GEOGRAPHICAL PATTERNS OF LABOR FORCE PARTICIPATION RATES IN OKLAHOMA COUNTIES

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PREFACE

The main theme of this study concerns the variations of labor force participation rates in Oklahoma counties. The study has three main objectives. First, it tries to develop a set of geographical models to investigate the extent that personal, family factors and labor market conditions affect labor force participation rates in Oklahoma counties. Second, the effect of work-residence separation on the labor force participation is examined. Finally, for more insights into geographic variability of labor force participation rates, analysis, mapping and interpretation of residuals from regression are undertaken.

The foundation upon which this work began started in January, 1976, when I first enrolled in "Seminar in Regional Analysis," conducted by Dr. Paul Hagle. Among major topics that received in depth treatment included the Input-output Model and the Export Base Theory. From that experience, I owe profound gratitude to Dr. Paul Hagle for offering me that stimulus. He has indeed provided me with tools in analyzing manpower problems, programs and employment. As my thesis adviser, his compassionate attitude and spirit of tolerance, valuable advice, guidance and inspiration is beyond doubt--to him I say thank you.

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friendly advice, and the patience to read and approve this work bear testimony for my offering them my sincere gratitude.

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CHAPTER I

INTRODUCTION

Geographical Patterns of Labor Force Participation Rates In Oklahoma Counties

The Background: U.S. Manpower Development Programs, Policies, and the Labor Market Problems

One can hardly think of a nation that devotes more effort and funds to the improvement of productive capabilities of its workers than the U.S.A. The range of improvement and rehabilitation of potential workers extends from federal programs to that of states and local governments. Prior to 1962, the viewpoint prevailed that unemployment, coupled with underemployment of workers and their related poverty and crime problems, had much to do with deficiencies and inadequacies on the part of potential workers. To counteract these problems, the Manpower Development and Training Act (MDTA) of 1962 was enacted. This Act gave birth to specialized manpower programs. The proliferation of Job Corps and vocational-rehabilitation centers soon brought many handicapped, less fortunate, and the unemployable persons into training. In the state of Oklahoma in 1971, total enrollment in area vocational-technical schools amounted to 16,112 students (Statistical Abstract, 1972, p. 100).

These programs have transformed many of the unemployed, including some who had been viewed as "unemployable", into employable workers. Despite their apparent capabilities, some persons of prime working age still disdain employment. Those persons who for any reason do not hold a job are classified as "not in the labor force." Labor force, as defined by the U.S. Census of Population, includes persons 16 years and over who were employed or looking for work (unemployed) as of the calendar week of the census enumeration, plus members of the Armed Forces (Census Users Guide, Part I, p. 103). Those who are not in the labor force are termed nonparticipants.

Manpower Research Bulletin (MRB) describes nonparticipation in the labor force as those people who are neither working (employed) nor looking for a job (unemployed). Some of these persons are primarily family members keeping house, in school, disabled, or retired persons (MRB No. I, July 1963, p. 18). The bulletin notes that a national downward trend exists among young persons--potential workers--who form the bulk of the nonparticipants category. This, perhaps, reflects increased numbers of years in school attendance and their exodus from farms to cities. Among older persons, there is an accelerated decline in labor force participation. This may well be a consequence of the liberalized retirement provisions of the Social Security Act. In contrast, women's participation rates have shown steady increases, particularly among married women (Manpower Report of the President, 1973, p. 56). But, if we observe different age and sex groups, it is possible to identify variations and patterns through time, space, and industry type in Oklahoma.

Everyone seems to agree that we have to produce in order to satisfy our numerous wants and preferences. Low levels of economic activity

could lower people's work rates (Sandmeyer and Warner, 1968, p. 4). There is much consensus that among the nonparticipants are some so-called "discouraged" workers who feel, that after a repeated job search without finding work, the best they can do is to relax as one of the idle poor. However, labor market tightness during increasing unemployment may cause more people to become discouraged. The extent to which this hypothesis holds true is yet unresolved.

As long as lack of knowledge concerning the determinants of labor force participation in a given geographical area prevails, efforts to get people to work must still remain bleak.

On the occasion of the first anniversary of MDTA, Mr. Wesley L. Hjornevik asserted that the problems in the supply side of the labor market were by definition solved; but what about the demand side? Are there discriminating practices in job placement? Do housing segregation practices increase the work-residence distance, thus affecting employ-ability? If not, what about urban land use system? Around 1950, William Goldner introduces the concept of "Normal Preference Area for Workers." In his own words, normal preference area of an individual wage earner is that geographical area within which he is willing to work at a particular point in time (Goldner, 1956, p. 113). Under this concept, potential workers in Oklahoma counties located long distances away from growth centers (employment-opportunity centers) are likely to fall short of expected participation ratios in the labor force. Consequently, if location influences work participation rates, could it be a good policy mix to set up industry in close proximity to workers residence? Consid-erations of certain factors, such as the distance variable, income, and unemployment situations within administrative counties in Oklahoma,

should serve to explain spatial patterns of labor force participation rates as evidenced in this relatively young but dynamic state.

Geographers, while making numerous contributions to such related problems as migration, devote little or no attention to the study of labor force participation ratios. Economic principles alone cannot fully explain the variations in the labor force participation ratios; neither can sociology nor demography do full justice. If spatial concepts serve as a basis for explaining other location and allocation problems, why should these not help explain variations in rates of labor force participation? To exemplify the issue, if the participation rates in Cleveland or Canadian County are considered as the norm, why should those of Roger Mills and Adair be so much below the norm?

These geographical variations are consequential to certain detectable phenomena involving interaction between characteristics of the individual, social status, market conditions, and locational factors. Variations in labor force participation rates as influenced by certain geographic, economic, social, and labor market conditions relative to Oklahoma counties constitutes the research problem investigated in this report. Findings of this study also will be evaluated in terms of possible implications for manpower policy and programs. The next section deals with the objectives and scope of this report.

Research Objectives and Scope of Research

The title of this report suggests that the overall research goal focuses on identification and analysis of geographical patterns created in Oklahoma by county-level labor force participation. Based on the

ideas gained from the statement of the problem, the objectives of this report might be summarized as follows:

1. Develop a set of procedures to investigate the extent that personal, family factors, and labor market conditions affect labor force participation rates in Oklahoma counties. Test the effect of these variables by the use of regression and correlation methods.
2. Examine the effects of location of job opportunity on labor force status.
3. Attempt to gain additional insights to geographic patterns by mapping and analyzing residuals from regression.
4. Suggest recommendations and policy implications of research findings.

This research report is organized and presented in five chapters. Chapter I reviews the general background upon which the research is based. The nature of manpower policies and programs since the early 1960's are considered. In addition to relevant literature, specific references to works dealing with "discouraged and added workers" hypotheses, working wives, family status, and other general determinants of labor force participation are reviewed.

Chapter II looks into the resource base of the study area--Oklahoma Counties--and through graphic presentation, illustrates the regional variations of labor force participation rates. Chapter three deals with development of a general model of participation rates for a given area. It considers factors relating to personal, family and labor market conditions.

Chapter III discusses methods of selecting variables, data used, and regression model specification.

The empirical findings are taken up in Chapter IV. The result of regression analysis (the least-squares method) are presented and analyzed. Interpretations are also made where appropriate. Residuals from regression for male 25-65 age group are calculated, interpreted, mapped and the patterns are discussed.

Finally, Chapter V summarizes the report by presenting summaries, conclusions and recommendations. A list of reference works consulted is presented after Chapter V, followed by appendices.

A Brief Review of Selected Studies of Labor Force Participation Rates

John Parker and L. B. Shaw studied the influence unemployment and education have on labor force participation rates of individuals and families in different income groups within tracts in metropolitan settings. Their paper places emphasis on examining the "Added and Discouraged" worker hypothesis. Where higher unemployment exists, jobs are more difficult to find; workers, therefore, drop out of the labor force or fail to enter, thus being viewed as "discouraged." According to the authors, higher unemployment and lower income pressures on the family would force marginal workers--housewives, children, and retired spouses--to enter the labor force at this time in order that the household budget could be balanced.

They found that discouraged workers, in effect, exist for all population groups (specific age groups of both sexes), but the most discouraged workers are those at the higher income levels among the tracts,

perhaps because of long-run adjustments and relatively high female unemployment rates. Their findings suggest that the additional-worker effect may be found most commonly among women from high-income tracts.

Writing on the same theme, Jacob Mincer interpreted the additional-worker effect as an alternative to dissaving, that is, asset decumulation in an effort to maintain household consumption at a level comparable to that prior to the loss of income brought about by unemployment (Mincer, 1966, p. 95). This indicates that the "additional worker" is more likely to be from low-income households than the discouraged worker.

Joseph D. Mooney used regression with one or two independent variables to analyze the extent of discouragement in white and non-white, low-income tracts. He found a strong discouragement effect in non-white, low-income tracts (Mooney, 1968, pp. 14-16). Glenn Cain, on the other hand, found a weak and statistically insignificant response among similar sub-populations.

Bowen and Finegan, using the cross-sectional approach, estimated the effect of unemployment rates as a proxy for local market conditions on labor force participation rates of various age-sex groups from 1940, 1950, and 1960 censuses. They discovered a strong, negative relationship between unemployment and labor force participation for all population groups (Bowen and Finegan, 1965, p. 146). In their conclusion, they indicate that unemployment induces some secondary workers to enter the labor force but that the tendency has been more than offset by the discouragement effect (Bowen and Finegan, 1965, p. 147).

Thomas Dernburg and Kenneth Strand, using a time-series analysis of data for 1953 to 1962 for the United States, found that the discouraged-worker concept is inconsistent with observations for all female groups

and that only the very old and very young male groups are affected (Dernburg and Strand, 1965, p. 76). Thus, it is evident that some conflicting findings have resulted from different studies.

As is evident in all these studies, there is sound reason to believe that adverse economic conditions, as approximately measured by labor-market unemployment rates, may produce both discouraged and additional workers. But Sandmeyer and Warner point out that unemployment rates are less appropriate measures to explore the discouragement effect in what they call an "open system," such as the Ozarks region of Arkansas, Missouri, and Oklahoma because of geographic mobility of workers. However, lack of agreement in the findings of different studies might be due to the methodology used in investigations, since some use time-series analysis while others employ the cross-section approach.

In a more general sense, many writers have explored conditions of labor force status in an attempt to discover crucial factors that help to determine the rate of labor participation in a given geographical area. Apart from those specific treatments on the relationship between labor force participation and labor market tightness or looseness, factors like educational attainment, migration, age, earnings, race, and worker's relative locations to job place have been explored, some much in depth and some with shallow treatment. Some of the related significant studies include the major work The Economics of Labor Force Participation by William Bowen and T. A. Finegan. Clarence Long wrote on The Labor Force Under Changing Income and Employment. The work of Robert Sandmeyer and Larkin Warner on the Determinants of Labor Force Participation Rates, with Special Reference to the Ozark Low-Income Area is also worth mentioning.

The analysis of the "discouraged-worker" effect, as reviewed here, is of a static nature. That is, the authors use the unemployment data as defined for only a point in time. Stuart Schweitzer and Ralph E. Smith also recognize that unemployment tends to cause workers to withdraw from the labor force. But they maintain that the memory of past failure in the labor force market may influence subsequent labor force participation decisions thereby creating a persistent "scar effect" (Schweitzer and Smith, 1974, p. 249). In using data from the University of Michigan Income Dynamics Panel and past and present unemployment rates, they discovered a significant negative relationship between current participation and both current and past unemployment. Then they concluded that the discouraged worker effect has a significant dynamic component which implies that the cost of unemployment persist over time (Ibid, p. 260).

A more recent study by Valerie Kincade Oppenheimer adds a different perspective on the "added worker" theory. She illustrates that peaks in earnings for different professions occur at different times than the peak periods of family needs. As a consequence, wives and other secondary workers are brought into the labor force for additional household income (Oppenheimer, 1974, p. 227). This view is in accord with the hypothesis that "added workers," because of high unemployment and the consequent lower incomes and economic pressures on the family, enter the labor force (Parker and Shaw, 1968, p. 538).

Female Participation Rates

On specific topics such as women's labor and participation rates, several economists, sociologists, demographers, and feminists have been

attracted. Some of these are briefly reviewed. Kupinsky (1971) indicates that an inverse relationship exists between the number of children born to a married woman and the proportion of her married life that she has held employment. Karen Manson (1974) and Whelpton and Campbell (1966) and many others point out that working wives prefer smaller families than their non-working counterparts. Reports also hold that women who are employed because they like to be employed anticipate fewer children than those employed because they need the money made available by the job. Examples of these are found in Westoff (1966). However, these suggestions indicate that part of the relationship between women, fertility, and labor force participation is caused by an inverse relationship between their desire for employment outside the home and their desires for childbearing and child raising.

In partial agreement with the consensus that number of children and labor force activity are negatively correlated are the findings of Linda J. Waite and Ross M. Stolzenberg in their investigations of female participation rates. They use data from National Longitudinal Study (NLS)* of the Labor Market Experiences of Young Women to answer these questions:

1. Do women limit their fertility in order to have time to pursue their non-family oriented interests?
2. Do women work if their fertility permits them to do so?

In response to these questions, Waite and Stolzenberg conclude:

> Our analysis permits a cautious answer. . . , yes, women do appear to limit their fertility plans to accomodate their plans to participate in the labor force, and yes, women's

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*NLS is designed by the Center for Human Resource Research at Ohio State University but it is funded by the U. S. Department of Labor. It collects its data by sampling certain sections of the U. S. population.

> fertility expectations do seem to affect their plans for labor force participation (Waite and Stolzenberg, p. 56).

On the question of patterns of labor force participation of married women, Linda J. Waite hypothesized that significant changes have occured since 1940 in the effect of the factors influencing working wives. Using certain variables such as income of the husband, wage potential of the wife, and the number of children under six, she found a significant support of the hypothesis for the early stages of marriage and childbearing only. For factors that facilitate married women working, Waite points to the past labor force activity and the wife's earning power (Waite, 1976, p. 65).

The matter of fertility and work has been approached in a different way. Garfinkle employs 1960 census data to construct a multiple decrement life table analysis of the work life of married women. From his study he made the following conclusions:

> The birth of a child reduces the average number of years a married woman can be expected to spend in the work force by about ten years. The birth of each additional child appears to further reduce the work life expectancy from two to three years for each child (Garfinkle, U.S. Department of Labor, 1967, p. 65).

Distance and Labor Force Participation

So far we have seen a wealth of knowledge contributed to labor force participation with regards to labor market conditions and women determining factors to their working life. Nevertheless, the above literatures on labor force participation is yet inconclusive. Numerous studies also exist that analyze the effect of certain variables as to what effects they have on the labor force. Paul Offner, who writes on the "Labor Force Participation in the Ghetto," among other variables such as wage,

wealth and taste for work, also investigates whether the different amounts of labor supply in the ghetto are due to location or to demographic, social, or economic characteristics of their residents (Offner, p. 462). He found out that the distance between center city poverty area and the low-skill job concentrations have a significant negative effect on the labor supply of the blacks. According to him, as center-city employers continue to move to the suburbs and the average distance to job concentrations increases, labor supply in center-city poverty areas will suffer (Offner, p. 479). In a related study, Duncan shows that Negroes commute further to work than the whites (Duncan, p. 52). Arnold Weber also comments on the geographical dispersion of job opportunities. On its impact on various groups of workers he concludes thus, ". . . a new class has emerged in the urban labor market. Its members are separated from the mainstream of economic activity by deficiencies in skill and education, pronounced gaps in the labor market information system and increased physical distance" (Arnold Weber, 1964, p. 74).

However, the effect of location in relationship to work opportunity areas may be far from physical distance separation. Housing segregation, race and sex discriminations also increase the work-residence separation. Commenting on jobs, housing segregation and distance, President Lydon Johnson, in 1966, was quoted as saying, "Sometimes, Negroes were unable to find adequate housing near federal installations and did not want to commute long distances to work. Therefore they turned down federal jobs at those installations." (New York Times, March 8, 1966) The distance variable, as pointed out by certain authorities, seem to be a major factor in the supply of labor. However, socioeconomic characteristics of workers are not the only major elements that influence the

distance separation of workplace and residence, but the centralization of work places affect it also (Beverley Duncan, 1951, p. 48).

Before concluding the review of literatures on the subject of labor force participation it should be added that some research designs used in studying this subject focus on factors such as migration, education and health. Robert K. Baer found education but not migration to be a leading determinant of labor force patterns (Baer, 1976, p. 635). Russell Hill found a positive effect on the supply of labor of non-poor household heads but a not significant effect on the black poor, and a non-linear effect on white poor heads. In addition, he found out that the health of head and wife has an important effect on the ability of the poor to supply labor services while for the non-poor the health effect is insignificant. A positive relationship between family size and the supply of labor is also discovered (Russell Hill, 1971, p. 379).

From these reviews, one can easily discern a great deal of interest other disciplines have had to the study of labor force participation. But, to my knowledge, there seems to have been little or no interest on the part of geographers in studying labor for participations, despite their many contributions on other human resources topics. Therefore, the next section discusses the sparse geographical contributions and the role this study might have in correcting this deficiency.

Absence of Geographical Literature To Labor Force Participation

The author has noted that in numerous contributions, geographers have explored major topics related to manpower problems, programs, and policies; but it is difficult to find relevant references to labor

force participation. Geographers have frequently written on migration, for example, "Information and Entropy in Migrant Flows" by Brian J. L. Berry and Paul Schwind and "Distance and Directional Bias in Interurban Migratory Streams" by Julian Wolpert. But no specific studies on labor force participation have been found by the author of this report. Certain literatures from non-geographical disciplines have tried indirectly to apply spatial concepts and locational theory in the study of participation rates in the labor force, but these studies are not all satisfactory to the geographer. This paper, therefore, intends to contribute to a filling of the gap in the geographical literature.

These earlier studies do have much bearing upon the problem of concern to this paper. Thus, the research reported on here attempts to use these contributions as a base for expanding research on labor force participation rates along more purely geographical lines.

Problem Specification and Justification

The literature cited above clearly indicates the amount and depth various diciplines have written on this theme--Labor Force Participation. Reference to these works will convince a reader of the variety of concepts, data collection methods, and measurements procedures which may and have been used. Moreover, the geographical areas which prior studies have focused on, range from the whole continental United States to selected metropolitan areas from different states with data aggregated to form a focal point as their area of research. Some have used census tracts in major metropolitan areas, studying differences existing between them and recommending policy statements that may be appropriate to each tract.

Recognition of the county as a basic local labor supply area is ignored. Where an attempt is made, county patterns are investigated through Statistical Economic Areas (SEA) groupings. "The basic intention which the investigators used for this purpose is found in the U.S. Bureau of Census' 1960 State Economic Area definitions." (Sandmeyer and Warner, 1968, p. 4) The only exception so far known to the author of this report is the work done by Peter S. Barth. Barth examines participation rates in Michigan, excluding some counties which are to me of great importance as far as employment is concerned. "Six areas were excluded due to the presence of large state hospitals or prisons. Since these institutions probably had no effect on groups aged 14 to 17, these areas were included in the regressions for these classes. Five areas were dropped in the regressions for the age class 18 to 24 because of the presence of a large college or university." (Barth, 1967, p. 235 f. n.) The dropping of counties because they have large prisons, colleges, or hospitals means dropping huge employment potentials and are inconsistent with the geographical concept of economic base theory.

If we examine all the counties between 2500 and 5000, we would discover that each has a certain percentage of its labor force engaged in prisons, universities, or hospitals. If the minimum percentage engaged in any of these institutions according to the county sizes is 2.2 percent, any employment beyond that ratio is considered to be a gross export or basic employment, serving markets outside the county by bringing income to pay the county's import (Abler Adams and Gould, 1971, p. 203). Excluding Payne County, because of Oklahoma State University (OSU) in Stillwater, from the analysis of labor force participation in Oklahoma, constitutes distortion of information. Therefore, this report

does not exclude any county because it has large prisons or universities since these institutions offer huge employment potentials.

Geographers' long-standing interest in small-area data would seem to suggest that the county may be a useful areal unit for observation of geographic differences in LFPR. The choice of Oklahoma counties for use in this study will be further examined in Chapter Two.

Problem Definition and Description

With these short-comings in mind, this report is designed to:

1. Investigate appropriate factors that influence labor force participation in Oklahoma, using county data.
2. Focus on three types of explanatory factors: individual, family status, and market conditions that influence labor force participation rates.
3. Consider the effects of location on LFPR by evaluating distance to job opportunity locations from place of residence as a contributing factor.
4. Since geographic pattern formation can help explain variations in quantitative models, selective variables will be mapped and analyzed. This map analysis will also include mapping of residuals from regression analysis.

Also, an attempt will be made to provide some guidelines for future geographic studies of labor force participation. Hopefully, this report might act as a catalyst to geographers interested in the study of human resource problems.

CHAPTER II

THE STUDY AREA AND REGIONAL VARIATIONS OF LABOR FORCE PARTICIPATION RATES

The Study Area

Most studies in labor-force participation use broad spatial settings such as the entire continental U.S.A. Examples of such geographic considerations include Clarence D. Long's "The Labor Force Under Changing Income and Employment," 1958; The Economics of Labor Force Participation by Bowen and Finegan, 1969; and "Women's Labor Market Experience" from the Manpower Report of the President, 1974. Other research reports focus attention on metropolitan centers delineating census tracts as feasible areal settings for comparisons and policy recommendations. Analysis based on the broad geographical delineations such as SMSAs is suitable as a generalized conceptual framework for the study of labor force status. On the other hand recommending policies and executing programs on individual census tract basis may incorporate too much geographical detail, especially if correspondence to functioning labor market areas is appropriate.

Analysis of labor force participation based on county data aggregates has not been as common. Counties provide areal units which have some ideal properties for analysis of geographic patterns. Focus on counties encompasses both the rural and the metropolitan delineations and afford areal differentiations that help identify and pinpoint

patterns of areal association. Moreover, the U.S. Bureau of the Census publishes socio-economic data on the county basis, a fact which lends a basic advantage to analysis of this kind and supports the use of counties as feasible area units for analysis. The biggest drawback to the use of counties in the study of labor force status relates to the fact that their boundaries only rarely correspond to labor market boundaries.

In an earlier study, Sandmeyer and Warner used county data to analyze labor force participation in the Ozarks. But later, they departed from studying the labor force determinants from the standpoint of county variances in the Ozarks to the aggregated state economic areas (Sandmeyer and Warner, 1968, p. 4). Their focus is on the state economic areas rather than county basis. The SEAs in Oklahoma probably have little more correspondence to labor market regions than counties.

Another study which focuses entirely on county level data was conducted by Peter Barth (Barth, 1967, pp. 234-249). But in my opinion, Barth's effort has also been jeopardized, in that he has deliberately excluded many counties from his analysis for what he called extraneous factors. "Six areas were excluded due to the presence of large state hospitals or prisons. Since these institutions probably had no effect on groups aged 14-17, these areas were included in the regressions for these classes. Five areas were dropped in the regressions for the age class 18-21 because of the presence of a large college or university" (Barth, 1967, p. 235, footnote). This procedure tends to distort information and inject bias into the investigation. If we exclude Pittsburg County that has a large prison in McAlester which employs hundreds of people or Payne County for the sake of Oklahoma State University that is also employment opportunity area, can we afford to exclude the whole of

Oklahoma County that has many institutions with concentrated population in analyzing labor force study in Oklahoma? This is a matter that needs further consideration. This study will attempt to identify some distortions of this type but will not eliminate them from analysis.

Another kind of regional delineation in Oklahoma may be usefully recognized. The three SMSAs (Oklahoma City, Tulsa, and Lawton) form a northeast-southwest axis in Oklahoma, creating a buffer zone between the rural east and west, respectively.

The population of the state of Oklahoma is composed of several major ethnic groups. For example, the 1970 U. S. census of population indicates that the American Indian population in Oklahoma was 97,731, representing the highest Indian population in a single state in the nation (Statistical Abstract of Oklahoma, 1972, p. 258).

Although this paper does not intend to analyze the effect of race on labor force supply, substantive evidence exists that the supply of labor can be influenced by the value a given ethnic group attaches to work.

Since Oklahoma counties have been selected for this study, it should be of use and interest to describe briefly the resource base and socio-economic characteristics of these counties. This description is provided in the following section.

The Study Area--Oklahoma Counties Population: Composition and Density

Oklahoma is relatively young, but a dynamic state. There are 77 counties of uneven sizes with populations also unevenly distributed in terms of ethnicity, sex, and density. There are about 2.5 million people living in Oklahoma. About one-half of the population still live in

rural-agricultural parts of the state. The major racial groups include whites, blacks, and Indians. The Indians number about 98,000, the blacks about 172,000, while the rest could easily be classified as whites. The Indian population in Oklahoma is the largest in the nation, mostly living in the east and southeastern counties of the state. The black population concentrates in the central cities of urbanized areas, of which more than 90,000 of them are absorbed by the Oklahoma City and Tulsa SMSAs. Out of 77 counties, 67 have female population exceeding that of males. A line stretching from Tulsa across Oklahoma City to Lawton forms the major population axis that divides the counties into East and West, characterized with low densities.

Topography

The eastern counties in Oklahoma are dominated by rolling hills with generally flat prairie lands to the west. Weather conditions, vegetation, and agricultural activities vary along with these topographies. Although the Oklahoma weather is very unpredictable, an overall east-west climatic pattern exists with annual rainfall totals generally declining from southeast to northwest.

Agriculture and Forestry

Forest growth and utilization provide the needed timber resources for the state's construction activities. Many of these forest products are obtained from the southeastern counties, particularly from the Ouachita National Forest which extends over 240,000 acres (Statistical Abstract of Oklahoma, 1972, p. I). The timber industry no doubt provides incentives for local labor supply. On the other hand, the western

Oklahoma counties specialize in grain production, particularly the celebrated winter wheat. The total wheat yield for 1970 amounted to 98,202,000 bushels for the whole state. Intensive grazing lands in the eastern counties seems to complement the irrigated crop farming and feedlots of the west and the Panhandle, where Texas County leads all counties in agricultural production. The state realizes more than $900 million annually from crop and livestock production (Statistical Abstract of Oklahoma, 1972, p. 4).

Mining

Oklahoma is an oil state. Oil and gas are found in 71 counties, but almost all counties have some form of mineral production. Mineral production makes a major contribution to the state's gross product, and has made the state the fourth leading mineral producer of the United States. With reference to the employment situation, the mining industry directly provided for a total of about 55,000 employees in 1970.

Manufacturing and Construction

Although the Oklahoma economy relies heavily on extractive industries, manufacturing industries are growing rapidly and warrant some comment. About 86,600 people worked in all manufacturing industries in all the 77 counties in 1960. A decade later the figure jumped to almost 134,800, giving a 56 percent increase. Salaries and wages paid to households from the manufacturing sector alone was $961 million in 1970.

As the economy grows, road and housing construction follows suit. In 1970, federal, state and private contract awards increased work opportunities in the state's labor market. This phenomenon is highly

noticeable in the southeastern counties. Counties such as Sequoyah, showing poorly in terms of income per capita, was 6 percentage points greater than the mean percent employed in construction in the state (Census, 1970, General Social Economic Characteristics, PC(1) 38, p. 345). Federal contract awards in 1970 amounted to about $6,815,000,000 and that from the state was worth $813,138,000. These awards were mostly for the construction of highways, residential and commercial buildings (Statistical Abstract of Oklahoma, 1972, p. 66).

The distribution of manufacturing industries in highly concentrated in the three Standard Metropolitan Statistical Areas, where most of the non-farm population live. Approximately 70 percent of all industries employing 1000 to 5000 people are located in the Oklahoma City and Tulsa areas. This high concentration leaves the periphery counties with minor industries with smaller employment impact. Combining the percent employed in manufacturing and construction provides a vivid visual impression when mapped. A line drawn from Kay County in north-central Oklahoma to Cotton County in the southwest leaves a belt of almost two-thirds of the state as high manufacturing and construction areas to the east. While the west is characterized as a low manufacturing and construction area.

Human Resource Development in Oklahoma

Formal college and vocational-technical education assume high priority in the state of Oklahoma. Education and training improve the chances of an individual's occupational preference and employability. In 1960 the U.S. illiteracy rate was 2.4 percent for persons 14 years and over, while that of Oklahoma was merely 1.9 percent. The median school year in Oklahoma by 1970 was 12.1, substantially higher than the 10.4 years

of a decade earlier (Census of Population, 1970, General Social and Economic Character, final report, PC(1)-C-38).

Numerous elementary and high schools, colleges, and vocational-technical schools provide opportunity and encouragement to persons wishing to improve their knowledge and skills. There are 24 state-owned higher institutions, 14 privately owned, and 6 community colleges for higher education in Oklahoma. According to the Regents for Higher Education, total enrollment for 1971 was 116,702. Although this includes out-of-state students, Oklahoma residents studying outside their own state are probably enough to maintain the high figure. This enrollment is also supplemented by enrollments in area vocational-technical schools. The 1971-72 enrollment in secondary, post-secondary, and adult area vocational-technical schools showed a total of 16,112 students. The location of these institutions, however, is concentrated in the major SMSA axis. There are some with minimal course offerings located in the more rural southeastern and northwestern counties.

Since vocational and technical education provides a vital link between man and his work, this should place much emphasis upon getting people into or back into the labor force. Knowledge of human and material resources and the ways human capital development takes place are important considerations in the study of how and why variations in labor force participation in Oklahoma counties occur.

Patterns of Labor Force Participation Rates in Oklahoma Counties: Regional Variations

The overall theme in this section is the presentation of labor-force participation rates (LFPR) of selected sex-age groups in graphic forms

for identificaiton of patterns. Regional variations and sex varying patterns will be shown.

LFPR for each of the selected groups for all the 77 observations (counties) were ranked in quartiles using a computer ranking technique. For the discussion of the ranking method see Barr, Goodnight et al., 1976, pp. 212-215. The computer output arranged the values for LFPR's for each county as either 0, 1, 2 or 3. The legends of the maps follow this order. Any county with zero rank indicates that its LFPR for the age-six groups is low, one indicates moderate, two may be high, and three may signify very high. However, each rank, whether low, moderate or high is relative to the scores of other counties in the state but does not compare with national figures nor time in the past.

Figures 1-2 show the cartographic forms of LFPR for the groups LFPRTOTM and LFPRTOTF. Table I shows some relevant statistics (mean, max, min, etc.) related to LFPR for these counties. Table III in the Appendix also tabulates the LFPR for all the male sex-age groups (25-65+).

Male-Female LFPR Differences

It would seem questionable to say LFPR in Oklahoma counties or that of the women groups is above or below normal. This is because acceptance of what is "normal" has not been as firmly established for LFPR as is the case with unemployment rates. An attempt of such comparison would result in a theoretical fallacy, for it may be possible to find labor force participation rates having about 99 percent value. However, this must not be interpreted that all those in the working age group is at one time in the labor-force. It is a mere theoretical

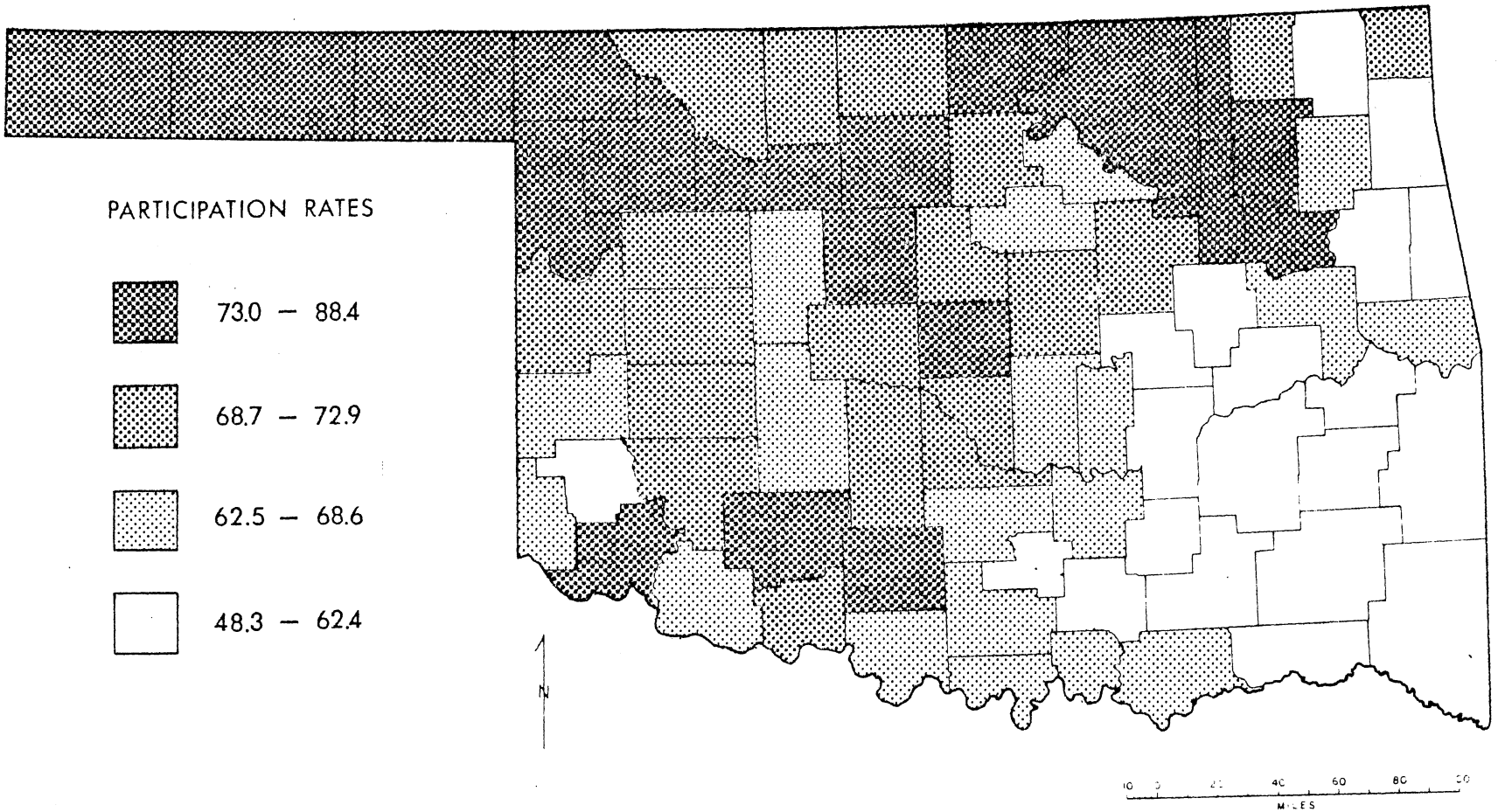

Figure 1: Labor Force Participation Rates for Males Aged 25 - 65+ (Source: U. S. Census of 1970)

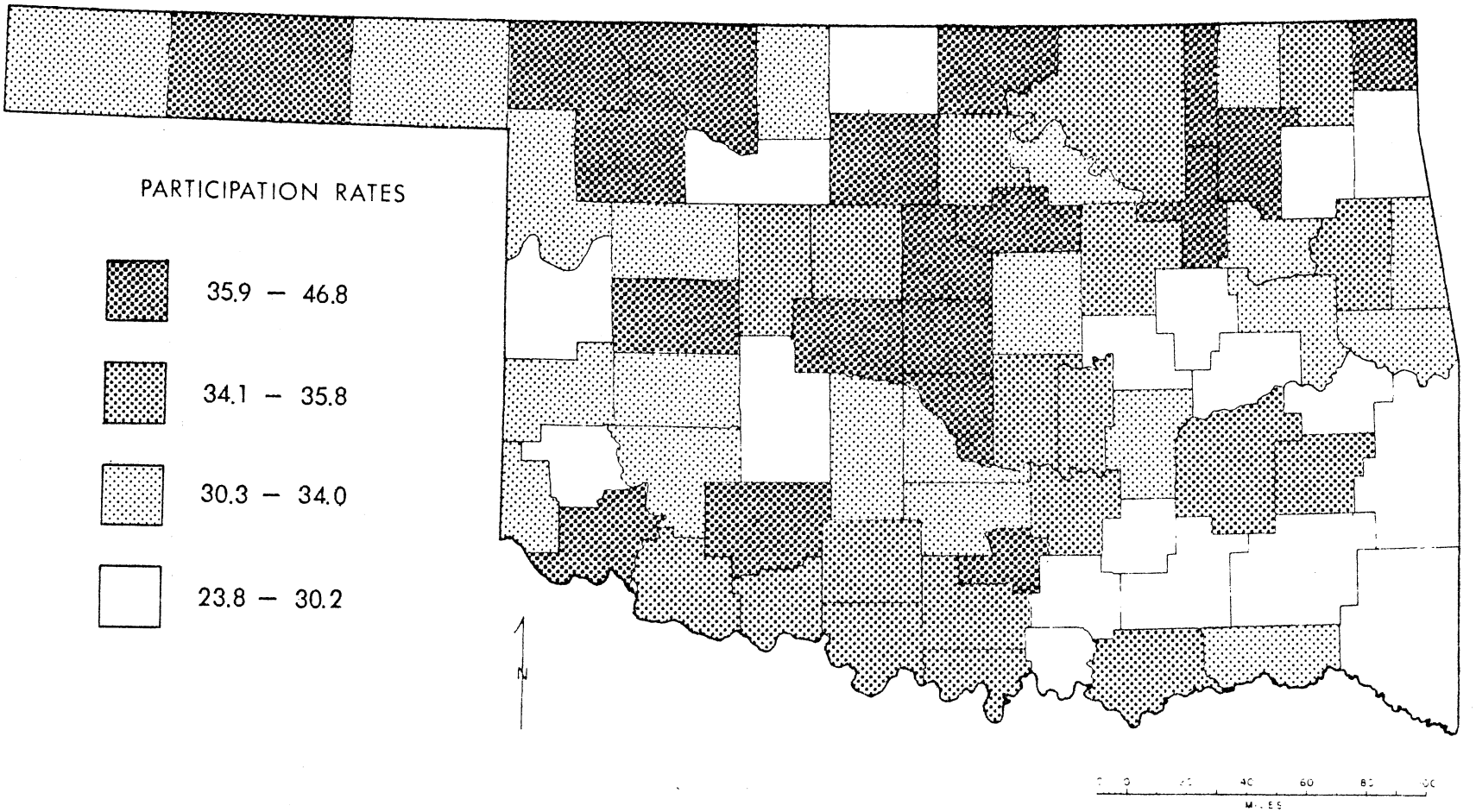

Figure 2: Labor Force Participation Rates for Females Aged 25 - 65+ (Source: U. S. Census of 1970)

maximum.

Male LFPRs in Oklahoma counties for each of the groups discussed here are almost 50% higher than those of women. Regional comparisons show that like any other socio-economic indicators in Oklahoma, apart from poverty rates, the three SMSA's illustrate very high scores (see Figure 1). A line drawn from the Ottawa County across Tulsa through Oklahoma City to Comanche County in the southwest forms the major axis of high LFPR's. The east and west of this line have marked spatial differences. As one moves farther away from the axis toward east and southeast, a region of very low LFPR's is discovered. A westward movement approaches a region of moderate participation rates. The counties in the Panhandle have high male participation rates.

Women LFPR's in the Panhandle are comparably lower than those of men (see Figure 2). The western counties have generally low participation rates for women (see Figure 2). This low level participation rates may indicates a need for close examination of what type of industries are located there. It is a national trend that women participate less in agriculture but more in services, clerical, and factory jobs. It seems suprising to have high female (25-34) participation rates in Greer, Harmon and Kiowa Counties in the west, and Cherokee, Hughes, Murray, Johnston, and Choctaw in the east and southeast. Pittsburg County is also another example with high participation rates for women of this group in this region. These counties show low LFPR mostly for male groups. Thus, one may be tempted to find an answer within the framework of the "added-worker" hypothesis. But in the case of Pittsburg County, high female LFPR might relate to service work opportunity in the state prison at McAlester.

Another interesting pattern worth noting is the high LFPR's for some counties that lie in the periphery of the standard metropolitan statistical areas (SMSA's). Some counties such as Jackson, Cimarron, Garfield and Ottawa always show high labor-force participation. A closer examination reveals that these counties respond to the distance vs. job opportunity concept. Altus, Enid, and Miami are the seats of these counties and places of at least 10,000 inhabitants. These cities should offer greater job opportunity. Miami, although it is a potential growth center, is at the same time just a few miles from Joplin, Missouri. However, Sequoyah County that is much closer to Fort Smith (SMSA) in Arkansas fails to indicate this kind of response.

A concluding remark for this section would be to point out that in all cases mapped, Tulsa County alone indicated very high labor-force participation rates. On the lower level of the ladder, Adair County shows the least.

CHAPTER III

METHODOLOGY AND THE DEVELOPMENT OF AN OPERATIONAL MODEL

Theoretical Consideration

Let us ponder a little bit and ask ourselves this question--Why do people work? In other words, why do people take part in the labor force? Labor force participation rate, according to official definition by the Bureau of the Census, is that percentage of a given population group who were either "employed" or "unemployed" during the census week (Census of Population, 1970). An unbiased answer to either of these alternative questions will be such that several motives come into play. Do people register among the working force because of higher wages, to improve life style, because the job site is closer to home, or because there is a greater squeeze in our economic resources when these resources cannot take care of our family needs?

From the section on the literature that was reviewed in Chapter I, it is clear that the theory of labor force participation has occupied the minds of theorists in various academic disciplines. Economists have shown lively interest in this area of research. They have exploited areal data published in population censuses. The work of Clarence Long in 1958, Bowen and Finegan, 1965, Barth in 1967 and a host of others are unique examples of economic contributions. Their attention is primarily focusing on measuring the effect of economic variables (the wage rate,

income and assets) on the quantity of labor supplied by certain demographic groups.

The second major contributors are sociologists and demographers. Perhaps readers may be interested in sociological contributions; the following offer major reference works; Duran, J. D., 1948, James Sweet, 1968, and Russell Hill, 1971. Valarie Kincade Oppenheimer illustrates sociologically that peaks in earnings for different professions occur at different times from the peak periods of family needs. In consequence wives and other secondary workers are brought into the labor force for additional household income (Oppenheimer, 1974, p. 227). This sociological view is in accord with the economist's belief that "added workers", because of high unemployment and the consequent lower incomes and economic pressures on the family, secondary workers enter the labor force (Parker and Shaw, 1968, p. 538). Like the economist, the sociologists and demographers choose various demographic variables in their analysis. A closer observation, however, reveals that there exists many significant and interesting differences in the effect of most of the variables on the quantity of labor supplied by specific areal units.

The inclusion of distance or locational variable is without doubt of a spatial order. But as has already been observed, the problem of analyzing and interpreting areal differentials in the labor force participation rates (LFPR) of subpopulations has received scant or no attention from geographers.

Since labor force participation should not be analyzed using market factors alone, the model developed in this research problem is such that it takes into consideration determinants reflecting:

(a) Education factors.

(b) Individual and family characteristics.

(c) Income per capita (economic growth, GNP).

(d) Geographic factors.

(e) Freedom of accessibility to job opportunities.

(f) Labor market conditions, and

(g) Industrial structure of employment.

In the section dealing with choice of variables, the rationale for the inclusion of each variable to reflect the above general factors will be analyzed. Then their connections to the personal, family and labor market conditions will be spelt out and tied to the general operational model.

Basic Data Set and Source

This section is intended to discuss the data and the sources. As it had already been explained elsewhere in the paper, the study utilizes the data published by the Bureau of the Census in U. S. Census of Population in 1970. The specific publication where the data are retrieved include the General, Social and Economic Characteristics, United States Census of Population, 1970, PC(1)C-38, Tables 120, 121, 122, 123 and 124. The data are also cross-checked with those published by the Oklahoma Employment Security Commission and that of the Bureau of Labor Statistics.

Many authors have criticized methods of identifying unemployed persons in censuses prior to that of 1970. The section that follows gives a brief look at some of the major differences as they relate to the concept of labor force participation.

Definition of the Unemployed

The employed and the unemployed are the two major components in labor force status. "In the 1960 Census the unemployed were still identified as those persons who were not at work but were "looking for work." But the phrase "looking for work" was not specified in the census, rather the enumerators were given supplementary instructions regarding the meaning of "looking for work" which did not appear on the questionnaire" (Sweet, 1973, p. 34). Sweet's remark is consistent with the Bureau of the Census view that the unemployment concept used in prior censuses was ambiguous. In keeping with the new concepts, the following definitions and corrections were either added to or subtracted from, the 1950 and 1960 census years.

> Persons are classified as unemployed if they were civilians 16 years old and over and:
>
> (a) Were neither "at work" nor "with a job, but not at work" during the reference week,
>
> (b) Were looking for work during the past 4 weeks and
>
> (c) Were available to accept a job.
>
> (General Social and Economic Characteristics, PC(1)-C38 App.-15).

As the above indicates, a specific time period was added in order to ascertain how long a job-seeker had been trying to find one. The age for a new potential entrant to the labor force had changed from 14 to 16. Another added element qualified a person who is temporarily absent from work as being employed--"with a job, but not at work."

However, for a person to be actively looking for a job, the census required that among other things he must register at a public or private

employment office or write letters of application for a job. These elements are some of the marked differences between 1970 census and those of 1950 and 1960 as related to labor force participation concepts.

The Effect of Age and Sex on Labor Supply

The main focus of this study is to explore the labor force participation response of individuals and families in varying labor markets--the counties. The independent variables used for this study reflect the general hypothesis that certain factors of geographic, economic and social conditions work in unison to cause the differences in labor force participations. However, age and sex differences in one way or another seem to affect the amount and quality of labor supply. Before the choice of the independent variables are rationalized and selected to suit the general operation model for this study, it seems expedient to explore the age and sex differences as they inherently affect labor supply.

Age

Everyone realizes that the quantity supplied and the perfection of every human activity varies with age. Moreover, employment statistics are usually classified into different age groups. Such taxonomy provides easy access for comparisons of individual group status.

Indeed there is a great deal of substance in age differences as related to work participation. A basic hypothesis concerning work and age is that the older a person grows, the higher the probability that he or she is physically unable to work (Sweet, 1973, p. 51). Age by itself incorporates a life cycle concept. An older person may be able to

survive for a longer period of time on accumulated assets such as rental properties or corporate stocks without work, but a relatively younger person cannot. The age a person attains has much relevance to his work ability and interest. Although age is not stated specifically as an explanatory variable for this study, it is implicit that as labor force participation varies from county to county, it also varies with the age of participants as well. For example, a county with a high proportion of workers under 25-34 age groups is bound to have a more impressive labor force participation than another county which has a higher proportion of working men in the 16-24 age group. Another variable element in the analysis is sex classification.

Sex Differences

For ages and from one culture to another, males have been looked upon as the bread-winner of their respective families. Sandmeyer asserts "American value system with respect to work, places men 25-55 in a role in which nonparticipation, unless associated with disability, is viewed as an aberration (Sandmeyer and Warner, 1968, p. 52). Women who enter the labor force in tight market conditions are trying to stretch the squeezed family budget. If such happens, it is what theorists call the "added-worker" effect, since her labor at this situation is regarded as secondary to that of the husband.

But the view that the wife's labor force participation is a secondary one is approaching a reverse in America. Miller wrote in 1955, "The working wife has become such a characteristic feature in the American economy that no discussion of family income would be complete without consideration of the factors that influence the labor participation of

married women" (Miller, 1955, p. 86). The female labor force has been increasing in America. Because of that, the manpower report of the president pointed out that among the factors affecting women participation "have been greatly reduced impact of marriage itself upon the labor force activity of women and rising levels of educational attainment. . ." (Manpower Report of the President, 1975, p. 55). The report went on to note the high levels of labor force activity among black married women age 25 and over. To identify some of the causes, the report went on to say, "The action reflects in considerable degree their continuing obligation to supply a substantial proportion of family income in order to help compensate for the generally low wages of their husbands" (Ibid., p. 55).

With these reflections it is easy to see the wave of change that is slowly changing the labor force composition in America. But in some Oklahoma counties this change is yet to be experienced. In 1970, the county with the highest participation rate for all females aged 25 and over was more than 3% points less than the county with the minimum labor force participation rate for males of the same category (Table II). The mean for labor force participation for all females aged 25 and over in all Oklahoma counties in 1970 is only 33.8% while that of men is about 68%.

Confrontations of Human Decisions

To drink water or coke is a decision that must be chosen from all other alternatives from our hierarchy of preferences. In like manner, although an individual remains as one in a group, the decision of every member to work or not to work lies not only in the unanimous family

decision but also, in most part, influenced by individual judgment. Both the individual and family decisions are also affected by market conditions. Therefore, it would appear that one's decision to participate in the labor force in a given county in Oklahoma is endogenously and exogenously influenced.

A black housewife with dependent children is confronted with the decision either to work or to care for her children. Even if she decides to work, she is also faced with another problem beyond the control of herself or the family. Because she is a woman as well as being black, she may be confronted with labor market discrimination. Will she get the job of her choice? Because her predecessors had been denied such jobs, it is therefore doubtful if her sex and color would allow her to find the right job. It is with these acknowledgments that the explanatory variables for this study were selected.

Individual Versus Family Decision in Labor Force Participation

Endogenous influences that govern our choice of work or leisure have twofold components: personal and family dimensions. This is what Everett Burtt had to say in connection with individual and family decisions as they influence labor force participation. "The individual makes the comparison of disutilities and utilities and that a decision imposed upon him by someone else would not necessarily coincide with the one he would make; freedom to make one's own decision concerning one's own welfare is regarded as the anchor of the labor market. . . job decisions are the product not solely of a comparison of their own (family) gains but also of the many interpersonal compromises fashioned within

the family" (Burtt, 1963, p. 44). In support of family as a decision-making unit to enhance labor force participation, the Manpower Report of the President (MRP) in 1967 asserts that:

> The amount of economic hardship resulting from the fact that a man is not a worker is determined largely by his family responsibilities. Concern centers on the situation of the mature men outside the labor force, many of whom are family heads and on the consequences for the people who would normally depend on them for support. (MRP, 1967, p. 132).

On the deliberations of the Senate Special Committee on unemployment problems, Senator Eugene McCarthy exposed the burden levied by unemployment on individuals for their merely being members of a family. He concluded:

> Nine out of ten workers in the United States are members of families with the responsibility for the support of other members. Nearly half of the 44 million families in the United States in 1957 were supported by the efforts of one wage earner. (McCarthy, 1960, p. 7).

These citations support the contention that individual decisions, as well as those generated from the family ties and loyalty, act as push factors for labor force participation. Before the variables are specified and their expected relationships with the labor participations are analyzed, it must be recognized that no factor acts in isolation. A factor that is influenced by personal decision may also be influenced by family decision and vice versa.

Choice of Variables

Personal Variables and A Priori Expectations

Based on other social science studies, selected variables were identified for use in a preliminary analysis to assess their degree of relevance to model development. These variables are treated below.

Variables' names are first presented as acronyms, followed by a description and identification of their expected effect on labor force participation. However, not all the variables presented here were included in the final analysis. The final selection procedure will be treated later.

1. BLAMPOP. This variable describes percentage total population which listed race as either Negro or American Indian. Its effect was to test the hypothesis that different races have different labor force participation status.

2. MEDEMA. Median number of years of school for all males 25 years and over. To an important extent, education has economic effects on an individual as well as social effects. Education for men and women helps to raise individual employability and earning potentials. Therefore a positive relationship with labor force participation groups is expected.

3. COLGRAD. This variable describes the percentage of total population 25 years of age and over who have completed four or more years of college. It was expected to correlate positively with the dependent variables. The hypothesis is that the greater the number of people in this category in each county, the greater labor participation will be.

4. DEATHR. This variable represents the mortality rate in a county. Its basic premise is to serve as a surrogate variable for life expectancy as a factor in labor force participation. It is expected to have inverse effect. That is, the higher the death rate in a county, the lower will be the participation rates. The next section deals with variables that have close links to family situations.

Family Factors

1. NONWINC. This describes the percentage of families receiving payment to families with dependent children. Its relationship with the dependent variable is expected to be inverse. Money income into the family other than those from work is bound to depress work initiative. Therefore, counties with a large amount of recipients of such incomes are likely to have lower rates of labor force participation.

2. MWCUI8. This signifies married couples with children under 18 years of age (%). As James Sweet puts it, "the presence of children probably constrains the decision to work or not to work much more than it constrains the decision of how long to work" (Sweet, 1973, p. 38). Whatever is the case, a negative coefficient sign is expected at least for the younger of working women groups.

3. FAMPOVI. Percent of all families with a 1969 family income below the poverty level. For discussion of poverty level income (see PC(1)-C publication, Appendix C, pp. 19-31). Counties with high percentage of families under poverty level in normal circumstances should have a high positive correlation coefficient. But since such effects can be upset by provisions of liberal welfare payments to combat poverty, this relationship might be obscured.

Labor Market Conditions

Several variables exist that could be used to represent labor market conditions, some of which are discussed below.

1. MUNEMRT:FUNEMRT. Both acronyms refer to unemployment rates for male and female, respectively. Unemployment rates of male and females at county levels help to indicate general economic conditions in the local

market. Essentially high male or female unemployment rates are expected to have two main effects: jobs are too difficult to find in a situation of high employment; therefore, workers drop out of the labor force or fail to enter. This is a "discouragement effect". High unemployment of either men or women lower household incomes (Parker and Shaw, 1968, p. 540). Since lower incomes cause economic pressures, secondary workers enter the labor force. Therefore, the hypothesis states that as male unemployment rates in a county increases, more females in that labor market will look for jobs in order to avert the economic pressures brought about by the lower income.

2. LEVEL OF ECONOMIC ACTIVITY. It has been suggested by M. G. Sobol that lower levels of economic activity could lower female work rates (Sobol, 1973). It was in such consideration that certain variables were selected for statistical analysis to test their relationships with the labor force participation. The variables believed to be useful in measuring economic activity of any labor market are those discussed below.

3. INCPERC. Dollar income per capita in 1969. Income per capita of any county measures the strength of that economy. Then in hypothesizing its relationship with labor force, we should expect positive relationship. That is, the county with high income per capita should also have high participation rate, since this variable is a representation of the GNP. The higher the GNP, the higher the INCPERC, provided that population stays the same, and the lower the unemployment rate. Lower unemployment rate relates to higher labor force participation all things being equal.

4. LABFAG, LABFMFGI, LABCON. These three variables relate to what Nedra Belloc calls industrial mix. Belloc maintains that the industrial composition of a given area might affect participation rates (Belloc, 1950, pp. 400-410). The first acronym stands for the percent of employed civilian labor force in manufacturing. The second one is the percent of employed civilian labor force in agriculture. The third one signifies the percent of employed civilian labor force in construction. What Belloc says seems to coincide with John Durand's observation that "The more important agriculture is in a region the lower female labor force participation rate for the region" (Durand, 1947, p. 217). This is true because more men are farmers in America and farmers do not face open unemployment as it is often the case in manufacturing industries. The apriori expectation would therefore be positive relationship for males participation rates, but negative relationship for that of females.

The manufacturing industry pays higher wages than agriculture and they tend to locate in urban areas. These tendencies attract in-migrants. Since higher pay is somehow a motivator for work participation, the basic premise would be, the greater the degree of manufacturing in a county, the greater the participation rates.

The Distance and Locational Variables

Many studies have tried to identify spatial preferences of the working men relating to journey from home to work or as Beverly Duncan puts it, "work-residence separation" (Duncan, 1951, p. 48). According to William Goldner, the supply of labor is some function of geographical location and socio-economic factors (Goldner, p. 113). It is with these conceptions that some variables were selected to investigate the response

of working men in Oklahoma counties as regard to their supply of labor in relation to how far they have to journey to work places.

1. DISTOKC. This indicates linear distance in miles from county seat to Oklahoma City. Oklahoma City is a SMSA, the state headquarters and has lots of potential job opportunities. The intent of this variable is that the closer potential workers from a given county lives to Oklahoma City, the higher will be the labor force participation rate of such a county.

2. DISTOCT. This variable specifies an alternative job opportunity area--Tulsa and Oklahoma City, whichever is the shortest. The basic hypothesis is equally the same with that of the one above. But both of these variables were rejected in the final analysis because a systematic error is bound to exist in using linear distance to calculate distance separation from home to workplace. Differences exist between linear and actual traveling distance. This is evidenced by the report of Rand, McNally, Chicago Traction and Subway Commission. The report found out that for 350,007 Chicago workers going to work, the average linear distance covered was only 3.31 miles, whereas the actual traveling distance average was 4.23 miles (Rand, 1916, Chap. 7).

3. DISTIOKT. This variable describes the actual traveling mileage distance on the highway from each county seat in Oklahoma to places of 10,000 people. It was invisaged that, apart from the three SMSA's, places of 10,000 people may offer jobs in retailing and manufacturing industries. Assuming that this is true, a county with a town of at least 10,000 people, or that county is situated in close proximity to one, would have higher participation rates.

4. WORINCO. This variable identifies the percentage of all employed persons resident in one county but employed in another. It is closely tied with locational preference of a worker. It is in some way related to Duncan's proposition that "The degree of work-residence separation varies directly with the socio-economic level of the worker" (Duncan, 1951, p. 48).

But my justification to include WORINCO was in keeping with the freedom of workers to find any job elsewhere across the boundaries of his county or state. A positive relationship was expected between this variable and the labor force participation because the more people can find jobs outside his labor market boundary the larger the labor force in the county of residence.

MEDGRENT. This acronym symbolizes median gross rent. Gross rent signifies the sum of actual monthly rent paid to the landlord plus the monthly cost of utilities. Median gross rent, therefore, is that gross rent value that divides all monthly rent values into high and low. It is a variable that indicates the variations in locational cost. Gross rent in one county seems to differ from that of the other. Therefore, it is hypothesized that counties with high MEDGRENT will have high labor force participation rates provided there is no housing subsidy.

Final Selection of Independent Variables

The preliminary processes for selecting a more appropriate explanatory variables used in the final analysis was governed by certain considerations.

The most important of these was to avoid what statisticians call "multicolinearity." As David Smith explains, "independent variables in

multiple correlation and regression should be statistically independent" (Smith, 1975, p. 277). When independent variables correlate with the dependent variable and also show high intercorrelation with other independent variables, this is a situation of multicolinearity. When such a situation is experienced, the explained variance in regression analysis may not increase significantly by addition of other colinear variables.

The method used to investigate such commonalities was to include all of the variables (without specifying which is dependent or independent) in a simple linear regression technique (Barr et al., 1976, pp. 92-96). For the final selection, the author compared the degree of correlation between the unspecified dependent variables with independent ones of the same group. Those that failed to correlate significantly with the dependent variables but rather intercorrelated with independent variables of the same group were rejected.

Another consideration was the reliability of the method of compiling the data. For example, some of the distance variables, particularly those utilizing the linear distance measurement were rejected on the ground of unrealistic nature of linear distance measurement.

Finally, the following independent variables were selected for the final test run: INCPERC, DISTIOKT, WORINCO, MEDEMA/FMSYEAC, MUNEMRT/FUNEMRT, MWCUI8, and CONMFG (CONMFG signifies the percentage of workers in construction and manufacturing). These factors are linked to the hypothesis that the degree of labor force participation of specific workers group is influenced by personal characteristics and labor market phenomena.

These factors are linked to the hypothesis that the degree of labor force participation of specific workers group is influenced by personal, family characteristics, and labor market phenomena.

The Regression Models

In order to analyze the patterns of geographical labor force participation rates in Oklahoma counties, it is important to specify a workable model such that it will reflect individual characteristics, family factors, and labor market conditions. This is a study of geographic variability of labor force participation rates (LFPR). LFPR is defined as follows:

$$LFPR = \frac{\text{Employed + Unemployed}}{\text{Number of Persons in Age Group}} \times 100$$

Participation rates may be calculated for any specific age group, for example, ages 25-34, 55-64, etc. Overall participation rates are commonly based on all persons aged 16 and over. LFPR may also be calculated for other subpopulations, such as by sex, race, etc. This study focuses on labor force participation rates for selected age-sex groups of cohorts.

The labor force participation rates, arranged according to the age-sex cohorts, are the problem variables. These age-sex cohorts based on participation rates are as follows:

Participation Rates By Age Cohorts		Acronyms	
		Male	Female
1. 25-34 years of age	=	PRNOIM	PRNOIF
2. 35-44 years of age	=	PRNO2M	PRNO2F
3. 45-64 years of age	=	PRNO3M	PRNO3F
4. 65+ years of age	=	PRNO4M	PRNO4F
5. 25 and over years of age	=	LFPRTOTM	LFPRTOTF
6. 16 and over years of age	=	MFLFPR	MFLFPR

Earlier it was proposed that geographical location, economic factors, educational attainment, employment in manufacture and construction, freedom of movement to jobs within and outside counties, and market conditions help determine the labor participation rates in each county. Since these variables reflect individual, family, and the conditions in the local labor markets, they serve as predictor variables. They help to explain the variance of the dependent or problem variables--the age-sex labor participation rates. The independent variables were identified and defined as follows:

1. INCPERC = Money income per capita ($), 1969.
2. DISTIOKT = The highway distance from each county seat to the nearest place of 10,000 population (growth center) (miles).
3. WORINCO = Percent of all employed persons resident in one county but work in another.
4. MEDEMA = Median number of years of school for all males 25 years and over.
5. FMSYEAC = Females (25 years and over) median school years completed.
6. MUNEMRT = Male unemployment rates.
7. FUNEMRT = Female Unemployment rates.
8. MWCUI8 = Percent married couple with children under 18 years of age.
9. CONMFG = Percent employed civilian labor force in manufacturing and construction in each county.

Two basic types of regression models have been developed--one for male participation rates, the other for female LFPR. As was indicated above, a total of eleven dependent variables were identified based on five female age groupings, five male age groupings, and an overall participation rate including both sexes and total population 16 and over. Therefore, a total of eleven regression models were specified.

Male age cohort models were specified as follows:

LFPR = f(INCPERC, WORINCO, MEDEDMA, MUNEMRT, MWCUI8, CONMFG)

Thus, the same six independent variables were entered into regression analysis for each male age cohort model. The purpose in using this procedure was to allow for a comparison of how effects of explanatory variables differed among age and sex groupings. It is highly likely that different models with higher explanatory power could have been discovered for each age grouping, but this is not the primary objective of research procedures used.

The main objective is to identify a relatively efficient and simple model (small number of variables) which might have some relevance to all age groups and then use the results of regression analysis to compare and evaluate variations in quality of model applicability between age groups. Variables were identified in a process which included consideration of:

1. Basic "theory" of labor markets.
2. Findings of other related research.
3. Oklahoma socio-economic conditions.

With a few changes in variable spedification, models of female labor force participation rates were designed in a similar procedure to that used for males. The general model for female age cohorts is:

LFPR = f(INPERC, WORINCO, FMSYEAC, FUNEMRT, MWCUI8, CONMFG)

Computation of model parameters and associated measures were accomplished by use of the Statistical Analysis System (SAS) procedure called GLM (generalized least-squares multiple regression). The findings are discussed and evaluated in Chapter Four.

CHAPTER IV

REGRESSION RESULTS

Introduction

Table I shows all the parameter estimates for each age group of males using the independent variables indicated earlier. In addition, the table presents average quantity of labor supplied by each population category of males ($\overline{Y}$) and other statistics of interest such as the coefficient of determination (R^2), the standard deviation (SD) and the F-Values. Table II presents the same information as provided in Table I except that it refers to female labor force participants.

Males Regression Results

Column eleven ($\overline{Y}$) in both Table I and II shows the mean values of labor force participation rates for counties by male and female workers in each age group. A closer look reveals that mean values for males in all the groups are relatively higher than those of females. The highest value for males occurs in the 25-34 age category, 90.69%, followed by that of the 35-44 age group. There is a noticeable reduction in the average quantity of labor supply for the older age categories. The mean value for the 65 years old and over is only 24.35%.

Although labor force participation for the 16-23 age group is not analyzed in this study, earlier studies reveal that this group has

TABLE I

REGRESSION COEFFICIENTS OF INDEPENDENT VARIABLES*
ON PARTICIPATION RATES FOR MALE GROUPS

No. of Observations = 77

Equation Numbers	Age Class	Constant	Independent Variables							R^2	$\bar{Y}$	SD	F-Value
			INCPERC	DISTIOKT	WORINCO	MEDEMA	MUNEMRT	MWCU18	CONMFG				
Eq A-1	25-34	58.49	0.008	0:055	0.112	0.402	-0.082	0.092	0.037	0.27	90.69	6.83	3.58
Eq A-2	35-44	51.88	0.004	0.040	0.100	2.940	-0.024	-0.112	0.0009	0.54**	90.39	4.55	11.77
Eq A-3	45-64	33.91	0.009	0.028	0.068	3.331	-0.061	-0.187	-0.150	0.76**	78.82	4.49	31.28
Eq A-4	65+	4.66	0.008	0.102	0.021	1.068	-0.139	-0.109	-0.369	0.69**	24.35	5.18	22.17
Eq A-5	25-65+	7.84	0.011	0.038	0.026	1.620	-0.079	0.387	-0.092	0.72**	67.59	4.78	25.37

*Description of Variables:

INCPERC: Dollar value of income per capita in the counties.
DISTIOKT: Highway distance (miles) from county seat to nearest place of 10,000 population.
WORINCO: Percent of employed males residing in one county but employed in another.
MEDEMA: Median school years completed by males 25 years and older in a county.
MUNEMRT: Percent of males 25 years and older who are unemployed in a county.
MWCU18: Percent of total married couples with children under 18.
CONMFG: Percent of males employed in construction and manufacturing in a county.

**Significantly different than zero at the .01 level.

TABLE II

REGRESSION COEFFICIENTS OF INDEPENDENT VARIABLES*
ON PARTICIPATION RATES FOR FEMALE GROUPS

No. of Observations = 77

Equation Numbers	Age Class	Constant	Independent Variables							R^2	$\bar{Y}$	SD	F-Value
			INCPERC	DISTIOKT	WORINCO	FMSYEAC	FUNEMRT	MWCU18	CONMFG				
Eq B-1	25-34	52.35	0.00016	-0.084	0.028	0.476	0.324	-0.294	-0.096	0.19	40.96	5.59	2.32
Eq B-2	35-44	60.65	0.004	-0.047	-0.058	-0.390	-0.042	-0.0298	-0.030	0.21	48.55	4.89	2.69
Eq B-3	45-64	11.04	0.004	-0.026	-0.005	1.601	0.181	0.086	-0.088	0.48**	40.82	4.66	9.09
Eq B-4	65+	-8.34	0.002	0.014	-0.021	0.693	-0.189	0.129	-0.047	0.48**	8.30	2.28	9.12
Eq B-5	25-65+	9.01	0.005	-0.032	-0.015	0.720	0.333	0.128	-0.050	0.58**	33.76	3.05	13.45

*Description of Variables:

INCPERC: Dollar value of income per capita in the counties.
DISTIOKT: Highway distance (miles) from county seat to nearest place of 10,000 population
WORINCO: Percent of employed females residing in one county but employed in another.
FMSYEAC: Median school years completed by females 25 years and older in a county.
FUNEMRT: Percent of females 25 years and older who are unemployed in a county.
MWCU18: Percent of total married couples with children under 18.
CONMFG: Percent of females employed in construction and manufacturing in a county.

**Significantly different than zero at the .01 level.

relatively low participation rates and hence low county means. Since younger and older age groups have low participation rates, it therefore stands to confirm the expectation that both youth and old age reduces labor force participation.

Table I provides five standard labor force participation equations (Eq. A-1 to Eq. A-5). For example, Equation A-2 refers to the 35-44 age category. It states that the labor force participation rate for this group is determined by the positive and negative influences of the factors (variables) described in the table.

$$\text{Male LFPR (35-44)} = 51.88 + 0.004\ \text{INCPERC} + 0.04\ \text{DISTIOKT} + 0.1\ \text{WORINCO} + 2.94\ \text{MEDEMA} - 0.024\ \text{MUNEMRT} - 0.112\ \text{MWCU18} + 0.0009\ \text{CONMFG}$$

Each variable used in this equation has the relationship with Male LFPR (35-44) indicated by the values of the coefficients. The value 51.88 is a constant term or the intercept.

For the Eq. A-2, the coefficient of multiple determination (R^2) is 0.54; that of Eq. A-1 equals 0.27. The R^2 statistics indicates the proportion of the variability in the independent variable accounted for by the independent variables. This proportion is commonly multiplied by 100 and expressed as a percentage. The R^2 of 0.54 indicates that the independent variables in Eq. A-2 account for 54 percent of the variations in the labor force participation rates for 35-44 age groups in Oklahoma in 1970. The same variables account for only 27 percent of the variance in the 25-34 age group. It, therefore, seems that the older the age group, the more explanatory power the independent variables in the analysis have.

The first purpose of this research was to discover a set of independent variables which show promise for explaining county variations in labor force participation rates. Seven variables were so identified and examined in earlier chapters. This seven variable model was then used to test ten age and sex specific labor force participation rates. It was expected that these variables would more effectively "explain" participation rates for some age groups than for others.

This was the case as said above. These seven variables were better for explaining the participations rates of the older age groups, but were also very effective in accounting for the geographic variability for the total 25 years of age and over participation rates of both men (R^2 = 0.72) and for women (R^2 = 0.58). These seven variable models were of little practical value in accounting for the county level geographic variability of participation rates for men 25-34 or for the female age groups 25-34 and 35-44.

It appears likely that other, "better" (in terms of variance) models could be identified for these younger age groups. Actually better models might be identified for each age-sex group, but this was not the main purpose of the research.

Interpretation and Effect of Coefficient Signs

The interpretation of the effect of the independent variables with regard to the signs of the equations may be illustrated as follows: The education variable (MEDEMA) enter Eq. A-2 with a positive coefficient of 2.9 while male unemployment enters with a negative coefficient (-0.02). The effect of education indicates that if median school years completed in a given county in Oklahoma rises by one year, the labor force

participation in the counties might rise 29 percentage points higher, other things being equal. This is the model result indicated, but in practice this might not be observable since education alone cannot create jobs. The effect of male unemployment is toward the inverse. For Eq. A-2, if male unemployment increases by one percent, the model result suggests that labor force participation for males 35-44 groups will decrease by at least 2 percent, holding other things constant.

Male unemployment (MUNEMRT) shows a negative effect on the labor force participation for all age groups in the study. The inverse relationship concurs with some of the earlier studies. In Barth's findings, only four of the six demographic groups he studied have negative coefficients (Barth, 1967, p. 236).

Then, Barth concludes that if various age-sex groups conform to the discouraged-worker hypothesis, the participation rates for these groups will be low in areas with high unemployment. That means an inverse relationship between participation rates and unemployment. Since the results of the regression in Tables I and II have similar features, there is evidence that the "discouraged worker" effect exists in some Oklahoma counties. It must be remembered that the data used in this study refers to only intercounty variations and not to variability or change in status over time as in a dynamic flow of unemployment experiences. Schweitzer and Smith believe that it is persistent unemployment that causes "discouraged-workers" effect. Using past and present unemployment data they discovered what they call "a significant dynamic component of the discouraged-worker effect" (Schweitzer and Smith, p. 259).

Child care responsibility places constraints on the possibility of parents working. The responsibility varies with age and the number of children in the family; and the burden falls mostly on the wife. The variable used to treat the effect of family responsibility on the supply of labor is the percent of married couples with children under 18. The hypothesis maintains that the greater the number of such couples in a given county, the less will be the labor supply. That is an increase of such families will result in a decrease of the labor force participation. The regression result indicates that the male age groups 35-44, 45-65 and 65 years old and over have inverse relationships. The 25-34 and 25-65+ age categories have plus signs.

The positive coefficient for the 25-34 age group is as expected and it probably should be also for the total 25 and over model. The negative signs of the coefficients for the three oldest age categories of males seems contradictory to the simple hypothesis but may actually be demonstrating that this variable is not relevant to male labor force participation models or that a more complex interrelationship exists that has not been properly identified. A brief examination of the residuals shows that most of the large negative residuals are found for the generally younger population counties of eastern and southeastern Oklahoma which also are well known employment problem counties. This variable may be therefore masking or hiding some more complex underlying employment problems.

The percentage of employed persons in construction and manufacturing (CONMFG) represents industrial-mix in a county labor market. An apriori expectation with regards to this variable calls for positive relationship. That is, the greater the proportion of "working men" in

these related activities the greater will be participation rates. To put it in another way, the greater the chances for employment in manufacturing and construction, the more some men would be willing to work since they pay higher wages than is the case in agriculture. But as Table I shows, only two of the five male categories have plus signs, the 25-34 and 35-44 age groups. The older age groups have negative signs. The inverse relationship possibly indicates higher participation rates for older men in some of the less dynamic and/or less urban counties. Some earlier studies, however, show positive correlation for all male age groups (Barth, 1967, p. 242).

Education, income per capita and distance variables enter the regression table with all positive signs. The signs are consistent with prior expectations and this should be of great interest to policy makers.

The effects of higher education levels are associated with increases in labor participation. But it must be remembered that education alone does not create jobs (Weisbrod, p. 13). However, it helps reduce unemployment by matching available job slots with the right people.

Oklahoma workers have considerable freedom to search for jobs outside their labor market boundaries. This is indicated by the number of people living in one county but employed in another of the same state or in neighboring states. In 1970, the mean county level percentage value for workers involved in intercounty commuting amounted to 19% while the maximum value was 62%. The equations in Table I indicate that increase in the number of workers commuting to work outside their county of residence resulted in increases of work participation rates for males

of all demographic groups. Although the regression coefficients are not large, this relationship is important enough to point out that in periods of tight labor market conditions, workers may take advantage of high geographic mobility to seek employment in other counties.

The distance variable (DISTIOKT) is the major variable employed to explain the effects of access to job opportunity on variance in labor force participation rates in Oklahoma counties. Close proximity of a worker's residence is associated with high labor participation ratios. In more recent years, questions have been raised as to whether distant job locations cause depressed participation rates of ghetto workers. Testing such hypothesis in Oklahoma, this study found out that distance variable is positively related to the amount of labor supplied by all male groups. Commuting distance from workers residence to job opportunity areas does not appear to reduce work participation rates of males in Oklahoma counties. According to the regression coefficients, an increase of extra distance from each of the county seats to (existing towns of 10,000 inhabitants assumed to be growth centers) job centers seems not to have a substantial adverse effect on LFPR.

The finding may be attributed to the fact that Oklahoman commuting workers readily accept the direct cost of commuting to work. The employers in one way or the other may award some incentives commensurate with the problems of traveling to job. Hence distance effect has no decreasing power on Oklahoma male workers. But another attribute to the positive effect might be found in the fact that many counties in Oklahoma are at least within one hour driving range to job centers. In counties where urban jobs are few, the rural-agricultural sector offers useful employments. Very probably, the variable specified in this

research does not adequately measure the effects of geographic access to job opportunity on labor force status.

Sandmeyer and Warner talk about negative correlation coefficients of distance variable associated with nonwhite labor force participation rates. But this argument is doubtful since none of their dependent variables have reference to white or nonwhite categories (Sandmeyer and Warner, 1968, p. 86).

Finally, the income per capita variable associates positively with male labor force participation rates. This conforms with prior expectations. Since this variable refers to the economic growth of a particular county, it then follows that higher levels of county income per capita would be associated with higher labor force participation. This conclusion seems reasonable since economic growth theory maintains that in order to reduce unemployment, additional increases in GNP must be maintained to a certain level (Okun, 1965, pp. 13-22). Therefore high income per capita represents high economic growth, and prosperity is associated with high labor force participation.

Regression Results for Females

The female regression models have quite distinctive patterns differing from those of males. More of the variables affect female labor force participation inversely. Also a negative intercept value occurs for females 65 years old and over (Table II, Eq. B-4). This observation is also seen in Barth's regression result (Barth, p. 240).

Income per capita have all positive coefficient values but are relatively very low values. The distance variable (DISTIOKT) has almost all negative values. The only exception is with the 65 years and over

age group which associates positively with the distance variable (see Table II, EqB-4). The negative coefficients indicate that distance to work has an adverse effect on female participation rates. The reflection might be due to women inclination to service jobs in the urban areas.

The next variable considered is the percentage of people residing in one county but employed in another. The hypothesis called for positive relationships with labor force participation of all groups. But as Table II reveals, this does not conform with female participation rates, except for 25-35 age group. The negative relationship might reflect the low negative interest that women show in working farther away from their homes.

Education, measured as median years of schooling for females (FMSYEAC) is negatively correlated to labor force participation rates for age group 35-44 but positive to all other subgroups. For the total sample of females (25-65+) the regression coefficient is 0.72. This indicates a strong positive relationship that education of females in general influences the degree of their labor participation. But this result is opposite to Parker and Shaw findings. In their study they found negative relationships of education variable with the total of all age groups for females (Parker and Shaw, 1968, p. 544).

Female unemployment rates enter the model as a representative of labor market conditions. High unemployment rates as indicated earlier are capable of reducing female participation rates. That calls for inverse relationship. But as Table II indicates, only two female demographic groups has negative signs: 35-44 and 65 years old and over. To more fully understand the positive coefficients, it would probably

be necessary to have more information on family status of females as it differs between counties.

The family variable performs as expected. The presence of married couples with dependent children under 18 (MWCU18) correlates inversely with female participation ratios for the childbearing age groups. Older age groups correlate positively, indicating non-significant effect of this variable with their desire to work, provided that other factors remain the same.

Employment in manufacturing and construction show minus signs for all female subgroups. Perhaps what constitutes the inverse relations might be found in relatively low employment of females in construction activities since males are more dominant in road and factory construction plus heavy manufacturing activities in the state it might be realistic to speculate on the damping effect of this variable along with female labor force participation. Although these inverse relationships were measured, it must be pointed out that manufacturing-construction variable explains very little of the variance among female participation rates.

These observations conclude the result of regression analysis. The next section will involve examination of some residuals from the regression models.

Analysis, Mapping and Patterns Formed From Residuals

Table I, equation five, gives the values of the parameters of labor force participation determinants defined in this study for males 25 and over. The equation is reproduced thus:

Male (25 and over) LFPR = 7.84 + 0.011 INCPERC + 0.038 DISTIOKT
+ 0.026 WORINCO + 1.62 MEDEMA
- 0.079 MUNEMRT + 0.387 MWCU18
- 0.092 CONMFG

The following table presents Payne County data from the 1970 Census for the independent variables specified in this study.

1970 LFPRTOTM	=	62.8%
INCPERC	=	$2473
DISTIOKT	=	8 miles
WORINCO	=	7.25%
MEDEMA	=	12.6 years
MUNEMRT	=	3.0%
MWCU18	=	47.7%
CONMFG	=	13.17%

If we substitute these values into the above equation or model, we discover that instead of the 62.8% 1970 LFPR for 25-65+ age group reported by the Bureau of the Census, the model estimates 71.99%. Although the predicted and residual values are calculated through computerized technique, the following illustrates the basic computations.

LFPRTOTM (Payne County) = 7.84 + 0.011(2473) + 0.038(8) +
+ 0.026(7.25) + 1.62(12.6) - 0.079(3)

$$+ 0.387(47.7) - 0.092(13.17)$$

$$= 71.99 \text{ (approx.)}$$

Assuming that Payne County conforms to the model defined in this study or equation five (Eq. A-5), we should expect that its labor force participation rate for the male group would equal 71.99%.

In the case of Payne County the difference between observed labor force participation rate (LFPR) and the expected LFPR is the residual 62.8 - 71.99 = -9.99%. The value (-9.99) is called the residual from regression. The sum of the squared residuals represents the amount of variance in the dependent variable which is not predicted or accounted for by the independent variables.

To interpret the significance of the residual, the Payne County Case will be used as an example. Given the values of income per capita, education level, unemployment rate for males, the closeness to potential job centers, the employment in construction/manufacturing, the lower percentage of couples with dependent children and the freedom that some of its workers find jobs outside the county boundaries, Payne County labor force participation for males 25-65+ was lower than expected. That means the labor force participation rate as recorded by the Bureau of the Census in 1970 was less than we would expect. Using Eq. A-5 model and the coefficients for the factors, I have computed the expected values (labor force participation rates) and derived residuals for the rest of the counties in Oklahoma (Table III). This table reveals that residuals values have some with positive and negative values. Those with positive values indicate that the Bureau of the Census in 1970 recorded higher values than would be expected from the model used in this study.

An example of a county with a high positive value is Jackson County in Southwest Oklahoma. Table III in the appendix shows this.

Mapping the Residuals: Table I, equation 5, shows that the coefficient of multiple determination, R^2 is 0.72. That means the model described in the present study is capable of explaining 72 percent of the variations in labor force participation for all males 25-65 years old and over. In other words, the factors used in the models accounted for 72 percent of the variances in labor force participation for the demographic group 25-65 years old and over. Therefore, 28 percent remains unaccounted for. The 72 percent is due to the combined effect of the factors specified and analyzed in this study. What then accounts for the remaining 28 percent?

In an attempt to find out what might help to explain the remaining 28 percent, geographers sometimes employ a mapping of residuals. Figure 3 illustrates the mapping of positive and negative residuals from regression for males aged 25-65 and over. Those mapped in figure 3, however, are residuals equal (=) to or greater than (+) or less than (-) 4 percentage points in absolute terms. The spatial patterns formed may suggest additional clues to help explain the 28 percent residual variance. A close observation of figure 3 seems to point out that counties with large negative values have college or university towns in them. Others have large Indian population concentrations, therefore the residual variance for these counties may be associated with special employment problems of Indian people.

The group of counties with college population towns include:

(1) Cleveland County (-11.74) Home of Oklahoma Univ. (OU)

(2) Payne County (- 9.19) Home of Oklahoma State Univ. (OSU)

(3) Custer County (- 5.91) Home of Southwest Oklahoma State Univ. (SWOSU)

(4) Woods County (- 4.02) Home of Northwest Oklahoma State Univ. (NWOSU)

In this series Canadian County has a negative residual value of (-5.59) and it is the home of a small college population, the Oklahoma Christian College. But unlike the rest of the counties with college towns, its recorded value is relatively and moderately high enough, 71.4%. Therefore the high negative residual value cannot be justifiably attributed to the presence of the small college population. However, it must be remembered that Canadian County forms a part of the Greater Oklahoma City urban area. The other groups of counties with large negative residuals have concentrations of Indian populations and the following patterns can be identified from figure 3.

Counties with Indian population concentration:

(1) Northeast: Delaware (-5.91) Adair (-5.80) Craig (-4.12)

(2) Southeast: Atoka (-12.30) Pittsburg (-9.78) McIntosh (-6.53) Latimer (-4.38)

(3) Southeast: Greer (-8.67)

As it has been pointed out some of the counties in the central, northwest and west with large negative residual values have student populations. Perhaps some of the students could not record appropriately their work relationships. It might be that most of the foreign students in these university towns who work full time failed to report their working relationships for the fear of contravening immigration laws or that they were not served with census forms at all. The south and eastern counties with negative residuals have for decades, prior to the 1970

census, been characterized by low incomes and some are those with large Indian population concentrations.

Figure 3 also shows a pattern of positive residuals for the counties which recorded labor force participation rates in excess of what the model in this study reveals. These counties form two major clusters, one in the southwest encompassing the relative new Lawton Statistical Metropolitan Area. The other counties are scattered in the Northeast, South and West portion of the state.

However, I would like to conclude that the more we map and study residuals, the more knowledge we could gain and the more hypotheses we may be able to develop and test. This exploratory study has only scratched the surface of possibilities for the geographic study of labor force participation.

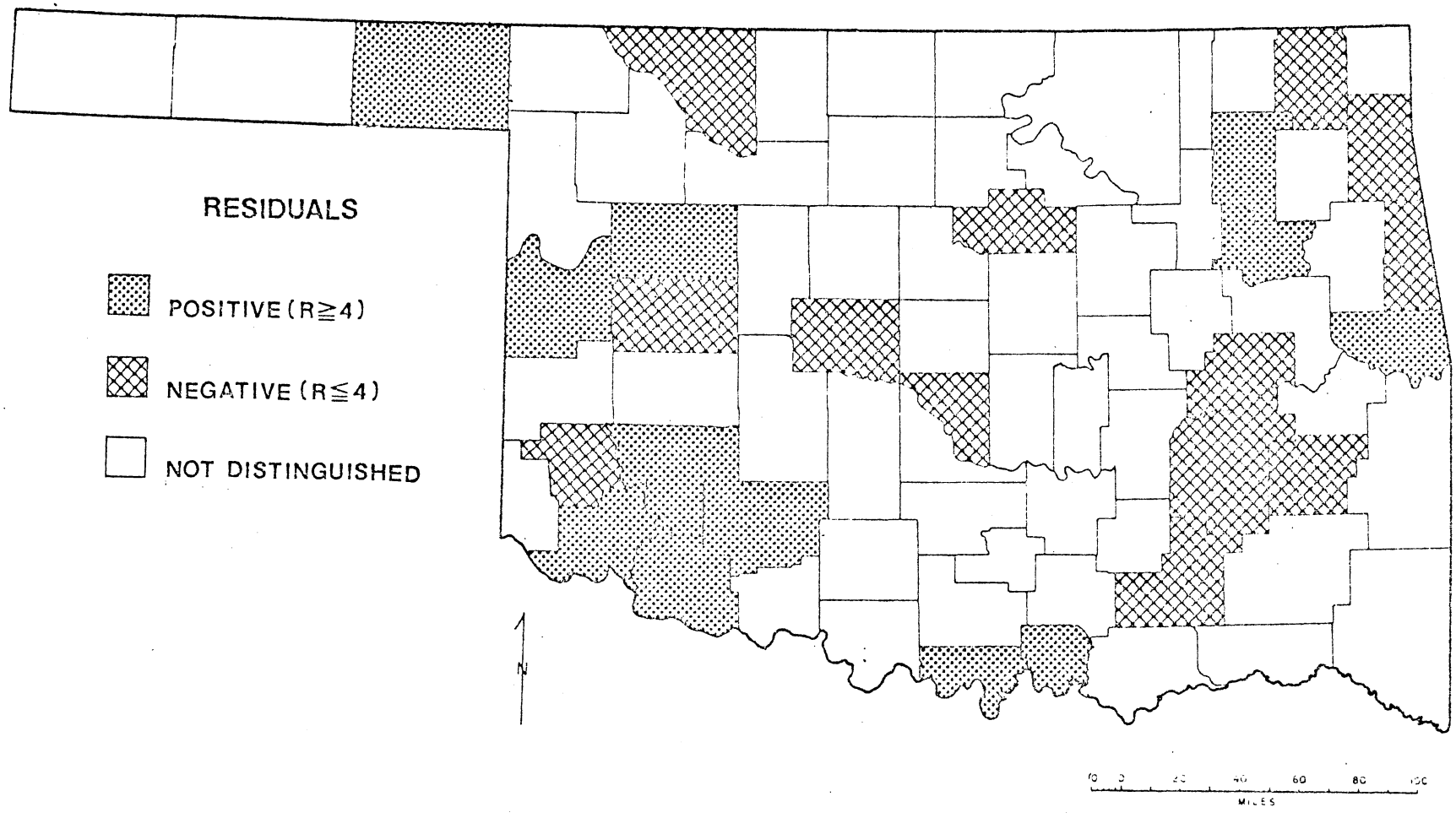

Figure 3. Residuals from Regression: Positive and Negative Absolute Values Greater Than 4. Oklahoma Counties Receiving Less Than and Greater Than Predicted Values of LFPR in 1970 (Males 25-65+) (R = Residuals from Regression)

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary and Conclusion

Geographical variations of labor force participation rates has been the topic of discussion in this study. Basically, in order to discover these variations: three major objectives were spelled out in Chapter I. First, an analysis was made of the effect of personal, family, and local market conditions utilizing some specific explanatory variables. Secondly, an attempt was made to examine the influence of the work-residence separation of workers on participation rates. Lastly, since geographers traditionally have tried to discern patterns to find solutions, regression residuals were mapped in order to determine which counties in 1970 recorded labor force participation rates in excess of or below what the models predict. The 77 counties in Oklahoma were chosen as the study area and the 1970 U. S. Census published data served as input data.

Areal-Socioeconomic Differences

In Chapter II an insight into the variances of population density and composition along with economic and employment situations were discussed. It was discovered that a central axis running from the Northeast to Southwest encompassing the three SMSA's forms a major thrust in economic and social activities. High labor force participation

rates were discovered to follow the same pattern. Increasing distance away from this main axis certain counties east and west experience depressed or low level labor force participation rates. These patterns were highly noticeable when males and females of prime age workers were analyzed and mapped. As expected, female participation rates were considerably lower than those for males. Through the mapping of residuals from regression, it was discovered that certain counties, given their values on the independent variables used in this study, recorded much higher labor force participation rates while others recorded much less when the predicted (by the model) and 1970 observed census values are compared. Some of the counties that recorded lower than participation rates (negative residuals) are college or University towns and some are those with Indian concentrations.

Factors in Model

On the basis of intuition and the factor selection procedure discussed in Chapter III, seven variables were chosen for entering into the regression models. In general observation, the models fail to explain adequately the major part of the variances in labor force participation rates for the younger age-sex groups. This is indicated by their low level values of coefficient of multiple determinations, R^2. But the explanatory power of the model variables increases for older age-sex groups. When the total working age group (25-65+) is considered the factors show much more explanatory power, therefore the models should be viewed as useful.

Specific consideration of each factor points out that level of education is very important in determining labor force participation

rates. The presence of children under 18, as was expected, serves to depress participation rates, particularly for women of the child-bearing ages. Male unemployment, according to the findings, has an adverse effect on participation rates of all male age groups tested. Since these three factors are representative of personal, family, and labor market conditions the model basically point out that those factors are coordinated in certain ways and act in unison to determine labor force participation rates in Oklahoma.

In addition to other factors it seems reasonable to suggest that good access to work place encourages the employability of workers. But, the negative relationship with distance to places over 10,000 in this model was not found to hold for male age groups. However, female participation rates were found to be affected by the distance variable. If we assume that female workers represent a special case of disadvantaged workers in that they are discriminated against in regards to certain jobs or they are not capable of doing them, then possibly we might suggest that the work-residence separation effect has greatest impact on disadvantaged workers.

The manufacturing and construction employment used to test the effect of industrial mix in a county really performed as it had been expected. It has negative coefficient for all female age groups and for the older male age categories. Possibly the absence of female and older male employment in construction helps cause the inverse relationships. Whatever might be the case, it is appropriate to note that female labor force participation rates are relatively lower than that of males. The eastern and southeastern counties in Oklahoma are also characterized by low labor force participation rates for all age-sex categories.

Major Conclusions

The following constitutes the major conclusions of this research:

1. The variables education, unemployment, and family with dependent children emerge as leading and meaningful determinants of areal labor force patterns in Oklahoma.

2. The effect of education on labor force participation is stronger for male groups than for female groups.

3. Unemployment has a negative effect on labor force participation for all but three of the ten male-female demographic groups indicating the potential existence of a discouragement effect.

4. The demographic variable representing the family dimension (presence of children under 18) has more inverse effect on the male groups than it has on the females, very likely indicating that the measure used is not adequately identified for these models.

5. The effect of journey to work, as demonstrated by the coefficients of the distance variable,tends to reduce female labor force participation rates much more than it does for male groups.

6. A general geographic finding shows depressed labor force participation rates east and west of the northeast-to-southwest urban corridor of Oklahoma, and female labor force appears to have a similar geographic pattern of participation although levels are quite below the levels obtained by their male counterparts.

Recommendations

The preceding section gives some major conclusions derived from this study. Suggestions relating to policy and programs that will help improve the low level labor force participation rates as recognized in

some counties is the main objective taken up in this section. Suggestions offered, are based on the findings of the present study as well as some of the author's experiences. Thus most of the recommendations are subjective in nature.

It should be reiterated that the counties in Oklahoma mainly serve as political units and as labor market areas should be viewed fundmentally as a series of submarkets. Therefore a good knowledge of how these submarkets function in relation to manpower demand and supply in the whole state is very essential. Lack of such knowledge renders employment programs and other manpower services fruitless. Some recommendations have been made for future research and those to enhance labor force participations.

Some of the models results in large negative residuals for some counties which indicate that their labor force participation rates are considerably lower than expected in models based on all Oklahoma counties. To better understand the labor force status of those counties suggests the need for identifying alternative models which incorporate such factors as racial composition, areal retirement income effect, and the degree of agricultural employment. Since Oklahoma demonstrates three marked geographical and economical regions (the northeast-southwest urban corridor and the two areas northwest and southeast of the corridor), future studies might focus upon each of these regions separately.

The positive regression coefficients for per capita income and the industrial mix variables suggest that there is a consistent sensitivity of labor force participation rates to indicators of the general level of economic growth and development. For example, the low levels of labor force participation prevailing in southeast Oklahoma are associated with

the underdeveloped nature of the economy of that part of the state. In contrast, northwestern Oklahoma's higher levels of labor force participation associate realistically with the higher levels of income and economic activity per capita.

The economy of the northwest part of the state is more mature, agriculturally-based economic system where the main goals are maintenance of high levels of productivity per worker along with moderate growth or expansion. On the other hand, southeast Oklahoma apparently will require both substantial economic growth and socioeconomic change if participation rates are expected to reach higher levels. Barring further economic growth, the southeast part of the state could only expect to improve on labor force participation rates through an outmigration of the excess population.

The urban corridor counties extending from the Tulsa SMSA in the northeast through the Oklahoma City and Lawton SMSAs toward the southwest comprise the major region of job creation and employment growth in the State. Thus this region serves as an area of greater employment opportunity for potential migrants of the less developed southeast part of the state.

Under these conditions, public policy could either focus on encouragement of economic growth and job creation in the less developed areas or upon the encouragement of outmigration from these areas to other regions of higher employment opportunity and growth potential. In practice, policy could include elements of both alternatives. Following Niles M. Hansen's recommendations, more emphasis might be placed on human resource development in less developed areas (counties). Thus better educated and trained migrants should be more successful in

employment search and job retention should they decide to move to cities such as Tulsa or Oklahoma City. Those electing to remain in the less developed areas might also serve as an attraction to business and industry considering investment in areas such as southeastern Oklahoma.

The education variable used in this study clearly indicates the association between county level participation rates and educational levels. Counties with low aggregate educational levels stand out as areas of low labor force participation compared with those areas of higher educational levels. If this association represents real forces at work which enhance the employability of individuals, then additional investment in human resource development (general education, career specific education, job training, etc.) should encourage higher labor force participation.

Education and training for work in Oklahoma takes different forms. To name but a few, these include vocational-technical schools, job corps centers, neighborhood youth corps (NYC) and the job opportunities in the business sector (JOBS). The target populations served by these programs are the so called "disadvantaged workers". The question is who are these disadvantaged persons? A high proportion come from minority groups (females, blacks, chicanos, American Indians).

Since obstacles for employability of females and persons of various minority groups derive also from such things as prejudicial discrimination in hiring, then education of such persons will not have the same effect on participation rates as for the economically dominant white male population. Some evidence for this is indicated by the

negative regression coefficients for the education variable in the models for the two youngest female labor force participation models.

The 1970 Census data also indicate labor force participation rates that are lower for black males and American Indian males than for white males. While education levels of these subpopulations also are different, the important question relevant to this study is: If the education level of minority groups is improved, will it have an impact on participation rates similar to that for white males? The data used in the models for this study included all racial-ethnic subpopulations. However, racial-ethnic minority groups are not evenly distributed geographically in Oklahoma. Therefore the higher participation rates of northwestern Oklahoma might partially be the result of the very low proportion of minority groups population living in that region. In contrast, southeast Oklahoma has a large proportion of racial-ethnic group minority population which can clearly be associated with the area's low participation rates.

In terms of training for jobs, another aspect of the discriminatory practices should be examined. Common sense teaches us that the value of skill training depends on its intensity. Applying this hypothesis to the training and education offered in programs such as that in the job corps centers, it seems that most students barely complete one year before they are passed out. Have these people really received adequate training that would lead them to gainful employment or are they trained for dead-end jobs? Training for dead-end jobs is equivalent to no training at all since this is likely to induce the discouragement effect. If the training of the disadvantaged minority groups is to help increase their labor supply propensities, it may be

necessary to increase the duration each enrollee spends in the programs.

Education and skill training, no doubt, improve the chances of disadvantaged workers getting meaningful jobs. At the same time an equal employment opportunity law in a multiracial nation such as the United States is necessary to make it illegal for employers to engage in discriminatory employment practices. This administrative procedure has generally been "observed" given due attention since its "incursion" in 1964. But it is suprising nowadays to see employers, manpower directors and administrators trying to regard training of disadvantaged persons as a prerequisite to equality of employment opportunity. This new interpretation of equal employment opportunity in no way can help motivate the needed labor of these groups of people. The blacks and other minority groups view the new concept as racial victimization and therefore get discouraged and fail to apply for jobs. Equating the "Equality of Employment Opportunity" concept with how much educational level a minority group could attain before employment is offered seems to indicate educational abuse.

Therefore to raise the standard of labor supply in a county area, this aspect of educational abuse must be removed. Once this is done, the better equiped minority students will make the best use of their educational opportunities and take their rightful place in the society rather than a mass of ill-equiped blacks pouring into colleges with no aim in mind, and then later come out to spoil the dignity of work-education relationships.

The results of this study also indicate that the presence of dependent children in the family reduces the amount of labor supply

provided by the adults in the household. This suggests that each county needs to look carefully at day care facilities as a corollary to manpower policy. If secondary workers (wife or husband whichever) are to participate in the job market, each county, particularly those within the Standard Metropolitan Statistical Areas, need to devise day care programs that are more feasible. Their feasible locations, cost and quality must be carefully studied before implementation. When this is done more mothers would be attracted to the labor force.

However, job sharing procedures might serve as a better alternative to day care. Job sharing is a system whereby two persons through their agreement with the employer share one job task. While one woman works for one week the other stays home watching both women's children. When the turn comes, both switch their responsibilities. It seems appropriate to recommend that Oklahoma take a pioneering lead in introducing job sharing phenomena into its labor market strategies. At any rate, this job sharing procedure could be augmented with more part time jobs for women in the government and industries.

In view of the research results, their interpretations and recommendations should be taken only as suggestive. I do hope however that the research design and the present findings will encourage further geographic studies with greater attention given to spatial determinants of labor force participation.

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APPENDIX

LABOR FORCE PARTICIPATION RATES FOR MALES 25-65 YEARS OLD AND OVER IN OKLAHOMA COUNTIES IN 1970

TABLE III

LABOR FORCE PARTICIPATION RATES FOR MALES 25-65 YEARS OLD AND OVER IN OKLAHOMA COUNTIES IN 1970: SHOWING OBSERVED VALUES, PREDICTED VALUES AND RESIDUALS FROM REGRESSION

	Counties	Observed Value	Predicted Value	Residuals (Rounding)
1.	Adair	51.5	57.29	- 5.80
2.	Alfalfa	71.6	71.82	- 0.22
3.	Atoka	48.3	60.60	-12.30
4.	Beaver	83.5	75.61	7.89
5.	Beckham	65.9	64.74	- 3.84
6.	Blaine	67.3	67.50	- 0.20
7.	Bryan	66.6	63.48	3.12
8.	Caddo	67.4	64.19	3.21
9.	Canadian	71.4	76.99	- 5.59
10.	Carter	68.3	68.48	- 0.18
11.	Cherokee	58.4	61.34	- 2.94
12.	Choctaw	55.7	56.63	- 0.18
13.	Cimarron	80.6	82.10	- 1.50
14.	Cleveland	69.6	81.34	-11.74
15.	Coal	53.1	55.82	- 2.72
16.	Comanche	88.4	76.42	11.98
17.	Cotton	71.7	70.67	1.03
18.	Craig	60.9	65.02	- 4.12
19.	Creek	72.2	69.02	3.18
20.	Custer	70.4	76.22	- 5.82
21.	Delaware	52.0	57.91	- 5.91
22.	Dewey	72.4	68.24	4.16
23.	Ellis	73.8	70.50	3.30
24.	Garfield	76.7	76.50	0.20
25.	Garvin	65.8	68.80	- 3.00
26.	Grady	71.0	68.41	2.59
27.	Grant	68.7	68.05	0.65
28.	Greer	51.5	60.17	- 8.67
29.	Harmon	67.4	63.74	3.66
30.	Harper	76.4	74.57	1.83
31.	Haskell	62.3	58.88	3.42
32.	Hughes	61.9	59.61	2.29
33.	Jackson	84.5	72.40	12.10
34.	Jefferson	63.7	62.03	1.67
35.	Johnston	53.7	54.38	- 0.68
36.	Kay	75.6	74.09	1.51
37.	Kingfisher	74.0	77.99	- 3.99
38.	Kiowa	69.4	64.74	4.66
39.	Latimer	53.6	57.98	- 4.38
40.	Le Flore	58.6	59.24	- 0.64

TABLE III (Continued)

	Counties	Observed Value	Predicted Value	Residuals (Rounding)
41.	Lincoln	69.2	66.61	2.59
42.	Logan	68.7	65.32	3.38
43.	Love	65.7	60.39	5.31
44.	McClain	68.9	68.54	0.36
45.	McCurtain	60.9	59.25	1.65
46.	McIntosh	52.2	58.73	- 6.53
47.	Major	74.0	71.65	2.35
48.	Marshall	65.2	60.29	4.91
49.	Mayes	65.7	65.09	0.61
50.	Murray	62.3	63.64	- 1.34
51.	Muskogee	66.4	67.04	- 0.64
52.	Noble	69.1	68.72	- 0.62
53.	Nowata	68.9	65.09	3.88
54.	Okfuskee	60.5	59.55	0.95
55.	Oklahoma	81.4	82.61	- 1.21
56.	Okmulgee	59.2	58.26	0.94
57.	Osage	73.6	74.03	- 0.43
58.	Ottawa	70.2	68.67	1.53
59.	Pawnee	64.5	66.63	- 2.13
60.	Payne	62.8	71.99	- 9.19
61.	Pittsburg	56.0	65.78	- 9.78
62.	Pontotoc	67.9	68.12	- 0.22
63.	Pottawatomie	68.4	69.20	- 0.80
64.	Pushmataha	53.3	55.62	- 2.32
65.	Roger Mills	72.8	68.27	4.53
66.	Rogers	78.0	72.08	5.92
67.	Seminole	62.5	59.93	2.57
68.	Sequoyah	65.2	60.67	4.53
69.	Stephens	73.0	71.60	1.40
70.	Texas	79.3	79.90	- 0.60
71.	Tillman	68.5	64.39	4.11
72.	Tulsa	81.1	83.03	- 1.93
73.	Wagoner	74.0	68.83	5.17
74.	Washington	80.0	83.26	- 3.26
75.	Washita	72.8	69.92	2.88
76.	Woods	71.3	75.32	- 4.02
77.	Woodward	75.4	77.22	- 1.82

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