increase in

7. Charles R. Link and Russell F. Settle, "A Simultaneous Equation Model of Labor Supply, Fertility, and Earnings of Married Women: The Case of Registered Nurses," Southern Economic Journal, Volume 47, Number 4, (April 1981), page 987.

8. Chris Robinson and Nigel Tomes, "Family Labor Supply and Fertility: A Two Regime Model," Canadian Journal of Economics, Volume XV, Number 4, (November 1982), page 724.

9. *ibid*, page 707.

the wife's predicted wage raises fertility. They argue that children may not be female-time intensive in the context of less developed countries due to the existence of extended family child care arrangements and "cottage industries" that permit on-the-job child care.

The other income variable included in the equation was family income when the head of the household was age 35-44. As previously noted, this variable should serve as a good proxy for permanent income, and its importance should give us something close to a pure income effect. (The typical assumption being made is that family income largely represents male income, and that the male is providing the goods and services purchased in the marketplace, while the female is providing the in-home produced goods and services which are time intensive.)

The weighted results for this variable were 0.002, with a T statistic of 0.414 for whites and 0.017 with a T of 1.941 for blacks. The unweighted results were -0.000 (T = -0.122) and -0.013 (T = -1.296) for whites and blacks respectively.

With one exception (the weighted black data), results were all insignificant. Given that insignificance, the negative sign for the weighted white data is not a major concern. Why the weighted black data gives a large positive T statistic is not clear. One possible explanation lies in

the high weighted correlation (0.652) between family income and female earnings (see Table XI). While multicollinearity usually produces insignificant coefficients each with the same sign, it can also produce coefficients with opposite signs.

In a study of ethnic variations in fertility rates and income, Bean and Wood (1974) found that "entering either actual or relative income (but not both) in the regressions reveals a significant positive effect for Anglos and a significant negative effect for Blacks."¹⁰ When similar regressions were run for Mexican Americans, higher actual income was associated with lower fertility while higher relative income was associated with higher fertility. The authors conclude that different measures of income relate to fertility in different ways for different ethnic groups.

Relative income was measured by Bean and Wood as the ratio of actual to estimated income where estimated income was computed on the basis of a regression of actual income on occupation, education, and age. This definition is along the lines suggested by Friedman (1963) as discussed earlier in this paper.

Becker and Lewis (1974) argue that a quality constant income effect (as discussed here) should be bigger in

10. Frank D.Bean and Charles H. Wood, "Ethnic Variations in the Relationship Between Income and Fertility," Demography, Volume 11, No. 4 (November 1974), page 634.

absolute value than the reduced form income effect (reported in the Appendix) which does not hold quality constant. In the current data set, such results are not apparent (see Table XVI).

TABLE XVI
SUMMARY OF REGRESSION RESULTS FOR FAMILY INCOME*

WHITES

REGRESSION	PARAMETER	T-STATISTIC
<hr/>		
With quality held constant		
unweighted	-0.000757	-0.122
weighted	+0.002351	+0.414
Without quality		
unweighted	+0.001142	+0.023
weighted	+0.003074	+0.541

BLACKS

REGRESSION	PARAMETER	T-STATISTIC
<hr/>		
With quality held constant		
unweighted	-0.013399	-1.296
weighted	+0.017841	+1.941
Without quality		
unweighted	-0.013330	-1.298
weighted	+0.017900	+1.955

* The independent variable used here is YPERM--median family income when the head of the household is age 35-44. Quality is being measured by D--the percentage of the age 20-21 population enrolled in school.

Source: Compiled from Tables XII to XV and Appendix Tables A-I to A-IV

DeTray (1974), using male earnings as a variable, found that an increase in those earnings had a significant positive effect on children ever born. DeTray also used the median value of housing in each county as a proxy for permanent income. (The median value of housing and median income are highly correlated--DeTray found a simple correlation of 0.82.) He found this variable to have a small but statistically significant positive effect on children ever born.

Rosenzweig used farm value, which he described as a close empirical counterpart to full family income, as his income variable. He found that farm value is negatively correlated with farm family size. "This result is consistent with a positive relationship between the wife's price of time and farm income...since most farms do not utilize hired labor and farm wives' participation in non-farm employment activity is relatively small."¹¹

In surveying other studies, Keeley reports that both Gardner and Michael found a positive and statistically significant effect of income on completed family size. Newlove and Schultz found similar results for Puerto Rico. In addition, a time-series study by Wilkinson and another by

11. Mark R. Rosenzweig, "The Economic Determinants of Population Change in the Rural and Urban Sectors of the United States: A Theoretical and Empirical Analysis" (unpublished Ph.D. dissertation, Columbia University, 1973), page 144.

Simon have both found positive and significant income elasticities. Keeley concludes that "in many studies, but not all, the negative gross relationship between income and fertility becomes positive when variables that are proxies for the price effects of children are held constant."¹²

Meeker (1977), in a cross-sectional study of black fertility at the turn of the century, found that the sign of his family income variable was uniformly negative and generally significant. Because black females were more likely to work than white females, female income provided a larger fraction of family income for blacks than whites. Meeker suggests that this high proportion of black family income earned by females may be responsible for the sign of the income coefficient. In other words, the substitution effect would dominate the income effect in such a case. (This argument is, however, inconsistent with the results reported here.)

In an attempt to test the hypothesis of a positive income effect, Thornton used four different data sets and several different income concepts. Testing for a husband's income, relative income, subjective well being, and optimism about future economic conditions, he concludes that "while some of the data were consistent with the hypothesis, most of the results were clearly not supportive of the

12. Keeley, op. cit., page 463.

hypothesized positive effect of income. Certainly the data do not support the contention that the effect of income was large or consistent."¹³

In the current study, several other measures of income (male earnings and median family income) were also tested. In general, the switching of income variables did not have any significant results on the other variables in the equation or on the total F values and adjusted R-squares.

There were, however, significant differences in the results for the income variable itself when various income measures were substituted for each other in the same equation. The parameter estimates and t values, weighted and unweighted, for blacks and whites are summarized in Table XVII. As can be seen from the Table, while age 35-44 income and family income yield insignificant (and occasionally negative) results, male earnings show up with a statistically significant value and a positive sign (at least for the weighted results). This would be consistent with the expectation of a significant positive income effect.

The relationship among the income variables themselves is illustrated by Tables XVIII and XIX, which gives Pearson correlation coefficients for the white and black income variables, respectively. As would be expected, the various

13. Thornton, op. cit., page 261.

income measures have high positive correlations between them. Of particular note is the high correlation of male income to the other income variables for blacks but not for whites.

TABLE XVII
REGRESSION RESULTS FOR VARIOUS INCOME MEASURES

WHITE

UNWEIGHTED RESULTS			
	YPERM	YHOU	YMALE
PARAMETER ESTIMATE	-0.000757	+0.000408	+0.003772
T VALUE	-0.122	+0.071	+1.961
WEIGHTED RESULTS			
	YPERM	YHOU	YMALE
PARAMETER ESTIMATE	-0.002351	+0.007451	+0.004314
T VALUE	+0.414	+1.593	+2.064

BLACK

UNWEIGHTED RESULTS			
	YPERM	YHOU	YMALE
PARAMETER ESTIMATE	-0.013399	-0.025987	+0.009798
T VALUE	-1.296	-1.963	+0.696
WEIGHTED RESULTS			
	YPERM	YHOU	YMALE
PARAMETER ESTIMATE	+0.017841	+0.006504	+0.035342
T VALUE	+0.941	+0.591	+2.507

TABLE XVIII

WHITE INCOME CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER H0:RHO=0 / N = 318

	YPERM	YFEM	YHOU	YMALE
YPERM	1.00000	0.73663	0.91106	0.32412
AGE 35/44 INCOME	0.0000	0.0001	0.0001	0.0001
YFEM	0.73663	1.00000	0.67977	0.29298
FEMALE INCOME	0.0001	0.0000	0.0001	0.0001
YHOU	0.91106	0.67977	1.00000	0.34434
FAMILY INCOME	0.0001	0.0001	0.0000	0.0001
YMALE	0.32412	0.29298	0.34434	1.00000
MALE INCOME	0.0001	0.0001	0.0001	0.0000

TABLE XIX

BLACK INCOME CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER H0:RHO=0 / N = 225

	YPERM	YFEM	YHOU	YMALE
YPERM	1.00000	0.71495	0.87155	0.65235
AGE 35/44 INCOME	0.0000	0.0001	0.0001	0.0001
YFEM	0.71495	1.00000	0.71881	0.81600
FEMALE INCOME	0.0001	0.0000	0.0001	0.0001
YHOU	0.87155	0.71881	1.00000	0.67027
FAMILY INCOME	0.0001	0.0001	0.0000	0.0001
YMALE	0.65235	0.81600	0.67027	1.00000
MALE INCOME	0.0001	0.0001	0.0001	0.0000

FEMALE LABOR MARKET ACTIVITY

For both whites and blacks, the female unemployment rate proved to be a significant factor in predicting fertility levels. The weighted results were a parameter estimate of 4.9384 with a T statistic of 7.501 for whites, and a parameter estimate of 13.768 with a T statistic of 3.079 for blacks.

Because female unemployment is not considered to be as "basic" a determinant of fertility as education, income, and female wage rates, the regressions were also run leaving out the female unemployment variable. The complete results for those regressions are presented in the Appendix (Tables A-IX through A-XII). In general, the overall results are not very different from those found when the unemployment variable was included. One notable exception is that, for whites, quality of children (as measured by percentage enrolled in school, age 20-21) became a significant variable when the female unemployment rate was dropped from the equation.

The regression equation was also run with both the female income and female unemployment variables deleted and replaced by a new variable, "expected female wages" (YEXP). This variable was defined as one minus the female unemployment rate times female earnings.

The results of these regressions are presented in Tables XX through XXIII for whites and blacks in weighted and unweighted form, respectively. Again, the results using this new variable tend to confirm the previously described relationships.

Of some note is that expected female wages (like female earnings) has a negative sign and, as in the more general regressions, is significant for all specifications except the weighted black regression.

TABLE XX

WHITE REGRESSION USING 'YEXP'

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	8395181	763198.2	20.757	0.0001
ERROR	306	11250909	36767.68		
C TOTAL	317	19646090			
ROOT MSE		191.749	R-SQUARE	0.4273	
DEP MEAN		2586.912	ADJ R-SQ	0.4067	
C.V.		7.412274			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2972.147	150.4255	19.758
F	1	7.836185	1.906219	4.111
YPERM	1	-0.0130669	0.004966695	-2.631
XEL	1	0.6391357	1.487542	0.430
XFOR	1	-11.0978	2.555835	-4.342
XINDF	1	-36.1237	11.60079	-3.114
AA	1	-153.296	23.84127	-6.430
SP	1	12.56468	1.475272	8.517
URB	1	-1.37275	0.7332633	-1.872
IN	1	1.35222	4.211709	0.321
D	1	-1.41972	0.7995856	-1.776
YEXP	1	-0.0302844	0.006443352	-4.700

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
YPERM	1	0.0089		AGE 35/44 INCOME
XEL	1	0.6677		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0020		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.0621		%URBAN
IN	1	0.7484		INFANT MORT
D	1	0.0768		COLLEGE (QUALITY)
YEXP	1	0.0001		EXPECTED WAGES

TABLE XXI

WEIGHTED WHITE REGRESSION USING 'YEXP'

 DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	270048786217	24549889656	39.353	0.0001
ERROR	306	190892368846	623831271		
C TOTAL	317	460941155063			
ROOT MSE		24976.61	R-SQUARE	0.5859	
DEP MEAN		2466.233	ADJ R-SQ	0.5710	
C.V.		1012.743			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2869.648	150.8594	19.022
F	1	6.00823	2.015333	2.981
YPERM	1	-0.00355611	0.004476134	-0.794
XEL	1	-2.53958	1.516301	-1.675
XFOR	1	-18.5871	2.317566	-8.020
XINDF	1	-16.2673	11.69048	-1.392
AA	1	-173.786	20.05932	-8.664
SP	1	10.22084	1.588615	6.434
URB	1	-1.02636	0.684695	-1.499
IN	1	-3.49748	4.525702	-0.773
D	1	-1.71487	1.034772	-1.657
YEXP	1	-0.0464395	0.006039861	-7.689

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0031		FEMALE HS GRADS
YPERM	1	0.4275		AGE 35/44 INCOME
XEL	1	0.0950		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.1651		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.1349		%URBAN
IN	1	0.4402		INFANT MORT
D	1	0.0985		COLLEGE (QUALITY)
YEXP	1	0.0001		EXPECTED WAGES

TABLE XXII

BLACK REGRESSION USING 'YEXP'

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	14437980	1312544	16.008	0.0001
ERROR	213	17464960	81995.12		
C TOTAL	224	31902940			
ROOT MSE		286.3479	R-SQUARE	0.4526	
DEP MEAN		3302.511	ADJ R-SQ	0.4243	
C.V.		8.670611			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4232.268	226.7827	18.662
F	1	-12.9375	3.070957	-4.213
YPERM	1	-0.0136529	0.008513423	-1.604
XEL	1	-17.6657	6.456044	-2.736
XFOR	1	-25.1665	9.905862	-2.541
XINDF	1	-22.1484	15.60057	-1.420
AA	1	-163.253	44.58206	-3.662
SP	1	43.82885	30.16283	1.453
URB	1	0.6088829	1.530456	0.398
IN	1	13.8273	7.793484	1.774
D	1	-0.0408961	1.844023	-0.022
YEXP	1	-0.0103421	0.004243897	-2.437

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
YPERM	1	0.1103		AGE 35/44 INCOME
XEL	1	0.0067		%PRIVATE EDUC
XFOR	1	0.0118		%FOREIGN BORN
XINDF	1	0.1572		INDUST STRUCT-F
AA	1	0.0003		ABORTION
SP	1	0.1477		%HISPANIC
URB	1	0.6911		%URBAN
IN	1	0.0775		INFANT MORT
D	1	0.9823		COLLEGE (QUALITY)
YEXP	1	0.0156		EXPECTED WAGES

TABLE XXIII

BLACK WEIGHTED REGRESSION USING 'YEXP'

 DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	105123977583	9556725235	44.739	0.0001
ERROR	213	45498844941	213609601		
C TOTAL	224	150622822524			
ROOT MSE		14615.39	R-SQUARE	0.6979	
DEP MEAN		3052.041	ADJ R-SQ	0.6823	
C.V.		478.8726			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4359.639	222.7723	19.570
F	1	-12.4074	3.336216	-3.719
YPERM	1	-0.00770041	0.00784708	-0.981
XEL	1	-19.4594	5.065127	-3.842
XFOR	1	-39.4245	7.756905	-5.083
XINDF	1	-37.6685	13.28929	-2.834
AA	1	-143.537	31.97642	-4.489
SP	1	108.8138	34.46772	3.157
URB	1	-1.03992	1.74558	-0.596
IN	1	8.526368	6.586851	1.294
D	1	-0.396159	2.135029	-0.186
YEXP	1	-0.00331005	0.004082566	-0.811

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0003		FEMALE HS GRADS
YPERM	1	0.3276		AGE 35/44 INCOME
XEL	1	0.0002		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0050		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0018		%HISPANIC
URB	1	0.5520		%URBAN
IN	1	0.1969		INFANT MORT
D	1	0.8530		COLLEGE (QUALITY)
YEXP	1	0.4184		EXPECTED WAGES

The results of the regression for the importance of industrial structure show that it is a significant variable for whites (-37.870 with a T of -3.340) and blacks (-34.032 with a T of -2.707) when unweighted data are used. When weighted data are used, the results prove insignificant for both whites and blacks.

The negative sign indicated the expected: the greater availability of "female dominated" jobs in an economy raises women's opportunities and reduces the fertility level.

Cain and Weininger (1973) report that they tried several occupation variables for 1960 data, but the results were not statistically significant. Their variables were:

(a) the percentage of females in professional occupations;

(b) the percentage of females in clerical and professional occupations;

(c) the percentage of males in professional and managerial occupations.

Using 1940 data, Cain and Weininger found that these occupational variables were sometimes significant, but their signs were opposite of what was expected, and so the variables were dropped from their study.

Cain and Dooley made use of an industrial structure variable which measure the expected portion of the SMSA labor force which is female based on the industrial structure of the SMSA. However, they then argue that "as a practical matter this is an unsatisfactory measure of the level of demand for a given quality and quantity of female labor in the SMSA."¹⁴ This industrial structure variable, however, was only used by them as an independent variable in a preliminary equation to determine wage rates which were then used in a fertility regression.

In this study, a variable was also explored which measured the total number (male and female) employed in the same three "female-dominated" occupations. For most specifications of the model, this variable yielded positive rather than the expected negative results.

THE OTHER VARIABLES

Both the percentage of the population that was foreign born and the percentage that is of Hispanic origin were included in the analysis as taste variables. In almost all cases, they had statistically significant results (the exception was unweighted black data).

The Hispanic variable yielded positive results which would be expected if Hispanic origin is taken as a proxy for

14. Cain and Dooley, op. cit., page S196.

Catholic. Other studies have not, however, yielded statistically significant results for similar variables. Cain (page S195) used the proportion of children enrolled in parochial schools as a proxy for Catholic. He found, however, that the results for that "Catholic" variable were generally not significant. In Cain and Weininger, a similar variable is used and they report that "the insignificant and sometimes negative effects on fertility rates are surprising to say the least."¹⁵

In other regressions, Cain and Weininger used the percent of the population with self or parents born in "Catholic" countries (Czechoslovakia, France, Ireland, Italy, Mexico, Poland, and Puerto Rico), but the effects found there were consistently negative--although this may reflect the fertility behavior of immigrants rather than of Catholics per se. As such, the latter results are consistent with the current study, which found negative results for foreign born. Cain and Weininger, however, reported insignificant results for several nativity variables that they considered. And in their study of nurses cited earlier, Link and Settle (1981) found significant negative results for a variable looking at the percentage of nurses who were foreign born.

15. Cain and Weininger, op. cit., page 217.

The percentage of elementary school students in private elementary schools can, as previously noted, also be used as a proxy for percentage Catholic. In this study, it consistently yielded statistically insignificant results.

Infant mortality was included in the regression "to account for exogenous variation in the expected survival rate of children, thus allowing children ever born to be interpreted as completed family size."¹⁶ The results found here, however, showed that infant mortality was a statistically insignificant variable. DeTray, in his study, also found that the coefficient of the infant death rate variable is never significantly different from zero. Rosenzweig (1977) similarly found infant mortality to be statistically insignificant and seems surprised that "the precipitous fall in rural infant mortality rates in the 1925-65 period did not play a significant role in the fertility decline in the agricultural sector."¹⁷ Yamada, on the other hand, found that the association between infant mortality rates and fertility (for whites) was generally negative and significant.

Other studies that have focused on the effects of infant mortality found that birth rates of older women respond more quickly and to a greater degree than birth

16. DeTray, op. cit., page 105.

17. Rosenzweig (1977), op. cit., page 138.

rates of younger women. Among these older women, the response of birth rates is also greater to male child deaths than to female child deaths, presumably reflecting preferences for family sex composition(Schultz, 1972).

The dummy variable for legalized abortion proved to be negative and significant for both blacks and whites (in weighted and unweighted form). If abortion were to be considered a form of birth control, then the negative results would be expected.

The percentage of the population that resides in the urbanized area of the SMSA is both a taste variable and an attempt to account for cross-sectional variation in the price of market goods and services. The expected relationship is negative since an increase in urbanization raises the cost of children and would thus lower the fertility rate. The results of the current study show it to be an insignificant variable. In his study of black fertility, Meeker (1977) found that the percentage urban had a negative effect and in most cases was the most important variable in explaining fertility. DeTray (1974) also found it to be significant--but his data represented random U.S. counties with a much greater range of urbanization than is found within SMSA's.

The quality of children, as measured by the percentage of people age 20-21 enrolled in school, was found to be of marginal statistical significance when used as an independent variable in fertility regressions.

RACE DIFFERENCES

As already noted, there appear to be wide differences in fertility behavior by race in the United States. Whether these differences are due to something inherent in race itself or to various socio-economic differences between races is a subject for exploration.

The first question is in terms of differences when socio-economic conditions are not controlled for. This has been referred to as the gross race difference. This difference can be measured in two ways.

(a) The difference in means between black and white fertility measures:

	unweighted means	weighted means

black fertility rate	3302.51	3052.04
white fertility rate	2586.91	2466.23
	-----	-----
difference	716.60	585.81

(b) The regression coefficient found when the black and white data sets are combined and the regression is run with fertility as a function of just race (with no other variables included). Results are in Tables XXIV and XXV for weighted and unweighted data. As expected, they show race to be an important determinant of fertility with a statistically significant T value.

TABLE XXIV

FULL REGRESSION FOR COMBINED SAMPLE
WHEN RACE IS THE ONLY INDEPENDENT VARIABLE*

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	1	67476019	67476019	708.152	0.0001
ERROR	541	51549030	95284.71		
C TOTAL	542	119025049			
ROOT MSE		308.6822	R-SQUARE	0.5669	
DEP MEAN		2883.431	ADJ R-SQ	0.5661	
C.V.		10.70538			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2586.912	17.31004	149.446
COL	1	715.5992	26.89099	26.611

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
COL	1	0.0001	RACE

* "COL" is a dummy variable defined as one when black variables are used and zero when white variables are used.

TABLE XXV

WEIGHTED FULL REGRESSION FOR COMBINED SAMPLE
WHEN RACE IS THE ONLY INDEPENDENT VARIABLE*

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	1	367123613954	367123613954	324.764	0.0001
ERROR	541	611563977587	1130432491		
C TOTAL	542	978687591541			
ROOT MSE		33621.9	R-SQUARE	0.3751	
DEP MEAN		2547.779	ADJ R-SQ	0.3740	
C.V.		1319.656			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2466.233	12.1281	203.349
COL	1	585.8079	32.50659	18.021

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
COL	1	0.0001		RACE

* "COL" is a dummy variable defined as one when black variables are used and zero when white variables are used.

The second question to be explored is what has been referred to in the literature as net race differences. Net race differences can be interpreted as that portion of the gross difference that would remain if both racial groups had the same mean values for all the explanatory variables.

In order to test for net race differences it must first be determined whether a pooled sample (both white and black observations together) or separate samples should be used in our regressions. This is done in terms of a Chow test, an F test which explores whether differences in slope coefficients for blacks and whites are statistically significant. In our case, this test shows us that, as expected, the slope coefficients are significantly different and the data should be run in two separate regressions (as reported in the first part of this chapter).

While there is no unique way of testing for net race differences, one can explore the issue by using the pooled data set in running a regression with all the other socio-economic variables included along with the race dummy. Results of these regressions in weighted and unweighted form are in Tables XXVI and XXVII. By taking the difference between the parameter estimate for race in the two pairs of regressions we can get at a net race difference--that part of racial differences that survives even when other socio-economic characteristics are controlled for. Again, as expected, there are significant net race differences.

Net race differences can also be explored by taking the difference between black and white intercepts and adding that number to the differences between black and white parameter estimates times the combined sample means of each variable. This is the formula used by Edwards and Grossman (1982).

In our case, using this formula yields a net race difference that is greater than the gross difference. This implies that if both whites and blacks had the same socio-economic characteristics discussed in this paper, the racial differences in fertility would be even greater than they actually are.

Other researchers have also explored the relationship between fertility and race (or ethnic group) in the United States. Sly (1970) found that fertility differences between whites and nonwhites could largely be explained by socio-economic status variables. Roberts and Lee (1973) replicated this finding for a white-nonwhite comparison but found substantial ethnic differences not of socio-economic status when more refined categorizations of ethnic status were used.¹⁸

Most explanations of net race differences have focused on missing variables or on sociological differences. So,

18. Both studies are discussed in Bean and Wood, op. cit., page 631.

for example, one variable not included in the current study is age at first marriage. If that age were significantly different for blacks and whites it could explain fertility differences. Yet, based on time-series data for the U.S., Sly concludes that "age at first marriage accounts for very little of the fertility differential."¹⁹ Studies of differences in fecundity between races also fail to explain racial differences.

Goldscheider and Uhlenberg suggest that one neglected aspect of racial differences in fertility has been the independent role of minority group status. They argue that this status interacts with socio-economic variables. They suggest that "the residue lower fertility of minority groups may result from the insecurities associated with minority group status" and be independent of socio-economic variables. According to them, "the explanation of the lower fertility of the Jews and segments of the Negro and Japanese-American populations may reside in the interactions of minority group status and social and economic status."²⁰

19. David F. Sly, "Minority Group Status and Fertility: An Extension of Goldscheider and Uhlenberg," American Journal of Sociology, Volume 76, Number 3 (November 1970), page 445.

20. Calvin Goldscheider and Peter R. Uhlenberg, "Minority Group Status and Fertility," American Journal of Sociology, Vol. 74, Number 4, page 370.

In attempting to test the Goldscheider-Uhlenberg hypothesis however, Sly concludes that "the analysis of variance...shows rather conclusively...the importance of the socio-economic characteristics and region as determining factors in the level of fertility of minority groups.²¹

The relevance of race to the various socio-economic variables used in this study is shown by Table XXVIII, which gives the correlations between race and the other variables being considered. In particular, we find that race is strongly correlated with fertility, the percentage of females who are high school graduates, the female unemployment rate, age 35-44 family income, and the industrial structure variable.

21. Sly, op. cit., page 457.

TABLE XXVI
FULL REGRESSION FOR COMBINED SAMPLE

DEP VAR: FERTILITY

----- ANALYSIS OF VARIANCE -----

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	13	85322818	6563294	103.019	0.0001
ERROR	529	33702231	63709.32		
C TOTAL	542	119025049			

ROOT MSE	252.4071	R-SQUARE	0.7168
DEP MEAN	2883.431	ADJ R-SQ	0.7099
C.V.	8.753706		

----- PARAMETER ESTIMATES -----

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3632.455	144.5793	25.124
F	1	-3.39587	1.7787	-1.909
UNEM	1	16.47629	3.493402	4.716
YFEM	1	-0.0310309	0.01113935	-2.786
YPERM	1	-0.00780081	0.005777949	-1.350
XEL	1	-2.17687	1.828107	-1.191
XFOR	1	-11.5709	3.016232	-3.836
XINDF	1	-37.8183	9.896991	-3.821
AA	1	-145.776	24.20506	-6.023
SP	1	9.860466	1.820665	5.416
URB	1	-0.702987	0.7587455	-0.927
IN	1	5.140181	4.268481	1.204
D	1	-0.292538	0.8525182	-0.343
COL	1	394.0556	54.14518	7.278

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0568		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YFEM	1	0.0055		FEMALE INCOME
YPERM	1	0.1776		AGE 35/44 INCOME
XEL	1	0.2343		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0001		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.3546		%URBAN
IN	1	0.2290		INFANT MORT
D	1	0.7316		COLLEGE (QUALITY)
COL	1	0.0001		RACE

TABLE XXVII

WEIGHTED FULL REGRESSION FOR COMBINED SAMPLE

DEP VAR: FERTILITY

----- ANALYSIS OF VARIANCE -----

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	13	722189952678	55553073283	114.573	0.0001
ERROR	529	256497638863	484872663		
C TOTAL	542	978687591541			

ROOT MSE	22019.82	R-SQUARE	0.7379
DEP MEAN	2547.779	ADJ R-SQ	0.7315
C.V.	864.2754		

-----PARAMETER ESTIMATES-----

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	3165.001	126.081	25.103
F	1	3.265586	1.647364	1.982
UNEM	1	31.15091	4.148414	7.509
YFEM	1	-0.0579861	0.008581775	-6.757
YPERM	1	0.008041144	0.00448851	1.791
XEL	1	-2.0343	1.322522	-1.538
XFOR	1	-14.7321	1.893035	-7.782
XINDF	1	-35.7121	8.694596	-4.107
AA	1	-141.274	16.8768	-8.371
SP	1	8.838382	1.325612	6.667
URB	1	-1.80466	0.5778066	-3.123
IN	1	-1.95188	3.683877	-0.530
D	1	-1.46548	0.8601974	-1.704
COL	1	465.8488	51.17496	9.103

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
F	1	0.0480	FEMALE HS GRADS
UNEM	1	0.0001	FEMALE UNEMP
YFEM	1	0.0001	FEMALE INCOME
YPERM	1	0.0738	AGE 35/44 INCOME
XEL	1	0.1246	%PRIVATE EDUC
XFOR	1	0.0001	%FOREIGN BORN
XINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.0001	ABORTION
SP	1	0.0001	%HISPANIC
URB	1	0.0019	%URBAN
IN	1	0.5964	INFANT MORT
D	1	0.0890	COLLEGE (QUALITY)
COL	1	0.0001	RACE

TABLE XXVIII

SIMPLE CORRELATIONS OF RACE WITH OTHER VARIABLES

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER HO:RHO=0 / N = 543

	A	F	UNEM	YFEM	YPERM	XEL
COL	0.75293	-0.66553	0.66605	-0.26379	-0.78424	-0.47498
RACE	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	XFOR	XINDF	AA	SP	URB	IN
COL	-0.21241	-0.63162	0.01786	-0.16795	0.48574	0.08098
RACE	0.0001	0.0001	0.6779	0.0001	0.0001	0.0593
	D					
COL	-0.17585					
RACE	0.0001					

WEIGHTED CORRELATIONS OF RACE WITH OTHER VARIABLES

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER HO:RHO=0 / N = 543
/ WEIGHT VAR=W

	A	F	UNEM	YFEM	YPERM	XEL
COL	0.61247	-0.59587	0.69342	-0.18666	-0.73478	-0.31127
RACE	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	XFOR	XINDF	AA	SP	URB	IN
COL	-0.11398	-0.32170	0.02399	-0.15493	0.35166	0.14122
RACE	0.0078	0.0001	0.5769	0.0003	0.0001	0.0010
	D					
COL	-0.14637					
RACE	0.0006					

CHAPTER VIII
OTHER EMPIRICAL RESULTS

Besides the regressions discussed in Chapter VII, the data were also tested in several other forms. First, the same variables were regressed against "quality of children." Then the country was divided into the four census regions and the same regressions were run for each region. Finally, data from just the fifty largest SMSA's in the sample (using the number of whites and blacks in the SMSA, respectively) were tested.

REGRESSION RESULTS FOR QUALITY OF CHILDREN

Following DeTray and others, the same variables that we've previously used were tested in a regression where quality of children was taken as the dependent variable. Quality was again measured by the percentage of people age 20-21 enrolled in school.

In this case, the results for whites and blacks were very different. For whites, using the weighted values, the statistically significant variables were the percentage of females who are high school graduates (0.2168 with a T

statistic of 1.964), the female unemployment rate (-0.8936 with a T of -2.475), the industrial structure (37.5106 with a T of 6.225), the percentage of Hispanic origin (-1.8949 with a T of -2.182), the percentage urban (-0.8987 with a T of -2.360) and infant mortality (-1.1217 with a T of -4.625).

Using unweighted data, all of the same variables proved significant except the percentage Hispanic origin. Tables XXIX and XXX give the results of the quality regressions for whites using weighted and unweighted data, respectively.

For blacks, again using the weighted values, the results were very different. The only statistically significant variables were the industrial structure (1.560 with a T statistic of 3.807), the infant mortality (-0.477 with a T of -2.285 and the percentage urban (-0.165 with a T of -3.018).

When unweighted data was used for blacks, the only variables that proved significant were the female unemployment rate (-0.418 with a T statistic of -2.515), industrial structure, and the percentage urban. Tables XXXI and XXXII give the results of the quality regressions for blacks.

TABLE XXIX

WHITE QUALITY REGRESSION

 DEP VARIABLE: D COLLEGE (QUALITY)
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	18159.9	1650.9	8.880	0.0001
ERROR	306	56886.55	185.9038		
C TOTAL	317	75046.45			
ROOT MSE		13.63465	R-SQUARE	0.2420	
DEP MEAN		33.33208	ADJ R-SQ	0.2147	
C.V.		40.9055			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	31.53114	12.10775	2.604
F	1	0.4414143	0.1335919	3.304
UNEM	1	-1.96644	0.4539944	-4.331
YFEM	1	-0.000545847	0.0009393961	-0.581
YPERM	1	-0.000572455	0.0004487353	-1.276
XEL	1	-0.123988	0.1058981	-1.171
XFOR	1	0.321431	0.181423	1.772
XINDF	1	3.21507	0.7978652	4.030
AA	1	-1.28794	1.731062	-0.744
SP	1	-0.0332169	0.1051326	-0.316
URB	1	-0.176992	0.05123917	-3.454
IN	1	-1.02052	0.2945245	-3.465

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0097	INTERCEPT
F	1	0.0011	FEMALE HS GRADS
UNEM	1	0.0001	FEMALE UNEMP
YFEM	1	0.5616	FEMALE INCOME
YPERM	1	0.2030	AGE 35/44 INCOME
XEL	1	0.2426	%PRIVATE EDUC
XFOR	1	0.0774	%FOREIGN BORN
XINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.4574	ABORTION
SP	1	0.7523	%HISPANIC
URB	1	0.0006	%URBAN
IN	1	0.0006	INFANT MORT

TABLE XXX

WEIGHTED WHITE QUALITY REGRESSIONS

 DEP VARIABLE: D COLLEGE (QUALITY)
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	236944444	21540404	11.366	0.0001
ERROR	306	579907541	1895123		
C TOTAL	317	816851985			
ROOT MSE		1376.635	R-SQUARE	0.2901	
DEP MEAN		33.25431	ADJ R-SQ	0.2645	
C.V.		4139.717			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	21.97446	9.436444	2.329
F	1	0.2167609	0.1103777	1.964
UNEM	1	-0.89361	0.361057	-2.475
YFEM	1	-0.0002237	0.0006093895	-0.367
YPERM	1	-0.000414067	0.0003139494	-1.319
XEL	1	-0.0763641	0.08581027	-0.890
XFOR	1	0.471649	0.1296462	3.638
XINDF	1	3.75106	0.6026138	6.225
AA	1	0.5571074	1.158659	0.481
SP	1	-0.189493	0.08685039	-2.182
URB	1	-0.0898669	0.03807212	-2.360
IN	1	-1.12171	0.2425362	-4.625

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0205	INTERCEPT
F	1	0.0505	FEMALE HS GRADS
UNEM	1	0.0139	FEMALE UNEMP
YFEM	1	0.7138	FEMALE INCOME
YPERM	1	0.1882	AGE 35/44 INCOME
XEL	1	0.3742	%PRIVATE EDUC
XFOR	1	0.0003	%FOREIGN BORN
XINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.6310	ABORTION
SP	1	0.0299	%HISPANIC
URB	1	0.0189	%URBAN
IN	1	0.0001	INFANT MORT

TABLE XXXI

BLACK QUALITY REGRESSION

DEP VARIABLE: D COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	5090.074	462.734	4.149	0.0001
ERROR	213	23757.61	111.5381		
C TOTAL	224	28847.68			
ROOT MSE		10.56116	R-SQUARE	0.1764	
DEP MEAN C.V.		28.316	ADJ R-SQ	0.1339	
		37.29749			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	29.00489	8.454602	3.431
F	1	-0.190809	0.1124458	-1.697
UNEM	1	-0.418139	0.1662667	-2.515
YFEM	1	0.000577588	0.0006536012	0.884
YPERM	1	0.0005495983	0.0003789263	1.450
XEL	1	0.2761403	0.2448584	1.128
XFOR	1	0.1383363	0.3661705	0.378
XINDF	1	2.465016	0.5507912	4.475
AA	1	-1.68717	1.637963	-1.030
SP	1	-0.933162	1.110798	-0.840
URB	1	-0.12942	0.05616311	-2.304
IN	1	-0.383597	0.2861353	-1.341

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0007	INTERCEPT
F	1	0.0912	FEMALE HS GRADS
UNEM	1	0.0126	FEMALE UNEMP
YFEM	1	0.3779	FEMALE INCOME
YPERM	1	0.1484	AGE 35/44 INCOME
XEL	1	0.2607	%PRIVATE EDUC
XFOR	1	0.7060	%FOREIGN BORN
XINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.3042	ABORTION
SP	1	0.4018	%HISPANIC
URB	1	0.0222	%URBAN
IN	1	0.1815	INFANT MORT

TABLE XXXII

WEIGHTED BLACK QUALITY REGRESSIONS

DEP VARIABLE: D COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	15863478	1442134	6.573	0.0001
ERROR	213	46735133	219413.8		
C TOTAL	224	62598611			
ROOT MSE		468.4162	R-SQUARE	0.2534	
DEP MEAN		29.01201	ADJ R-SQ	0.2149	
C.V.		1614.56			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	34.59077	7.123483	4.856
F	1	0.1352319	0.1091977	1.238
UNEM	1	-0.115299	0.1503822	-0.767
YFEM	1	.00000882733	0.0005016861	0.018
YPERM	1	-0.000237465	0.0003091299	-0.768
XEL	1	0.06519667	0.1810396	0.360
XFOR	1	0.1652345	0.2559405	0.646
XINDF	1	1.559911	0.4097386	3.807
AA	1	1.387086	1.011726	1.371
SP	1	-0.149574	1.111498	-0.135
URB	1	-0.16523	0.05474867	-3.018
IN	1	-0.476839	0.208644	-2.285

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.2169		FEMALE HS GRADS
UNEM	1	0.4441		FEMALE UNEMP
YFEM	1	0.9860		FEMALE INCOME
YPERM	1	0.4432		AGE 35/44 INCOME
XEL	1	0.7191		%PRIVATE EDUC
XFOR	1	0.5192		%FOREIGN BORN
XINDF	1	0.0002		INDUST STRUCT-F
AA	1	0.1718		ABORTION
SP	1	0.8931		%HISPANIC
URB	1	0.0029		%URBAN
IN	1	0.0233		INFANT MORT

The strong negative coefficient for infant mortality rates found for whites is consistent with the argument that the higher the probability of an infant's death, the less likely parents are to invest large amounts of resources in that child.

It can also be argued that both infant mortality rates and education are measures of child quality. The more resources are invested in the child, the more likely the child is to survive (and thus the lower the infant mortality rate) and the more likely the child is to attend college. DeTray reports similar findings for this variable.

Rosenzweig, however, finds infant mortality to be an insignificant variable with respect to child quality. He interprets this as meaning "that decreases in the infant death rate do not influence the quality investment per child. Since (his) fertility results indicate that decreases in infant mortality increase the demand for surviving quantity of children...these results together suggest that diminutions in infant mortality increase the demand for the quantity and quality of surviving farm children equally but not affect births or the quality per child."¹

The high positive result for the percentage of female high school graduates is probably a result of our measure of

1. Rosenzweig (1977), op. cit., page 144.

quality. Since high school is a prerequisite for college, we are presumably picking up some of the same generation in both measures, rather than measuring two different generations as the theory suggests. DeTray reports similar findings for this variable. He suggests that these results lend support to the "efficiency" (as opposed to time-intensity) explanation of the observed differences by educational class in female labor-force participation.²

Rosenzweig finds a negative but insignificant result for female education (but a positive and significant result for male education). He suggests that this shows that the farm wife's schooling is not biased toward the household production of farm child quality. Rosenzweig contends that the utilization of children and their human capital in farm production is likely to be responsible for the difference in results between his study and DeTray's.

Various studies have shown that those goods associated with child quality (home educational expenditures such as books, etc.) were more costly for rural families. Welch's study of school quality provides evidence for the inefficiency of rural schooling relative to urban, so that presumably for farm families to acquire the same quality children as non-farm families, higher costs must be incurred. These findings would support the notion that farm

2. DeTray, op. cit., page 112.

families are biased toward the production of more child quantity relative to quality.³

The high positive result for the percentage foreign born is not easily explained. One suggestion might be that the data are picking up the large group of foreign students who come to this country to take advantage of American educational facilities (and the data therefore say nothing about quality of children). It should be noted here that the quality variable data might be biased by the existence of "college towns" which have high numbers of age 20-21 people enrolled in school--but who were not born in the SMSA and whose parents are not permanent residents of that SMSA.

In another attempt to measure quality, the percentage of children in private elementary schools was used as the dependent variable--with the same independent variables as before.

Those results show that for whites, the significant variables were the percentage of female high school graduates, female income, the percentage foreign, the industrial structure variable, the percentage Hispanic, and the percentage in the urbanized area of the SMSA.

The industrial structure and female income results suggest that private schools make good babysitters. The

3. Rosenzweig (1973), op.cit., page 36.

urban percentage variable suggests that public schools might be of lower quality in urban areas and thus the need for more private schools in those areas. The negative sign for Hispanic origin is surprising, since Hispanic origin and private education have both been used as proxies to represent the Catholic population.

When the same regression was run for blacks, the only statistically significant variables were female income and the percentage urbanized. When weights were used, additional variables that proved significant were family income, the percentage foreign, the industrial structure variable, and the percentage of Hispanic origin.

RESULTS BY REGION

The same regressions that are discussed in Chapter VI were then run for the four geographic regions of the country as defined by the Census Bureau. The complete tables of these results are presented in Appendix C for white data and Appendix D for black data.

The results of the regional regressions are explored here to see if there are significant differences by region in the determinants of fertility. Other available data, however, indicate that there are major differences, at least by state in levels of fertility. For example, in 1980, fertility in the state with the highest total fertility rate

(TFR), Utah, was more than twice that of the lowest, Massachusetts. The TFR is the average number of children which a woman would have in her lifetime at today's rate.

The total fertility rate in 1980 for the entire country was 1,840, while it was 1,750 for the white population and 2,222 for the black population. Utah had a TFR of 3,223, the next highest state was Idaho with a TFR of 2,519, while Massachusetts, at the other end of the spectrum had a TFR of 1,453. It is worth noting that the TFR for the white population of Washington, D.C., was 755, a remarkably low figure which is undoubtedly explained by the large proportion of single women in the capital city.⁴

In my own testing of regional data, different variables proved to be statistically significant in different regions of the country and for each race.⁵

For whites, the key explanatory variables in the Northeast were the female unemployment rate, percentage private elementary education, and the percentage Hispanic. In the South, the key variables were the female unemployment rate, female income, the percentage foreign born, the abortion dummy, the percentage Hispanic, and the percentage of the age 20-21 population enrolled in school. For the North Central region, the key variables were the female

4. Population Today (February 1984), page 8.

5. Only weighted results are discussed here.

unemployment rate, the percentage female high school graduates, percentage private elementary education, the percentage foreign born, the industrial structure variable, the abortion dummy, and the percentage urban. In the Western states, the only explanatory variables for whites that proved to be statistically significant were age 35-44 income and the percentage enrolled in private elementary school.

For blacks, the key explanatory variables by region were: for the Northeast, percentage foreign born, the industrial structure variable, and the percentage Hispanic; for the South, percentage female high school graduates, female income, the industrial structure variable, the abortion dummy, the infant mortality rate, and the percentage age 20-21 enrolled in school; for the North Central states, the only key variables for blacks were the percentage female high school graduates and the abortion dummy; for the West, the percentage enrolled in private elementary school and the percentage in the urbanized area of the SMSA proved to be the only statistically significant variables.

The difference in F values and adjusted R-squares for the regions as summarized in Table XXXIII are also noteworthy. For both whites and blacks, the adjusted R-squares are highest for the Northeastern states and lowest for the North Central states.

TABLE XXXIII

SUMMARY
F VALUES AND R SQUARES BY REGION

FOR WHITES		
Region	F Value	Adjusted R Square
Northeast	46.175	0.8974
South	42.713	0.8105
North Central	12.271	0.6169
West	8.457	0.7224
FOR BLACKS		
Region	F Value	Adjusted R Square
Northeast	16.848	0.8371
South	36.149	0.7976
North Central	3.209	0.3377
West	4.876	0.6504

Sources: Appendix C for white data and Appendix D for black data.

RESULTS FOR THE FIFTY LARGEST SMSA'S

The same regressions for fertility were also run for the SMSA's with the 50 largest white and black populations, respectively. For whites, in both weighted and unweighted form, the key statistically significant variables were the female unemployment rate, the percentage foreign born, and the abortion dummy. (Although not statistically significant, of some note is that, as in the full sample of SMSA's, the female high school variable had a positive sign).

For blacks, with weighted data, the key variables were female earnings, age 35-44 income, the percentage foreign born, and the abortion dummy. In unweighted form, only female earnings and the abortion dummy proved to be statistically significant. Complete regression results along with descriptive statistics for the top 50 SMSA's are included in Appendix E.

When comparing descriptive statistics for the top fifty SMSA's with those previously reported for our entire sample, we find that, for whites, fertility rates are somewhat lower in the largest cities, possibly due to the presence of more single women. We also find that the percentage of female high school graduates is higher, the percentage in private elementary school is higher, and both of our income measures are higher. We also find that the percentage Hispanic and

percentage foreign born is higher in the fifty largest SMSA's than in the country as a whole.

For blacks, there seem to be less differences between the top fifty SMSA's and all SMSA's. Fertility rates are lower in the larger areas and the percentage enrolled in private elementary schools is higher. As would probably be expected, the percentage in the urbanized area of the SMSA is higher in the top fifty SMSA's for both races.

CHAPTER IX
FACTOR ANALYSIS

METHODOLOGY

In another attempt to explore the issue of fertility, the independent variables were analysed using factor analysis. Factor analysis is generally used to uncover the independent sources of data variation. "Because interdependence may exist between the data, factor analysts are asking whether the same amount of variation from the data can be represented equally well by dimensions smaller in number than the columns necessary to tabulate the data."¹

Put another way, the most distinctive characteristic of factor analysis is its data reduction capacity. The technique allows us to see whether some underlying pattern of relationships exist such that the data may be 'rearranged' or 'reduced' to a smaller set of factors or components that may be taken as 'source variables' accounting for the observed interrelations in the data.

1. R.J. Rummel, Applied Factor Analysis (Evanston" Northwestern University Press, 1970), page 16.

The factors themselves can be considered as empirical results, classifying or categorizing phenomena according to their interrelationships.² For our purposes, factor analysis is being used to group interdependent variables into descriptive categories.

There are various methods and forms of factor analysis. Probably the most general, and the one used here, is to create an orthogonal transformation matrix.

To do this, the factors are rotated so that all factors are mutually orthogonal. That is, the rotated factors will be uncorrelated. This is desirable to delineate substantive areas of importance such as income. "For orthogonal rotation, the varimax criterion has by consensus become the best function for simple structure analytic rotation" and is being used here.³

The orthogonal rotation insures that factors will delineate statistically independent variation. Orthogonal rotation has several characteristics of interest:

"1. The inner production of the factor loadings is zero for the rotation of principal axes factors⁴...Factor loadings...may be correlated even though they are orthogonal. This is possible because the correlation coefficient involves summing the product of mean deviation loadings while orthogonality is determined through a straight sum of products of loadings.

2. *ibid*, page 21.

3. *ibid*, page 170.

2. The resulting factor scores are linearly independent and uncorrelated. A correlation matrix of factor scores will be an identity matrix.

3. The communality of a variable is invariant through an orthogonal rotation of an orthogonal preliminary solution. Therefore, a check of rotation accuracy is made to calculate the communality and compare it with that for the unrotated factors.

4. The ordering of the rotated factors may be completely different from the unrotated solution. Factor S-3 in the unrotated case, for example, may be most similar to S-6 of the rotated factors."⁵

To decide how many factors to include in the analysis, a scree test is used. The test, originally proposed by Cattell, results from the practical observation that the factor variance levels off when the factors are largely measuring random error.

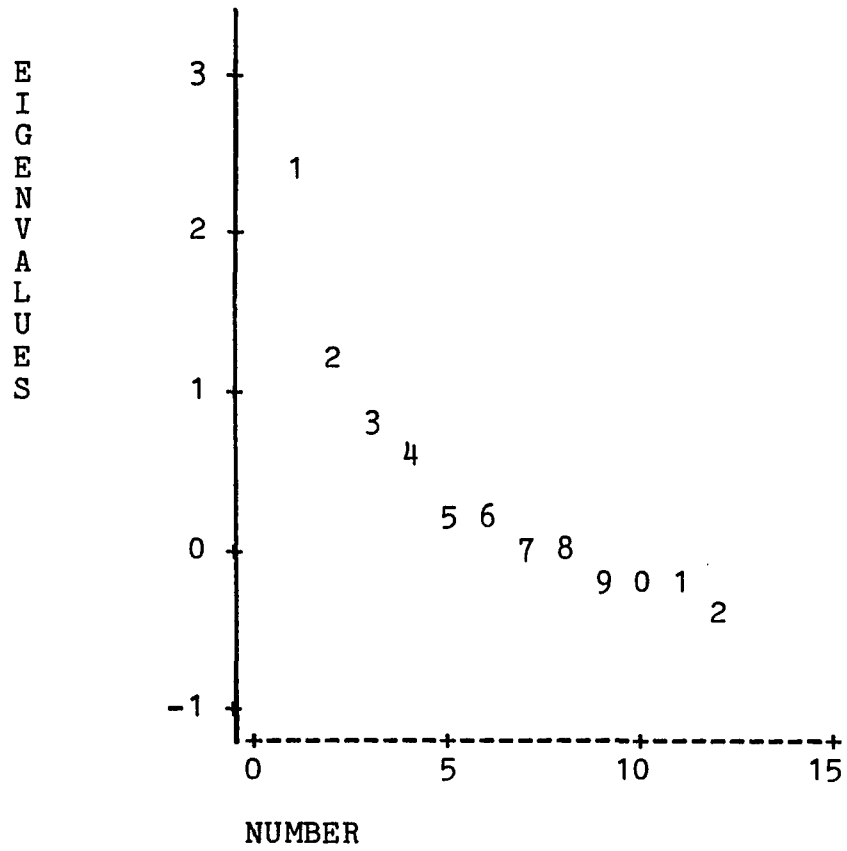
Figures I and II are scree plots for whites and blacks, respectively. The leveling off of the curves takes place when the random error factors--or trivial factors--are reached. Cattell called this the scree tests "since the random error factors in a plot (like figures I and II) resemble scree--the debris that has fallen or been eroded off a mountain and that lies at its base."⁶

4. The inner products of two vectors is the sum of the product of their corresponding elements.

5. Rummel, op. cit., pages 385-386.

6. R.J. Rummel, page 362.

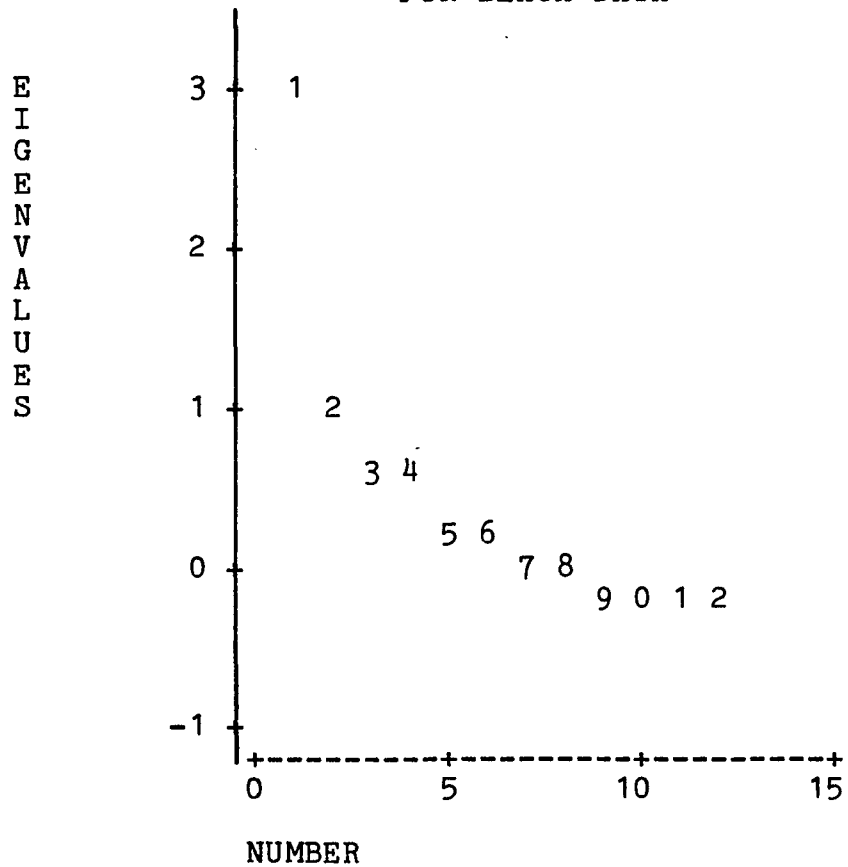
FIGURE 1
SCREE PLOT OF EIGENVALUES
FOR WHITE DATA*



* Initial Factor Method: Principal Factors

FIGURE 2

SCREE PLOT OF EIGENVALUES
FOR BLACK DATA



* Initial Factor Method: Principal Factors

RESULTS USING WHITE DATA

Table XXXIV presents the results of factor analysis on the white variables. The Table presents standardized scoring coefficients for whites. The prior communality estimates, eigenvalues, and initial factor pattern are represented in Appendix F. Seven key factors are identified by the computer and discussed here.

TABLE XXXIV
STANDARDIZED SCORING COEFFICIENTS
FOR WHITE DATA

	FACTOR1	FACTOR2	FACTOR3	
F	0.06254	-0.07712	0.14344	FEMALE HS GRADS
UNEM	0.07649	0.01323	-0.32508	FEMALE UNEMP
YFEM	0.39781	0.08567	-0.12856	FEMALE INCOME
YPERM	0.50926	-0.04409	0.02930	AGE 35/44 INCOME
XEL	0.03103	0.03286	-0.02603	%PRIVATE EDUC
XFOR	0.04970	0.40296	-0.00929	%FOREIGN BORN
XINDF	0.00011	0.02597	0.32319	INDUST STRUCT-F
AA	0.06420	0.03730	-0.00583	ABORTION
SP	-0.01759	0.44879	0.04411	%HISPANIC
URB	0.01227	0.09753	-0.00603	%URBAN
IN	0.01162	-0.02406	0.04221	INFANT MORT
D	-0.06091	0.00838	0.28558	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	-0.41113	-0.18857	0.20830	FEMALE HS GRADS
UNEM	-0.06724	-0.06719	-0.13289	FEMALE UNEMP
YFEM	0.04536	-0.13980	-0.18325	FEMALE INCOME
YPERM	0.09865	0.18443	0.07557	AGE 35/44 INCOME
XEL	0.02527	0.28988	-0.05902	%PRIVATE EDUC
XFOR	-0.06016	0.00076	-0.06148	%FOREIGN BORN
XINDF	0.18645	0.05028	-0.03986	INDUST STRUCT-F
AA	0.04812	-0.24460	-0.02307	ABORTION
SP	-0.00623	-0.05950	0.08810	%HISPANIC
URB	-0.01748	0.20105	0.31010	%URBAN
IN	0.34574	-0.03627	0.02341	INFANT MORT
D	-0.16996	-0.06109	-0.16782	COLLEGE (QUALITY)
	FACTOR7			
F	0.13002			FEMALE HS GRADS
UNEM	0.11313			FEMALE UNEMP
YFEM	0.07652			FEMALE INCOME
YPERM	-0.19977			AGE 35/44 INCOME
XEL	0.12043			%PRIVATE EDUC
XFOR	0.10781			%FOREIGN BORN
XINDF	0.11310			INDUST STRUCT-F
AA	0.06402			ABORTION
SP	-0.11867			%HISPANIC
URB	0.00379			%URBAN
IN	0.02836			INFANT MORT
D	-0.01532			COLLEGE (QUALITY)

Factor one can be identified as income. The two important variables are age 35-44 income and female income. It is probably worth noting that no other variables prove to be significant in this factor.

The second factor identified by the computer appears to be a taste factor that is a function of ethnicity. The two key variables here are the percentage of Hispanic origin and the percentage foreign born.

Factor three for whites relates different measures of female labor market activity. The key variables are the female unemployment rate and the industrial structure variable. The percentage age 20-21 enrolled in school, the percentage of females who are high school graduates and female income also influence this factor.

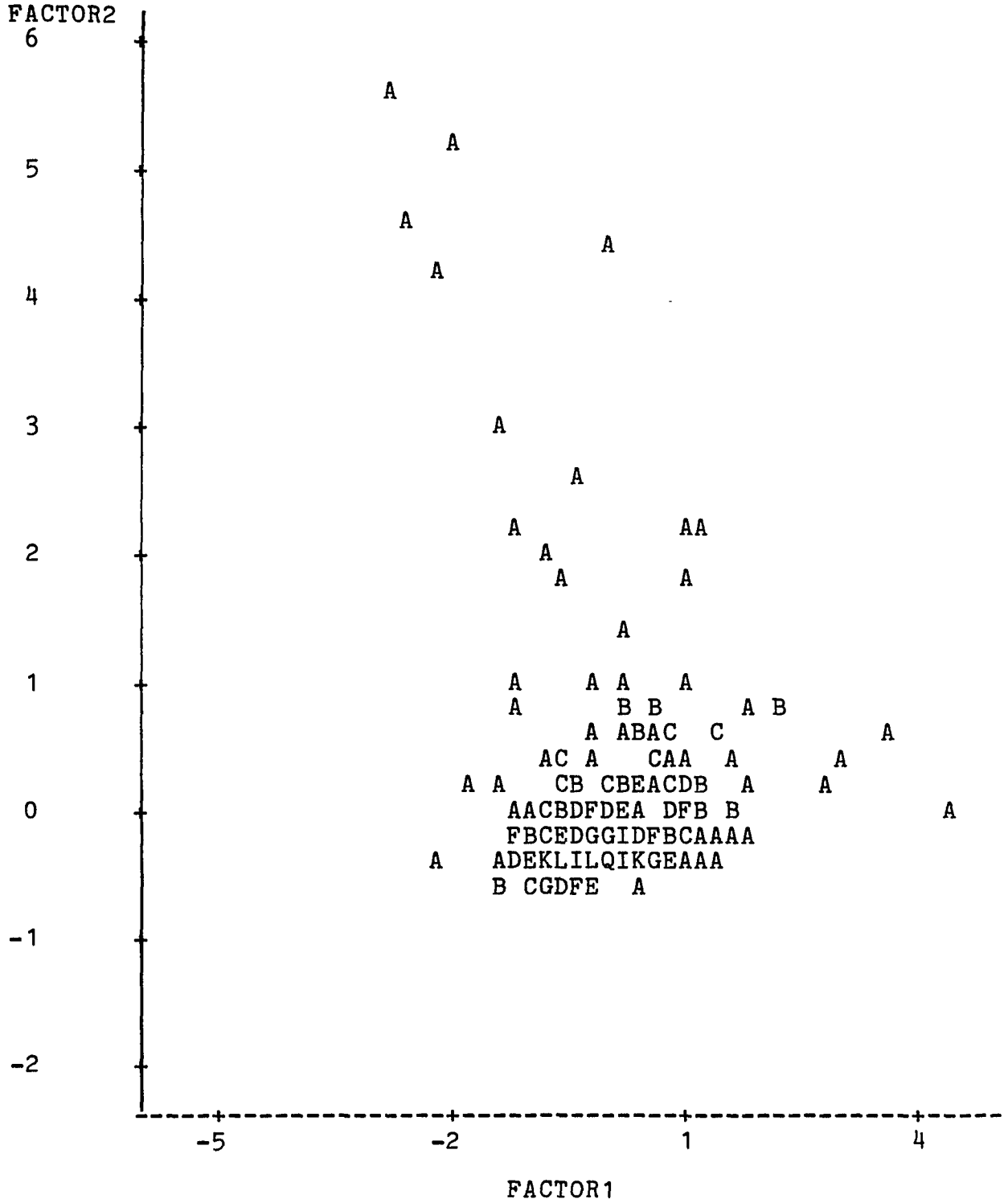
Factor four identifies female high school graduates and infant mortality as the key variables. While there is no clear connection between the two variables, they might both be some previously unconsidered measure of quality. The fact that the percentage age 20-21 enrolled in college is another important variable in this factor lends some evidence for that hypothesis.

Factor five has as key variables the abortion dummy, the percentage enrolled in private schools, and the percentage urbanized. I would venture a guess that all three serve as a kind of urbanization index.

Factor six for whites has the percentage urban as the key variable. Other contributing variables are the percentage of female high school graduates, female income, the percentage enrolled in college, and the female unemployment rate. These might all together conceivable be giving us some measure of human capital.

Factor seven has age 35-44 income, the percentage of female high school graduates, and the percentage in private elementary school as variables. What these three variables have in common is not readily apparent.

FIGURE 3
 PLOT OF FACTOR2*FACTOR1 FOR WHITE DATA
 LEGEND: A = 1 OBS, B = 2 OBS, ETC.



RESULTS USING BLACK DATA

Table XXXV presents the standardized scoring coefficients for the black sample of 225 SMSA's. The computer program (SAS) identifies six key factors which are discussed here. The prior communality estimates, eigenvalues, and initial factor pattern are all presented in Appendix F.

TABLE XXXV
STANDARDIZED SCORING COEFFICIENTS
FOR BLACK DATA

	FACTOR1	FACTOR2	FACTOR3	
F	0.27003	0.03434	-0.02302	FEMALE HS GRADS
UNEM	0.02559	-0.04351	-0.21636	FEMALE UNEMP
YFEM	0.27325	-0.00222	-0.01932	FEMALE INCOME
YPERM	0.44989	-0.14891	0.04328	AGE 35/44 INCOME
XEL	-0.00305	0.09190	0.06597	%PRIVATE EDUC
XFOR	-0.07519	0.41565	0.10485	%FOREIGN BORN
XINDF	-0.03888	-0.02656	0.33696	INDUST STRUCT-F
AA	0.00677	0.02714	0.00916	ABORTION
SP	-0.01474	0.43548	-0.13162	%HISPANIC
URB	0.02767	0.02402	-0.04309	%URBAN
IN	-0.09521	-0.02617	0.02496	INFANT MORT
D	-0.01362	-0.03554	0.33589	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	-0.06660	-0.27346	0.40415	FEMALE HS GRADS
UNEM	0.08916	0.15740	-0.00182	FEMALE UNEMP
YFEM	0.04096	0.50591	-0.06563	FEMALE INCOME
YPERM	-0.16671	-0.09485	-0.26820	AGE 35/44 INCOME
XEL	0.14324	0.18644	0.06556	%PRIVATE EDUC
XFOR	0.06507	-0.02585	-0.07733	%FOREIGN BORN
XINDF	0.01682	0.05932	0.18698	INDUST STRUCT-F
AA	-0.33451	0.02216	0.06562	ABORTION
SP	-0.14011	-0.00170	-0.03828	%HISPANIC
URB	0.37291	-0.04404	0.17312	%URBAN
IN	-0.08069	0.21257	0.10258	INFANT MORT
D	0.00769	-0.00897	-0.08698	COLLEGE (QUALITY)

Factor one for blacks can be identified as being a measure of income. This is the same result as was previously described for whites. While for whites the key variables were female income and family income, for blacks the percentage of females who are high school graduates is an equally important part of this factor.

Factor two can be identified as a measure of ethnicity. The two key variables here are the percentage foreign born and the percentage Hispanic. This is the same result as previously found for whites. The parallel result is somewhat surprising, since only about ten percent of Hispanics in the United States are black.

The third factor is a measure of female labor market activity. In addition to the expected unemployment rate and industrial structure variables, the percentage age 20-21 enrolled in school shows up as a significant part of this factor. The only observable connection is that attending college is to a certain extent a substitute for working or being unemployed.

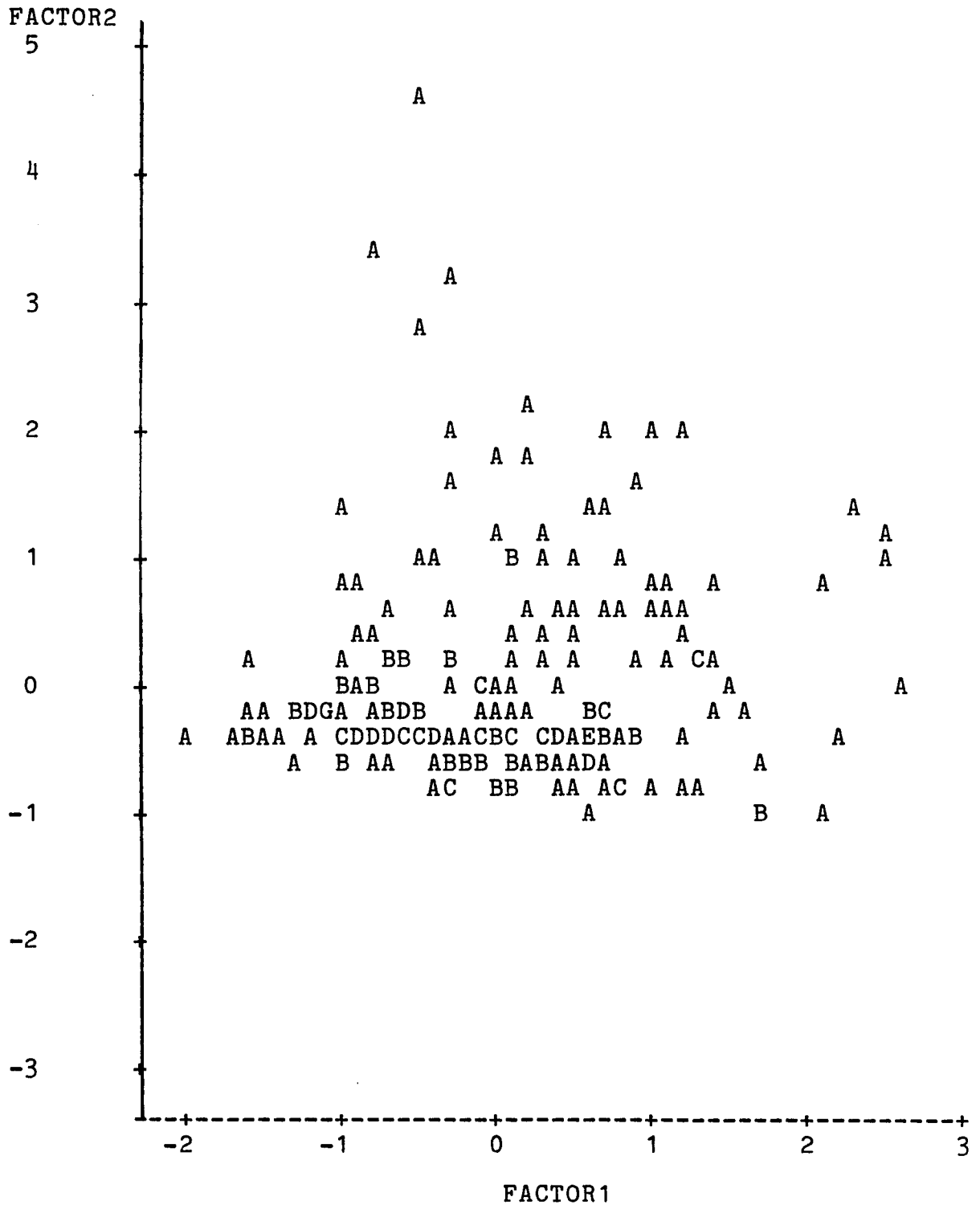
The fourth factor for blacks contains as key variables the abortion dummy and the percentage urbanized. Two other significant variables in that factor are the percentage in private elementary school and the percentage Hispanic, both of which could be proxies for percentage Catholic, as could the urbanization variable. The connection of those three

variables to the abortion dummy is certainly not apparent and maybe even contradictory.

Factor five includes female income as the key variable with secondary roles played by infant mortality and the percentage of females who are high school graduates. All could in some sense be thought of as the quality (or human capital) of the mother. Infant mortality is presumably connected to prenatal health care and a mother's education.

Factor six has the percentage of female high school graduates as the key variable along with age 35-44 income, industrial structure, and the percentage in the urbanized area of the SMSA. Again, the connection among these variables is not readily apparent.

FIGURE 4
 PLOT OF FACTOR2*FACTOR1 FOR BLACK DATA
 LEGEND: A = 1 OBS, B = 2 OBS, ETC.



CHAPTER X CONCLUSIONS

"It is characteristic of the age in which we live to think too much in terms of economics, to see things too predominantly in their economic aspect...there is no more important prerequisite to clear thinking in regard to economics itself than in recognition of its limited place among human interests at large. 1

--Frank H. Knight

There is probably nothing that looms larger among human interests than the urge for survival--both physical survival in a person's own lifetime and spiritual survival beyond one's lifetime through one's offspring. The concern about survival can be seen as far back as the Bible: "...be fruitful and multiply yourself and fill the earth and subdue it..." is considered by some to be the first commandment in the Bible.²

The issues motivating this study are at least as old as economics itself. Like the present author, the classical economists wrestled with the causes and consequences of fertility and a changing population. What is different here and in other recent studies is the absence of simple

1. Frank H. Knight, The Economic Organization (1933), quoted by Marc Nerlove (in Schultz), op. cit., page 527.

2. Genesis 1:28

answers.

SUMMARY OF KEY RESULTS

The basic question being posed in this paper is very simply "why do people have children or at least want to have children?"

The basic conclusions of this paper are that several factors are key variables that affect the demand for children.

Female earnings have consistently been shown to be a key variable in determining the demand for children. The higher female income, the lower will be the fertility rate. But female income has also been shown to be a function of time in the labor market, experience, and seniority as well as factors like skills and education (and even skills and education--investments in human capital--have been shown to have a decreasing value over time). Given these conflicting factors, the direction of causation is not all that clear. Higher fertility might cause a reduction in female earnings and not the other way around.

Female income has been used here to represent the opportunity cost of a woman's time. And that time is thought to be spent either in the market place or in home production (of children). But not all time away from the market is spent in home production. As Reid (1974) points

out, some nonmarket activities produce personal utility or enjoyment while others provide products for oneself or for others. All nonmarket activities (including having children) are not inseparable from the enjoyment of the commodity produced.³

The percentage of female high school graduates proved to be a significant variable but with opposite signs for whites and blacks. Let me offer here a somewhat novel explanation. For whites, high school graduation is a minimum level of achievement--the more people who have the minimum education needed for survival, the higher the fertility rate. For blacks, high school graduation is an important achievement and signifies a major increase in education over previous generations. Thus, the typical results of more education, lower fertility. This might be thought of as a "relative education" concept. (In a sense, this discussion is similar to the observations of a U-shaped relationship between income and fertility).

Industrial structure and female unemployment are both measures of job opportunity and availability for women. As such, both are significant; the industrial structure variable with a negative sign and female unemployment with a positive sign. Both tell us that the greater the job opportunities for women, the more likely women are to be out

3. Margaret Reid, "Comment on Education and the Derived Demand for Children," in Schultz, op. cit., page 157.

working and the less likely they are to be having children.

The percentage foreign born and the percentage Hispanic are both used here as taste variables and both prove to be significant. The message should go far beyond these two variables. Tastes and preferences are important determinants of fertility behavior.

But what this study and all others (at least all others that used group data) have done is to measure not tastes ("my taste for children is a 7") but rather factors (foreign born, urbanization, religion--and that with a proxy, yet) which influence tastes. To get at tastes themselves is impossible with grouped data and not, in my opinion, very rewarding, even with individual data which presumably measures tastes by survey questions.

The use of socio-economic groups to get at tastes as proposed by Leibenstein has some validity in theory and might be one direction to go in. However, in practice, there might be thousands of overlapping socio-economic groups in every SMSA (and the relevant groupings might be different for every product).

I'm reminded of my own little world, Brooklyn, New York, what our Borough President reminds us is the fourth largest city in America--if it were only a city. Some sizable percentage of that city within a city is Jewish. And the data from all the studies I've seen say that Jews

have fertility rates that are lower than the American average.

But within that Jewish community of Brooklyn are Orthodox, Conservative, and Reform Jews--all of whom, I would venture, have different birth rates. And within the Orthodox group are "conservadox," modern Orthodox, traditional Orthodox, and Chasidic, to coin names for just the major divisions. I'm not sure any of these distinctions are relevant in considering the demand for cars, but I have a strong hunch that they're a lot more important than income effects in determining the demand for children. And, one might add, they are also important distinctions in considering the demand for some consumer goods, most notably (kosher) food.

When the same variables were tested with quality of children (the percentage of people age 20-21 enrolled in school) as the dependent variable, very different results were found for whites and blacks. For whites, the key variables were the female unemployment rate, the industrial structure, the percentage urban, and the infant mortality rates. For blacks, the key variables were the industrial structure and the percentage urban. If there is any common thread running through these explanatory variables, it is that they are themselves possible measures of quality (infant mortality) or costs of child quality (percentage urban).

RECOMMENDATIONS FOR FURTHER STUDY

The basic postulates used in this paper are that children are goods, that all goods are subject to two constraints--time and money--and that children are relatively time intensive. But this does not distinguish children from cars or refrigerators.

I think we know why people want refrigerators, but why do they want children? In terms of the theoretical framework used in this paper, I have been looking for shifters of the utility function, or alternatively, for factors that change the implicit household production functions.

Since we're discussing the demand for children rather than for cars or refrigerators, we have to ask ourselves what it is about children that makes them different--what is it that distinguishes children from other time-intensive durable goods? As Tobin points out, children have some very peculiar properties that make them different than refrigerators.

"They come in discrete integral lumps; they cannot be bought or sold in the used-child market or scrapped at will; the rental market is highly imperfect; delivery time is more than normally uncertain; their qualities are very uncertain ex ante, and ex post control of quality is quite limited; their own requirements and tastes alter the household utility function, and so on. Suppressing these concerns and looking at the problem as one of durable goods investments, I am led to some other questions..."⁴

What we need to study are the motives people have for having children. Griliches points to two interdependent motives that I think have some relevance for the United States and other developed countries:⁵

(1) the production of reciprocal caring between parents and children; and

(2) an attempt at immortality via one's offspring.

I would venture that it is the strength of such motives that is the missing element in looking at the demand for children. I would also suggest that it is the decline in the returns on those motives (connected with the breakup of the extended family, increased geographic mobility, less assurance of children having grandchildren, less control over adult offspring, etc.) that help explain the secular decline in fertility rates in the United States.⁶

It is usual to conclude a paper such as this both with a summation and a suggestion that there is more research yet

4. James Tobin, "Comment on 'T. Paul Schultz, Birth Rate Changes over Space and Time: A Study of Taiwan,'" in Schultz, op. cit., pages 293-294.

5. Zvi Griliches, "Comment on Toward a New Theory of Population and Economic Growth," in Schultz, op. cit., page 547.

6. Much of the discussion in the preceding paragraphs is based on Marc Nerlove, "Toward a New Theory of Population and Economic Growth" (in Schultz), and on Zvi Griliches' comments on that paper (also in Schultz).

to be done (there is always more to be done--such is the nature of time constraints). In this case, I believe the additional research must look in new and expanded directions--past price and income constraints to the utility function itself.

Easterlin, for example, points to some work which has yielded empirical maps of indifference curves relating to different commodities (shirts versus shoes) and to household attitudes toward male vs. female children. In sociology, attitudinal data are already available both on goods aspirations and ideal family size.⁷

Since much of the model described in this paper is based on the assumption that there is one utility function for the entire household, further study will have to separate that utility function into components for each parent (and maybe for others involved in the decision as well). And the relevant utility functions for examining fertility behavior are interdependent ones--between husband and wife and between parents and children.⁸ As Ryder (1974) points out, much of what we have done until now involves solving the problems of family economics by dissolving the family.

This suggestion is not totally new. Bentham discusses "the pleasures...of being on good terms with him or them,"

7. Easterlin (1978), op.cit., page 67.

"the pleasures resulting from the view of any pleasures supposed to be possessed by the beings who may be the objects of benevolence," and "the pleasures resulting from the view of any pain supposed to be suffered by the beings who may become the objects of malevolence."⁹ More recently, Becker has developed a theory of social interaction and used it to help explain such behavior as discrimination, charity, and interactions within a family.

Becker suggests that a husband would eat with his fingers only if its value to him exceeded the value (to him) of the disgust experienced by his family. And the same husband would read in bed at night only if the value of reading exceeded the value (to him) of the loss in sleep experienced by his wife.¹⁰ Such interdependent utility is also, I believe, a determinant of whether or not children are brought into this world.

8. Relevant starting points might include Gary Becker, "A Theory of Social Interactions," Journal of Political Economy Volume 82 (November/December 1974), pages 1063-93, and Harold Hochman and Shmuel Nitzan, "Concepts of Extended Preference" (unpublished manuscript, 1981). Some work on the effects of intergenerational transfers on population has been done. See, for example, Marc Nerlove, Assaf Razin, and Efrain Sadka, "Bequests and the Size of Population When Population is Endogenous," Journal of Political Economy, Volume 92, Number 3 (1984), pages 527-531.

9. Bentham (1789), page 1064, quoted in Becker (1974), op. cit., page 1064

10. Becker (1974), op. cit., page 1078.

Such interdependence might extend to large segments of society. In criticising the Easterlin approach (criticism that would certainly apply to the Chicago-Columbia model as well), Tully argues that:

"Easterlin's formulation seems to assume that a couple are making decisions with a view to their own present resources and future satisfactions, whereas we have encountered a number of cases where a household or kin group appears to make collective decisions with respect to its own community or the welfare of its senior members...

The existing literature gives too little place to returns from children other than the satisfactions to be gained from direct interaction with them and from vicarious participation in their accomplishments. It also slights the participation of compound households, kin groups, and communities in the crucial decisions."

The theory of the demand for children is also incomplete on other grounds. Just as Becker's theory of marriage required a complementary theory of divorce to make it complete, any theory of fertility must also explain the increasing numbers of cases of child abuse and abandonment that are reported in the daily newspapers. Such issues as adoption, foster-parent programs, child custody battles, and maybe even kidnapping might also be relevant for a complete model of the demand for children.

It is only when we look at all such decisions and the

11. Tully, "Questions and Conclusions", op. cit., pages 346-7

interdependent decision making that goes into them that we will discover the missing link in determining the demand for children.

APPENDIX A -- ALTERNATIVE SPECIFICATIONS OF THE MODEL
 TABLE A-I
 REDUCED FORM WHITE REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	8631685	784698.7	21.800	0.0001
ERROR	306	11014404	35994.79		
C TOTAL	317	19646090			
ROOT MSE		189.7229	R-SQUARE	0.4394	
DEP MEAN		2586.912	ADJ R-SQ	0.4192	
C.V.		7.333953			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2847.418	168.4765	16.901
F	1	7.547532	1.8589	4.060
UNEM	1	34.3866	6.317224	5.443
YFEM	1	-0.0512532	0.01307147	-3.921
YPERM	1	0.0001417221	0.006244044	0.023
XEL	1	1.252609	1.473547	0.850
XFOR	1	-11.9943	2.524458	-4.751
XINDF	1	-42.9179	11.1021	-3.866
AA	1	-136.845	24.08731	-5.681
SP	1	12.94736	1.462895	8.851
URB	1	-1.33259	0.7129807	-1.869
IN	1	2.257152	4.098238	0.551

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
F	1	0.0001	FEMALE HS GRADS
UNEM	1	0.0001	FEMALE UNEMP
YFEM	1	0.0001	FEMALE INCOME
YPERM	1	0.9819	AGE 35/44 INCOME
XEL	1	0.3960	%PRIVATE EDUC
XFOR	1	0.0001	%FOREIGN BORN
XINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.0001	ABORTION
SP	1	0.0001	%HISPANIC
URB	1	0.0626	%URBAN
IN	1	0.5822	INFANT MORT

TABLE A-III
REDUCED FORM BLACK REGRESSION

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	14463611	1314874	16.060	0.0001
ERROR	213	17439330	81874.79		
C TOTAL	224	31902940			
ROOT MSE		286.1377	R-SQUARE	0.4534	
DEP MEAN		3302.511	ADJ R-SQ	0.4251	
C.V.		8.664247			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4098.412	229.0639	17.892
F	1	-13.2849	3.04654	-4.361
UNEM	1	10.56513	4.504731	2.345
YFEM	1	0.004501902	0.01770828	0.254
YPERM	1	-0.0133297	0.0102664	-1.298
XEL	1	-18.3362	6.634048	-2.764
XFOR	1	-25.1929	9.920806	-2.539
XINDF	1	-22.5159	14.92281	-1.509
AA	1	-166.179	44.37799	-3.745
SP	1	43.41337	30.0953	1.443
URB	1	0.6456899	1.52165	0.424
IN	1	13.96394	7.75238	1.801

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
UNEM	1	0.0199		FEMALE UNEMP
YFEM	1	0.7996		FEMALE INCOME
YPERM	1	0.1956		AGE 35/44 INCOME
XEL	1	0.0062		%PRIVATE EDUC
XFOR	1	0.0118		%FOREIGN BORN
XINDF	1	0.1328		INDUST STRUCT-F
AA	1	0.0002		ABORTION
SP	1	0.1506		%HISPANIC
URB	1	0.6717		%URBAN
IN	1	0.0731		INFANT MORT

TABLE A-V
WHITE REGRESSION RESULTS WITH FEMALE INCOME EXCLUDED

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	8200488	745498.9	19.931	0.0001
ERROR	306	11445602	37403.93		
C TOTAL	317	19646090			
ROOT MSE		193.4009	R-SQUARE	0.4174	
DEP MEAN		2586.912	ADJ R-SQ	0.3965	
C.V.		7.476132			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2835.002	172.9112	16.396
F	1	7.80026	1.925152	4.052
UNEM	1	26.48823	6.518979	4.063
YPERM	1	-0.0173916	0.004755756	-3.657
XEL	1	0.5995582	1.5009	0.399
XFOR	1	-11.1167	2.584802	-4.301
XINDF	1	-39.5219	11.60603	-3.405
AA	1	-157.657	24.10169	-6.541
SP	1	12.45304	1.487202	8.373
URB	1	-1.48172	0.7401045	-2.002
IN	1	1.645886	4.251302	0.387
D	1	-1.46481	0.8104278	-1.807

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YPERM	1	0.0003		AGE 35/44 INCOME
XEL	1	0.6898		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0007		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.0462		%URBAN
IN	1	0.6989		INFANT MORT
D	1	0.0717		COLLEGE (QUALITY)

TABLE A-VI
WEIGHTED WHITE REGRESSION RESULTS WITH FEMALE INCOME EXCLUDED

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	265112871021	24101170093	37.660	0.0001
ERROR	306	195828284042	639961713		
C TOTAL	317	460941155063			
ROOT MSE		25297.46	R-SQUARE	0.5752	
DEP MEAN		2466.233	ADJ R-SQ	0.5599	
C.V.		1025.753			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2625.659	174.7266	15.027
F	1	5.928264	2.041023	2.905
UNEM	1	47.10679	6.667561	7.065
YPERM	1	-0.0109764	0.004263379	-2.575
XEL	1	-3.05176	1.538237	-1.984
XFOR	1	-19.3958	2.366853	-8.195
XINDF	1	-21.9211	11.67933	-1.877
AA	1	-187.888	20.34341	-9.236
SP	1	10.06183	1.608255	6.256
URB	1	-0.955201	0.6985122	-1.367
IN	1	-2.34073	4.582831	-0.511
D	1	-1.66997	1.050273	-1.590

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0039		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YPERM	1	0.0105		AGE 35/44 INCOME
XEL	1	0.0482		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0615		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.1725		%URBAN
IN	1	0.6099		INFANT MORT
D	1	0.1129		COLLEGE (QUALITY)

TABLE A-VII
BLACK REGRESSION RESULTS WITH FEMALE INCOME EXCLUDED

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	14458889	1314444	16.050	0.0001
ERROR	213	17444051	81896.95		
C TOTAL	224	31902940			
ROOT MSE		286.1764	R-SQUARE	0.4532	
DEP MEAN		3302.511	ADJ R-SQ	0.4250	
C.V.		8.665419			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4097.213	235.1306	17.425
F	1	-13.2369	3.065986	-4.317
UNEM	1	10.93542	4.391386	2.490
YPERM	1	-0.0119201	0.008446952	-1.411
XEL	1	-17.9746	6.462283	-2.781
XFOR	1	-25.0417	9.902448	-2.529
XINDF	1	-22.5607	15.57402	-1.449
AA	1	-165.313	44.41756	-3.722
SP	1	43.65707	30.145	1.448
URB	1	0.7098135	1.528791	0.464
IN	1	14.00252	7.785969	1.798
D	1	0.1546046	1.853266	0.083

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
UNEM	1	0.0135		FEMALE UNEMP
YPERM	1	0.1597		AGE 35/44 INCOME
XEL	1	0.0059		%PRIVATE EDUC
XFOR	1	0.0122		%FOREIGN BORN
XINDF	1	0.1489		INDUST STRUCT-F
AA	1	0.0003		ABORTION
SP	1	0.1490		%HISPANIC
URB	1	0.6429		%URBAN
IN	1	0.0735		INFANT MORT
D	1	0.9336		COLLEGE (QUALITY)

TABLE A-VIII
 BLACK WEIGHTED REGRESSION RESULTS WITH FEMALE INCOME EXCLUDED

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	105436233943	9585112177	45.182	0.0001
ERROR	213	45186588581	212143608		
C TOTAL	224	150622822524			
ROOT MSE		14565.15	R-SQUARE	0.7000	
DEP MEAN		3052.041	ADJ R-SQ	0.6845	
C.V.		477.2265			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4268.901	232.8509	18.333
F	1	-11.9817	3.325439	-3.603
UNEM	1	6.395195	4.377998	1.461
YPERM	1	-0.00740521	0.007765672	-0.954
XEL	1	-20.4138	5.051568	-4.041
XFOR	1	-38.5636	7.757105	-4.971
XINDF	1	-37.2592	13.14686	-2.834
AA	1	-143.729	31.58572	-4.550
SP	1	108.2246	34.3521	3.150
URB	1	-1.10897	1.738184	-0.638
IN	1	8.443385	6.560624	1.287
D	1	-0.258006	2.130556	-0.121

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
F	1	0.0004	FEMALE HS GRADS
UNEM	1	0.1456	FEMALE UNEMP
YPERM	1	0.3414	AGE 35/44 INCOME
XEL	1	0.0001	%PRIVATE EDUC
XFOR	1	0.0001	%FOREIGN BORN
XINDF	1	0.0050	INDUST STRUCT-F
AA	1	0.0001	ABORTION
SP	1	0.0019	%HISPANIC
URB	1	0.5242	%URBAN
IN	1	0.1995	INFANT MORT
D	1	0.9037	COLLEGE (QUALITY)

TABLE A-IX
 WHITE REGRESSION RESULTS WITH UNEMPLOYMENT EXCLUDED

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	7939357	721759.7	18.866	0.0001
ERROR	306	11706733	38257.3		
C TOTAL	317	19646090			
ROOT MSE		195.5947	R-SQUARE	0.4041	
DEP MEAN		2586.912	ADJ R-SQ	0.3827	
C.V.		7.560935			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3356.669	145.3424	23.095
F	1	8.954447	1.944307	4.605
YFEM	1	-0.0404399	0.01324935	-3.052
YPERM	1	-0.0101326	0.006133512	-1.652
XEL	1	1.227911	1.522115	0.807
XFOR	1	-9.67947	2.586962	-3.742
XINDF	1	-51.5445	11.3738	-4.532
AA	1	-135.084	24.84202	-5.438
SP	1	12.47356	1.505706	8.284
URB	1	-2.49954	0.7245958	-3.450
IN	1	-0.0620727	4.304421	-0.014
D	1	-2.48952	0.796033	-3.127

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
YFEM	1	0.0025		FEMALE INCOME
YPERM	1	0.0996		AGE 35/44 INCOME
XEL	1	0.4205		%PRIVATE EDUC
XFOR	1	0.0002		%FOREIGN BORN
XINDF	1	0.0001		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.0006		%URBAN
IN	1	0.9885		INFANT MORT
D	1	0.0019		COLLEGE (QUALITY)

TABLE A-X
WHITE WEIGHTED REGRESSION RESULTS WITH UNEMPLOYMENT EXCLUDED

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	237786090794	21616917345	29.642	0.0001
ERROR	306	223155064269	729264916		
C TOTAL	317	460941155063			
ROOT MSE		27004.91	R-SQUARE	0.5159	
DEP MEAN		2466.233	ADJ R-SQ	0.4985	
C.V.		1094.986			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3456.445	146.262	23.632
F	1	5.503425	2.177749	2.527
YFEM	1	-0.0299353	0.01189716	-2.516
YPERM	1	-0.00662854	0.00603758	-1.098
XEL	1	-1.45384	1.684563	-0.863
XFOR	1	-14.8894	2.570602	-5.792
XINDF	1	-44.5017	11.91806	-3.734
AA	1	-161.868	22.72815	-7.122
SP	1	8.374496	1.700679	4.924
URB	1	-2.50345	0.7333095	-3.414
IN	1	-4.0312	4.921215	-0.819
D	1	-2.82964	1.110349	-2.548

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0120		FEMALE HS GRADS
YFEM	1	0.0124		FEMALE INCOME
YPERM	1	0.2731		AGE 35/44 INCOME
XEL	1	0.3888		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0002		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.0007		%URBAN
IN	1	0.4133		INFANT MORT
D	1	0.0113		COLLEGE (QUALITY)

TABLE A-XI
BLACK REGRESSION RESULTS WITH UNEMPLOYMENT EXCLUDED

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	14022222	1274747	15.185	0.0001
ERROR	213	17880718	83947.03		
C TOTAL	224	31902940			
ROOT MSE		289.7361	R-SQUARE	0.4395	
DEP MEAN		3302.511	ADJ R-SQ	0.4106	
C.V.		8.773207			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4229.485	230.9131	18.316
F	1	-13.3594	3.105337	-4.302
YFEM	1	0.01588932	0.01725515	0.921
YPERM	1	-0.0164126	0.01036381	-1.584
XEL	1	-17.9855	6.735404	-2.670
XFOR	1	-29.4994	9.873475	-2.988
XINDF	1	-26.3514	15.73016	-1.675
AA	1	-180.69	44.58819	-4.052
SP	1	43.51615	30.52422	1.426
URB	1	0.5536519	1.559157	0.355
IN	1	14.59382	7.878847	1.852
D	1	-0.60567	1.852454	-0.327

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0001		FEMALE HS GRADS
YFEM	1	0.3582		FEMALE INCOME
YPERM	1	0.1148		AGE 35/44 INCOME
XEL	1	0.0082		%PRIVATE EDUC
XFOR	1	0.0031		%FOREIGN BORN
XINDF	1	0.0954		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.1554		%HISPANIC
URB	1	0.7229		%URBAN
IN	1	0.0654		INFANT MORT
D	1	0.7440		COLLEGE (QUALITY)

TABLE A-XII
BLACK WEIGHTED REGRESSION RESULTS WITH UNEMPLOYMENT EXCLUDED

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	107782300200	9798390927	48.717	0.0001
ERROR	213	42840522324	201129213		
C TOTAL	224	150622822524			
ROOT MSE		14182	R-SQUARE	0.7156	
DEP MEAN		3052.041	ADJ R-SQ	0.7009	
C.V.		464.6727			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	4412.812	215.5918	20.468
F	1	-11.2514	3.206809	-3.509
YFEM	1	-0.052976	0.01420155	-3.730
YPERM	1	0.0128596	0.009226038	1.394
XEL	1	-7.95643	5.46291	-1.456
XFOR	1	-35.3013	7.593005	-4.649
XINDF	1	-38.9176	12.71808	-3.060
AA	1	-148.051	30.64734	-4.831
SP	1	97.25495	33.59598	2.895
URB	1	-0.84708	1.687919	-0.502
IN	1	8.127334	6.386391	1.273
D	1	-0.575259	2.071655	-0.278

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0005		FEMALE HS GRADS
YFEM	1	0.0002		FEMALE INCOME
YPERM	1	0.1648		AGE 35/44 INCOME
XEL	1	0.1467		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.0025		INDUST STRUCT-F
AA	1	0.0001		ABORTION
SP	1	0.0042		%HISPANIC
URB	1	0.6163		%URBAN
IN	1	0.2045		INFANT MORT
D	1	0.7815		COLLEGE (QUALITY)

APPENDIX B - REGRESSION RESULTS USING LOGS
 TABLE B-I
 FULL WHITE LOG REGRESSION

DEP VARIABLE: LA FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	0.9130372	0.07608644	13.341	0.0001
ERROR	305	1.739497	0.005703268		
C TOTAL	317	2.652534			

ROOT MSE	0.07551998	R-SQUARE	0.3442
DEP MEAN	7.853925	ADJ R-SQ	0.3184
C.V.	0.9615573		

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	9.89685	0.4202731	23.549
LF	1	0.1134226	0.04899936	2.315
LUNEM	1	0.07221653	0.01576349	4.581
LYFEM	1	-0.108036	0.0434939	-2.484
LYPERM	1	-0.129743	0.05823595	-2.228
LXEL	1	-0.00694286	0.007858315	-0.884
LXFOR	1	-0.0155892	0.00722547	-2.158
LXINDF	1	-0.0920605	0.04179524	-2.203
AA	1	-0.0604715	0.009447518	-6.401
LSP	1	0.0112327	0.00509771	2.203
LURB	1	-.0000630919	0.01565067	-0.004
LIN	1	-0.0150231	0.02243858	-0.670
LD	1	-0.0166538	0.01080814	-1.541

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
LF	1	0.0213	FEMALE HS GRADS
LUNEM	1	0.0001	FEMALE UNEMP
LYFEM	1	0.0135	FEMALE INCOME
LYPERM	1	0.0266	AGE 35/44 INCOME
LXEL	1	0.3777	%PRIVATE EDUC
LXFOR	1	0.0317	%FOREIGN BORN
LXINDF	1	0.0284	INDUST STRUCT-F
AA	1	0.0001	ABORTION
LSP	1	0.0283	%HISPANIC
LURB	1	0.9968	%URBAN
LIN	1	0.5037	INFANT MORT
LD	1	0.1244	COLLEGE (QUALITY)

TABLE B-II
WEIGHTED FULL WHITE LOG REGRESSION

DEP VARIABLE: LA FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	40063.6	3338.633	30.036	0.0001
ERROR	305	33902.39	111.1554		
C TOTAL	317	73965.99			
ROOT MSE		10.54303	R-SQUARE	0.5416	
DEP MEAN		7.805616	ADJ R-SQ	0.5236	
C.V.		135.0697			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	8.714339	0.4212787	20.685
LF	1	0.08412087	0.05641938	1.491
LUNEM	1	0.1004273	0.01717899	5.846
LYFEM	1	-0.133847	0.04044766	-3.309
LYPERM	1	0.03274785	0.05803393	0.564
LXEL	1	-0.0349655	0.008695069	-4.021
LXFOR	1	-0.0163145	0.008076942	-2.020
LXINDF	1	-0.0358011	0.04583591	-0.781
AA	1	-0.0713068	0.008872658	-8.037
LSP	1	-0.002792	0.005128423	-0.544
LURB	1	-0.00190175	0.01853892	-0.103
LIN	1	-0.0562366	0.02430535	-2.314
LD	1	-0.0418872	0.01481065	-2.828

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
LF	1	0.1370	FEMALE HS GRADS
LUNEM	1	0.0001	FEMALE UNEMP
LYFEM	1	0.0010	FEMALE INCOME
LYPERM	1	0.5730	AGE 35/44 INCOME
LXEL	1	0.0001	%PRIVATE EDUC
LXFOR	1	0.0443	%FOREIGN BORN
LXINDF	1	0.4354	INDUST STRUCT-F
AA	1	0.0001	ABORTION
LSP	1	0.5866	%HISPANIC
LURB	1	0.9184	%URBAN
LIN	1	0.0213	INFANT MORT
LD	1	0.0050	COLLEGE (QUALITY)

TABLE B-III
FULL BLACK REGRESSION

DEP VARIABLE: LA

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	1.280368	0.1066973	13.506	0.0001
ERROR	212	1.674792	0.00789996		
C TOTAL	224	2.955159			
ROOT MSE		0.08888172	R-SQUARE	0.4333	
DEP MEAN		8.095907	ADJ R-SQ	0.4012	
C.V.		1.09786			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	9.481841	0.4107947	23.082
LF	1	-0.205232	0.05376369	-3.817
LUNEM	1	0.03984012	0.01591979	2.503
LYFEM	1	-0.0196538	0.04445172	-0.442
LYPERM	1	-0.0581203	0.05087743	-1.142
LXEL	1	-0.0162496	0.008587379	-1.892
LXFOR	1	-0.0149745	0.01039379	-1.441
LXINDF	1	-0.0495345	0.03112547	-1.591
AA	1	-0.0544811	0.01374698	-3.963
LSP	1	0.0139881	0.0159415	0.877
LURB	1	0.01216725	0.03213135	0.379
LIN	1	0.05299925	0.03473564	1.526
LD	1	0.004500718	0.01585535	0.284

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
LF	1	0.0002		FEMALE HS GRADS
LUNEM	1	0.0131		FEMALE UNEMP
LYFEM	1	0.6588		FEMALE INCOME
LYPERM	1	0.2546		AGE 35/44 INCOME
LXEL	1	0.0598		%PRIVATE EDUC
LXFOR	1	0.1511		%FOREIGN BORN
LXINDF	1	0.1130		INDUST STRUCT-F
AA	1	0.0001		ABORTION
LSP	1	0.3812		%HISPANIC
LURB	1	0.7053		%URBAN
LIN	1	0.1286		INFANT MORT
LD	1	0.7768		COLLEGE (QUALITY)

TABLE B-IV
WEIGHTED FULL BLACK LOG REGRESSION

DEP VARIABLE: LA

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	11499.97	958.3305	47.579	0.0001
ERROR	212	4270.041	20.1417		
C TOTAL	224	15770.01			
ROOT MSE		4.487951	R-SQUARE	0.7292	
DEP MEAN		8.017177	ADJ R-SQ	0.7139	
C.V.		55.97919			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	9.661401	0.3790224	25.490
LF	1	-0.150729	0.05649629	-2.668
LUNEM	1	0.02977603	0.01620953	1.837
LYFEM	1	-0.161551	0.03419499	-4.724
LYPERM	1	0.09208139	0.045149	2.039
LXEL	1	-0.0137817	0.009403679	-1.466
LXFOR	1	-0.0348164	0.01075574	-3.237
LXINDF	1	-0.0847191	0.03185199	-2.660
AA	1	-0.0604979	0.009925958	-6.095
LSP	1	0.02399509	0.01715094	1.399
LURB	1	-0.0404004	0.03715156	-1.087
LIN	1	-0.0135838	0.02587129	-0.525
LD	1	-0.0150051	0.01874246	-0.801

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
LF	1	0.0082		FEMALE HS GRADS
LUNEM	1	0.0676		FEMALE UNEMP
LYFEM	1	0.0001		FEMALE INCOME
LYPERM	1	0.0426		AGE 35/44 INCOME
LXEL	1	0.1442		%PRIVATE EDUC
LXFOR	1	0.0014		%FOREIGN BORN
LXINDF	1	0.0084		INDUST STRUCT-F
AA	1	0.0001		ABORTION
LSP	1	0.1633		%HISPANIC
LURB	1	0.2781		%URBAN
LIN	1	0.6001		INFANT MORT
LD	1	0.4243		COLLEGE (QUALITY)

TABLE B-V
WHITE QUALITY LOG REGRESSION

DEP VARIABLE: LD COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	12.64429	1.149481	7.204	0.0001
ERROR	306	48.82267	0.1595512		
C TOTAL	317	61.46696			
ROOT MSE		0.3994386	R-SQUARE	0.2057	
DEP MEAN		3.40982	ADJ R-SQ	0.1772	
C.V.		11.71436			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	6.020893	2.19609	2.742
LF	1	0.3444381	0.2584173	1.333
LUNEM	1	-0.364833	0.08072525	-4.519
LYFEM	1	-0.104977	0.2299687	-0.456
LYPERM	1	-0.205058	0.3077972	-0.666
LXEL	1	-0.0214351	0.04154596	-0.516
LXFOR	1	0.08411895	0.03791305	2.219
LXINDF	1	0.6761911	0.2176566	3.107
AA	1	-0.0130658	0.04996402	-0.262
LSP	1	-0.0522546	0.02679671	-1.950
LURB	1	-0.192704	0.08204289	-2.349
LIN	1	-0.421862	0.1162056	-3.630

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0065		INTERCEPT
LF	1	0.1836		FEMALE HS GRADS
LUNEM	1	0.0001		FEMALE UNEMP
LYFEM	1	0.6484		FEMALE INCOME
LYPERM	1	0.5058		AGE 35/44 INCOME
LXEL	1	0.6063		%PRIVATE EDUC
LXFOR	1	0.0272		%FOREIGN BORN
LXINDF	1	0.0021		INDUST STRUCT-F
AA	1	0.7939		ABORTION
LSP	1	0.0521		%HISPANIC
LURB	1	0.0195		%URBAN
LIN	1	0.0003		INFANT MORT

TABLE B-VI
WEIGHTED WHITE QUALITY LOG REGRESSION

DEP VARIABLE: LD

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	10	216722.1	21672.21	13.099	0.0001
ERROR	307	507940.9	1654.531		
C TOTAL	317	724662.9			
ROOT MSE		40.67592	R-SQUARE	0.2991	
DEP MEAN		3.457935	ADJ R-SQ	0.2762	
C.V.		1176.307			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	5.781579	1.573863	3.673
LF	1	0.2087751	0.2164128	0.965
LUNEM	1	-0.237854	0.06487072	-3.667
LYPERM	1	-0.296419	0.1817999	-1.630
LXEL	1	0.006615383	0.03334932	0.198
LXFOR	1	0.1361514	0.02930787	4.646
LXINDF	1	0.8095005	0.1697885	4.768
AA	1	0.05639229	0.03297943	1.710
LSP	1	-0.0725898	0.01930044	-3.761
LURB	1	-0.165169	0.07004577	-2.358
LIN	1	-0.416514	0.09032472	-4.611

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0003	INTERCEPT
LF	1	0.3355	FEMALE HS GRADS
LUNEM	1	0.0003	FEMALE UNEMP
LYPERM	1	0.1040	AGE 35/44 INCOME
LXEL	1	0.8429	%PRIVATE EDUC
LXFOR	1	0.0001	%FOREIGN BORN
LXINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.0883	ABORTION
LSP	1	0.0002	%HISPANIC
LURB	1	0.0190	%URBAN
LIN	1	0.0001	INFANT MORT

TABLE B-VII
BLACK QUALITY LOG REGRESSION

DEP VARIABLE: LD

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	8.017095	0.7288268	4.940	0.0001
ERROR	213	31.42485	0.1475345		
C TOTAL	224	39.44194			
ROOT MSE		0.3841022	R-SQUARE	0.2033	
DEP MEAN		3.261309	ADJ R-SQ	0.1621	
C.V.		11.77755			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2.248039	1.768553	1.271
LF	1	-0.53236	0.2294584	-2.320
LUNEM	1	-0.226328	0.06702676	-3.377
LYFEM	1	0.3267946	0.1907885	1.713
LYPERM	1	0.1300191	0.2196862	0.592
LXEL	1	0.09845572	0.03649203	2.698
LXFOR	1	-0.00310246	0.04491625	-0.069
LXINDF	1	0.5474147	0.1291732	4.238
AA	1	-0.0122253	0.05940162	-0.206
LSP	1	-0.101371	0.06854011	-1.479
LURB	1	-0.243102	0.1378529	-1.763
LIN	1	-0.244583	0.1491716	-1.640

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.2051	INTERCEPT
LF	1	0.0213	FEMALE HS GRADS
LUNEM	1	0.0009	FEMALE UNEMP
LYFEM	1	0.0882	FEMALE INCOME
LYPERM	1	0.5546	AGE 35/44 INCOME
LXEL	1	0.0075	%PRIVATE EDUC
LXFOR	1	0.9450	%FOREIGN BORN
LXINDF	1	0.0001	INDUST STRUCT-F
AA	1	0.8371	ABORTION
LSP	1	0.1406	%HISPANIC
LURB	1	0.0793	%URBAN
LIN	1	0.1026	INFANT MORT

APPENDIX C
REGIONAL RESULTS FOR WHITES

TABLE C-I
MEANS OF VARIABLES(NORTHEAST)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	63	2539.7	182.2	1979.0	2918.0
D	63	36.3	11.5	14.3	84.9
F	63	67.4	7.2	46.8	79.9
UNEM	63	5.9	1.7	2.6	9.9
YFEM	63	10140.2	1216.3	4777.0	12888.0
YPERM	63	24085.6	3710.7	18786.0	40179.0
XEL	63	14.9	10.6	4.5	83.5
XFOR	63	6.4	4.4	1.1	23.7
XINDF	63	9.2	1.0	6.8	12.1
AA	63	0.2	0.4	0.0	1.0
SP	63	2.1	3.4	0.2	23.4
URB	63	66.7	20.9	5.2	100.0
IN	63	12.4	2.2	7.4	19.3

WEIGHTED MEANS OF VARIABLES (NORTHEAST)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	1585667	2393.9	255.6
D	1585667	39.3	7.6
F	1585667	68.7	5.9
UNEM	1585667	5.7	1.3
YFEM	1585667	11031.1	1343.8
YPERM	1585667	24446.1	2565.0
XEL	1585667	18.0	8.8
XFOR	1585667	9.0	6.0
XINDF	1585667	9.8	1.0
AA	1585667	0.5	0.5
SP	1585667	3.7	4.3
URB	1585667	66.1	18.8
IN	1585667	12.9	1.8

TABLE C-II
MEANS OF VARIABLES(SOUTH)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	118	2525.8	255.3	2030.0	3764.0
D	118	31.0	15.4	4.8	85.8
F	118	64.6	7.9	38.7	84.8
UNEM	118	5.4	1.9	2.0	12.1
YFEM	118	9594.3	913.7	7557.0	14040.0
YPERM	118	23145.0	3013.9	13513.0	33474.0
XEL	118	10.6	7.0	1.4	41.5
XFOR	118	3.0	4.8	0.4	37.6
XINDF	118	9.3	1.1	6.8	12.5
AA	118	0.4	0.5	0.0	1.0
SP	118	5.6	14.6	0.4	91.0
URB	118	68.7	15.8	34.5	100.0
IN	118	14.6	2.9	7.6	28.1

WEIGHTED MEANS OF VARIABLES (SOUTH)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	2360341	2420.5	233.6
D	2360341	31.4	11.2
F	2360341	67.6	7.7
UNEM	2360341	4.7	1.5
YFEM	2360341	10369.0	1322.1
YPERM	2360341	24945.9	3650.1
XEL	2360341	12.6	7.5
XFOR	2360341	4.4	6.8
XINDF	2360341	9.5	1.1
AA	2360341	0.4	0.5
SP	2360341	6.1	12.7
URB	2360341	74.3	15.1
IN	2360341	14.6	2.0

TABLE C-III
MEANS OF VARIABLES(NORTHCENTRAL)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	85	2700.2	202.2	2299.0	3396.0
D	85	35.7	18.2	14.4	84.1
F	85	71.2	5.6	61.4	85.4
UNEM	85	6.1	2.2	2.3	12.0
YFEM	85	10326.6	1015.5	7351.0	12715.0
YPERM	85	25283.1	2006.4	18789.0	30650.0
XEL	85	13.2	7.2	3.3	42.2
XFOR	85	2.1	1.5	0.6	9.5
XINDF	85	8.8	1.1	6.8	12.4
AA	85	0.0	0.2	0.0	1.0
SP	85	1.1	2.3	0.2	21.1
URB	85	66.4	15.3	28.3	100.0
IN	85	13.4	2.8	5.7	23.1

WEIGHTED MEANS OF VARIABLES(NORTHCENTRAL)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	2034438	2605.2	153.6
D	2034438	31.4	11.0
F	2034438	70.7	4.8
UNEM	2034438	5.8	2.0
YFEM	2034438	11043.8	1060.0
YPERM	2034438	26825.0	2048.5
XEL	2034438	16.5	6.6
XFOR	2034438	4.0	3.0
XINDF	2034438	9.0	0.7
AA	2034438	0.0	0.2
SP	2034438	1.8	2.2
URB	2034438	75.0	13.3
IN	2034438	14.1	2.5

TABLE C-IV
MEANS OF VARIABLES(WEST)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	52	2597.6	308.4	1981.0	4107.0
D	52	31.0	13.4	11.7	62.8
F	52	76.5	6.0	60.9	89.4
UNEM	52	6.9	2.2	3.8	14.4
YFEM	52	10612.7	1938.3	4364.0	16249.0
YPERM	52	25060.0	3054.7	19940.0	37381.0
XEL	52	8.1	4.2	0.9	22.7
XFOR	52	7.2	8.8	1.7	53.8
XINDF	52	8.1	0.8	6.3	9.9
AA	52	0.8	0.4	0.0	1.0
SP	52	7.3	8.0	0.9	43.8
URB	52	71.3	19.5	26.9	100.0
IN	52	11.5	2.2	6.6	16.6

WEIGHTED MEANS OF VARIABLES(WEST)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	1704821	2431.0	271.7
D	1704821	32.4	8.1
F	1704821	77.1	4.8
UNEM	1704821	5.7	1.6
YFEM	1704821	11316.5	1873.0
YPERM	1704821	26491.3	2595.3
XEL	1704821	11.2	4.7
XFOR	1704821	8.9	6.5
XINDF	1704821	8.2	0.6
AA	1704821	0.9	0.3
SP	1704821	9.7	7.4
URB	1704821	84.9	17.5
IN	1704821	11.0	1.9

TABLE C-V
FULL WHITE REGRESSION(NORTHEAST)

DEP VARIABLE: A FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	1489603	124133.6	10.921	0.0001
ERROR	50	568304.3	11366.09		
C TOTAL	62	2057907			
ROOT MSE		106.6119	R-SQUARE	0.7238	
DEP MEAN		2539.698	ADJ R-SQ	0.6576	
C.V.		4.197815			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3093.904	240.5419	12.862
F	1	5.711038	3.860369	1.479
UNEM	1	21.39056	12.79567	1.672
YFEM	1	-0.00869768	0.02174949	-0.400
YPERM	1	-0.0153763	0.007221969	-2.129
XEL	1	-2.87031	1.467821	-1.955
XFOR	1	-6.33149	6.854243	-0.924
XINDF	1	-40.877	22.23162	-1.839
AA	1	42.28567	39.61751	1.067
SP	1	-13.1473	8.225498	-1.598
URB	1	-0.226225	0.7766187	-0.291
IN	1	-4.06294	7.733628	-0.525
D	1	-1.64162	1.502474	-1.093

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.1453		FEMALE HS GRADS
UNEM	1	0.1008		FEMALE UNEMP
YFEM	1	0.6909		FEMALE INCOME
YPERM	1	0.0382		AGE 35/44 INCOME
XEL	1	0.0561		%PRIVATE EDUC
XFOR	1	0.3601		%FOREIGN BORN
XINDF	1	0.0719		INDUST STRUCT-F
AA	1	0.2909		ABORTION
SP	1	0.1163		%HISPANIC
URB	1	0.7720		%URBAN
IN	1	0.6017		INFANT MORT
D	1	0.2798		COLLEGE (QUALITY)

TABLE C-VI
FULL WHITE REGRESSION(SOUTH)

DEP VARIABLE: A FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	6200296	516691.4	38.113	0.0001
ERROR	105	1423468	13556.84		
C TOTAL	117	7623765			
ROOT MSE		116.4338	R-SQUARE	0.8133	
DEP MEAN		2525.831	ADJ R-SQ	0.7919	
C.V.		4.609725			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2696.049	195.4113	13.797
F	1	-0.12306	2.864289	-0.043
UNEM	1	35.85848	7.715691	4.647
YFEM	1	-0.0840722	0.02990145	-2.812
YPERM	1	0.01581603	0.009483575	1.668
XEL	1	1.530739	1.807438	0.847
XFOR	1	-24.6674	4.065893	-6.067
XINDF	1	13.96081	16.24162	0.860
AA	1	-81.3326	27.71307	-2.935
SP	1	18.03676	1.583452	11.391
URB	1	-0.379929	0.9844137	-0.386
IN	1	4.556959	3.993684	1.141
D	1	-3.07851	0.8330937	-3.695

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.9658		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YFEM	1	0.0059		FEMALE INCOME
YPERM	1	0.0983		AGE 35/44 INCOME
XEL	1	0.3990		%PRIVATE EDUC
XFOR	1	0.0001		%FOREIGN BORN
XINDF	1	0.3920		INDUST STRUCT-F
AA	1	0.0041		ABORTION
SP	1	0.0001		%HISPANIC
URB	1	0.7003		%URBAN
IN	1	0.2564		INFANT MORT
D	1	0.0004		COLLEGE (QUALITY)

TABLE C-VII
 FULL WHITE REGRESSION(NORTHCENTRAL)

DEP VARIABLE: A

FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	2152394	179366.1	10.065	0.0001
ERROR	72	1283105	17820.91		
C TOTAL	84	3435499			
ROOT MSE		133.495	R-SQUARE	0.6265	
DEP MEAN C.V.		2700.188	ADJ R-SQ	0.5643	
		4.943914			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2532.251	377.1032	6.715
F	1	15.76288	4.812469	3.275
UNEM	1	24.84778	10.55923	2.353
YFEM	1	-0.0386137	0.02342009	-1.649
YPERM	1	-0.00436368	0.01376793	-0.317
XEL	1	16.30357	2.655235	6.140
XFOR	1	-31.3832	12.41697	-2.527
XINDF	1	-61.8755	19.8693	-3.114
AA	1	-128.514	75.30879	-1.706
SP	1	6.202027	7.072243	0.877
URB	1	-3.31056	1.272871	-2.601
IN	1	5.782737	6.313224	0.916
D	1	-1.80594	1.087579	-1.661

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0016		FEMALE HS GRADS
UNEM	1	0.0213		FEMALE UNEMP
YFEM	1	0.1036		FEMALE INCOME
YPERM	1	0.7522		AGE 35/44 INCOME
XEL	1	0.0001		%PRIVATE EDUC
XFOR	1	0.0137		%FOREIGN BORN
XINDF	1	0.0026		INDUST STRUCT-F
AA	1	0.0922		ABORTION
SP	1	0.3834		%HISPANIC
URB	1	0.0113		%URBAN
IN	1	0.3627		INFANT MORT
D	1	0.1012		COLLEGE (QUALITY)

TABLE C-VIII
FULL WHITE REGRESSION(WEST)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	2678073	223172.8	4.004	0.0005
ERROR	39	2173587	55733.01		
C TOTAL	51	4851661			
ROOT MSE		236.0784	R-SQUARE	0.5520	
DEP MEAN		2597.558	ADJ R-SQ	0.4141	
C.V.		9.088476			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2785.59	911.9258	3.055
F	1	1.287087	11.23814	0.115
UNEM	1	11.83756	24.88531	0.476
YFEM	1	-0.0052023	0.03627959	-0.143
YPERM	1	-0.0270605	0.02234404	-1.211
XEL	1	-38.0314	10.91482	-3.484
XFOR	1	8.657507	5.732015	1.510
XINDF	1	98.60247	56.12726	1.757
AA	1	-133.886	149.52	-0.895
SP	1	-1.91071	8.762006	-0.218
URB	1	-1.53715	2.522972	-0.609
IN	1	-4.46976	20.55397	-0.217
D	1	2.962338	3.21433	0.922

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0041		INTERCEPT
F	1	0.9094		FEMALE HS GRADS
UNEM	1	0.6370		FEMALE UNEMP
YFEM	1	0.8867		FEMALE INCOME
YPERM	1	0.2332		AGE 35/44 INCOME
XEL	1	0.0012		%PRIVATE EDUC
XFOR	1	0.1390		%FOREIGN BORN
XINDF	1	0.0868		INDUST STRUCT-F
AA	1	0.3760		ABORTION
SP	1	0.8285		%HISPANIC
URB	1	0.5459		%URBAN
IN	1	0.8290		INFANT MORT
D	1	0.3624		COLLEGE (QUALITY)

TABLE C-IX
WEIGHTED FULL WHITE REGRESSION(NORTHEAST)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	95007480911	7917290076	46.175	0.0001
ERROR	50	8573104836	171462097		
C TOTAL	62	103580585748			
ROOT MSE		13094.35	R-SQUARE	0.9172	
DEP MEAN		2393.873	ADJ R-SQ	0.8974	
C.V.		546.9945			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	3102.373	237.1042	13.084
F	1	4.813507	4.282825	1.124
UNEM	1	25.66629	14.13858	1.815
YFEM	1	-0.0448818	0.0253607	-1.770
YPERM	1	-0.00108273	0.006821815	-0.159
XEL	1	-7.51341	2.722164	-2.760
XFOR	1	-3.12368	7.336688	-0.426
XINDF	1	-39.1384	24.85816	-1.574
AA	1	49.05298	38.59383	1.271
SP	1	-24.1408	11.71685	-2.060
URB	1	-1.01578	0.9685562	-1.049
IN	1	-0.620903	9.786775	-0.063
D	1	0.6789038	1.947933	0.349

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.2664		FEMALE HS GRADS
UNEM	1	0.0755		FEMALE UNEMP
YFEM	1	0.0829		FEMALE INCOME
YPERM	1	0.8745		AGE 35/44 INCOME
XEL	1	0.0081		%PRIVATE EDUC
XFOR	1	0.6721		%FOREIGN BORN
XINDF	1	0.1217		INDUST STRUCT-F
AA	1	0.2096		ABORTION
SP	1	0.0446		%HISPANIC
URB	1	0.2993		%URBAN
IN	1	0.9497		INFANT MORT
D	1	0.7289		COLLEGE (QUALITY)

TABLE C-XI
WEIGHTED FULL WHITE REGRESSION(NORTHCENTRAL)

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM 'OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	32240619254	2686718271	12.271	0.0001
ERROR	72	15764328559	218949008		
C TOTAL	84	48004947814			
ROOT MSE		14796.93	R-SQUARE	0.6716	
DEP MEAN		2605.237	ADJ R-SQ	0.6169	
C.V.		567.9686			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2392.336	383.5945	6.237
F	1	15.06353	4.063902	3.707
UNEM	1	36.62822	8.867189	4.131
YFEM	1	-0.024378	0.01892925	-1.288
YPERM	1	0.001189535	0.01213576	0.098
XEL	1	10.37729	2.741043	3.786
XFOR	1	-23.087	7.560667	-3.054
XINDF	1	-79.9364	19.86519	-4.024
AA	1	-122.405	58.62151	-2.088
SP	1	4.968869	6.570211	0.756
URB	1	-2.48287	1.181261	-2.102
IN	1	3.357765	6.78301	0.495
D	1	-1.54227	1.255472	-1.228

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0004		FEMALE HS GRADS
UNEM	1	0.0001		FEMALE UNEMP
YFEM	1	0.2019		FEMALE INCOME
YPERM	1	0.9222		AGE 35/44 INCOME
XEL	1	0.0003		%PRIVATE EDUC
XFOR	1	0.0032		%FOREIGN BORN
XINDF	1	0.0001		INDUST STRUCT-F
AA	1	0.0403		ABORTION
SP	1	0.4520		%HISPANIC
URB	1	0.0391		%URBAN
IN	1	0.6221		INFANT MORT
D	1	0.2233		COLLEGE (QUALITY)

TABLE C-XII
WEIGHTED FULL WHITE REGRESSION(WEST)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	90910260370	7575855031	8.457	0.0001
ERROR	39	34936219186	895800492		
C TOTAL	51	125846479557			
ROOT MSE		29929.93	R-SQUARE	0.7224	
DEP MEAN		2430.993	ADJ R-SQ	0.6370	
C.V.		1231.181			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	2906.287	905.2894	3.210
F	1	6.332234	10.86824	0.583
UNEM	1	-2.16633	24.34759	-0.089
YFEM	1	0.0171526	0.02569135	0.668
YPERM	1	-0.0344902	0.01843838	-1.871
XEL	1	-46.8754	8.893318	-5.271
XFOR	1	8.911566	5.96338	1.494
XINDF	1	83.08839	52.41946	1.585
AA	1	-150.691	123.168	-1.223
SP	1	7.243923	8.680591	0.834
URB	1	-3.46154	2.289013	-1.512
IN	1	-10.697	19.71246	-0.543
D	1	-0.0435524	3.438074	-0.013

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0027		INTERCEPT
F	1	0.5635		FEMALE HS GRADS
UNEM	1	0.9296		FEMALE UNEMP
YFEM	1	0.5083		FEMALE INCOME
YPERM	1	0.0689		AGE 35/44 INCOME
XEL	1	0.0001		%PRIVATE EDUC
XFOR	1	0.1431		%FOREIGN BORN
XINDF	1	0.1210		INDUST STRUCT-F
AA	1	0.2285		ABORTION
SP	1	0.4091		%HISPANIC
URB	1	0.1385		%URBAN
IN	1	0.5905		INFANT MORT
D	1	0.9900		COLLEGE (QUALITY)

TABLE C-XIII
WHITE QUALITY REGRESSION (NORTHEAST)

DEP VARIABLE: D COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	3188.745	289.8859	2.936	0.0045
ERROR	51	5034.972	98.72495		
C TOTAL	62	8223.717			
ROOT MSE		9.936043	R-SQUARE	0.3877	
DEP MEAN		36.34921	ADJ R-SQ	0.2557	
C.V.		27.33497			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	-0.272451	22.41807	-0.012
F	1	0.9449242	0.3345655	2.824
UNEM	1	-1.88582	1.162931	-1.622
YFEM	1	0.0009253033	0.00202287	0.457
YPERM	1	-0.00200615	0.0006116503	-3.280
XEL	1	0.09670937	0.1361264	0.710
XFOR	1	0.851936	0.627566	1.358
XINDF	1	2.721722	2.036596	1.336
AA	1	-1.0204	3.689519	-0.277
SP	1	-0.34694	0.7650615	-0.453
URB	1	-0.0574301	0.07193141	-0.798
IN	1	-0.344773	0.7191423	-0.479

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.9904	INTERCEPT
F	1	0.0067	FEMALE HS GRADS
UNEM	1	0.1111	FEMALE UNEMP
YFEM	1	0.6493	FEMALE INCOME
YPERM	1	0.0019	AGE 35/44 INCOME
XEL	1	0.4807	%PRIVATE EDUC
XFOR	1	0.1806	%FOREIGN BORN
XINDF	1	0.1873	INDUST STRUCT--F
AA	1	0.7832	ABORTION
SP	1	0.6521	%HISPANIC
URB	1	0.4283	%URBAN
IN	1	0.6337	INFANT MORT

TABLE C-XVI
WHITE QUALITY REGRESSION (WEST)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	3705.633	336.8757	2.498	0.0171
ERROR	40	5394.255	134.8564		
C TOTAL	51	9099.888			
ROOT MSE		11.61277	R-SQUARE	0.4072	
DEP MEAN		30.98462	ADJ R-SQ	0.2442	
C.V.		37.47914			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	70.11766	43.4663	1.613
F	1	0.8882493	0.5346693	1.661
UNEM	1	-1.87101	1.187831	-1.575
YFEM	1	-0.00229114	0.001747449	-1.311
YPERM	1	-0.000821129	0.001091415	-0.752
XEL	1	-0.568336	0.5293296	-1.074
XFOR	1	0.1564536	0.2808723	0.557
XINDF	1	-3.40032	2.708064	-1.256
AA	1	10.36031	7.170191	1.445
SP	1	0.3201145	0.4280235	0.748
URB	1	-0.0792667	0.1234713	-0.642
IN	1	-2.00806	0.9599099	-2.092

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.1146		INTERCEPT
F	1	0.1045		FEMALE HS GRADS
UNEM	1	0.1231		FEMALE UNEMP
YFEM	1	0.1973		FEMALE INCOME
YPERM	1	0.4562		AGE 35/44 INCOME
XEL	1	0.2894		%PRIVATE EDUC
XFOR	1	0.5806		%FOREIGN BORN
XINDF	1	0.2165		INDUST STRUCT-F
AA	1	0.1563		ABORTION
SP	1	0.4589		%HISPANIC
URB	1	0.5245		%URBAN
IN	1	0.0428		INFANT MORT

TABLE C-XVIII
WEIGHTED QUALITY REGRESSION(SOUTH)

DEP VARIABLE: D COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	98785401	8980491	4.859	0.0001
ERROR	106	195899374	1848107		
C TOTAL	117	294684775			
ROOT MSE		1359.451	R-SQUARE	0.3352	
DEP MEAN		31.42009	ADJ R-SQ	0.2662	
C.V.		4326.694			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	31.50511	15.97293	1.972
F	1	0.2001659	0.2814699	0.711
UNEM	1	-2.31802	0.8688982	-2.668
YFEM	1	-0.00306753	0.002885203	-1.063
YPERM	1	.00000567918	0.001074602	0.005
XEL	1	0.03829911	0.1468696	0.261
XFOR	1	0.6832114	0.2242552	3.047
XINDF	1	5.644967	1.592897	3.544
AA	1	3.274967	2.485846	1.317
SP	1	-0.0683276	0.1427155	-0.479
URB	1	-0.321703	0.09389621	-3.426
IN	1	-0.36766	0.4809433	-0.764

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0512	INTERCEPT
F	1	0.4786	FEMALE HS GRADS
UNEM	1	0.0088	FEMALE UNEMP
YFEM	1	0.2901	FEMALE INCOME
YPERM	1	0.9958	AGE 35/44 INCOME
XEL	1	0.7948	%PRIVATE EDUC
XFOR	1	0.0029	%FOREIGN BORN
XINDF	1	0.0006	INDUST STRUCT-F
AA	1	0.1905	ABORTION
SP	1	0.6331	%HISPANIC
URB	1	0.0009	%URBAN
IN	1	0.4463	INFANT MORT

TABLE C-XIX
WEIGHTED QUALITY REGRESSION(NORTHCENTRAL)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	106453838	9677622	5.086	0.0001
ERROR	73	138908448	1902855		
C TOTAL	84	245362287			
ROOT MSE		1379.44	R-SQUARE	0.4339	
DEP MEAN		31.42364	ADJ R-SQ	0.3486	
C.V.		4389.817			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	42.6419	35.41053	1.204
F	1	0.4706969	0.3748295	1.256
UNEM	1	-0.677024	0.8228352	-0.823
YFEM	1	0.001109022	0.001759895	0.630
YPERM	1	-0.00252923	0.001091939	-2.316
XEL	1	-0.612601	0.245268	-2.498
XFOR	1	1.809252	0.6722802	2.691
XINDF	1	4.555331	1.773522	2.569
AA	1	-6.79329	5.40683	-1.256
SP	1	0.05119896	0.6124772	0.084
URB	1	-0.00697989	0.1101198	-0.063
IN	1	-1.59167	0.6042809	-2.634

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.2324		INTERCEPT
F	1	0.2132		FEMALE HS GRADS
UNEM	1	0.4133		FEMALE UNEMP
YFEM	1	0.5306		FEMALE INCOME
YPERM	1	0.0234		AGE 35/44 INCOME
XEL	1	0.0148		%PRIVATE EDUC
XFOR	1	0.0088		%FOREIGN BORN
XINDF	1	0.0123		INDUST STRUCT-F
AA	1	0.2130		ABORTION
SP	1	0.9336		%HISPANIC
URB	1	0.9496		%URBAN
IN	1	0.0103		INFANT MORT

TABLE C-XX
WEIGHTED QUALITY REGRESSION(WEST)

DEP VARIABLE: D COLLEGE (QUALITY)
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	36115333	3283212	1.733	0.1009
ERROR	40	75784571	1894614		
C TOTAL	51	111899904			
ROOT MSE		1376.45	R-SQUARE	0.3227	
DEP MEAN C.V.		32.35735	ADJ R-SQ	0.1365	
		4253.901			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	40.97272	41.12631	0.996
F	1	0.3644413	0.4964877	0.734
UNEM	1	-0.429209	1.117665	-0.384
YFEM	1	-0.00213052	0.001132482	-1.881
YPERM	1	0.0007031906	0.0008406436	0.836
XEL	1	0.308628	0.406074	0.760
XFOR	1	0.117527	0.2736201	0.430
XINDF	1	-1.66213	2.396355	-0.694
AA	1	3.979492	5.629328	0.707
SP	1	-0.0348272	0.3991745	-0.087
URB	1	-0.0214435	0.105215	-0.204
IN	1	-1.90429	0.8550964	-2.227

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.3251	INTERCEPT
F	1	0.4672	FEMALE HS GRADS
UNEM	1	0.7030	FEMALE UNEMP
YFEM	1	0.0672	FEMALE INCOME
YPERM	1	0.4078	AGE 35/44 INCOME
XEL	1	0.4517	%PRIVATE EDUC
XFOR	1	0.6698	%FOREIGN BORN
XINDF	1	0.4919	INDUST STRUCT-F
AA	1	0.4837	ABORTION
SP	1	0.9309	%HISPANIC
URB	1	0.8395	%URBAN
IN	1	0.0316	INFANT MORT

APPENDIX D
REGIONAL RESULTS FOR BLACKS

TABLE D-I
MEANS OF VARIABLES(NORTHEAST)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	38	3147.1	347.7	2550.0	4016.0
D	38	30.4	8.2	12.9	46.5
F	38	54.4	5.8	37.9	64.6
UNEM	38	11.9	4.2	4.2	23.9
YFEM	38	10205.6	753.0	8575.0	11577.0
YPERM	38	16600.8	2697.3	12995.0	23308.0
XEL	38	7.7	3.8	1.9	18.0
XFOR	38	5.2	4.3	0.9	18.7
XINDF	38	7.1	1.6	4.1	10.3
AA	38	0.2	0.4	0.0	1.0
SP	38	2.2	1.1	0.7	5.3
URB	38	92.8	12.8	34.5	100.0
IN	38	12.9	2.2	9.3	19.3

WEIGHTED MEANS OF VARIABLES(NORTHEAST)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	323701	2755.3	240.7
D	323701	31.7	5.1
F	323701	56.9	3.6
UNEM	323701	10.9	2.7
YFEM	323701	10778.9	520.1
YPERM	323701	15306.7	1912.2
XEL	323701	11.1	2.7
XFOR	323701	11.0	7.6
XINDF	323701	8.8	1.0
AA	323701	0.5	0.5
SP	323701	3.1	1.7
URB	323701	97.9	5.2
IN	323701	14.3	1.4

TABLE D-II
MEANS OF VARIABLES(SOUTH)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	108	3395.5	346.1	2562.0	4318.0
D	108	27.6	11.5	6.0	71.6
F	108	47.8	7.4	32.5	72.9
UNEM	108	10.9	4.0	4.5	24.4
YFEM	108	7875.8	1121.0	3546.0	12404.0
YPERM	108	14516.1	2322.5	9675.0	23261.0
XEL	108	3.1	2.5	0.1	15.9
XFOR	108	1.4	1.7	0.2	14.8
XINDF	108	6.8	1.5	2.2	12.1
AA	108	0.4	0.5	0.0	1.0
SP	108	1.1	0.5	0.4	3.8
URB	108	80.7	16.0	30.4	100.0
IN	108	14.7	2.8	8.1	28.1

WEIGHTED MEANS OF VARIABLES(SOUTH)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	509981	3221.4	347.1
D	509981	28.2	8.4
F	509981	51.3	7.5
UNEM	509981	9.9	3.3
YFEM	509981	8663.5	1863.1
YPERM	509981	15696.6	2920.1
XEL	509981	4.5	3.0
XFOR	509981	2.0	2.7
XINDF	509981	7.8	1.8
AA	509981	0.5	0.5
SP	509981	1.1	0.6
URB	509981	86.7	12.1
IN	509981	15.0	2.1

TABLE D-III
MEANS OF VARIABLES(NORTHCENTRAL)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	53	3380.0	383.6	2257.0	4426.0
D	53	28.5	13.0	8.1	68.3
F	53	54.7	7.1	38.8	79.4
UNEM	53	14.9	5.4	4.7	35.0
YFEM	53	10696.1	1303.2	8504.0	15131.0
YPERM	53	18342.0	2371.0	12000.0	24583.0
XEL	53	5.5	2.9	0.7	12.0
XFOR	53	1.2	1.5	0.2	10.4
XINDF	53	6.8	1.4	4.1	10.0
AA	53	0.1	0.2	0.0	1.0
SP	53	0.8	0.3	0.2	1.5
URB	53	93.2	8.1	59.5	100.0
IN	53	13.7	2.5	9.5	21.0

WEIGHTED MEANS OF VARIABLES(NORTHCENTRAL)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	282900	3164.9	225.0
D	282900	26.3	5.4
F	282900	56.1	3.6
UNEM	282900	14.3	3.3
YFEM	282900	11183.5	1105.6
YPERM	282900	18174.5	1422.9
XEL	282900	8.6	2.5
XFOR	282900	1.1	0.5
XINDF	282900	8.0	1.1
AA	282900	0.0	0.2
SP	282900	0.7	0.1
URB	282900	97.1	3.8
IN	282900	15.1	2.0

TABLE D-IV
MEANS OF VARIABLES(WEST)

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	26	2985.6	295.1	2361.0	3677.0
D	26	27.6	11.5	8.1	50.9
F	26	68.5	9.0	50.8	85.9
UNEM	26	11.2	3.6	0.8	18.1
YFEM	26	10558.4	1176.6	8365.0	13162.0
YPERM	26	19095.4	3222.3	12473.0	26275.0
XEL	26	6.1	2.9	1.7	12.2
XFOR	26	2.6	0.9	1.3	4.8
XINDF	26	6.9	1.1	4.8	9.0
AA	26	0.8	0.4	0.0	1.0
SP	26	2.3	0.9	1.0	4.7
URB	26	89.6	17.0	31.5	100.0
IN	26	11.6	1.8	8.0	15.7

WEIGHTED MEANS OF VARIABLES(WEST)

VARIABLE	N	MEAN	STANDARD DEVIATION
A	126215	2875.7	207.7
D	126215	31.4	6.2
F	126215	68.3	4.4
UNEM	126215	9.7	1.8
YFEM	126215	11404.6	779.1
YPERM	126215	18434.9	1788.2
XEL	126215	9.5	2.9
XFOR	126215	2.5	0.6
XINDF	126215	7.9	1.2
AA	126215	1.0	0.2
SP	126215	1.9	0.5
URB	126215	96.4	11.0
IN	126215	9.9	1.9

TABLE D-V
FULL REGRESSION(NORTHEAST)

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	2631123	219260.2	2.977	0.0103
ERROR	25	1841310	73652.38		
C TOTAL	37	4472432			
ROOT MSE		271.3897	R-SQUARE	0.5883	
DEP MEAN		3147.132	ADJ R-SQ	0.3907	
C.V.		8.623399			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4891.241	995.2384	4.915
F	1	-5.96396	16.21039	-0.368
UNEM	1	18.94246	22.39791	0.846
YFEM	1	-0.0597166	0.09052292	-0.660
YPERM	1	0.002668208	0.02461604	0.108
XEL	1	-8.32644	14.76583	-0.564
XFOR	1	-29.5637	15.79249	-1.872
XINDF	1	-18.5681	51.51568	-0.360
AA	1	-62.8898	136.1187	-0.462
SP	1	110.6637	51.54572	2.147
URB	1	-4.88805	4.924943	-0.993
IN	1	-36.9872	28.35162	-1.305
D	1	-0.928615	6.663228	-0.139

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.7160		FEMALE HS GRADS
UNEM	1	0.4057		FEMALE UNEMP
YFEM	1	0.5155		FEMALE INCOME
YPERM	1	0.9145		AGE 35/44 INCOME
XEL	1	0.5778		%PRIVATE EDUC
XFOR	1	0.0729		%FOREIGN BORN
XINDF	1	0.7215		INDUST STRUCT-F
AA	1	0.6481		ABORTION
SP	1	0.0417		%HISPANIC
URB	1	0.3305		%URBAN
IN	1	0.2039		INFANT MORT
D	1	0.8903		COLLEGE (QUALITY)

TABLE D-VI
FULL REGRESSION(SOUTH)

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	5943425	495285.4	6.843	0.0001
ERROR	95	6876144	72380.46		
C TOTAL	107	12819569			
ROOT MSE		269.0362	R-SQUARE	0.4636	
DEP MEAN		3395.463	ADJ R-SQ	0.3959	
C.V.		7.923402			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4570.249	356.215	12.830
F	1	-14.5654	4.761802	-3.059
UNEM	1	6.295347	7.663392	0.821
YFEM	1	-0.067356	0.03123093	-2.157
YPERM	1	-0.0258554	0.0149185	-1.733
XEL	1	-2.80999	11.09165	-0.253
XFOR	1	-0.675398	23.23005	-0.029
XINDF	1	13.67231	22.86838	0.598
AA	1	-189.125	65.38062	-2.893
SP	1	-74.0463	81.47191	-0.909
URB	1	0.5830844	1.919316	0.304
IN	1	30.20265	9.780394	3.088
D	1	-2.16796	2.786467	-0.778

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0029		FEMALE HS GRADS
UNEM	1	0.4134		FEMALE UNEMP
YFEM	1	0.0336		FEMALE INCOME
YPERM	1	0.0863		AGE 35/44 INCOME
XEL	1	0.8006		%PRIVATE EDUC
XFOR	1	0.9769		%FOREIGN BORN
XINDF	1	0.5513		INDUST STRUCT-F
AA	1	0.0047		ABORTION
SP	1	0.3657		%HISPANIC
URB	1	0.7619		%URBAN
IN	1	0.0026		INFANT MORT
D	1	0.4385		COLLEGE (QUALITY)

TABLE D-VII
FULL REGRESSION(NORTHCENTRAL)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	3934057	327838.1	3.526	0.0013
ERROR	40	3719456	92986.4		
C TOTAL	52	7653513			
ROOT MSE		304.9367	R-SQUARE	0.5140	
DEP MEAN		3379.981	ADJ R-SQ	0.3682	
C.V.		9.021847			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4968.719	833.641	5.960
F	1	-35.9688	13.23337	-2.718
UNEM	1	0.9103942	11.77558	0.077
YFEM	1	0.06607699	0.04823727	1.370
YPERM	1	-0.0361854	0.03013773	-1.201
XEL	1	-39.1207	16.31544	-2.398
XFOR	1	36.06395	42.62524	0.846
XINDF	1	-18.1447	43.72623	-0.415
AA	1	233.3736	215.5494	1.083
SP	1	107.8911	193.5873	0.557
URB	1	6.184849	6.398754	0.967
IN	1	-11.1948	21.38711	-0.523
D	1	3.083112	4.86135	0.634

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0097		FEMALE HS GRADS
UNEM	1	0.9388		FEMALE UNEMP
YFEM	1	0.1784		FEMALE INCOME
YPERM	1	0.2369		AGE 35/44 INCOME
XEL	1	0.0213		%PRIVATE EDUC
XFOR	1	0.4025		%FOREIGN BORN
XINDF	1	0.6804		INDUST STRUCT-F
AA	1	0.2854		ABORTION
SP	1	0.5804		%HISPANIC
URB	1	0.3396		%URBAN
IN	1	0.6036		INFANT MORT
D	1	0.5296		COLLEGE (QUALITY)

TABLE D-VIII
FULL BLACK REGRESSION(WEST)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	1382269	115189.1	1.884	0.1357
ERROR	13	794891.7	61145.52		
C TOTAL	25	2177160			
ROOT MSE		247.2762	R-SQUARE	0.6349	
DEP MEAN		2985.577	ADJ R-SQ	0.2979	
C.V.		8.282359			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	3752.797	1127.915	3.327
F	1	-10.7401	21.88007	-0.491
UNEM	1	-11.406	24.82194	-0.460
YFEM	1	0.110693	0.1576798	0.702
YPERM	1	-0.0516509	0.07158653	-0.722
XEL	1	-47.279	31.80112	-1.487
XFOR	1	76.51213	132.3126	0.578
XINDF	1	20.13725	75.08323	0.268
AA	1	-204.295	269.9929	-0.757
SP	1	-58.337	140.1545	-0.416
URB	1	-4.17658	4.903014	-0.852
IN	1	30.80744	42.03908	0.733
D	1	6.81766	8.276089	0.824

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0055		INTERCEPT
F	1	0.6317		FEMALE HS GRADS
UNEM	1	0.6535		FEMALE UNEMP
YFEM	1	0.4950		FEMALE INCOME
YPERM	1	0.4834		AGE 35/44 INCOME
XEL	1	0.1609		%PRIVATE EDUC
XFOR	1	0.5730		%FOREIGN BORN
XINDF	1	0.7928		INDUST STRUCT-F
AA	1	0.4627		ABORTION
SP	1	0.6840		%HISPANIC
URB	1	0.4097		%URBAN
IN	1	0.4767		INFANT MORT
D	1	0.4249		COLLEGE (QUALITY)

TABLE D-IX
WEIGHTED FULL REGRESSION(NORTHEAST)

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	16693885782	1391157148	16.848	0.0001
ERROR	25	2064319359	82572774		
C TOTAL	37	18758205140			
ROOT MSE		9086.956	R-SQUARE	0.8900	
DEP MEAN		2755.307	ADJ R-SQ	0.8371	
C.V.		329.7983			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	5590.116	757.011	7.384
F	1	-4.56163	11.84062	-0.385
UNEM	1	-29.4406	17.34481	-1.697
YFEM	1	-0.0483849	0.0791639	-0.611
YPERM	1	-0.00495997	0.01737994	-0.285
XEL	1	-11.5699	10.94685	-1.057
XFOR	1	-37.6432	9.589431	-3.925
XINDF	1	-93.6867	35.90881	-2.609
AA	1	99.26121	85.20887	1.165
SP	1	67.6351	34.07222	1.985
URB	1	-6.23581	4.369271	-1.427
IN	1	-2.23287	18.16588	-0.123
D	1	2.634224	5.920308	0.445

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.7033		FEMALE HS GRADS
UNEM	1	0.1020		FEMALE UNEMP
YFEM	1	0.5466		FEMALE INCOME
YPERM	1	0.7777		AGE 35/44 INCOME
XEL	1	0.3007		%PRIVATE EDUC
XFOR	1	0.0006		%FOREIGN BORN
XINDF	1	0.0151		INDUST STRUCT-F
AA	1	0.2550		ABORTION
SP	1	0.0582		%HISPANIC
URB	1	0.1659		%URBAN
IN	1	0.9032		INFANT MORT
D	1	0.6602		COLLEGE (QUALITY)

TABLE D-X
WEIGHTED FULL REGRESSION(SOUTH)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	50402138539	4200178212	36.149	0.0001
ERROR	95	11038189760	116191471		
C TOTAL	107	61440328299			
ROOT MSE		10779.21	R-SQUARE	0.8203	
DEP MEAN C.V.		3221.442	ADJ R-SQ	0.7976	
		334.6084			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	4524.905	301.1265	15.027
F	1	-16.2545	4.213254	-3.858
UNEM	1	12.21102	6.703493	1.822
YFEM	1	-0.0727672	0.01580175	-4.605
YPERM	1	-0.00973278	0.01295765	-0.751
XEL	1	-12.6652	7.377476	-1.717
XFOR	1	-1.03593	16.67481	-0.062
XINDF	1	35.49069	16.76265	2.117
AA	1	-282.309	43.08217	-6.553
SP	1	-68.2904	76.18184	-0.896
URB	1	-1.10935	1.650689	-0.672
IN	1	27.4672	7.924143	3.466
D	1	-4.20806	2.177289	-1.933

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0001	INTERCEPT
F	1	0.0002	FEMALE HS GRADS
UNEM	1	0.0717	FEMALE UNEMP
YFEM	1	0.0001	FEMALE INCOME
YPERM	1	0.4544	AGE 35/44 INCOME
XEL	1	0.0893	%PRIVATE EDUC
XFOR	1	0.9506	%FOREIGN BORN
XINDF	1	0.0369	INDUST STRUCT-F
AA	1	0.0001	ABORTION
SP	1	0.3723	%HISPANIC
URB	1	0.5032	%URBAN
IN	1	0.0008	INFANT MORT
D	1	0.0563	COLLEGE (QUALITY)

TABLE D-XI
WEIGHTED FULL REGRESSION(NORTHCENTRAL)

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	7023670081	585305840	3.209	0.0027
ERROR	40	7295201595	182380040		
C TOTAL	52	14318871676			
ROOT MSE		13504.82	R-SQUARE	0.4905	
DEP MEAN		3164.867	ADJ R-SQ	0.3377	
C.V.		426.7104			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	5748.959	958.6786	5.997
F	1	-28.8565	13.81003	-2.090
UNEM	1	18.15504	12.61936	1.439
YFEM	1	-0.00330106	0.04812816	-0.069
YPERM	1	0.002066326	0.03277397	0.063
XEL	1	-5.24038	14.61684	-0.359
XFOR	1	119.6916	78.54611	1.524
XINDF	1	-20	46.47866	-0.430
AA	1	475.3912	192.0176	2.476
SP	1	257.2789	230.1487	1.118
URB	1	-11.12	8.774592	-1.267
IN	1	-15.9244	21.23445	-0.750
D	1	-1.70667	7.093042	-0.241

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.0431		FEMALE HS GRADS
UNEM	1	0.1580		FEMALE UNEMP
YFEM	1	0.9457		FEMALE INCOME
YPERM	1	0.9500		AGE 35/44 INCOME
XEL	1	0.7218		%PRIVATE EDUC
XFOR	1	0.1354		%FOREIGN BORN
XINDF	1	0.6693		INDUST STRUCT-F
AA	1	0.0176		ABORTION
SP	1	0.2703		%HISPANIC
URB	1	0.2124		%URBAN
IN	1	0.4577		INFANT MORT
D	1	0.8111		COLLEGE (QUALITY)

TABLE D-XII
WEIGHTED FULL REGRESSION(WEST)

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	4453289879	371107490	4.876	0.0040
ERROR	13	989466819	76112832		
C TOTAL	25	5442756699			
ROOT MSE		8724.267	R-SQUARE	0.8182	
DEP MEAN		2875.705	ADJ R-SQ	0.6504	
C.V.		303.3784			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	3283.514	985.38	3.332
F	1	8.517012	20.49261	0.416
UNEM	1	-14.5394	23.52265	-0.618
YFEM	1	0.1719024	0.1419596	1.211
YPERM	1	-0.0964219	0.06497018	-1.484
XEL	1	-72.5954	23.34264	-3.110
XFOR	1	22.55344	97.82749	0.231
XINDF	1	-5.66178	62.57894	-0.090
AA	1	-381.916	240.9554	-1.585
SP	1	100.8079	135.4987	0.744
URB	1	-7.20292	3.819242	-1.886
IN	1	28.29626	29.87159	0.947
D	1	7.387849	6.55219	1.128

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0054	INTERCEPT
F	1	0.6845	FEMALE HS GRADS
UNEM	1	0.5472	FEMALE UNEMP
YFEM	1	0.2475	FEMALE INCOME
YPERM	1	0.1616	AGE 35/44 INCOME
XEL	1	0.0083	%PRIVATE EDUC
XFOR	1	0.8213	%FOREIGN BORN
XINDF	1	0.9293	INDUST STRUCT-F
AA	1	0.1370	ABORTION
SP	1	0.4701	%HISPANIC
URB	1	0.0818	%URBAN
IN	1	0.3608	INFANT MORT
D	1	0.2799	COLLEGE (QUALITY)

TABLE D-XIII
QUALITY REGRESSION(NORTHEAST)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	814.5857	74.05325	1.161	0.3591
ERROR	26	1658.889	63.80343		
C TOTAL	37	2473.475			
ROOT MSE		7.987705	R-SQUARE	0.3293	
DEP MEAN		30.45	ADJ R-SQ	0.0456	
C.V.		26.2322			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	-9.27909	29.23587	-0.317
F	1	0.2841499	0.4738483	0.600
UNEM	1	0.9230021	0.6338894	1.456
YFEM	1	-0.00208857	0.002632651	-0.793
YPERM	1	0.0003930312	0.0007204023	0.546
XEL	1	0.08077705	0.434308	0.186
XFOR	1	0.3550677	0.4595683	0.773
XINDF	1	1.260485	1.495953	0.843
AA	1	8.596863	3.634298	2.365
SP	1	0.4005062	1.51509	0.264
URB	1	0.1304764	0.1426774	0.914
IN	1	0.122495	0.834116	0.147

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.7535		INTERCEPT
F	1	0.5539		FEMALE HS GRADS
UNEM	1	0.1573		FEMALE UNEMP
YFEM	1	0.4348		FEMALE INCOME
YPERM	1	0.5900		AGE 35/44 INCOME
XEL	1	0.8539		%PRIVATE EDUC
XFOR	1	0.4467		%FOREIGN BORN
XINDF	1	0.4071		INDUST STRUCT-F
AA	1	0.0257		ABORTION
SP	1	0.7936		%HISPANIC
URB	1	0.3689		%URBAN
IN	1	0.8844		INFANT MORT

TABLE D-XIV
QUALITY REGRESSION(SOUTH)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	4736.373	430.5794	4.434	0.0001
ERROR	96	9322.096	97.10516		
C TOTAL	107	14058.47			
ROOT MSE		9.854195	R-SQUARE	0.3369	
DEP MEAN		27.64722	ADJ R-SQ	0.2609	
C.V.		35.64262			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	31.66375	12.6408	2.505
F	1	-0.152738	0.1737162	-0.879
UNEM	1	-0.825324	0.2677557	-3.082
YFEM	1	-0.000483447	0.001142855	-0.423
YPERM	1	0.0004465665	0.0005445274	0.820
XEL	1	-0.169031	0.4058961	-0.416
XFOR	1	-0.408032	0.849845	-0.480
XINDF	1	3.73425	0.7458866	5.006
AA	1	-2.90657	2.376301	-1.223
SP	1	-5.8436	2.923928	-1.999
URB	1	-0.124646	0.06913961	-1.803
IN	1	0.206998	0.3576105	0.579

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0139		INTERCEPT
F	1	0.3815		FEMALE HS GRADS
UNEM	1	0.0027		FEMALE UNEMP
YFEM	1	0.6732		FEMALE INCOME
YPERM	1	0.4142		AGE 35/44 INCOME
XEL	1	0.6780		%PRIVATE EDUC
XFOR	1	0.6322		%FOREIGN BORN
XINDF	1	0.0001		INDUST STRUCT-F
AA	1	0.2243		ABORTION
SP	1	0.0485		%HISPANIC
URB	1	0.0746		%URBAN
IN	1	0.5641		INFANT MORT

TABLE D-XV
QUALITY REGRESSION(NORTHCENTRAL)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	4863.591	442.1446	4.607	0.0002
ERROR	41	3934.646	95.96698		
C TOTAL	52	8798.237			
ROOT MSE		9.796274	R-SQUARE	0.5528	
DEP MEAN		28.50755	ADJ R-SQ	0.4328	
C.V.		34.36379			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	64.49555	24.81487	2.599
F	1	-0.0322108	0.4251002	-0.076
UNEM	1	-0.595438	0.3666899	-1.624
YFEM	1	0.00128489	0.001536604	0.836
YPERM	1	0.001181915	0.0009504343	1.244
XEL	1	-0.780032	0.5097901	-1.530
XFOR	1	3.25648	1.271417	2.561
XINDF	1	1.139961	1.393404	0.818
AA	1	-6.50521	6.849721	-0.950
SP	1	-14.2934	5.804685	-2.462
URB	1	-0.473403	0.1918081	-2.468
IN	1	-0.864068	0.6736915	-1.283

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0129		INTERCEPT
F	1	0.9400		FEMALE HS GRADS
UNEM	1	0.1121		FEMALE UNEMP
YFEM	1	0.4079		FEMALE INCOME
YPERM	1	0.2207		AGE 35/44 INCOME
XEL	1	0.1337		%PRIVATE EDUC
XFOR	1	0.0142		%FOREIGN BORN
XINDF	1	0.4180		INDUST STRUCT-F
AA	1	0.3478		ABORTION
SP	1	0.0181		%HISPANIC
URB	1	0.0178		%URBAN
IN	1	0.2068		INFANT MORT

TABLE D- XVI
 QUALITY REGRESSION(WEST)

DEP VARIABLE: D

COLLEGE (QUALITY)
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	2387.576	217.0524	3.404	0.0171
ERROR	14	892.7179	63.76557		
C TOTAL	25	3280.294			
ROOT MSE		7.985334	R-SQUARE	0.7279	
DEP MEAN		27.58462	ADJ R-SQ	0.5140	
C.V.		28.94851			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	79.63346	29.55911	2.694
F	1	-0.882778	0.6660233	-1.325
UNEM	1	-0.679334	0.7807468	-0.870
YFEM	1	0.001234073	0.00508129	0.243
YPERM	1	0.0001481795	0.002311417	0.064
XEL	1	1.020136	0.9901066	1.030
XFOR	1	6.253744	3.932335	1.590
XINDF	1	0.6690475	2.418074	0.277
AA	1	-3.8124	8.65919	-0.440
SP	1	0.1706039	4.525805	0.038
URB	1	-0.00164732	0.1583333	-0.010
IN	1	-2.07979	1.238565	-1.679

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0175		INTERCEPT
F	1	0.2062		FEMALE HS GRADS
UNEM	1	0.3989		FEMALE UNEMP
YFEM	1	0.8116		FEMALE INCOME
YPERM	1	0.9498		AGE 35/44 INCOME
XEL	1	0.3203		%PRIVATE EDUC
XFOR	1	0.1341		%FOREIGN BORN
XINDF	1	0.7861		INDUST STRUCT-F
AA	1	0.6665		ABORTION
SP	1	0.9705		%HISPANIC
URB	1	0.9918		%URBAN
IN	1	0.1153		INFANT MORT

TABLE D-XVII
WEIGHTED QUALITY REGRESSION(NORTHEAST)

DEP VARIABLE: D COLLEGE (QUALITY)
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	6024230	547657.3	6.044	0.0001
ERROR	26	2355853	90609.74		
C TOTAL	37	8380083			
ROOT MSE		301.0145	R-SQUARE	0.7189	
DEP MEAN		31.67549	ADJ R-SQ	0.5999	
C.V.		950.3073			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	30.51357	24.35226	1.253
F	1	1.0035	0.3392858	2.958
UNEM	1	0.3719089	0.5699159	0.653
YFEM	1	-0.00716298	0.002214384	-3.235
YPERM	1	0.0007548065	0.0005563721	1.357
XEL	1	0.1006134	0.3620881	0.278
XFOR	1	0.12632	0.316692	0.399
XINDF	1	0.5411127	1.184772	0.457
AA	1	7.859295	2.36464	3.324
SP	1	0.3661334	1.12639	0.325
URB	1	-0.0631892	0.144205	-0.438
IN	1	-0.0566375	0.6016605	-0.094

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.2214		INTERCEPT
F	1	0.0065		FEMALE HS GRADS
UNEM	1	0.5198		FEMALE UNEMP
YFEM	1	0.0033		FEMALE INCOME
YPERM	1	0.1866		AGE 35/44 INCOME
XEL	1	0.7833		%PRIVATE EDUC
XFOR	1	0.6932		%FOREIGN BORN
XINDF	1	0.6517		INDUST STRUCT-F
AA	1	0.0027		ABORTION
SP	1	0.7477		%HISPANIC
URB	1	0.6649		%URBAN
IN	1	0.9257		INFANT MORT

TABLE D-XIX
WEIGHTED QUALITY REGRESSION(NORTHCENTRAL)

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	4598237	418021.5	4.728	0.0001
ERROR	41	3625036	88415.51		
C TOTAL	52	8223273			
ROOT MSE		297.3475	R-SQUARE	0.5592	
DEP MEAN		26.32076	ADJ R-SQ	0.4409	
C.V.		1129.707			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	63.24689	18.65437	3.390
F	1	0.01294233	0.3040609	0.043
UNEM	1	-0.0653739	0.277664	-0.235
YFEM	1	0.001213008	0.001042609	1.163
YPERM	1	-.0000355377	0.0007215921	-0.049
XEL	1	-0.45125	0.3140212	-1.437
XFOR	1	4.691272	1.56656	2.995
XINDF	1	2.355053	0.9549839	2.466
AA	1	0.05609732	4.227811	0.013
SP	1	-7.60421	4.926264	-1.544
URB	1	-0.481776	0.1779446	-2.707
IN	1	-1.15228	0.4315173	-2.670

VARIABLE	DF	PROB)	T
INTERCEP	1	0.0016	INTERCEPT
F	1	0.9663	FEMALE HS GRADS
UNEM	1	0.8150	FEMALE UNEMP
YFEM	1	0.2514	FEMALE INCOME
YPERM	1	0.9610	AGE 35/44 INCOME
XEL	1	0.1583	%PRIVATE EDUC
XFOR	1	0.0046	%FOREIGN BORN
XINDF	1	0.0179	INDUST STRUCT-F
AA	1	0.9895	ABORTION
SP	1	0.1304	%HISPANIC
URB	1	0.0098	%URBAN
IN	1	0.0108	INFANT MORT

APPENDIX E
RESULTS FOR FIFTY LARGEST SMSAS'

TABLE E-I
MEANS OF WHITE VARIABLES

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	50	2442.9	218.6	1979.0	3313.0
D	50	33.2	6.8	20.3	49.0
F	50	71.4	6.5	58.3	84.8
UNEM	50	5.2	1.4	2.9	8.5
YFEM	50	11032.1	1294.2	5896.0	14040.0
YPERM	50	26099.8	2680.0	19446.0	33474.0
XEL	50	15.6	7.6	2.3	41.5
XFOR	50	6.1	6.0	0.9	37.6
XINDF	50	9.3	0.9	7.6	12.0
AA	50	0.4	0.5	0.0	1.0
SP	50	5.1	8.5	0.4	41.9
URB	50	79.1	15.6	34.7	100.0
IN	50	13.4	2.1	8.1	18.1

TABLE E-II
WEIGHTED MEANS OF VARIABLES

VARIABLE	N	MEAN	STANDARD DEVIATION
A	4611852	2385.6	221.1
D	4611852	33.7	6.8
F	4611852	72.0	6.3
UNEM	4611852	5.1	1.4
YFEM	4611852	11497.9	1283.4
YPERM	4611852	26718.0	2655.4
XEL	4611852	16.5	7.5
XFOR	4611852	7.9	6.5
XINDF	4611852	9.3	1.0
AA	4611852	0.5	0.5
SP	4611852	6.4	8.1
URB	4611852	80.2	15.5
IN	4611852	13.3	2.4

TABLE E-III
SIMPLE WHITE CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER H0:RHO=0 / N = 50

	A	D	F	UNEM	YFEM
A	1.00000	-0.34958	-0.08999	0.27756	-0.38700
FERTILITY	0.0000	0.0128	0.5343	0.0510	0.0055
D	-0.34958	1.00000	0.10492	0.02828	0.16331
COLLEGE (QUALITY)	0.0128	0.0000	0.4684	0.8454	0.2571
F	-0.08999	0.10492	1.00000	-0.37392	0.47863
FEMALE HS GRADS	0.5343	0.4684	0.0000	0.0075	0.0004
UNEM	0.27756	0.02828	-0.37392	1.00000	-0.17612
FEMALE UNEMP	0.0510	0.8454	0.0075	0.0000	0.2212
YFEM	-0.38700	0.16331	0.47863	-0.17612	1.00000
FEMALE INCOME	0.0055	0.2571	0.0004	0.2212	0.0000
YPERM	-0.24991	-0.00687	0.63387	-0.38173	0.72743
AGE 35/44 INCOME	0.0801	0.9623	0.0001	0.0062	0.0001
XEL	-0.20162	0.07205	-0.40383	0.19890	0.07970
%PRIVATE EDUC	0.1603	0.6190	0.0036	0.1661	0.5822
XFOR	-0.47697	0.29764	-0.00265	0.01746	0.21395
%FOREIGN BORN	0.0005	0.0358	0.9854	0.9042	0.1357
XINDF	-0.20087	0.38561	-0.02634	-0.26088	0.23706
INDUST STRUCT-F	0.1619	0.0057	0.8559	0.0673	0.0974
AA	-0.34388	0.22284	0.35338	0.02982	0.41364
ABORTION	0.0145	0.1198	0.0118	0.8372	0.0028
SP	-0.14203	-0.03358	-0.07568	-0.08776	-0.00299
%HISPANIC	0.3252	0.8169	0.6014	0.5445	0.9835
URB	-0.05402	-0.08852	0.33197	-0.19077	0.02067
%URBAN	0.7094	0.5410	0.0185	0.1845	0.8867
IN	-0.15836	-0.20742	-0.34508	-0.10450	-0.09693
INFANT MORT	0.2720	0.1484	0.0141	0.4702	0.5031
	YPERM	XEL	XFOR	XINDF	AA
A	-0.24991	-0.20162	-0.47697	-0.20087	-0.34388
FERTILITY	0.0801	0.1603	0.0005	0.1619	0.0145

SIMPLE WHITE CORRELATIONS(continued)

	YPERM	XEL	XFOR	XINDF	AA
D	-0.00687	0.07205	0.29764	0.38561	0.22284
COLLEGE (QUALITY)	0.9623	0.6190	0.0358	0.0057	0.1198
F	0.63387	-0.40383	-0.00265	-0.02634	0.35338
FEMALE HS GRADS	0.0001	0.0036	0.9854	0.8559	0.0118
UNEM	-0.38173	0.19890	0.01746	-0.26088	0.02982
FEMALE UNEMP	0.0062	0.1661	0.9042	0.0673	0.8372
YFEM	0.72743	0.07970	0.21395	0.23706	0.41364
FEMALE INCOME	0.0001	0.5822	0.1357	0.0974	0.0028
YPERM	1.00000	-0.10082	-0.01726	0.19041	0.24146
AGE 35/44 INCOME	0.0000	0.4860	0.9053	0.1853	0.0912
XEL	-0.10082	1.00000	0.23160	0.26288	-0.22055
%PRIVATE EDUC	0.4860	0.0000	0.1056	0.0651	0.1238
XFOR	-0.01726	0.23160	1.00000	0.05271	0.07770
%FOREIGN BORN	0.9053	0.1056	0.0000	0.7162	0.5917
XINDF	0.19041	0.26288	0.05271	1.00000	-0.11954
INDUST STRUCT-F	0.1853	0.0651	0.7162	0.0000	0.4083
AA	0.24146	-0.22055	0.07770	-0.11954	1.00000
ABORTION	0.0912	0.1238	0.5917	0.4083	0.0000
SP	-0.16303	-0.01351	0.68964	-0.08667	0.02641
%HISPANIC	0.2579	0.9258	0.0001	0.5495	0.8555
URB	0.11867	0.08040	0.22785	-0.24562	-0.17069
%URBAN	0.4117	0.5789	0.1115	0.0856	0.2360
IN	0.05502	0.28631	-0.08050	0.40979	-0.25358
INFANT MORT	0.7043	0.0438	0.5784	0.0031	0.0756
		SP	URB	IN	
A	-0.14203	-0.05402	-0.15836		
FERTILITY	0.3252	0.7094	0.2720		
D	-0.03358	-0.08852	-0.20742		
COLLEGE (QUALITY)	0.8169	0.5410	0.1484		

SIMPLE WHITE CORRELATIONS(continued)

	SP	URB	IN
F FEMALE HS GRADS	-0.07568 0.6014	0.33197 0.0185	-0.34508 0.0141
UNEM FEMALE UNEMP	-0.08776 0.5445	-0.19077 0.1845	-0.10450 0.4702
YFEM FEMALE INCOME	-0.00299 0.9835	0.02067 0.8867	-0.09693 0.5031
YPERM AGE 35/44 INCOME	-0.16303 0.2579	0.11867 0.4117	0.05502 0.7043
XEL %PRIVATE EDUC	-0.01351 0.9258	0.08040 0.5789	0.28631 0.0438
XFOR %FOREIGN BORN	0.68964 0.0001	0.22785 0.1115	-0.08050 0.5784
XINDF INDUST STRUCT-F	-0.08667 0.5495	-0.24562 0.0856	0.40979 0.0031
AA ABORTION	0.02641 0.8555	-0.17069 0.2360	-0.25358 0.0756
SP %HISPANIC	1.00000 0.0000	0.25043 0.0794	-0.15640 0.2781
URB %URBAN	0.25043 0.0794	1.00000 0.0000	-0.19002 0.1862
IN INFANT MORT	-0.15640 0.2781	-0.19002 0.1862	1.00000 0.0000

TABLE E-IV
FULL WHITE REGRESSION

DEP VARIABLE: A FERTILITY
 ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	1403406	116950.5	4.610	0.0002
ERROR	37	938564.8	25366.62		
C TOTAL	49	2341971			
ROOT MSE		159.269	R-SQUARE	0.5992	
DEP MEAN		2442.9	ADJ R-SQ	0.4693	
C.V.		6.519669			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	2447.513	552.7102	4.428
F	1	7.994231	6.564612	1.218
UNEM	1	62.38158	20.90812	2.984
YFEM	1	-0.0286822	0.03206614	-0.894
YPERM	1	-0.0016246	0.01642587	-0.099
XEL	1	-1.92918	4.181066	-0.461
XFOR	1	-19.4372	6.752754	-2.878
XINDF	1	32.94068	39.31206	0.838
AA	1	-157.312	60.76265	-2.589
SP	1	6.964842	4.607211	1.512
URB	1	-1.2133	2.000476	-0.607
IN	1	-25.6134	16.00863	-1.600
D	1	-6.91597	4.832154	-1.431

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.2310		FEMALE HS GRADS
UNEM	1	0.0050		FEMALE UNEMP
YFEM	1	0.3769		FEMALE INCOME
YPERM	1	0.9217		AGE 35/44 INCOME
XEL	1	0.6472		%PRIVATE EDUC
XFOR	1	0.0066		%FOREIGN BORN
XINDF	1	0.4075		INDUST STRUCT-F
AA	1	0.0137		ABORTION
SP	1	0.1391		%HISPANIC
URB	1	0.5479		%URBAN
IN	1	0.1181		INFANT MORT
D	1	0.1608		COLLEGE (QUALITY)

TABLE E-V
WEIGHTED FULL WHITE REGRESSION

DEP VARIABLE: A		FERTILITY ANALYSIS OF VARIANCE			
SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	160773016814	13397751401	7.666	0.0001
ERROR	37	64666488291	1747742927		
C TOTAL	49	225439505105			
ROOT MSE		41806.02	R-SQUARE	0.7132	
DEP MEAN		2385.636	ADJ R-SQ	0.6201	
C.V.		1752.405			
PARAMETER ESTIMATES					
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	
INTERCEP	1	2540.901	503.9806	5.042	
F	1	5.904765	5.917179	0.998	
UNEM	1	62.87604	18.5491	3.390	
YFEM	1	-0.0345638	0.02997119	-1.153	
YPERM	1	0.01005632	0.015267	0.659	
XEL	1	-0.831652	4.11389	-0.202	
XFOR	1	-19.4741	7.191433	-2.708	
XINDF	1	4.357338	35.04494	0.124	
AA	1	-200.098	55.90695	-3.579	
SP	1	7.509021	5.141635	1.460	
URB	1	-2.05357	1.91207	-1.074	
IN	1	-21.8785	13.63281	-1.605	
D	1	-4.09126	4.813055	-0.850	
VARIABLE	DF	PROB)	T	VARIABLE LABEL	
INTERCEP	1	0.0001		INTERCEPT	
F	1	0.3248		FEMALE HS GRADS	
UNEM	1	0.0017		FEMALE UNEMP	
YFEM	1	0.2562		FEMALE INCOME	
YPERM	1	0.5142		AGE 35/44 INCOME	
XEL	1	0.8409		%PRIVATE EDUC	
XFOR	1	0.0102		%FOREIGN BORN	
XINDF	1	0.9017		INDUST STRUCT-F	
AA	1	0.0010		ABORTION	
SP	1	0.1526		%HISPANIC	
URB	1	0.2898		%URBAN	
IN	1	0.1170		INFANT MORT	
D	1	0.4008		COLLEGE (QUALITY)	

TABLE E-VI
WHITE QUALITY REGRESSION

DEP VARIABLE: D		COLLEGE (QUALITY) ANALYSIS OF VARIANCE			
SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	1208.458	109.8598	3.843	0.0009
ERROR	38	1086.378	28.58889		
C TOTAL	49	2294.836			
ROOT MSE		5.346858	R-SQUARE	0.5266	
DEP MEAN		33.226	ADJ R-SQ	0.3896	
C.V.		16.09239			
PARAMETER ESTIMATES					
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0	
INTERCEP	1	23.95576	18.14366	1.320	
F	1	-0.0751933	0.2200443	-0.342	
UNEM	1	0.1419914	0.7015336	0.202	
YFEM	1	-0.000764498	0.001069333	-0.715	
YPERM	1	-0.000222969	0.0005502492	-0.405	
XEL	1	-0.0843448	0.1396951	-0.604	
XFOR	1	0.670327	0.1989157	3.370	
XINDF	1	4.555138	1.093489	4.166	
AA	1	3.510233	1.958786	1.792	
SP	1	-0.395937	0.140703	-2.814	
URB	1	0.02865204	0.06699743	0.428	
IN	1	-1.38125	0.4884913	-2.828	
VARIABLE	DF	PROB)	T	VARIABLE LABEL	
INTERCEP	1	0.1946		INTERCEPT	
F	1	0.7344		FEMALE HS GRADS	
UNEM	1	0.8407		FEMALE UNEMP	
YFEM	1	0.4790		FEMALE INCOME	
YPERM	1	0.6876		AGE 35/44 INCOME	
XEL	1	0.5496		%PRIVATE EDUC	
XFOR	1	0.0017		%FOREIGN BORN	
XINDF	1	0.0002		INDUST STRUCT-F	
AA	1	0.0811		ABORTION	
SP	1	0.0077		%HISPANIC	
URB	1	0.6713		%URBAN	
IN	1	0.0074		INFANT MORT	

TABLE E-VII
WEIGHTED WHITE QUALITY REGRESSION

DEP VARIABLE: D		COLLEGE (QUALITY) ANALYSIS OF VARIANCE			
SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	137449556	12495414	6.294	0.0001
ERROR	38	75445958	1985420		
C TOTAL	49	212895514			
ROOT MSE		1409.049	R-SQUARE	0.6456	
DEP MEAN		33.70774	ADJ R-SQ	0.5430	
C.V.		4180.196			
PARAMETER ESTIMATES					
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	
INTERCEP	1	12.07172	16.87314	0.715	
F	1	0.1015999	0.1987531	0.511	
UNEM	1	-0.039147	0.6251553	-0.063	
YFEM	1	-0.000787064	0.001002062	-0.785	
YPERM	1	-0.000303809	0.0005122006	-0.593	
XEL	1	-0.0398828	0.1385054	-0.288	
XFOR	1	0.7318899	0.2113133	3.464	
XINDF	1	4.22061	0.9624899	4.385	
AA	1	3.010887	1.81991	1.654	
SP	1	-0.455921	0.1567208	-2.909	
URB	1	0.04593761	0.064013	0.718	
IN	1	-1.1309	0.4212741	-2.684	
VARIABLE	DF	PROB)	T	VARIABLE LABEL	
INTERCEP	1	0.4787		INTERCEPT	
F	1	0.6122		FEMALE HS GRADS	
UNEM	1	0.9504		FEMALE UNEMP	
YFEM	1	0.4371		FEMALE INCOME	
YPERM	1	0.5566		AGE 35/44 INCOME	
XEL	1	0.7749		%PRIVATE EDUC	
XFOR	1	0.0013		%FOREIGN BORN	
XINDF	1	0.0001		INDUST STRUCT-F	
AA	1	0.1063		ABORTION	
SP	1	0.0060		%HISPANIC	
URB	1	0.4774		%URBAN	
IN	1	0.0107		INFANT MORT	

TABLE E-VIII
MEANS OF BLACK VARIABLES

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE
A	50	3162.8	307.5	2550.0	3811.0
D	50	29.4	8.3	16.3	52.8
F	50	53.3	7.2	38.5	70.7
UNEM	50	11.0	3.1	5.7	17.7
YFEM	50	9303.8	1808.4	3546.0	12723.0
YPERM	50	15943.9	2530.4	12071.0	22109.0
XEL	50	6.1	3.4	1.3	13.5
XFOR	50	2.4	4.0	0.4	18.7
XINDF	50	7.7	1.2	4.1	12.1
AA	50	0.4	0.5	0.0	1.0
SP	50	1.2	0.9	0.6	4.8
URB	50	90.2	11.3	46.8	100.0
IN	50	14.5	2.3	8.1	20.6

TABLE E-IX
WEIGHTED MEANS OF BLACK VARIABLES

VARIABLE	N	MEAN	STANDARD DEVIATION
A	977642	2978.1	313.7
D	977642	29.5	5.9
F	977642	56.3	6.4
UNEM	977642	10.9	3.1
YFEM	977642	10270.2	1749.0
YPERM	977642	16503.9	2480.4
XEL	977642	8.4	3.7
XFOR	977642	4.7	6.5
XINDF	977642	8.4	1.3
AA	977642	0.5	0.5
SP	977642	1.7	1.5
URB	977642	94.8	7.6
IN	977642	14.5	2.3

TABLE E-X
SIMPLE BLACK CORRELATIONS

PEARSON CORRELATION COEFFICIENTS
/ PROB) R UNDER H0:RHO=0 / N = 50

	A	D	F	UNEM	YFEM
A	1.00000	-0.22289	-0.68316	0.28649	-0.71705
FERTILITY	0.0000	0.1197	0.0001	0.0437	0.0001
D	-0.22289	1.00000	0.13268	-0.14112	-0.03842
COLLEGE (QUALITY)	0.1197	0.0000	0.3583	0.3283	0.7911
F	-0.68316	0.13268	1.00000	-0.14668	0.73369
FEMALE HS GRADS	0.0001	0.3583	0.0000	0.3094	0.0001
UNEM	0.28649	-0.14112	-0.14668	1.00000	0.04719
FEMALE UNEMP	0.0437	0.3283	0.3094	0.0000	0.7449
YFEM	-0.71705	-0.03842	0.73369	0.04719	1.00000
FEMALE INCOME	0.0001	0.7911	0.0001	0.7449	0.0000
YPERM	-0.54655	-0.04185	0.69604	-0.08632	0.72310
AGE 35/44 INCOME	0.0001	0.7729	0.0001	0.5512	0.0001
XEL	-0.30810	-0.07410	0.45660	0.24651	0.57828
%PRIVATE EDUC	0.0295	0.6091	0.0009	0.0844	0.0001
XFOR	-0.38677	0.07465	0.24766	-0.37048	0.21668
%FOREIGN BORN	0.0055	0.6064	0.0829	0.0081	0.1307
XINDF	-0.44543	0.31325	0.50565	-0.01767	0.43396
INDUST STRUCT-F	0.0012	0.0268	0.0002	0.9031	0.0016
AA	-0.28484	0.23276	0.06705	-0.18311	-0.00124
ABORTION	0.0450	0.1038	0.6436	0.2031	0.9932
SP	-0.27886	0.04139	0.18639	-0.35106	0.10044
%HISPANIC	0.0499	0.7753	0.1950	0.0124	0.4877
URB	-0.38590	-0.26362	0.59070	0.06236	0.52960
%URBAN	0.0056	0.0643	0.0001	0.6670	0.0001
IN	0.36731	-0.15697	-0.51369	0.15806	-0.26913
INFANT MORT	0.0087	0.2763	0.0001	0.2729	0.0588
	YPERM	XEL	XFOR	XINDF	AA
A	-0.54655	-0.30810	-0.38677	-0.44543	-0.28484
FERTILITY	0.0001	0.0295	0.0055	0.0012	0.0450

SIMPLE BLACK CORRELATIONS (continued)

	YPERM	XEL	XFOR	XINDF	AA
D	-0.04185	-0.07410	0.07465	0.31325	0.23276
COLLEGE (QUALITY)	0.7729	0.6091	0.6064	0.0268	0.1038
F	0.69604	0.45660	0.24766	0.50565	0.06705
FEMALE HS GRADS	0.0001	0.0009	0.0829	0.0002	0.6436
UNEM	-0.08632	0.24651	-0.37048	-0.01767	-0.18311
FEMALE UNEMP	0.5512	0.0844	0.0081	0.9031	0.2031
YFEM	0.72310	0.57828	0.21668	0.43396	-0.00124
FEMALE INCOME	0.0001	0.0001	0.1307	0.0016	0.9932
YPERM	1.00000	0.21465	0.01237	0.36559	0.18064
AGE 35/44 INCOME	0.0000	0.1344	0.9320	0.0090	0.2093
XEL	0.21465	1.00000	0.27288	0.36836	-0.21215
%PRIVATE EDUC	0.1344	0.0000	0.0552	0.0085	0.1391
XFOR	0.01237	0.27288	1.00000	0.26861	0.02864
%FOREIGN BORN	0.9320	0.0552	0.0000	0.0593	0.8435
XINDF	0.36559	0.36836	0.26861	1.00000	-0.03342
INDUST STRUCT-F	0.0090	0.0085	0.0593	0.0000	0.8178
AA	0.18064	-0.21215	0.02864	-0.03342	1.00000
ABORTION	0.2093	0.1391	0.8435	0.8178	0.0000
SP	-0.08238	0.23683	0.93949	0.15241	0.12332
%HISPANIC	0.5695	0.0977	0.0001	0.2907	0.3936
URB	0.41587	0.57423	0.31553	0.41182	-0.25742
%URBAN	0.0027	0.0001	0.0256	0.0030	0.0711
IN	-0.31095	-0.15970	-0.17640	-0.07228	0.00234
INFANT MORT	0.0280	0.2679	0.2204	0.6179	0.9871
	SP	URB	IN		
A	-0.27886	-0.38590	0.36731		
FERTILITY	0.0499	0.0056	0.0087		
D	0.04139	-0.26362	-0.15697		
COLLEGE (QUALITY)	0.7753	0.0643	0.2763		

SIMPLE BLACK CORRELATIONS(continued)

	SP	URB	IN
F	0.18639	0.59070	-0.51369
FEMALE HS GRADS	0.1950	0.0001	0.0001
UNEM	-0.35106	0.06236	0.15806
FEMALE UNEMP	0.0124	0.6670	0.2729
YFEM	0.10044	0.52960	-0.26913
FEMALE INCOME	0.4877	0.0001	0.0588
YPERM	-0.08238	0.41587	-0.31095
AGE 35/44 INCOME	0.5695	0.0027	0.0280
XEL	0.23683	0.57423	-0.15970
%PRIVATE EDUC	0.0977	0.0001	0.2679
XFOR	0.93949	0.31553	-0.17640
%FOREIGN BORN	0.0001	0.0256	0.2204
XINDF	0.15241	0.41182	-0.07228
INDUST STRUCT-F	0.2907	0.0030	0.6179
AA	0.12332	-0.25742	0.00234
ABORTION	0.3936	0.0711	0.9871
SP	1.00000	0.20438	-0.19389
%HISPANIC	0.0000	0.1545	0.1773
URB	0.20438	1.00000	-0.36833
%URBAN	0.1545	0.0000	0.0085
IN	-0.19389	-0.36833	1.00000
INFANT MORT	0.1773	0.0085	0.0000

TABLE E-XI
FULL BLACK REGRESSION

DEP VARIABLE: A FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	3528045	294003.8	9.847	0.0001
ERROR	37	1104699	29856.74		
C TOTAL	49	4632745			
ROOT MSE		172.791	R-SQUARE	0.7615	
DEP MEAN		3162.84	ADJ R-SQ	0.6842	
C.V.		5.463161			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3985.571	551.4994	7.227
F	1	-7.29251	7.172843	-1.017
UNEM	1	16.86423	9.965409	1.692
YFEM	1	-0.115441	0.02826595	-4.084
YPERM	1	0.02837512	0.01832621	1.548
XEL	1	10.17807	11.64033	0.874
XFOR	1	-38.6337	24.17377	-1.598
XINDF	1	-21.2251	28.0399	-0.757
AA	1	-184.474	60.71354	-3.038
SP	1	152.9297	109.5326	1.396
URB	1	-0.99376	3.937733	-0.252
IN	1	16.66041	14.18336	1.175
D	1	-2.15542	4.207818	-0.512

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.3159		FEMALE HS GRADS
UNEM	1	0.0990		FEMALE UNEMP
YFEM	1	0.0002		FEMALE INCOME
YPERM	1	0.1301		AGE 35/44 INCOME
XEL	1	0.3876		%PRIVATE EDUC
XFOR	1	0.1185		%FOREIGN BORN
XINDF	1	0.4539		INDUST STRUCT-F
AA	1	0.0043		ABORTION
SP	1	0.1710		%HISPANIC
URB	1	0.8022		%URBAN
IN	1	0.2476		INFANT MORT
D	1	0.6115		COLLEGE (QUALITY)

TABLE E-XII
WEIGHTED FULL BLACK REGRESSION

DEP VARIABLE: A

FERTILITY
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	12	79711088733	6642590728	14.926	0.0001
ERROR	37	16466429441	445038634		
C TOTAL	49	96177518173			
ROOT MSE		21095.94	R-SQUARE	0.8288	
DEP MEAN		2978.068	ADJ R-SQ	0.7733	
C.V.		708.3766			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0
INTERCEP	1	3530.612	677.5585	5.211
F	1	-8.42127	8.745334	-0.963
UNEM	1	12.66528	10.15094	1.248
YFEM	1	-0.113429	0.03008045	-3.771
YPERM	1	0.04999366	0.01987957	2.515
XEL	1	1.802791	11.67959	0.154
XFOR	1	-64.2849	28.2498	-2.276
XINDF	1	-25.9578	26.82183	-0.968
AA	1	-184.217	61.73643	-2.984
SP	1	263.0077	128.6457	2.044
URB	1	0.3154167	5.113316	0.062
IN	1	16.34062	15.07806	1.084
D	1	0.4811919	5.277996	0.091

VARIABLE	DF	PROB)	T	VARIABLE LABEL
INTERCEP	1	0.0001		INTERCEPT
F	1	0.3418		FEMALE HS GRADS
UNEM	1	0.2200		FEMALE UNEMP
YFEM	1	0.0006		FEMALE INCOME
YPERM	1	0.0164		AGE 35/44 INCOME
XEL	1	0.8782		%PRIVATE EDUC
XFOR	1	0.0288		%FOREIGN BORN
XINDF	1	0.3394		INDUST STRUCT-F
AA	1	0.0050		ABORTION
SP	1	0.0481		%HISPANIC
URB	1	0.9511		%URBAN
IN	1	0.2855		INFANT MORT
D	1	0.9278		COLLEGE (QUALITY)

TABLE E-XIII
QUALITY BLACK REGRESSION

DEP VARIABLE: D

COLLEGE (QUALITY)
ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB)F
MODEL	11	1655.545	150.5041	3.392	0.0024
ERROR	38	1686.275	44.37567		
C TOTAL	49	3341.82			
ROOT MSE		6.661506	R-SQUARE	0.4954	
DEP MEAN		29.44	ADJ R-SQ	0.3493	
C.V.		22.6274			

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR HO: PARAMETER=0
INTERCEP	1	70.91875	17.88021	3.966
F	1	0.4058812	0.2685772	1.511
UNEM	1	0.04344217	0.3841256	0.113
YFEM	1	-0.000818194	0.001081606	-0.756
YPERM	1	-0.000957704	0.0006892262	-1.390
XEL	1	0.2719438	0.4465888	0.609
XFOR	1	1.788827	0.8856267	2.020
XINDF	1	2.878598	0.9749413	2.953
AA	1	3.620011	2.265788	1.598
SP	1	-8.50132	3.991196	-2.130
URB	1	-0.479908	0.130327	-3.682
IN	1	-1.16048	0.5133744	-2.260

VARIABLE	DF	PROB) T	VARIABLE LABEL
INTERCEP	1	0.0003	INTERCEPT
F	1	0.1390	FEMALE HS GRADS
UNEM	1	0.9106	FEMALE UNEMP
YFEM	1	0.4540	FEMALE INCOME
YPERM	1	0.1728	AGE 35/44 INCOME
XEL	1	0.5462	%PRIVATE EDUC
XFOR	1	0.0505	%FOREIGN BORN
XINDF	1	0.0054	INDUST STRUCT-F
AA	1	0.1184	ABORTION
SP	1	0.0397	%HISPANIC
URB	1	0.0007	%URBAN
IN	1	0.0296	INFANT MORT

APPENDIX F
FACTOR ANALYSIS

TABLE F-I
INITIAL FACTOR METHOD: PRINCIPAL FACTORS (FOR WHITES)

PRIOR COMMUNALITY ESTIMATES: SMC

F	UNEM	YFEM	YPERM	XEL	XFOR
0.519357	0.368642	0.591825	0.693963	0.154811	0.400393
XINDF	AA	SP	URB	IN	D
0.311450	0.106177	0.457653	0.291739	0.202025	0.241982

TABLE F-II
EIGENVALUES OF THE REDUCED CORRELATION MATRIX

TOTAL =	4.34002	AVERAGE =	0.361668	
	1	2	3	4
EIGENVALUE	2.411931	1.143598	0.787946	0.567557
DIFFERENCE	1.268333	0.355653	0.220389	0.289051
PROPORTION	0.5557	0.2635	0.1816	0.1308
CUMULATIVE	0.5557	0.8192	1.0008	1.1316
	5	6	7	8
EIGENVALUE	0.278506	0.118504	0.038699	-0.090609
DIFFERENCE	0.160002	0.079805	0.129308	0.021382
PROPORTION	0.0642	0.0273	0.0089	-0.0209
CUMULATIVE	1.1957	1.2230	1.2320	1.2111
	9	10	11	12
EIGENVALUE	-0.111991	-0.227251	-0.270053	-0.306821
DIFFERENCE	0.115260	0.042802	0.036768	
PROPORTION	-0.0258	-0.0524	-0.0622	-0.0707
CUMULATIVE	1.1853	1.1329	1.0707	1.0000

7 FACTORS WILL BE RETAINED BY THE MINEIGEN CRITERION

TABLE F-III
 FACTOR PATTERN(WHITES)
 (INITIAL FACTOR METHOD: PRINCIPAL FACTORS)

	FACTOR1	FACTOR2	FACTOR3	
F	0.69976	-0.03764	0.12155	FEMALE HS GRADS
UNEM	-0.47592	-0.16018	0.43545	FEMALE UNEMP
YFEM	0.67104	-0.06902	0.40138	FEMALE INCOME
YPERM	0.84024	-0.05248	0.17691	AGE 35/44 INCOME
XEL	0.19344	0.11694	-0.04989	%PRIVATE EDUC
XFOR	-0.08333	0.65065	0.24641	%FOREIGN BORN
XINDF	0.44666	0.15954	-0.36649	INDUST STRUCT-F
AA	-0.04486	-0.05842	0.26636	ABORTION
SP	-0.27969	0.67717	0.09836	%HISPANIC
URB	0.35425	0.39553	-0.09408	%URBAN
IN	-0.13362	-0.11970	-0.23216	INFANT MORT
D	0.26835	0.11745	-0.22418	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	-0.29274	-0.07881	-0.06592	FEMALE HS GRADS
UNEM	0.00751	-0.02677	0.08019	FEMALE UNEMP
YFEM	0.15981	0.12397	0.03524	FEMALE INCOME
YPERM	0.16821	0.01638	-0.01609	AGE 35/44 INCOME
XEL	0.30933	-0.12920	0.21796	%PRIVATE EDUC
XFOR	0.00864	0.07374	0.06118	%FOREIGN BORN
XINDF	0.04365	0.19981	0.04786	INDUST STRUCT-F
AA	-0.09977	0.25819	-0.07672	ABORTION
SP	0.00778	0.08228	-0.05264	%HISPANIC
URB	0.10923	-0.22889	-0.13940	%URBAN
IN	0.37719	0.22886	-0.07807	INFANT MORT
D	-0.40754	0.12523	0.13603	COLLEGE (QUALITY)
	FACTOR7			
F	0.08066			FEMALE HS GRADS
UNEM	0.06256			FEMALE UNEMP
YFEM	-0.03469			FEMALE INCOME
YPERM	-0.07273			AGE 35/44 INCOME
XEL	0.05633			%PRIVATE EDUC
XFOR	0.02491			%FOREIGN BORN
XINDF	0.06889			INDUST STRUCT-F
AA	0.07703			ABORTION
SP	-0.05373			%HISPANIC
URB	0.05245			%URBAN
IN	0.02523			INFANT MORT
D	-0.03222			COLLEGE (QUALITY)

TABLE F-IV

ORTHOGONAL TRANSFORMATION MATRIX (FOR WHITE DATA)

	1	2	3	4
1	0.78802	-0.16973	0.49789	-0.18599
2	-0.06851	0.92187	0.23932	-0.10487
3	0.51074	0.27614	-0.66159	-0.29544
4	0.28811	0.08037	-0.33226	0.75440
5	0.15189	0.18757	0.37466	0.50525
6	0.00724	0.03639	0.07973	-0.20490
7	-0.08576	-0.04618	-0.00219	0.02719
	5	6	7	
1	0.16402	0.20048	0.02525	
2	0.19043	0.20230	-0.00009	
3	-0.33470	-0.14077	0.07790	
4	0.47483	0.06849	0.02937	
5	-0.60992	-0.41042	0.07513	
6	0.46939	-0.80562	0.28450	
7	-0.08375	0.27733	0.95176	

TABLE F-V
ROTATED FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	
F	0.51238	-0.16434	0.32129	FEMALE HS GRADS
UNEM	-0.14835	0.04897	-0.56965	FEMALE UNEMP
YFEM	0.80662	-0.02770	0.04828	FEMALE INCOME
YPERM	0.81314	-0.12278	0.23787	AGE 35/44 INCOME
XEL	0.18519	0.06715	0.02338	%PRIVATE EDUC
XFOR	0.02761	0.69760	-0.01921	%FOREIGN BORN
XINDF	0.19123	0.00961	0.56706	INDUST STRUCT-F
AA	0.10800	0.06137	-0.08894	ABORTION
SP	-0.19759	0.71551	-0.01810	%HISPANIC
URB	0.19520	0.23687	0.20001	%URBAN
IN	-0.07496	-0.08254	0.01256	INFANT MORT
D	-0.00573	-0.00200	0.50328	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	-0.40707	-0.06171	0.20333	FEMALE HS GRADS
UNEM	-0.04592	-0.20201	-0.22487	FEMALE UNEMP
YFEM	-0.06112	-0.01771	-0.01389	FEMALE INCOME
YPERM	-0.06655	0.13703	0.13052	AGE 35/44 INCOME
XEL	0.09145	0.39397	-0.01629	%PRIVATE EDUC
XFOR	-0.09362	0.01352	0.00818	%FOREIGN BORN
XINDF	0.13443	0.14186	0.07494	INDUST STRUCT-F
AA	0.00877	-0.35495	-0.08794	ABORTION
SP	0.00872	-0.01654	0.06135	%HISPANIC
URB	-0.08283	0.28656	0.39255	%URBAN
IN	0.52287	0.03374	-0.01652	INFANT MORT
D	-0.26892	-0.06193	-0.08871	COLLEGE (QUALITY)
	FACTOR7			
F	0.07064			FEMALE HS GRADS
UNEM	0.10249			FEMALE UNEMP
YFEM	0.03924			FEMALE INCOME
YPERM	-0.03263			AGE 35/44 INCOME
XEL	0.11599			%PRIVATE EDUC
XFOR	0.06395			%FOREIGN BORN
XINDF	0.07819			INDUST STRUCT-F
AA	0.08757			ABORTION
SP	-0.05916			%HISPANIC
URB	-0.00214			%URBAN
IN	0.00863			INFANT MORT
D	-0.00522			COLLEGE (QUALITY)

TABLE F-VI
OTHER FACTOR ANALYSIS DATA

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4
1.762470	1.115147	1.110796	0.563899
FACTOR5	FACTOR6	FACTOR7	
0.452579	0.288822	0.053029	

FINAL COMMUNALITY ESTIMATES: TOTAL = 5.346741

F	UNEM	YFEM	YPERM	XEL	XFOR
0.608617	0.452891	0.659522	0.774167	0.216642	0.500880
XINDF	AA	SP	URB	IN	D
0.408136	0.164808	0.558945	0.377296	0.287464	0.337374

SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4
0.775101	0.648404	0.557641	0.422413
FACTOR5	FACTOR6	FACTOR7	
0.322282	0.225780	0.072949	

TABLE F-VII
 INITIAL FACTOR METHOD: PRINCIPAL FACTORS (FOR BLACK DATA)

PRIOR COMMUNALITY ESTIMATES: SMC

F	UNEM	YFEM	YPERM	XEL	XFOR
0.588345	0.186500	0.613079	0.645450	0.290134	0.478796
XINDF	AA	SP	URB	IN	D
0.275976	0.178061	0.463933	0.335087	0.200260	0.176447

TABLE F-VIII
 EIGENVALUES OF THE REDUCED CORRELATION MATRIX

TOTAL =	4.43207	AVERAGE =	0.369339	
	1	2	3	4
EIGENVALUE	2.958954	0.973679	0.604325	0.527877
DIFFERENCE	1.985275	0.369354	0.076448	0.302386
PROPORTION	0.6676	0.2197	0.1364	0.1191
CUMULATIVE	0.6676	0.8873	1.0237	1.1428
	5	6	7	8
EIGENVALUE	0.225491	0.118721	-0.019583	-0.060263
DIFFERENCE	0.106770	0.138304	0.040681	0.091564
PROPORTION	0.0509	0.0268	-0.0044	-0.0136
CUMULATIVE	1.1936	1.2204	1.2160	1.2024
	9	10	11	12
EIGENVALUE	-0.151827	-0.209210	-0.243195	-0.292901
DIFFERENCE	0.057383	0.033985	0.049706	
PROPORTION	-0.0343	-0.0472	-0.0549	-0.0661
CUMULATIVE	1.1682	1.1210	1.0661	1.0000

6 FACTORS WILL BE RETAINED BY THE MINEIGEN CRITERION

TABLE F-IX
 FACTOR PATTERNS (BLACK DATA)

(INITIAL FACTOR METHOD: PRINCIPAL FACTORS)

FACTOR PATTERN				
	FACTOR1	FACTOR2	FACTOR3	
F	0.76921	-0.09637	-0.14466	FEMALE HS GRADS
UNEM	-0.08680	-0.36173	0.17638	FEMALE UNEMP
YFEM	0.72748	-0.34834	-0.03316	FEMALE INCOME
YPERM	0.70836	-0.37091	-0.26671	AGE 35/44 INCOME
XEL	0.51022	0.04129	0.25735	%PRIVATE EDUC
XFOR	0.52975	0.51565	0.06129	%FOREIGN BORN
XINDF	0.35958	0.17276	0.11350	INDUST STRUCT-F
AA	-0.00418	0.10557	-0.46377	ABORTION
SP	0.46922	0.49968	-0.07123	%HISPANIC
URB	0.48667	-0.08365	0.41323	%URBAN
IN	-0.40838	0.02054	0.06243	INFANT MORT
D	0.18617	0.09457	-0.04879	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	0.00856	-0.17143	0.14757	FEMALE HS GRADS
UNEM	-0.24811	0.13987	0.03237	FEMALE UNEMP
YFEM	-0.03763	0.21139	-0.04144	FEMALE INCOME
YPERM	0.01155	-0.01388	-0.08292	AGE 35/44 INCOME
XEL	0.01041	0.16904	0.02175	%PRIVATE EDUC
XFOR	-0.12219	0.05018	-0.07728	%FOREIGN BORN
XINDF	0.40987	0.03999	0.13728	INDUST STRUCT-F
AA	-0.01287	0.10783	0.14637	ABORTION
SP	-0.29676	0.05732	-0.00278	%HISPANIC
URB	-0.01378	-0.13386	0.07024	%URBAN
IN	0.07728	0.24786	0.11041	INFANT MORT
D	0.43274	0.06855	-0.15315	COLLEGE (QUALITY)

TABLE F-X
 ORTHOGONAL TRANSFORMATION MATRIX (BLACK DATA)

	1	2	3
1	0.80369	0.48083	0.24840
2	-0.50605	0.76034	0.28896
3	-0.27397	0.06194	-0.03308
4	-0.06662	-0.40587	0.89859
5	-0.12040	0.13278	0.11665
6	-0.06332	-0.06710	-0.18067
	4	5	6
1	0.16200	0.07257	0.17228
2	-0.14670	-0.23898	0.06062
3	0.90922	0.23007	0.20101
4	0.01696	-0.03671	0.14746
5	-0.24700	0.93490	-0.13862
6	-0.25351	0.09645	0.94089

TABLE F-XI
ROTATED FACTOR PATTERN (BLACK DATA)

	FACTOR1	FACTOR2	FACTOR3	
F	0.71733	0.25149	0.12905	FEMALE HS GRADS
UNEM	0.06261	-0.18875	-0.34440	FEMALE UNEMP
YFEM	0.74971	0.12900	0.07947	FEMALE INCOME
YPERM	0.83622	0.04110	0.10134	AGE 35/44 INCOME
XEL	0.29624	0.30942	0.15530	%PRIVATE EDUC
XFOR	0.15501	0.71202	0.18858	%FOREIGN BORN
XINDF	0.12966	0.14102	0.48365	INDUST STRUCT-F
AA	0.04888	0.05926	0.01938	ABORTION
SP	0.15681	0.72937	0.00383	%HISPANIC
URB	0.33284	0.17911	0.04236	%URBAN
IN	-0.39769	-0.18274	-0.01916	INFANT MORT
D	0.08775	0.00214	0.49971	COLLEGE (QUALITY)
	FACTOR4	FACTOR5	FACTOR6	
F	0.01230	-0.10078	0.26147	FEMALE HS GRADS
UNEM	0.15241	0.26372	-0.02695	FEMALE UNEMP
YFEM	0.09646	0.32342	0.02371	FEMALE INCOME
YPERM	-0.04868	0.05728	-0.02845	AGE 35/44 INCOME
XEL	0.26349	0.24612	0.14070	%PRIVATE EDUC
XFOR	0.07102	-0.02674	0.03716	%FOREIGN BORN
XINDF	0.09838	0.04650	0.27930	INDUST STRUCT-F
AA	-0.50178	-0.01683	0.03333	ABORTION
SP	-0.08054	-0.03754	0.04250	%HISPANIC
URB	0.48185	0.03251	0.24445	%URBAN
IN	-0.10031	0.21936	0.02436	INFANT MORT
D	0.00116	0.01312	-0.06179	COLLEGE (QUALITY)

TABLE F-XII
OTHER FACTOR ANALYSIS DATA (BLACK DATA)

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
2.212021	1.340770	0.697713	0.619727	0.302081	0.236735

FINAL COMMUNALITY ESTIMATES: TOTAL = 5.409047

F	UNEM	YFEM	YPERM	XEL	XFOR
0.673137	0.251664	0.699483	0.717688	0.357419	0.573703

XINDF	AA	SP	URB	IN	D
0.360468	0.259458	0.566282	0.437647	0.250693	0.261406

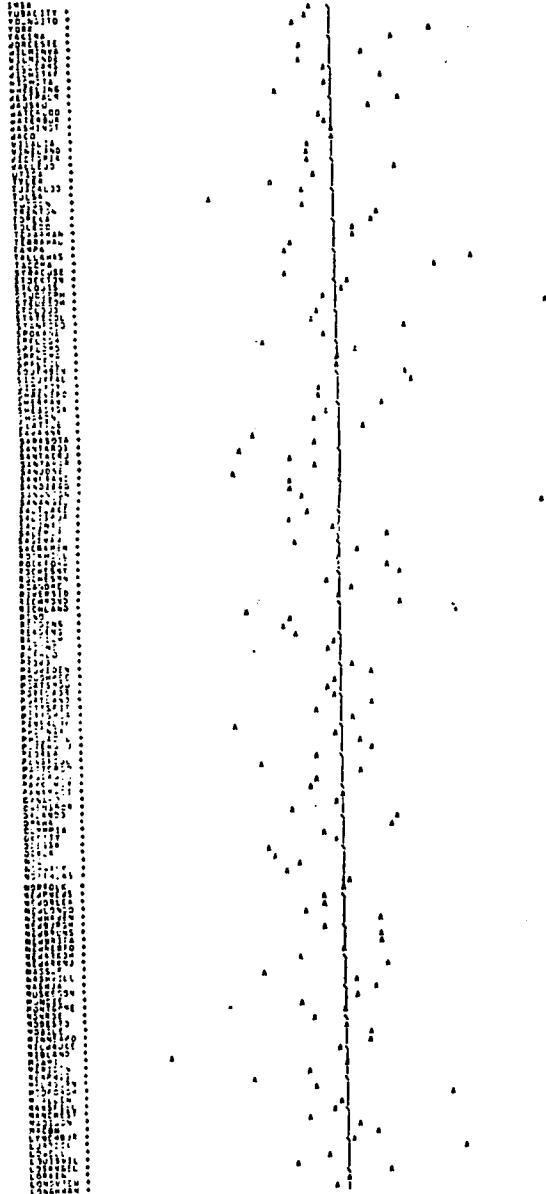
SCORING COEFFICIENTS ESTIMATED BY REGRESSION

SQUARED MULTIPLE CORRELATIONS OF THE VARIABLES WITH EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
0.802671	0.659322	0.432603	0.435780	0.321363	0.221126

APPENDIX G
REGRESSION RESIDUALS

TABLE G-I
RESIDUALS OF WHITE REGRESSION



(continued)

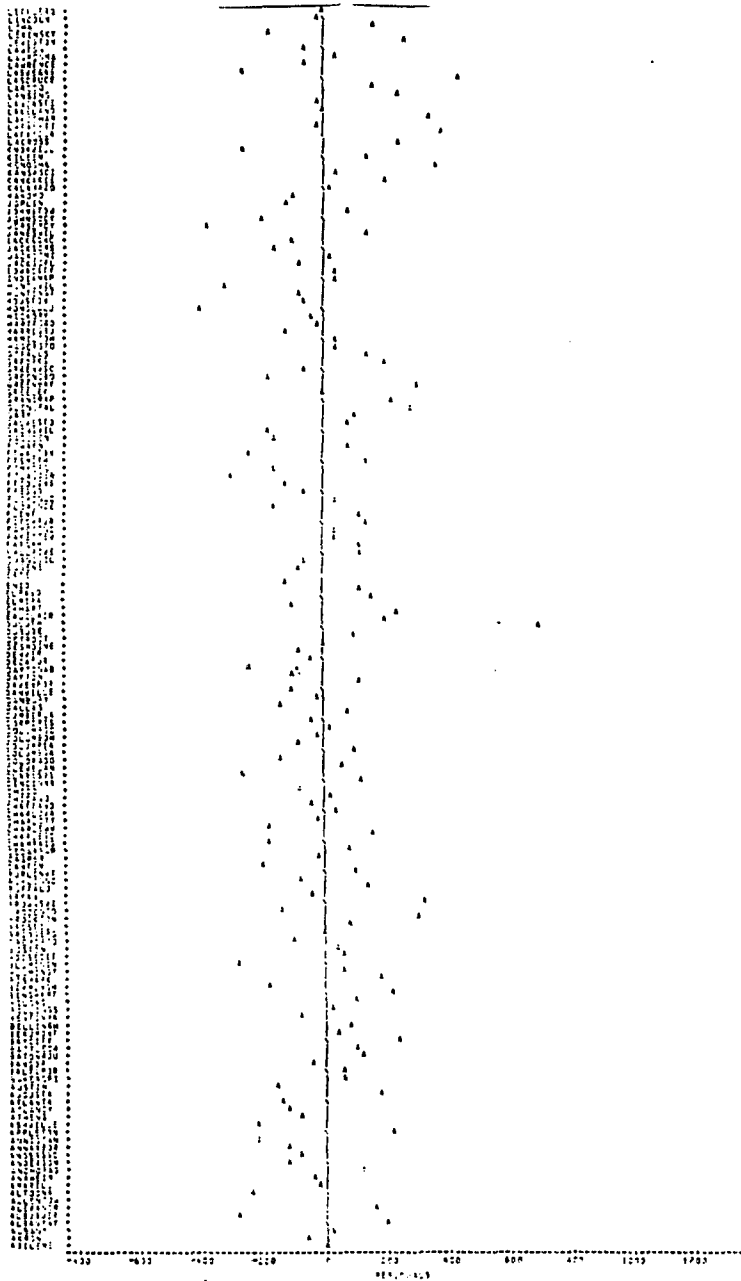
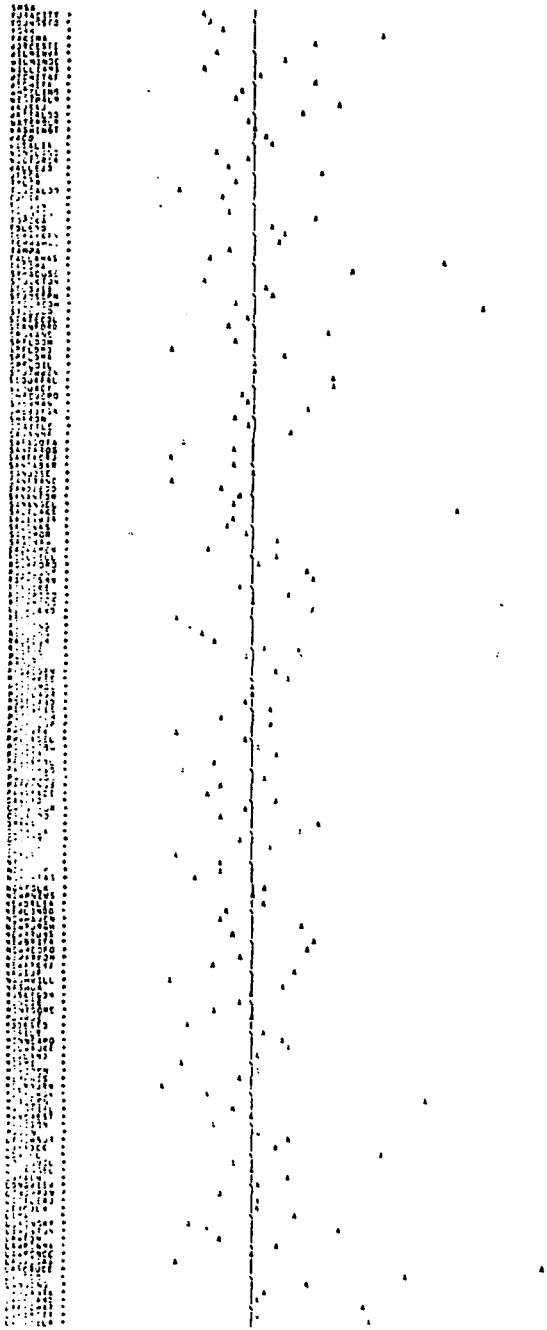
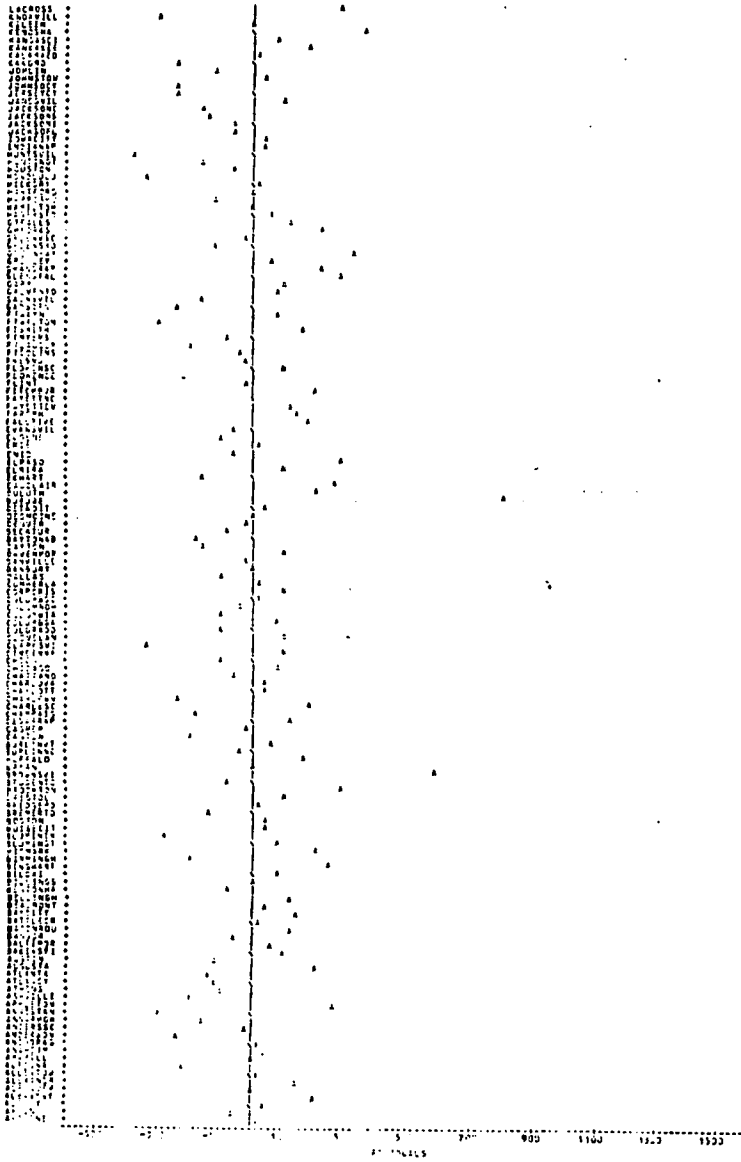


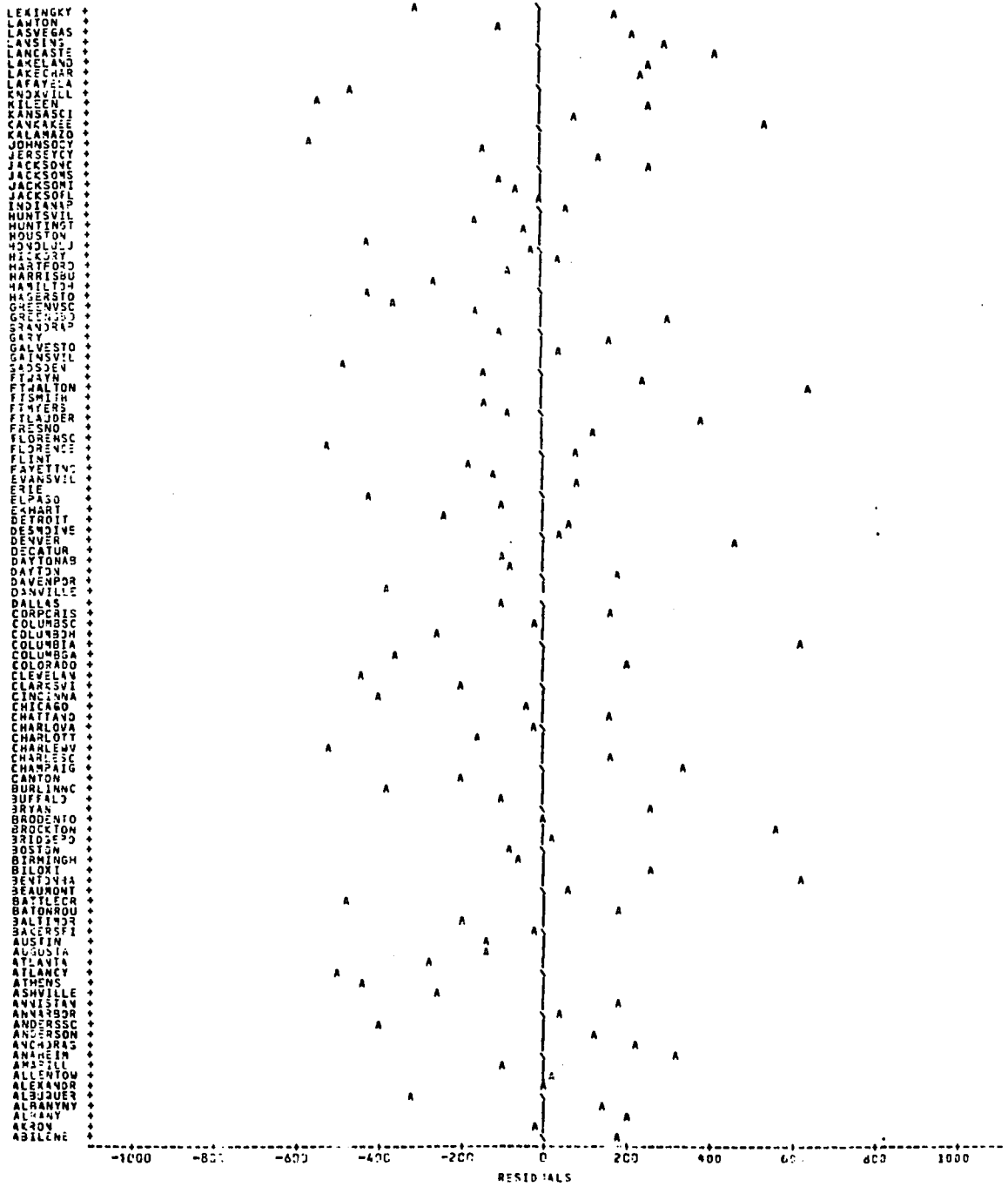
TABLE G-II
RESIDUALS OF WEIGHTED WHITE REGRESSION



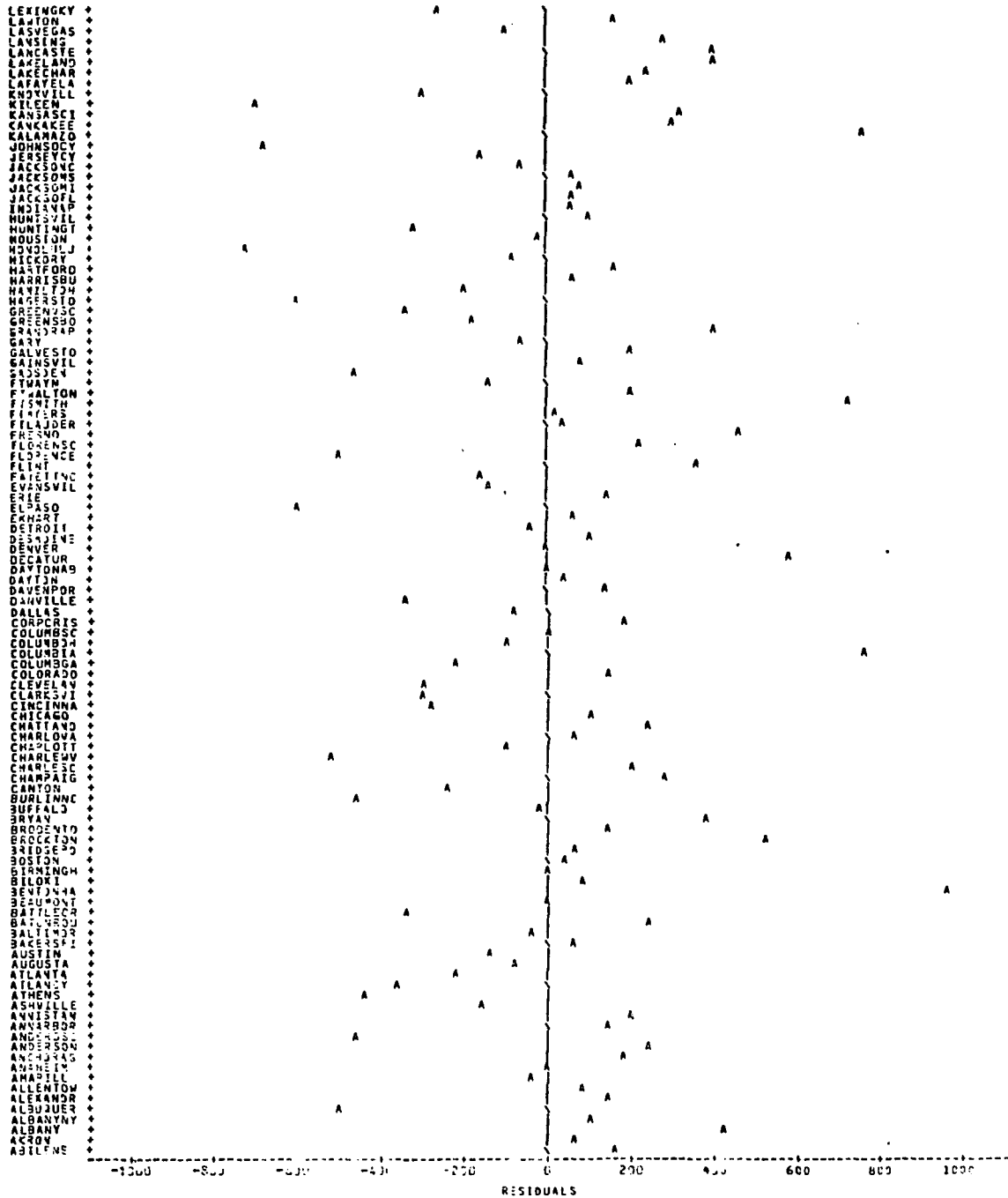
(continued)



(continued)



(continued)



BIBLIOGRAPHY

Appleman, Philip (editor)

An Essay on the Principle of Population by Robert Thomas Malthus. New York: W.W. Norton and Company, 1976.

Ashenfelter, Orley

"Comment on Dennis N. DeTray: Child Quality and the Demand for Children." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Bagozzi, Richard P. and Van Loo, M. Francis

"Fertility as Consumption: Theories from the Behavioral Sciences." Journal of Consumer Research 74 (March 1978), pages 199-228.

Bean, Frank D. and Wood, Charles H.

"Ethnic Variations in the Relationship Between Income and Fertility". Demography, Volume 11, Number 4 (November 1974), pages 629-640.

Becker, Gary S.

"A Theory of Social Interactions". Journal of Political Economy, Volume 82, Number 6 (November/December 1974), pages 1063-1093.

Becker, Gary S. (1965)

"A Theory of the Allocation of Time." In The Economic Journal, September 1965, pages 493-517, reprinted in Burton, John F., Benham, Lee K., Vaughn, William M., and Flanagan, Robert J., Readings in Labor Market Analysis. Homewood, Illinois: Richard D. Irwin, Inc., pages 106-125.

Becker, Gary S.

"An Economic Analysis of Fertility." In Demographic and Economic Change in Developed Countries. Universities-National Bureau Conference Series Number 11. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research, 1960.

Becker, Gary S. and Lewis, H. Gregg

"On the Interaction between the Quantity and Quality of Children." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Bellante, Don and Jackson, Mark

Labor Economics: Choice in Labor Markets. New York: McGraw Hill Book Company, 1981.

Ben-Porath, Yoram

"Child Mortality and Fertility: Issues in the Demographic Transition of a Migrant Population." In Easterlin, Richard A. (editor), Population and Economic Change in Developing Countries. Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980.

Ben-Porath, Yoram

"Economics and the Family--Match or Mismatch?" A Review of Becker's A Treatise on the Family, Journal of Economic Literature, Volume XX (March 1982), pages 52-64.

Ben-Porath, Yoram

"Fertility Response to Child Mortality: Microdata from Israel." In Samuel H. Preston (editor) The Effects of Infant and Child Mortality on Fertility. New York: Academic Press, 1978.

Ben-Porath, Yoram

"Short Term Fluctuations in Fertility and Economic Activity in Israel." Demography, 10 (May 1973), pages 185-204.

Ben-Porath, Yoram and Welch, Finis

"Do Sex Preferences Really Matter." Quarterly Journal of Economics XC (1976), pages 285-307.

Blake, Judith

"Are Babies Consumer Durables?" Population Studies, Volume XXII, Number, (March 1968), pages 5-25.

Cain, Glen G. and Dooley, Martin D.
"Estimation of a Model of Labor Supply, Fertility and Wages of Married Women." Journal of Political Economy, Volume 84, Number 4 (August, 1976), pages S179-201.

Cain, Glen G. and Weininger, Adriana
"Economic Determinants of Fertility: Results from Cross-Sectional Aggregate Data." Demography, Volume 10, Number 3 (May 1973), pages 205-233.

Candelario, Carlos
"The Economics of Fertility: The Puerto Rican Experience." Unpublished Ph.D. dissertation (City University of New York), 1980.

Carliner, Geoffrey
"Female Labor Force Participation Rates for Nine Ethnic Groups." Journal of Human Resources, Vol. XVI, Number 2, (1981), pages 286-283.

Carvajal, Manuel J. and Geithman, David T.
"Socioeconomic Fertility Determinants in Costa Rica 1963-1973." In New Perspectives on the Demographic Transition. Occasional Monograph Series, Number 4. Washington D.C.: Interdisciplinary Communications Program, Smithsonian Institution (1976), pages 95-162.

Coale, Ansley, J.
"Population and Economic Development." In The Population Dilemma, The American Assembly, Columbia University, Prentice Hall, Inc., 1963.

Cochrane, Susan Hill
Fertility and Education: What Do We Really Know. Baltimore: The John Hopkins University Press for the World Bank, Staff Occasional Papers, Number 26, 1979.

Day, Lincoln H. and Day, Alice Taylor
Too Many Americans, Boston: Houghton Mifflin Co., 1964.

DeTray, Dennis W.
"Child Quality and the Demand for Children." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia

"Market Prices, Opportunity Costs, and Income Effects."
In Measurement in Economics: Studies in Mathematical Economics and Econometrics in Memory of Yehuda Grunfeld.
Stanford: Stanford University Press, 1963, pages 67-82.

Namboodiri, N. Krishnan

"Comments on Fertility as Consumption: Theories from the Behavioral Sciences." Journal of Consumer Research, Volume 5 (March 1979), pages 290-292.

Namboodiri, N. Krishnan

"Some Observations on the Economic Framework for Fertility Analysis." Population Studies, Volume 26, Number 2 (July 1972), pages 185-206.

National Center for Health Statistics

Vital Statistics of the United States, 1978. Volume II, Part A. DHHS Pub. Number (PHS) 83-1101, Public Health Service, Washington, D.C., U.S. Government Printing Office, 1982.

Nerlove, Marc

"Toward a New Theory of Population and Economic Growth." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Nerlove, Marc and Schultz, T. Paul

Love and Life Between the Censuses: A Model of Family Decision Making in Puerto Rico, 1950-60. Santa Monica, CA, Rand Corporation, September 1970, (RM-6322-AID).

New York Times

Thursday, April 5, 1984.

Olsen, Randall J.

"Mortality Rates, Mortality Events and the Number of Births." American Economic Review, Volume 73, Number 2 (May 1983).

Okun, Bernard

"Comment on Gary Becker: An Economic Analysis of Fertility." In Demographic and Economic Change in Developed Countries, Universities-National Bureau Conference Series

Number 11. Princeton, New Jersey: Princeton University Press for the NBER, 1960.

Perlman, Mark

"Population and Economic Change in Developing Countries: A Review Article," Journal of Economic Literature, Volume XIX (March 1981), pages 74-82.

Perlman, Mark

"Some Economic Growth Problems and the Part Population Policy Plays." Quarterly Journal of Economics, Volume LXXXIX, Number 2 (May 1975), pages 247-256.

Pittsburgh Regional Planning Association

Region In Transition: Report of the Economic Study of the Pittsburgh Region, Pittsburgh, Penn.: University of Pittsburgh Press, 1963.

Reid, Margaret G.

"Comment on Education and the Derived Demand for Children." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Richardson, Harry W.

Urban Economics. Honesdale, Illinois. The Dryden Press.

Robinson, Chris and Tomes, Nigel

"Family Labour Supply and Fertility: A Two Regime Model," Canadian Journal of Economics, Volume XV, Number 4 (November 1982), pages 706-734.

Rosenzweig, Mark R.

"The Demand for Children in Farm Households." Journal of Political Economy, Volume 85, Number 1 (February 1977), pages 123-145.

Rosenzweig, Mark R.

The Economic Determinants of Population Change in the Rural and Urban Sectors of the United States: A Theoretical and Empirical Analysis. Unpublished Ph.D. dissertation (Columbia University), 1973.

Rosenzweig, Mark R. and Schultz, T. Paul
"Consumer Demand and Household Production: The Relationship Between Fertility and Child Mortality," American Economic Review, Volume 73, Number 2 (May 1983), pages 38-42.

Rottenberg, Simon
"Comments on "Contraception and Fertility: Household Production Under Uncertainty." In Terleckyj, Nestor E., Household Production and Consumption. New York: Columbia University Press for the National Bureau of Economic Research, 1975, pages 94-98.

Ruggles, Richard and Nancy
"Differential Fertility in United States Census Data." In Demographic and Economic Change in Developed Countries, Universities-National Bureau Conference Series Number 11. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research, 1960.

Rummel, R.J.
Applied Factor Analysis. Evanston: Northwestern University Press, 1970.

Ryder, Norman B
"Comment on Economic Theory of Fertility Behavior by Robert J. Willis." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Rytina, Nancy F. and Bianchi, Suzanne M.
"Occupational Reclassification and Changes in Distribution by Gender." Monthly Labor Review, Bureau of Labor Statistics, U.S. Department of Labor (March 1984), pages 11-17.

Sanderson, Warren C.
"Comment on Easterlin, Richard A.; Pollak, Robert A.; and Wachter, Michael L. Towards a More General Economic Model of Fertility Determination: Endogenous Preferences and Natural Fertility." In Easterlin, Richard A. (editor), Population and Economic Change in Developing Countries. Chicago: University of Chicago Press for the National Bureau of Economic Research, 1980.

SAS Institute, Inc.
S.A.S. Introductory Guide, Revised Edition. Cary,
N.C.: SAS Institute, Inc., 1983.

SAS Institute, Inc.
S.A.S User's Guide: Basics, 1982 Edition. Cary, N.C.:
SAS Institute, Inc.

SAS Institute, Inc.
S.A.S User's Guide: Statistics, 1982 Edition. Cary,
N.C.: SAS Institute, Inc.

Schultz, T. Paul
"A Preliminary Survey of Economic Analyses of
Fertility." American Economic Review, Volume LXIII, Number 2
(May 1973), pages 71-78.

Schultz, T. Paul
"The Decline in Fertility in a Rapidly Developing
Country." In Easterlin, Richard A. (editor), Population and
Economic Change in Developing Countries. Chicago:
University of Chicago Press for the National Bureau of
Economic Research, 1980.

Schultz, Theodore W.
"Fertility and Economic Value." In Schultz, Theodore W.
(editor), Economics of the Family: Marriage, Children, and
Human Capital. New York: Columbia University Press for the
National Bureau of Economic Research, 1974.

Schultz, Theodore W.
Human Capital: Policy Issues and Research
Opportunities. New York, National Bureau of Economic
Research, Columbia University Press, 1972.

Serow, William J. and Espenshade, Thomas J.
"The Economics of Declining Population Growth: An
Assessment of the Current Literature." In Espenshade, Thomas
J. and Serow, William J. (editors), The Economic
Consequences of Slowing Population Growth. New York:
Academic Press, 1978, pages 13-40.

Sly, David F.

"Minority Group Status and Fertility: An Extension of Goldscheider and Uhlenberg." American Journal of Sociology, Volume 76, Number 3 (1970), pages 443-459.

Smith, Larry J.
Black-White Reproductive Behavior: An Economic Interpretation. San Francisco: R and E Research Associates, Inc., 1977.

Sternlieb, George, Hughes, James W., and Hughes, Connie O.
Demographic Trends and Economic Reality: Planning and Markets in the '80's. New Brunswick, N.J.: Center for Urban Policy Research, Rutgers, The State University, 1982.

Supreme Court of the United States
Number 70-18, January 22, 1973: Jane Roe et. al. Appellants Vs. Henry Wade. Reprinted in Applemen, Philip (editor), An Essay on the Principles of Population by Robert Thomas Malthus. New York: W.W. Norton and Company. 1976.

Thornton, Arland
"The Relationship Between Fertility and Income, Relative Income, and Subjective Well-Being." In Simon, Julian (editor), Research in Population Economics, Volume 1, JAI Press, Inc., 1978, pages 261-290.

Tobin, James
"Comment on Birth Rate Changes Over Space and Time: A Study of Taiwan." In Schultz, Theodore W. (editor), Economics of the Family: Marriage, Children, and Human Capital. New York: Columbia University Press for the National Bureau of Economic Research, 1974.

Tomes, Nigel
"A Model of Fertility and Children's Schooling." Economic Inquiry, Volume XIX (April 1981), pages 209-234.

Tomes, Nigel
"Religion and the Rate of Return on Human Capital: Evidence from Canada." Canadian Journal of Economics, Volume XVI, Number 1 (February 1983), pages 122-138.

Tully, Charles

"Questions and Conclusions." In Charles Tully (editor), Historical Studies of Changing Fertility. Princeton, N.J.: Princeton University Press, 1978.

Turchi, Boone A.

"Book Review of Economics of Population by T. Paul Schultz." Journal of Political Economy, Volume 92, Number 2 (April 1984), pages 345-348.

Turchi, Boone A.

"Comment on Bagozzi and Van Loo. Fertility as Consumption: Theories from the Behavioral Sciences." Journal of Consumer Research, Volume 5 (March 1979), pages 293-296.

Turchi, Boone, A.

The Demand for Children: The Economics of Fertility in the United States. Cambridge, MA: Ballinger Publishing Company, 1975.

United States Bureau of the Census

Current Population Reports, Series P-20, Number 325. "Fertility of American Women, June 1977." U.S. Government Printing Office, Washington, D.C., 1978.

United States Bureau of the Census

Current Population Reports, Series P-20, Number 384, "Geographic Mobility: March 1980 to March 1982." U.S. Government Printing Office, Washington, D.C., 1983.

United States Bureau of the Census

Current Population Reports, Series P-25, Number 952, "Projections of the Population of the United States by Age, Sex, and Race, 1983 to 2080." U.S. Government Printing Office, Washington, D.C., 1984.

United States Bureau of the Census

State and Metropolitan Area Data Book, 1982. U.S. Government Printing Office, 1982.

United States Bureau of the Census

United States Census of the Population, Volume 1, Characteristics of the Population, Chapter C, General Social and Economic Characteristics, Parts 1-51, PC 80-1-C1-51.

United States Bureau of the Census
United States Census of the Population, Volume 1,
Characteristics of the Population, Chapter B, General
Population Characteristics, Part 1, U.S. Summary, PC
80-1-B1 (issued May 1983).

USA Today
Monday, April 23, 1984, page 1.

USA Today
Thursday, May 31, 1984 (by Tim Schreiner), page 1.

Westoff, Charles F. and Potvin, Raymond H.
College Women and Fertility Values. Princeton
University Press, 1967.

Willis, Robert J.
"A New Approach to the Economic Theory of Fertility
Behavior." In Schultz, Theodore W. (editor), Economics of
the Family: Marriage, Children, and Human Capital. New
York: Columbia University Press for the National Bureau of
Economic Research, 1974.

Wolfe, Barbara L.
"Childbearing and/or Labor Force Participation: The
Education Connection." In Simon, Julian L. and DaVanzo,
Julie (editors), Research in Population Economics, Volume 2.
JAI Press, Inc., 1980, pages 365-385.

Wrong, Dennis H.
Population and Society, Third Edition. New York:
Random House, Inc., 1967.

Yamada, Tadashi
Fertility Differentials of White Women in the United
States, 1970. Unpublished Master's thesis (Brooklyn
College, City University of New York), 1978.