AN ANALYSIS OF THE EFFECT OF THE MATCH BETWEEN APPLICANTS AND OPENINGS ON SELECTED UNEMPLOYMENT RATES

THESIS

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The purpose of this study was to classify unemployment by clearly defined, objectively measured categories which produced a consistent, empirical model identifying the structure of unemployment in Texas during the period 1973 to 1978. The models employed univariate hierarchical regression of Texas montly unemployment rates and changes in unemployment rates on measures of seasonality, cyclical fluctuations, the match of qualified applicants to available openings, and the interaction of these terms. The results of these models were reported.

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CHAPTER I

INTRODUCTION

The Problem

"I turned away, and the only remaining strength in my body seemed to completely forsake me. I staggered into the street, a completely world-forsaken man" (1, p. 178). Perhaps this description by B. Seebohm Rowntree in 1910 of an unemployed laborer precipitated John Garraty's grave appraisal, "Of the economic perils that threaten the Western world, one of the most alarming is the persistence of unemployment" (1, p. 1).

It has been said that the unemployment rate is the most important single statistic published by the federal government (2, p. 3). Certainly, a fundamental issue affecting economic decision making is the nature and extent of unemployment. For example, at the national level, determining the extent to which the unemployment rate can be lowered without causing an acceleration of prices is an ongoing problem. "A state and local question, on the other hand, is how to design programs that will enhance the labor market success of the unemployed and groups that are in economic distress" (3, p. 1).

Several factors may contribute to the unemployment rate: the business cycle, seasonal influences, and both long-term and short-term mismatches between skills of the unemployed and requirements of existing jobs. In order to insure the success of unemployment policies, government at all levels must tailor specific programs and design preventative strategies to combat these many factors which contribute to unemployment, since "programs targeted to particular types of unemployment are inappropriate in dealing with others" (3, p. 1).

In analyzing unemployment, economists have not yet resolved the categorization of unemployment. "For some time, American economists have been concerned over the ambiguity and lack of specification of attempts to classify unemployment into separate components" (3, p. 1). In 1961 the Subcommittee on Economic Statistics of the Joint Economic Committee published a glossary, specifying seventy categories (4, p. 15). Since that publication, several additional unemployment categories have been developed. However, many of these terms were not defined objectively and, as such, are meaningless factors for analyzing unemployment data.

While the taxonomy of unemployment is important because of concerns about the potential impact of various labor-market policies and programs, an operational measurement of unemployment types is feasible only if adequate data are available. In this sense, the available data directly influence the appropriateness of the classification system.

Therefore, this paper will attempt to design an operationally consistent and reasonable methodology for classifying unemployment into identifiable categories.

Although there have been many attempts to classify unemployment, the four most generally accepted components have been seasonal, cyclical, frictional, and structural. Seasonal unemployment is characterized by recurrence and generally short-duration annual patterns. For example, the weather affects construction, agriculture, and related industries, while styles and holidays affect trade and apparel industries. Cyclical unemployment results from fluctuations in the business cycle, such as peak, decline, trough, and recovery. Cycles may be considered nationwide or general business fluctuations, or they may be considered industrywide. Both the seasonal and cyclical components of unemployment generally are accepted by economic analysts as being measureable, reliable factors of total unemployment.

More controversial are the frictional and structural components of unemployment. Frictional unemployment is associated with the fact that in a dynamic--or changing--economy, there will not be a perfect or immediate matching of available jobs with skills. This term reflects the immobility of labor and capital and the imperfect organization of the labor market, such as a lack of knowledge of job opportunities. The distinctions between frictional and structural unemployment are not sharp. The following is a definition of structural unemployment drafted by the Subcommittee on Economic Statistics:

> The word "structural" frequently implies that the economic changes are massive, extensive, deep-seated, amounting to transformation of an economic structure, <u>i.e.</u>, the production of functions or labor supply distribution. More specifically, it refers to changes which are large in the particular area, industry, or occupation. These basic economic changes are considered as shifts--for instance, between industries or between geographic areas of the national economy--not as absolute decreases within the particular economic structure being discussed (4, p. 7).

Structural unemployment is viewed as the most difficult type of unemployment to solve because its remedy requires structural changes in either the work force, in the job mix, or in the process by which jobs and workers are matched. In addition to being a difficult type of unemployment to correct, structural unemployment is also difficult to measure objectively with available data sets. Consequently, it is not a very useful classification of unemployment.

> As a taxonomy of general causes and as a guide to measurement, decomposing unemployment into cyclical, frictional, and structural components has important limitations. In particular, structural unemployment clearly overlaps with other categories. The overlaps go beyond definitional problems; they reflect interactions among the causes of various types of unemployment. The result is that the concepts as they currently exist do not permit any definitive way of distinguishing empirically one type of unemployment from another (5, p. 7).

Therefore, the purpose of this paper will be to classify unemployment by categories that are clearly defined, objective, and measureable, thus leading to the development of a consistent, empirical model to be used in identifying the structure of unemployment in Texas for the period 1973 to 1978.

Survey of the Literature

"Unemployment has always been a complex and elusive phenomenon," observed John Garraty.

> Little wonder that throughout history unemployment has played a continuing but changing role in the development of economic and social thought, in the formulation of public policy, and in the shaping of popular attitudes toward work, government, life itself (1, p. 3).

The theoretical models of Pigou, Keynes, and Schumpeter traditionally have played significant roles in discussions of unemployment policies.

> Pigou's extensive writings on unemployment did not include systematic or explicit classifications of types of unemployment. One reason why Pigou did not classify types of unemployment was that he was interested in general diagnosis, rather than in solving particular problems of unemployment (4, p. 25).

Because Pigou perceived unemployment as a residual, to be calculated by subtracting employed workers from the number of "would-be wage earners," he explained unemployment almost wholly in terms of supply-and-demand factors that influence employment. To Pigou

> the essential aspect of unemployment was that its amount varied with the volume of employment. Pigou's view was that in stable conditions everyone will actually be employed. The implication is that such unemployment as exists at any time is due wholly to the fact that changes in demand conditions are continually taking place and that frictional resistances prevent the appropriate wage adjustments from being made instantaneously (4, p. 26).

Keynes grouped unemployment into three categories: frictional, voluntary, and involuntary. Frictional unemployment was a sort of job mismatch, voluntary unemployment was a rejection of available jobs by the potential laborer, and involuntary unemployment was caused by a greater demand than supply of employment. "According to Keynes' definitions, at the full employment level of economic activity, there could be frictional and voluntary unemployment but no involuntary unemployment" (4, p. 28). Thus, inadequate demand was the fundamental Keynesian explanation for unemployment. However, the theory that inadequate demand causes unemployment is still controversial. According to the structuralists' view, the principal explanation of persistent unemployment in recent years has been the rapid transformation of economic activity and occupational structure. Some examples of changes are the decline in goods-producing industries and the growth of service-rendering industries, as well as the shift in demand from blue-collar occupations to white-collar technical and professional employment. So the structuralist focuses on the educational system, training institutions, counseling, relocation, etc. The aggregative theorists, on the other hand, propose the lack of aggregate demand on the part of consumer, business firms, and government as the principal cause of unemployment, emphasizing the availability of jobs.

Schumpeter's definitions of types of unemployment can be grouped into two sets of classifications. The first set, which includes the types of unemployment found when economic systems are in "neighborhoods of equilibrium" or "normal unemployment," include the following:

1. Seasonal unemployment
2. Unemployment due to "ordinary" accidents
3. Unemployment related to unemployability
4. Unemployment due to change of residence, occupation, or jobs
5. Unemployment caused by imperfections of competition or equilibrium (called structural unemployment)
6. Secondary unemployment (unemployment induced by other unemployment)

The second set categorized by Schumpeter includes types of unemployment present during business cycles, referred to as "disturbance unemployment." Schumpeter's theory, while emphasizes "the mechanism of change," holds that innovation produces interruptions in "normal unemployment," causing "disturbance unemployment."

> Schumpeter's two sets of unemployment classifications, one for normal unemployment and one for disturbance unemployment, correspond to the two sets into which he analyzed the economic process: neighborhoods of eqiulibrium separated by business cycles (4, p. 31).

Categorizing unemployment provides disaggregated classifications of unemployment. Consequently, Robert S. Goldfarb classified unemployment into the following non-traditional categories:

1. Temporary layoffs
2. The effects of food stamp and WIN work requirements
3. Unemployment compensation
4. Wage rigidities
5. Lagged adjustment to supply increases
6. Turnover unemployment
7. Demographics

Goldfarb suggests that

> comparable information on unemployment--essentially information on the combination of wages and other conditions of employment that would result in a choice to provide specified labor services in exchange--is from an economic point of view essential to developing a meaningful interpretation of the data and to understanding its implications for policy (6, p. 52).

An alternative view of the labor market, the Dual Labor Market Hypothesis, is that of Doeringer and Piore. They divided the economy into two segments--a primary sector and a secondary sector.

> The primary sector is characterized by good jobs, high wages, satisfactory working conditions, employment stability and prospects for promotion. The secondary

> sector, its antithesis, is characterized by bad jobs, low wages, poor working conditions, layoffs, little chance for advancement, and high turnover (7, p. 8).

Doeringer and Piore suggested that the government impose the characteristics of the primary sector on the secondary sector through social legislation and a full-employment policy.

More recently, Alan L. Sorkin categorized unemployment as frictional, seasonal, cyclical, structural, disguised, and hidden. He defined frictional unemployment as that which consists of unemployed new entrants to the labor force, and seasonally unemployed, and those who voluntarily quit one job and have not found another. During periods of low unemployment, over half of all measured unemployment is frictional. Seasonal unemployment results from changes in business activity during the year caused by climatic or other seasonal changes in supply. To determine the economic meaning of a month's unemployment data relative to the previous month or months, it is essential to differentiate between the change that actually occurs in the month and the change, if any, that exceeded the normal, or expected, change. Therefore, all of the major labor force estimates are "seasonally adjusted" to permit an easy and more revealing comparison of data for one month with that of any other. Cyclical unemployment results from fluctuations in overall economic activity, whereas structural unemployment results from a mismatching of the skills and abilities of the unemployed with the employment requirements of industry. Disguised unemployment results from underutilization of one's skills or training, and hidden unemployment refers to discouraged workers outside the labor force who want work but are not actively seeking a job owing to hopelessness.

"The British experience with development planning for lagging regions has sparked an interest in separating total unemployment figures into components which are attributable to different sources" (8, p. 29). In one approach to this classification, aggregate data on unfilled job vacancies and registered unemployment in combination with the same data disaggregated by occupation and by region can be used to break down the total unemployment figures into demand deficient, structural, and frictional unemployment (8, p. 28).

> The importance of this particular classification scheme, however, is that it can show the extent to which the geographic structure of excess demand for labor of certain skills matches its supply. The availability of "suitable" unemployment, will affect the rate of new accessions and hence the unemployment rate: the poorer the geographical match between vacancies and registered unemployed, the higher the unemployment rate (8, p. 30).

Finally, a study by Robert M. Fearn, "Cyclical, Seasonal, and Structural Factors in Area Unemployment Rates" was conducted in order to identify areas of substantial and persistent unemployment. Fearn's model regressed the monthly unemployment rates for 142 major labor markets on the national unemployment rate and added measures of seasonality and time (in the form of a dummy variable) in order to demonstrate that most of the changes in area unemployment rates resulted from cyclical or seasonal influences rather than from structural factors. His model proposed that

> to the degree that one can separate out the aggregate cyclical and seasonal influences on local unemployment from those of a structural nature, one should be able to pinpoint structural problem areas more precisely (9, p. 424).

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CHAPTER II

METHODOLOGY

The Model

The analytical model used in this study postulates four different, but not mutually exclusive, types of unemployment: cyclical, seasonal, applicant-job mismatch and autonomous unemployment concepts are somewhat related to the general theories of structural and frictional unemployment, respectively, the alternative descriptions are adopted here because they are more consistent with the forms of measurement available. Using a linear equation, the researcher thus defines total unemployment as the sum of a seasonal, a cyclical, a mismatch, an interaction term, and an autonomous measure plus the random error term. That is:

$$U = a + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + e$$

where the terms are defined as follows:

U = aggregate unemployment rate

a = autonomous unemployment

X_1 = seasonal unemployment

X_2 = applicant-job mismatch unemployment

X_3 = cyclical unemployment

X_4 = linear trend

e = error term

B_{1-4} = regression coefficients of the independent variables X_1-X_4

The Variables

Table I lists and describes the variables employed. The unemployment equation specifies that the Texas unemployment rate is composed of the effects of four types of unemployment. Autonomous unemployment, "a," represents the form of unemployment which exists when unemployment owing to other measurable categories is zero. Some authors have referred to this as a minimum, irreducible form of frictional unemployment which results from a normal job change and labor force entry and re-entry. This is the "intercept" value of the linear trend.

The seasonal variable, X_1, measured unemployment associated with seasonal fluctuations in the economy. The seasonal variable takes into account those regular, recurrent spells of unemployment that show a yearly pattern, such as summer vacations from school, pre-Christmas retail sales, and agricultural harvesting seasons. In this model, seasonal unemployment was measured by a moving average of the residuals which remained after the monthly unemployment rate was regressed against a trend value.

Often referred to as "structural" unemployment among traditional unemployment taxonomies, X_2 represents

TABLE I

DESCRIPTION OF VARIABLES

Variable	Abbreviation	Description	Mode
Seasonal Index	Season	Seasonal index constructed by the method of moving averages	Interval
Short-term Mismatch	Stmis	Absolute regression coefficient generated from zero-order regression of applicants on openings for periods less than thirty days	Ratio
Long-term Mismatch	Ltmis	Absolute regression coefficient generated from zero-order regression of applicants on openings for periods more than thirty days	Ratio
Interaction of short-term and long-term mismatch	Intstlt	Multiplicative	Ratio
Cyclical Index	Cycmovav	Regression moving average index	Interval

TABLE I--Continued

Variable	Abbreviation	Description	Mode
Interaction of short-term mismatch and the cyclical index	Intstcyc	Multiplicative	Ratio
Interaction of long-term mismatch and the cyclical index	Intltcyc	Multiplicative	Ratio
Short-term mismatch probit	Strank	Probit transformations of the absolute regression coefficient	Interval
Long-term mismatch	Ltrank	Probit transformations of the absolute regression coefficient	Interval

unemployment resulting from applicant-job mismatchs. It can be subdivided into X_{2a}, short-term mismatch, and X_{2b}, long-term mismatch. ESARS data, from Table 96 for the period 1973-1978, were used to test the extent of applicant-job order mismatches in the Texas Employment Commission statewide system (1, p. 17). TEC job applicants, identified by occupational codes, were regressed against TEC job-order data, also occupationally specified. This procedure for orders and applicants on file for thirty or fewer days generated an X_{2a} variable (actually the regression coefficients of applicants to openings). X_{2b} was generated similarly by regressing applicant-job orders for those applicants and openings listed with TEC for more than thirty days.

The cyclical variable, X_3, represents that unemployment related to economic expensions and declines. In order to identify X_3, the measurement of cyclical behavior, a classical time series analytical technique was used. The cyclical measurement required the regression of the unemployment rate against a simple trend value. Taking the residuals from the linear trend and using a seasonal index and a moving average, the researcher constructed a classical single variable cyclical index in the form

$$C = \frac{T \cdot C \cdot S \cdot I}{T \cdot S \cdot I} \cdot 100.$$

This second cyclical measure was labelled X_3. A complete business cycle was evidenced during the period under study, 1973 to 1978.

Finally, in order to measure conditionality, interactions which reflected the relationship between the cyclical and mismatch terms, were calculated. The interactions were quantified by multiplying the two variable sets and using the product as the fifth set of independent variables in the estimating equation.

The Sources of Data

The data base for this study blends administrative program data from a state employment service agency--in this case, the Texas Employment Commission (TEC)--with survey data from a nationwide statistical program--the Current Population Survey (CPS) (2, p. 5). In addition to the use of administrative data on applicants and job orders in the TEC service network, monthly Texas unemployment rate estimates were obtained from the Current Population Survey which is conducted for the Bureau of Labor Statistics by the Census Bureau. Refer to the appendix for the data base used in this study.

Table 96 of the Employments Service Automated Reporting System (ESARS) is a quarterly report which provides applicant and job-order information by occupational categories, reflecting characteristics of individual applicants and nonagricultural job openings at TEC offices. A major limitation of the TEC data is that they reflect only those applications, job orders, and claims filed at TEC offices and, therefore, do not necessarily represent a random sample of the categories considered.

Since CPS unemployment data are published monthly, while the TEC reports used are available only by quarterly summaries, it was necessary to break out the quarterly data into approximate monthly time frames in order to achieve a reasonable symmetry of the data sets.

Analytical Method

Univariate hierarchical multiple regression was the statistical method used in the analysis of the structure of unemployment in Texas for the period 1973-1978. In the linear equation, the unemployment rate is the dependent variable; "a,", the Y-intercept, is the measure of autonomous unemployment; and B_1, B_2, B_3, and B_4 are the partial regression coefficients of the independent variables. The independent variables included seasonal, cyclical, mismatch, and interaction measures.

Four models were used in this study. Model I used the raw unemployment rate as the dependent variable. Model II used the same dependent variable but included a probit transformation of two independent variables, short-term mismatch and long-term mismatch. Model III used changes in the unemployment rate as the dependent variable. Model IV used the same dependent variable as Model III but included a probit transformation of short-term and long-term mismatch.

The software system employed was the Statistical Analysis System (3). SAS has a program which automatically compensates for autoregression, which was used in all four models. SAS also has a probit transformation program, which was used in Models II and IV.

Model I regressed raw unemployment data against the following independent variables:

1. Seasonal variance
2. Short-term mismatch
3. Long-term mismatch
4. Interaction of short-term and long-term mismatch
5. Cyclical index
6. Interaction of short-term mismatch and cyclical index
7. Interaction of long-term mismatch and cyclical index

Model II regressed raw unemployment data against the following independent variables:

1. Seasonal variance
2. Short-term mismatch probit
3. Long-term mismatch probit

4. Interaction of short-term and long-term mismatch
5. Cyclical index
6. Interaction of short-term mismatch and cyclical index
7. Interaction of long-term mismatch and cyclical index

In this model a probit transformation on short-term and long-term mismatch was done in order to normalize the B's.

Model III, employing a differencing of the series, used changes in unemployment as the dependent variable in the regression. Here changes in unemployment were regressed against the following independent variables.

1. Seasonal variance
2. Short-term mismatch
3. Long-term mismatch
4. Interaction of short-term and long-term mismatch
5. Cyclical index
6. Interaction of short-term mismatch and cyclical index
7. Interaction of long-term mismatch and cyclical index

Model IV, which also used changes in unemployment as the dependent variable, used a probit transformation on short-term and long-term mismatch variables in order to normalize the B's. The following were used as independent variables:

1. Seasonal variance
2. Short-term mismatch probit
3. Long-term mismatch probit
4. Interaction of short-term and long-term mismatch
5. Cyclical index
6. Interaction of short-term mismatch and cyclical index
7. Interaction of long-term mismatch and cyclical index

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CHAPTER III

FINDINGS

Four models were constructed to analyze unemployment rates as well as the changes in these rates for Texas over the period 1973-1978. Models I and II regressed unemployment rates against seasonal, cyclical, mismatch, and interaction variables. Models III and IV regressed changes in unemployment rates against seasonal, cyclical, mismatch, and interaction variables. The empirical results of this investigation are displayed in Tables II-V.

The results of the analysis of Model I are found in Table II. Model I, which was statistically significant at $p < .05$, explained approximately 82 percent of the variance in Texas unemployment rates over the period 1973-1978. An R^2 of .8150 indicated that the variance in unemployment in Texas was strongly related to seasonal and cyclical fluctuations. The seasonal variable accounted for about 64 percent of the variance in unemployment, significant at the .0001 level, while the partial R^2 was approximately 77 percent. The cyclical variable accounted for about 17 percent of the variance in unemployment significant at the .0001 level, whereas the partial R^2 was approximately 47 percent. Autonomous unemployment, the vertical intercept of the regression line, was statistically significant but was treated as

TABLE II

REGRESSION OF CATEGORIES OF UNEMPLOYMENT ON THE UNEMPLOYMENT RATE

Variable	Incremental R^2	Incremental B	Cumulative R^2	Simultaneous B	*t*	*p*	SR^2	PR^2
Intercept		.10821		-5.75163	.206	.8375		
Seasonal	.6418	4.91400	.6418	5.03240	10.195	.0001	64%	77%
Stmis	.0000	-.17032	.6418	.34956	-1.186	.2415		
Ltmis	.0000	-.00626	.6418	.73666	-.018	.9855		
Intstlt	.0000	-.12668	.6418	.64065	-.140	.8896		
Cycmovav	.1709	6.28953	.8127	6.19249	9.930	.0001	17%	47%
Intstcyc	.0000	.26159	.8127	-.04564	.210	.8348		
Intltcyc	.0023	-.06990	.8150	-.30573	-.073	.9418		

Total Model I R^2 = .8150

Total Model was significant at $p < .05$

zero since the B value was negative. Thus, the best explanation of unemployment variance was that of seasonal and cyclical fluctuation.

The results of the analysis of Model II are found in Table III. Model II, which was statistically significant at $p < .05$, explained approximately 83 percent of the variance in Texas unemployment rates over the period 1973-1978. An R^2 of .8300 indicated that the variance in unemployment in Texas was strongly related to seasonal and cyclical factors. The seasonal variable accounted for about 64 percent of the variance in unemployment, significant at the .0001 level, whereas the partial R^2 was approximately 76 percent. The cyclical variable accounted for about 16 percent of the variance in unemployment, significant at the .0001 level, whereas the partial R^2 was approximately 44 percent. Also in this model, the measure of autonomous unemployment was statistically significant but was treated as zero since the B value was negative. Thus, Model II explained the variance in unemployment in terms of seasonal and cyclical fluctuation.

The results of the analysis of Model III are found in Table IV. Model III, which was statistically significant at $p < .05$, explained approximately 42 percent of the variance in changes in Texas unemployment rates over the period 1973-1978. An R^2 of .4191 indicated that the

TABLE III

REGRESSION OF CATEGORIES OF UNEMPLOYMENT ON THE UNEMPLOYMENT RATE

Variable	Incremental R^2	Incremental B	Cumulative R^2	Simultaneous B	*t*	*p*	SR^2	PR^2
Intercept		.10821		-5.72270	.206	.8375		
Seasonal	.6418	4.91400	.6418	5.19944	10.195	.0001	64%	76%
Stmis	.0000	-.06528	.6418	-.23961	-1.228	.2252		
Ltmis	.0000	-.10343	.6418	-.39233	-.825	.4132		
Intstlt	.0000	-.13104	.6418	1.05116	-.332	.7416		
Cycmovav	.1597	6.33617	.8015	5.64740	9.338	.0001	16%	44%
Intstcyc	.0113	-.50199	.8128	1.07033	-.868	.3902		
Intltcyc	.0172	1.60591	.8300	1.60591	1.559	.1170		

Total Model II R^2 = .8300

Total Model was significant at $p < .05$

TABLE IV

REGRESSION OF CATEGORIES OF UNEMPLOYMENT ON CHANGES IN THE UNEMPLOYMENT RATE

Variable	Incremental R^2	Incremental B	Cumulative R^2	Simultaneous B	*t*	*p*	SR^2	PR^2
Intercept		-4.02438		-10.799	-5.132	.0001		
Seasonal	.3205	4.04756	.3205	3.153	5.185	.0001	32%	36%
Stmis	.0000	.12832	.3205	7.367	.463	.6451		
Ltmis	.0059	-.61498	.3264	1.985	-1.111	.2722		
Intstlt	.0385	-2.30967	.3649	-2.420	-1.671	.1016	4%	7%
Cycmovav	.0035	-.39821	.3684	9.802	-.502	.6718		
Intstcyc	.0449	-5.46798	.4133	-10.548	-1.842	.0722	8%	12.5%
Intltcyc	.0058	-4.77698	.4191	-4.776	.657	.5144		

Total Model III R^2 = .4191

Total Model eas significant at $p < .05$

variance in changes in unemployment in Texas was strongly related to the main effects of seasonal factors and the interaction effects of short-term and long-term mismatch as well as the interaction between short-term and cyclical variation. The seasonal variable accounted for about 32 percent of the variance, significant at the .0001 level, while the partial R^2 was approximately 36%. The interaction of short-term and long-term mismatch accounted for about 4 percent of the variance at a .05 level of significance for a one-tail test, whereas the partial R^2 was about 7 percent. The interaction of short-term mismatch and the cyclical index accounted for about 8 percent of the variance at a .05 level of significance for a one-tail test, while the partial R^2 was about 12.5 percent. The measure of autonomous changes in unemployment was statistically significant but was treated as zero since the B value was negative.

The results of the analysis of Model IV are found in Table V. Model IV, which was statistically significant at $\underline{p} < .05$, explained approximately 38 percent of the variance in changes in Texas unemployment rates over the period 1973-1978. An R^2 of .3791 indicated that the variance in changes in unemployment in Texas was related to seasonal behavior and an interaction of long-term mismatch and the cyclical index. The seasonal variable

TABLE V

REGRESSION OF CATEGORIES OF UNEMPLOYMENT ON CHANGES IN THE UNEMPLOYMENT RATE

Variable	Incremental R^2	Incremental B	Cumulative R^2	Simultaneous B	*t*	*p*	SR^2	PR^2
Intercept		-4.02438		-3.65103	-5.132	.0001		
Seasonal	.3205	4.04756	.3205	3.62865	5.185	.0001	32%	33%
Stmis	.0000	-.01522	.3205	-.03610	-.157	.8760		
Ltmis	.0043	-.23650	.3248	.26020	-1.098	.2778		
Intstlt	.0024	-.22555	.3272	-2.25062	-.328	.7447		
Cycmovav	.0027	-.35792	.3299	1.11715	-.427	.6715		
Intstcyc	.0054	.70980	.3353	-2.39372	.652	.5177		
Intltcyc	.0438	-3.22992	.3791	-3.22992	-1.778	.0824	4%	6%

Total Model IV $R^2 = .3791$

Total Model was significant at $p < .05$

accounted for about for about 32 percent of the variance, significant at a .0001 level, while the partial R^2 was about 33.3 percent. Interaction of long-term mismatch and the cyclical index accounted for about 4 percent of the variance at a .05 level of significance for a one-tail test, whereas the partial R^2 was about 6 percent. The measure of autonomous changes in unemployment was statistically significant but was treated as zero since the B value was negative.

CHAPTER IV

CONCLUSIONS

The purpose of this study was to classify unemployment by clearly defined, objectively measured categories which produced a consistent, empirical model identifying the structure of unemployment in Texas during the period 1973-1978. The models employed univariate heirarchical regression of Texas monthly unemployment rates and changes in unemployment rates on measures of seasonality, cyclical fluctuations, the match of qualified applicants to available openings, and the interaction of these terms. Model I explained approximately 82 percent of the variance in Texas unemployment, with statistically significant seasonal and cyclical variables. Model II explained approximately 83 percent of the variance in Texas unemployment, with statistically significant seasonal and cyclical variables. Model III explained approximately 42 percent of the variance in changes in Texas unemployment rates, with statistically significant main effects of seasonal factors and the interaction effects of short-term and long-term mismatch as well as the interaction between short-term and cyclical variation. Model IV explained approximately 38 percent of the variance in changes in Texas unemployment rates, with statistically significant seasonal behavior and an interaction of long-term mismatch and the cyclical index.

Table VI reports two analyses based on Model III's findings. First, the interaction of short-term job-applicant match and long-term job applicant match had an interesting effect on changes in unemployment rates. The interaction of low long-term match and low short-term match explained higher increases in unemployment, whereas the interaction of high long-term match and high short-term match explained increasingly greater downward changes in unemployment rates. Thus, a decline in unemployment seems to have been caused by a high degree of job-applicant matching.

Secondly, the interaction of short-term job-applicant match and the business cycle had an intersting effect on changes in the unemployment rate. In a condition of low short-term match, changes in the unemployment rates spiraled upward from peak to trough. However, in a condition of high short-term match, changes in the unemployment rates declined from peak to trough. Obviously, when economic conditions were bad, the fact of good matching became extremely important.

Table VII, an analysis of interaction effects on changes in unemployment, was based on Model IV's findings. The interaction of long-term match and cyclical variance

TABLE VI

ANALYSIS OF INTERACTION EFFECTS ON CHANGES IN UNEMPLOYMENT--MODEL III

		Short-term Match		
		Low	Medium	High
Interaction of Short-term Match and Long-term Match				
Long-term Match	Low	5.0	5.9	7.6
	Medium	1.0	-.1	-2.0
	High	-2.3	-5.0	-9.7
Interaction of Short-term Match and Cyclical Variance				
	Peak	2.0	-3.3	-12.0
	Transition	2.7	-3.3	-13.5
	Trough	3.3	-3.4	-14.6

explained increases in unemployment rates as the business cycle moved from peak to trough when a low long-term matching of job-applicant existed. However, when a high long-term match existed, the unemployment rate decreased as the business cycle moved from peak to trough. Thus, the degree to which there was a long-term matching of jobs had a significant lowering of the unemployment rate when this interacted with the state of economy.

TABLE VII

ANALYSIS OF INTERACTION EFFECTS ON CHANGES IN UNEMPLOYMENT--MODEL IV

	Long-term Match		
	Low	Medium	High
Interaction of Long-term Match and Cyclical Variance			
Peak	5.6	.8	-4
Transition	7.1	1.0	-5
Trough	8.4	1.2	-6

The measurement of match-mismatch derived from ESARS data was an important variable in understanding unemployment in Texas for the period 1973-1978. While not related to the raw unemployment rate, it was significantly related to the changes in unemployment rates.

APPENDIX

DATA BASE

Obser- vation	Unemploy- ment Rate	Seasonal Index	Short-term Mismatch	Long-term Mismatch	Cyclical Index
1	2.9	0.923	2.47	-1.67	0.74015
2	4.3	1.118	1.20	-0.44	0.73889
3	4.6	1.080	1.20	-0.44	0.73908
4	3.7	0.977	0.67	-0.03	0.74900
5	3.3	0.857	1.20	-0.44	0.76398
6	3.5	0.896	1.20	-0.44	0.78624
7	4.8	1.165	2.04	-1.44	0.79468
8	4.3	1.062	1.20	-0.44	0.82548
9	4.8	1.033	1.20	-0.44	0.84492
10	4.8	0.989	1.61	-1.35	0.86007
11	4.6	0.944	1.20	-0.44	0.88269
12	4.7	0.957	1.20	-0.44	0.91393
13	4.1	0.923	1.25	-0.44	0.93391
14	6.0	1.118	1.20	-0.44	0.95285
15	5.2	1.080	1.20	-0.44	0.96847
16	5.3	0.977	0.38	0.11	0.98375
17	5.1	0.857	1.20	-0.44	0.99431
18	5.5	0.896	1.20	-0.44	1.01244
19	6.3	1.165	0.77	0.18	1.01937
20	5.9	1.062	1.20	-0.44	1.03084

DATA BASE--Continued

Observation	Unemployment Rate	Seasonal Index	Short-term Mismatch	Long-term Mismatch	Cyclical Index
21	5.4	1.033	1.20	-0.44	1.02907
22	5.8	0.989	0.89	0.24	1.04456
23	5.4	0.944	1.20	-0.44	1.05007
24	5.8	0.957	1.20	-0.44	1.05224
25	5.3	0.923	1.14	-0.16	1.04838
26	6.0	1.118	1.20	-0.44	1.05124
27	5.8	1.080	1.20	-0.44	1.05558
28	5.9	0.977	1.43	-0.54	1.06343
29	5.1	0.857	1.20	-0.44	1.05581
30	5.6	0.896	1.20	-0.44	1.04421
31	7.0	1.165	0.37	0.38	1.03934
32	6.1	1.062	1.20	-0.44	1.03968
33	6.2	1.033	1.20	-0.44	1.04560
34	5.8	0.989	0.95	0.11	1.04460
35	5.2	0.944	1.20	-0.44	1.03826
36	4.8	0.957	1.20	-0.44	1.01759
37	5.4	0.923	1.10	-0.89	0.99711
38	6.6	1.118	1.20	-0.44	0.98391
39	6.4	1.080	1.20	-0.44	0.97508
40	5.3	0.977	1.29	-0.48	0.96721
41	4.9	0.857	1.20	-0.44	0.96054

DATA BASE--Continued

Obser-vation	Unemploy-ment Rate	Seasonal Index	Short-term Mismatch	Long-term Mismatch	Cyclical Index
42	4.1	0.896	1.20	-0.44	0.95498
43	5.7	1.165	1.93	-1.13	0.95443
44	5.5	1.062	1.20	-0.44	0.94008
45	5.4	1.033	1.20	-0.44	0.92611
46	5.5	0.989	1.54	-0.57	0.90933
47	5.2	0.944	1.20	-0.44	0.89596
48	5.0	0.957	1.20	-0.44	0.88043
49	4.7	0.923	0.35	0.30	0.87753
50	5.5	1.118	1.20	-0.44	0.87608
51	5.4	1.080	1.20	-0.44	0.87129
52	4.7	0.977	1.43	-0.63	0.86474
53	3.9	0.857	0.00	0.00	0.84973
54	4.2	0.896	0.00	0.00	0.84155
55	5.2	1.165	0.00	0.00	0.00000
56	5.2	1.062	0.00	0.00	0.00000
57	5.1	1.033	0.00	0.00	0.00000
58	4.8	0.989	0.00	0.00	0.00000
59	4.3	0.944	0.00	0.00	0.00000
60	4.8	0.957	0.00	0.00	0.00000

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