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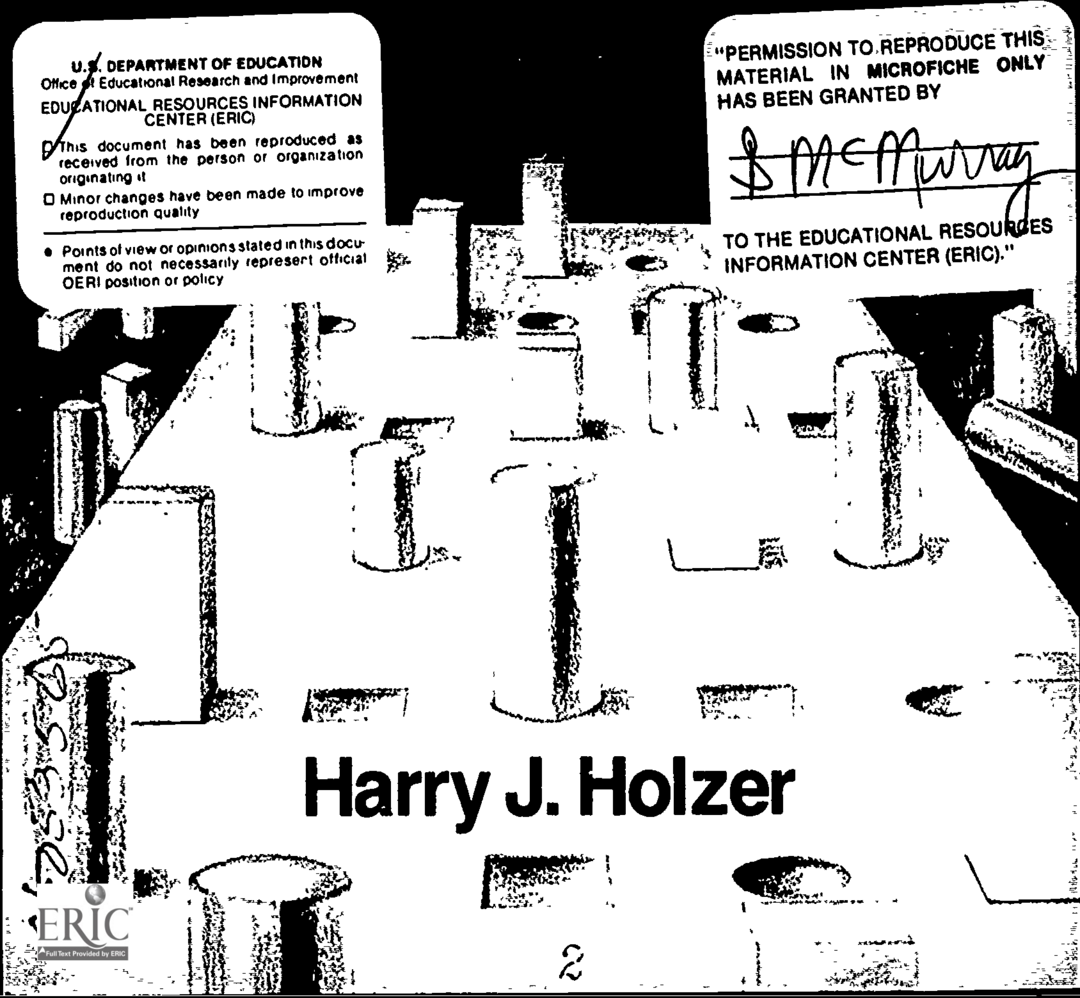
ABSTRACT

This monograph studies unemployment in relation to labor market vacancies throughout the United States, using a new set of data: the Survey of Firms from the Employment Opportunity Pilot Project, a labor market experiment conducted by the Department of Labor at 28 sites in 1979 and 1980. The monograph is organized in five chapters. The first chapter introduces the problem and explains the basis for the data analysis. Chapter 2 considers the characteristics of vacancies at the level of the firm. Chapter 3 turns to the relationship between unemployment rates and vacancy rates across local labor markets. Chapter 4 presents data on employment and sales growth for each of the 28 sites. The effects of recent demand shocks on local unemployment rates are then considered, as well as the role of persistent unemployment differences and migration. Chapter 5 contains a summary and conclusions, with implications for policy and further research. The document also includes a 48-item bibliography, an index, 27 tables, and 1 figure. (KC)



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UNEMPLOYMENT, VACANCIES *and* LOCAL LABOR MARKETS

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The facts presented in this study and the observations and viewpoints expressed are the sole responsibility of the author. They do not necessarily represent positions of the W. E. Upjohn Institute for Employment Research.

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1
Introduction
What are the Issues?

For decades, labor economists have grappled with the problem of explaining unemployment rates at the national, regional and local levels. Aside from the business cycle, what causes unemployment rates to vary over time? Why do they vary across local areas in patterns that often persist over time? Why have some regions of the country (e.g., the South and West) seen their unemployment rates drop in the last two decades, while others (e.g., the Midwest) have seen theirs grow?

Explanations generally begin with an attempt to distinguish "frictional" and "structural" unemployment from that caused by "deficient demand." The former are caused by the movement of people between jobs or changes in the nature of the jobs themselves. Since people do not find and accept new jobs instantly, some unemployment is generated by this search or matching process. If there is a mismatch between unemployed people and available jobs—due to skill requirements of the jobs, preferences of the people, or geographic locations of both—there is a "structural" component to unemployment. Of course, "frictional" and "structural" unemployment imply that jobs are available, but that they are not automatically filled for the reasons noted.

In contrast, "demand deficient" unemployment arises from a shortage of available jobs relative to unemployed workers. This shortage may be caused by a cyclical downturn, or more generally by wage and/or price rigidities which prevent the product and labor markets from equilibrating (e.g., due to minimum wages, union wages, mark-up pricing, etc.).

Distinguishing between these sources of unemployment is of critical importance for policymaking, since the policy implications of each type of unemployment are so different. Frictional unemployment may not be far from what is socially optimal, given the willingness of individuals to leave jobs or move into and out of the labor force and given their presumed unwillingness to accept any newly available jobs. If government were to reduce job turnover or the durations of unemployment spells following such turnover, this might be accomplished through various reforms in the system of unemployment insurance (e.g., improving the experience rating of employers, taxing benefits, etc.) or by improving job placement services in schools and state agencies. Reducing structural unemployment would involve government efforts to aid in the retraining and/or relocation of unemployed workers to fit the available jobs. Reducing demand-deficient unemployment would require either direct job creation (through more expansionary fiscal and monetary policies or wage subsidy/public employment programs) or reducing wage rigidities.

Unfortunately, efforts by economists to distinguish these types of unemployment from one another empirically have been marked by a great deal of confusion and controversy. Periodic claims that structural unemployment has worsened are often greeted with skepticism by the economics profession. This occurred during the late 1950s, when the "automation scare" led some to claim that unemployment would rise as a result of worker displacement by new technology.[1] Much of this concern proved short-lived, as the fiscal stimulus of the 1960s lowered unemployment levels significantly.

During the 1970s and 1980s, attempts to distinguish demand-deficient from other types of unemployment often focused on measurement of the "natural rate" (or nonaccelerating inflation rate) of unemployment, which presumably included frictional and structural but not cyclical unemployment.[2] However, the exact rates of unemployment at which inflation becomes stable have always been difficult to determine with any confidence from time-series data. This is especially true since the natural rate is itself changing over time as a result of demographic and/or policy-induced changes in labor force behavior (e.g., the entry of the "Baby Boom" cohort of the 1970s and the "Baby Bust" cohort of the 1980s, the growth of women in the labor force, changes in unemployment insurance and transfer payments, etc.).[3]

The need to distinguish among these sources of unemployment has, if anything, grown more urgent in the last few years since a new concern over structural unemployment has arisen in the press and among policymakers. The decline of employment in manufacturing industries and its growth in service and "high-tech" sectors have raised well-known concerns over whether those displaced from the former have the skills to obtain jobs in the latter. The concentration of the declining industries in certain metropolitan areas of the Northeast and Midwest has reinforced these concerns, since relocation costs (or lack of information) may further impede the ability of the displaced to obtain new employment.

Among academic economists, no greater consensus exists now than in the 1950s with regards to the magnitude of structural unemployment. David Lilien (1982) has recently claimed that the growth of unemployment during the 1970s was primarily caused by sectoral shifts in employment, which suggests a primary role for structural problems. However, Katherine Abraham and Lawrence Katz (1986) have challenged this interpretation, arguing that the apparent sectoral shifts really reflected cyclical downturns in the economy. More recent work by Steven Davis (1987) and Prakash Loungani (1986) continues to keep the debate alive.

A somewhat related issue involves the interpretation of differences in unemployment rates across regions, states, and metropolitan areas. Since these differences tend to be fairly persistent over time, many researchers have looked for "equilibrium" differences in the rates. Starting with Robert Hall (1970, 1972), researchers have focused on differences in area wages, demographic characteristics, UI payments, etc. While many of these can be considered sources of frictional and structural differences across local areas, some of them may also reflect demand—especially that part associated with persistent wage differentials across areas.

Another source of unemployment differences across local areas represents "disequilibrium" differences, which we presume will fade over time. These will reflect shifts in product and/or labor demand caused by changes in tastes and factor costs (such as energyprices) The relocation of firms between regions can also cause such demand shifts. Thus, those areas that face declines indemand for locally produced products or see their firms relocating to other areas may experience high unemployment of a type which is clearly demand-deficient.

There remains a large question, however, as to whether or not (or for how long) such unemployment persists. There is evidence that individuals and families migrate away from high-unemployment areas towards lower ones (Greenwood 1975; Topel 1986). At least some analysts (Marston 1985) have argued that migration forms the basis of an adjustment to demand shifts which eliminates such differences fairly quickly and leaves mostly equilibrium differences (which are presumably dominated by frictional and structural factors) for the longer term. On the other hand, others question whether the adjustment mechanism is so quick or so complete, as well as the nature of the unemployment components which seem to persist.

A major reason for the inability of economists to address these issues successfully lies in our lack of direct measures for these concepts. For instance, one measure of job availability that might help to distinguish frictional and structural unemployment from the demand-deficient variety is the job vacancy rate. These data have been used extensively in Britain to study issues of structural v. demand-deficient unemployment. The data have generally been far less available in the United States, however, as they are not regularly collected by the federal government. For time-series analysis, many researchers (e.g., Medoff 1983; Abraham and Katz 1986) have used the Conference Board's Help-Wanted Index as a proxy for the aggregate vacancy rate. While this use has been questioned in some circles,[4] it clearly cannot be used for cross-sectional analysis of unemployment rates.

A related problem exists for the study of demand shifts across areas. Measures of *variances* in output or employment growth are not provided by the Decennial Census (though *means* are provided for states, counties and metropolitan areas). Consequently, the analysis of structural problems within and across local labor markets has been quite difficult.

In this study, I hope to shed new light on these issues by using a new set of data: the Survey of Firms from the Employment Opportunity Pilot Project (EOPP). This project was a labor market experiment conducted by the Department of Labor in 1979 and 1980.[5] There were 30 sites (10 experimental, 20 control) originally, of which 28 were actually used. These sites consisted of groups of counties heavily concentrated in the South and Midwest, of which 13 were Standard Metropolitan Statistical Areas (SMSAs). The sites appear in table 1.1. Though they are by no means a random sample of local areas in the U.S., they do contain a broad range of geographic and industrial characteristics.

Table 1.1
EOPP Sites

Ohio	**Counties in Virginia**
1. Cincinnati	14. Buchanan/Dickenson
2. Columbus	
3. Dayton	**Counties in Kentucky**
4. Toledo	15. Harlan
	16. Pike
Louisiana	
5. Baton Rouge	**Counties in Wisconsin**
6. Lake Charles/Lafayette	17. Marathon
7. New Orleans	18. Outagamie
	19. Winnebago
Alabama	
8. Birmingham	**Counties in Colorado**
9. Mobile	20. Alamosa
	21. Logan/El Paso
Florida	22. Weld
10. Pensacola	
	Counties in Missouri
Texas	23. Grundy
11. Beaumont/Port Arthur	24. St. Francoise
12. Corpus Christi	25. Some counties in balance of state
13. San Antonio	
	Counties in Washington
	26. Skagit/Whatcom
	27. Skamania
	28. Some counties in balance of state

As part of the plans to evaluate the EOPP experiment, firms were surveyed at each site during the months of April through June 1980.

In all, some 5300 firms were surveyed. A follow-up survey was done in 1982 by Gallup, Inc. for about 3400 of these. The variables gauged in the surveys include data on vacancies, firm size and growth, sales growth, wages, and employee characteristics. Though large and/or low-wage firms were oversampled within each site, sample weights were added so that a random sample of firms can be generated for each site.

Using these surveys, I have calculated job vacancy rates and average growth of employment and sales within each site for the years 1980 and 1982. Variances across firms for employment and sales growth have also been calculated for each site, as have average wages (corrected for employee characteristics). These data have been supplemented by published data on unemployment rates and other labor market characteristics for each site from the 1970 and 1980 censuses. Data on various statewide characteristics (e.g., average unemployment insurance benefit-to-wage ratios) have been added as well.

Given these data, we can more carefully analyze the nature of unemployment rate differences across local labor markets. Estimates of vacancy rates will allow us to separate frictional and structural from demand-deficient components in unemployment across local areas. We can then use data on average wages, employee characteristics, industries, unemployment insurance benefits, etc., in trying to explain each of these components. We can also use the data on means and variances in employment and sales growth to analyze the effects of demand shifts between and within sites on local unemployment rates. Coupled with data on labor force changes and unemployment rates in 1970, the adjustment/persistence issues can be addressed as well.

The outline of the rest of the monograph proceeds as follows. In chapter 2, we consider the characteristics of vacancies at the level of the firm. In which occupations and industries are job vacancies most heavily concentrated? How do vacancy rates vary by firm size and degree of unionism? What role does the firm's wage policy and hiring activities play in determining vacancy rates? When and where are vacancy durations longest? Answers to these questions will give us a clearer picture of how vacancies are generated and what structural characteristics of labor markets might be useful for filling these vacancies as quickly as possible.

In chapter 3 we turn to the relationship between unemployment rates and vacancv rates across local labor markets. As described above, we will consider the frictional/structural and demand components of unemployment as measured by job vacancy rates, as well as the potential determinants of each. Separate analysis by region (South v. non-South) and by SMSA will be presented. Since some data are available for 1982 as well as 1980, we can analyze the effects of the 1981-82 recession on the unemployment-vacancy relationship and compare the components of unemployment in different cyclical environments.

Chapter 4 presents data on employment and sales growth for each site. The effects of the recent demand shocks on local unemployment rates will then be considered, as will the role of persistent unemployment differences and migration.

Chapter 5 will contain a summary and conclusions, with implications for policy and further research.

NOTES

1. See Lloyd Ulman (1974) for an earlier discussion of these issues.

2. Since the "natural rate" includes all noncyclical types of unemployment, those demand-deficiencies caused by long-run deviations of wages from their equilibrium levels (e.g., due to minimum wages, union wages, etc.) would be included. However, frictional and structural components are generally considered to comprise most of unemployment at the "natural rate."

3. For evidence on how these factors have contributed to changes in the "natural rate" see Perry (1977).

4. See Robert Solow's comment on Medoff (1983). A more recent paper which addresses these concerns is Abraham (1987).

5. See Burtless and Haveman (1984) for a description of this experiment.

2
Vacancies at the Firm Level

Before aggregating vacancy rates at the site level, it is worth analyzing differences across jobs and firms in vacancy rates and vacancy durations. This should give us a clearer picture of which jobs are the most difficult to fill and what structural characteristics of labor markets might contribute to these problems.

Vacancy Rates

Frequencies and Durations

When analyzing unemployment rates, it is common for economists to decompose them into *frequency* and *duration* of unemployment spells. Frequency refers to the rate at which people become unemployed, while duration refers to the length of time that elapses before these people obtain new jobs. Since high unemployment rates might reflect either or both of these characteristics, distinguishing them is crucial for any real understanding of the problem.

When discussing vacancy rates in jobs, a similar distinction can be made. Frequency here refers to the rate at which jobs become vacant, while duration measures the length of time that elapses before the jobs are filled. We can thus write:

(1) $VR = FV \cdot DV$

where VR reflects a firm's vacancy rate and F and D denote frequencies and duration respectively.

The frequency of vacancies at a firm should reflect the frequency at which firms must hire new workers. Of course, not all jobs are vacant when firms are hiring new workers to fill them. In many cases, firms have advance knowledge of a current employee's imminent departure and can move to replace him or her before that departure occurs. Among those jobs where this is not the case, a high frequency of vacancies can result either from a high turnover rate among the current employees or from a firm's desire to expand its workforce. Thus the fraction of jobs which become vacant in any period can be written as:

(2) $FV=(1-\lambda)(t+E)$

where λ reflects the fraction of jobs filled in advance, t reflects the turnover rate and E reflects the desired rate of employment growth. Once a vacancy spell begins for a job, the duration of this spell is determined by three factors: the rate at which applications for the job are received, the likelihood of a job applicant receiving an offer, and the likelihood of an offer being accepted. Since expected vacancy durations are inversely related to the likelihood of jobs being filled,[1] we can write:

(3) $DV={}^{1}/_{P_F}={}^{1}/_{P_{APP}P_{OFF}P_{ACC}}$

where P_F reflects the probability of a job being newly filled (within a certain time period), and where P_{APP}, P_{OFF} and P_{ACC} reflect the probabilities of the firm's receiving applications, making offers, and having them accepted, respectively. Since the first and third of these reflect the behavior of workers (i.e., labor supply) while the second reflects employer behavior (i.e., labor demand), we see that vacancy durations as well as rates are determined by factors on both side of labor markets.

Having thus defined the components of vacancy rates, we can consider more specific factors which might help to determine them. For instance, jobs in high-wage firms (relative to others in the area or industry) are likely to have low turnover rates and therefore lower vacancy rates. Such jobs should also receive a higher quantity and quality of job applicants, thus raising the applicant and offer probabilities; and such offers are more likely to be accepted as well. Thus vacancy durations as well as vacancy frequencies should be lower for high-wage jobs and/or firms.

Controlling for wages, jobs with higher skill requirements may have lower applicant and offer probabilities and therefore greater vacancy durations. Whether or not this occurs depends, of course, on the relative supply and demand for labor in different skill categories. But the greater need to screen applicants for jobs with such specific skill requirements may increase durations regardless of relative supplies. On the other hand, if turnover out of such jobs is lower, the net effect on vacancy rates is unclear.

Vacancy frequencies and durations should differ by firm size and industry as well. Large firms tend to pay higher wages; unless this strictly reflects a compensating differential for less appealing work conditions, turnover out of these firms should be lower. Large firms should also receive more applicants than smaller ones, due to greater applicant awareness of the larger firms. On both counts, their vacancy rates should be lower than those of smaller firms.

As for industry effects, these will reflect wage and skill differences across industries as well as growth rates of sales and employment. Differences in characteristics of local populations (skills, education, etc.) as well as policy variables (such as UI) should also contribute to vacancy differences across firms in different local areas.

To sum up, we see that vacancy rates across firms, jobs and industries should reflect a host of factors on both the supply and the demand sides of the labor market. Of course, wages and even skill requirements should adjust in the long run in response to these varying factors, and vacancies will respond accordingly. Applicant pools should also respond to vacancy rates through migration flows. The above analysis is thus best understood in a short-run context.

The Data

To analyze vacancy rates and durations, we use data from the 1980 Employment Opportunity Pilot Project (EOPP) Survey of Firms. We limit ourselves to firms that were also included in the 1982 follow-up survey, since chapters 3 and 4 will make use of that data as well. Sample sizes in general will vary, depending on the number of missing cases for each variable.

The vacancy rates for 1980 are calculated from a survey question which asked, "How many vacancies (does this/do these) establishments have in the ________ worker/job category?"[2] The occupations for which the question was asked were sales, office/clerical, craft, operative, and laborer/service jobs. Only current vacancies with immediate starting dates are included. Jobs for which new workers have already been hired or openings with future starting dates are omitted. Such omissions, in fact, seem sensible for the comparisons with currently unemployed workers that will be made in chapter 3. Jobs filled by internal promotion or recall from layoff are excluded as well.

Vacancy rates are then calculated by dividing the sum of these occupation-specific vacancy rates by the sum of the number of jobs for each occupation, where jobs include those both currently filled (full-time as well as part-time) and vacant. Where possible, means of vacancy rates are calculated using the ratio of mean vacancies to mean jobs rather than the mean of the ratios for each firm, since the former weights the calculation by the size of the firm. Also, the omission of professional and managerial jobs from both the numerator and denominator may make these calculations nonrepresentative for the entire workforce, though the direction of this effect is unclear.[3]

As for vacancy durations, these are gauged using the following question for the last nonsubsidized (i.e., by government programs) employee hired as of October 1, 1979: "Approximately how long was it between the time the employer started to recruit for the job and the time the last employee started work?" Answers were measured in days, and nonrecruited jobs received a value of zero.

Obviously, this variable is a highly imperfect measure of vacancy duration. For one thing, a more appropriate measure might have only included the time until an employee is hired. Given that these jobs are *currently* vacant, however, it is unlikely that the gap between hiring and beginning of work is large in most cases. A more serious concern may be the focus of the question on recruiting, and the omission of vacant jobs for which firms did not recruit. The inclusion of zeroes for such jobs may be a reasonable approximation, however, since the reason fo. nonrecruitment might well be a readily available pool of applicants from which to immediately choose a new employee. A final concern could involve the elapsed time between the opening of the job and the beginning of recruitment to fill it. Again, it is unlikely that much time would elapse for a job that is currently vacant. Overall, then, this variable appears to be a quite reasonable proxy for the vacancy duration measure that we seek.

Of course, this question is asked of only one position at each firm, and the positions will themselves vary across firms. Fortunately, we can control for these differences using data on the occupations in question and on characteristics of the individuals hired (where relevant). Data on starting wages for these jobs and hours spent recruiting and screening by the firm will also be used along with the appropriate controls.

Evidence on Vacancy Rates

Table 2.1 presents job vacancy rates for 1980 as calculated from the EOPP data. These rates are calculated for all jobs as well as within specific occupational categories. As noted above, the ratios of mean vacancies to jobs weights calculations by firm size. Each of these means was also sample-weighted to ensure an unbiased estimate of the vacancy rate within each site.[4]

The results show a mean vacancy rate of 1.4 percent across all firms and sites. This figure is fairly comparable to those reported by Abraham (1983). Though comparisons with unemployment rates will be made in chapter 3, it is clear from this figure that reported vacancies are generally small in number relative to employment levels and that vacancy rates will be lower than unemployment rates in most cases. This is true even for 1980, where the business cycle was not too far from its peak.[5] The rarity of vacancies also suggests the potential for a great deal of "noise" (or random variation) in these data, especially at the level of the firm.

Within specific occupations, we find the highest vacancy rates among sales and crafts workers. Since sales people presumably require some level of knowledge and communicative skills while crafts people clearly require more specific training, it appears that skills play an important role in determining job vacancy rates (presumably through their effects on vacancy durations). The somewhat higher rate among laborers and service employees than among clericals and operatives, on the other hand, may reflect (in addition to specific requirements for certain industries) the opposite: higher rates of turnover out of lower-wage and less-skilled jobs, which presumably affect vacancy frequencies as well as vacancy rates. If workers are reluctant to accept certain jobs due to their unappealing nature (for wage or nonwage reasons), vacancy durations for such jobs might rise as well. Thus the relationship between skill requirements (or wages) and vacancy durations is unlikely to be a monotonic one, since jobs at both ends of the skill spectrum may have higher vacancy rates than those in the middle. Still, the largest effects appear in the upper range.

Table 2.1
Job Vacancy Rates, 1980

Total	.014
By occupation:	
Office/clerical	.011
Sales	.025
Crafts	.020
Operatives	.011
Laborer/services	.014

NOTE: These rates are sample- and size-weighted means across firms

It should also be noted that the low vacancy rates among clerical workers may specifically reflect a large pool of qualified *women* who are available for these jobs, due to either the self-selection of women into these jobs or to barriers they may face in obtaining jobs in other occupations. (The evidence presented below on vacancy durations casts some doubt on this possibility.) Low turnover may be another reason. As for operative jobs, these presumably attract a low turnover workforce and a large pool of qualified applicants due to their moderate skill requirements.

In table 2.2 we present vacancy rates within one-digit industries. These results show that manufacturing (especially nondurable) and the financial sector have the lowest vacancy rates while mining, services and construction have the highest. In many ways, these results confirm many of our impressions from the previous table. The relatively high-wage and semiskilled nature of jobs in manufacturing generate low turnover and presumably attract a large enough pool of qualified applicants to keep vacancy durations short.[6] This is especially true for operatives, whose vacancy rates are low and who are more heavily concentrated in manufacturing than in most other sectors. Likewise, the heavy concentration of clerical workers in the financial sector should help to explain the relatively low vacancy rates which we observe there, while the concentrations of craftsmen in construction and services workers in the service industries may keep vacancy rates higher in these sectors. Once again, the high rates in construction presumably reflect skill requirements and therefore long vacancy durations, while those in services presumably reflect high turnover out of low-wage jobs.

Table 2.2
Job Vacancy Rates by Industry

Mining	.023
Construction	.017
Durable manufacturing	.010
Nondurable manufacturing	.007
Transportation, communication, utilities	.012
Wholesale trade	.013
Retail trade	.014
Finance, insurance and real estate	.010
Services	.021

NOTE: These rates are sample- and size-weighted means across firms.

An additional factor affecting vacancy rates across industries will be differences in levels of desired employment growth. These differences might reflect cyclical forces or secular trends operating through shifts in product demand, factor costs, etc. All will be reflected in the demand for labor an industry faces relative to the available pool of workers, however.

Thus, the long-term shift away from employment in manufacturing and towards services should also help to explain the low vacancy rates observed in the former and the high rates in the latter. Since these trends have remained strong throughout the 1980s, the observed differences in vacancy rates should have persisted. The extent to which these trends have been caused by exchange rates, growing imports of manufactured goods, relative wages, etc. remains unclear. But even with the partial recovery of employment in manufacturing recently (mostly filled by recalls from earlier layoffs), we might expect these trends to continue.

As for the mining industry, high vacancy rates there may have been a product of the strong demand for coal and petroleum resulting from the energy shocks of the 1970s. These demand effects may also have been confounded by both skill and geographic factors within that period. The collapse of oil prices in the mid-1980s, however, is likely to have reversed those effects at least for the time being.

Other characteristics of jobs and firms are also likely to affect vacancy rates. Two of these are considered in table 2.3: the size and union status of the firm. Size reflects the number of employees at all establishments of the firm within the site, while union status is considered positive for firms in which at least some employees are covered by collective bargaining.

Table 2.3
Vacancy Rates by Firm Size and Union Status

Firm size:	
1-49	.016
50-99	.015
100-499	.012
500-1999	.007
2000+	.013
Union status:	
None	.016
Some	.009

NOTE: Firm size includes any plants operated by the firm that are located within the specific site. Union status reflects the coverage by collective bargains of any or all of the firms (non-managerial) employees.

The results of table 2.3 strongly confirm the predictions made above with regard to these factors. Vacancy rates decline continuously with size until we reach the small category of firms with 2000 or more employees. The decline in vacancy rates for firms with more than 500 employees is particularly striking. Unionized firms also have significantly lower vacancy rates than nonunion ones.

There are several possible reasons for the low vacancy rates in large and/or unionized firms. Higher wages at these firms should certainly mean lower vacancy frequencies due to lower turnover and *possibly* due to lower employment growth as well. Lower turnover at union firms could be caused by features other than high wages (e.g., contract limitations and discharges, grievance procedures, etc.).[7] Lower employment growth generally appears to be a function of firm size as well.[8] Furthermore, vacancy durations as well as frequencies should be lower for large and/or unionized firms, since they are likely to draw large applicant pools.

This uncertainty over the exact mechanisms by which occupation, industry, size and union affect vacancies leads us to analyze their effects on vacancy rates more directly. In tables 2.4 and 2.5 we therefore consider some of these factors.

Table 2.4
Effects of Turnover and Firm Growth on Vacancy Rates

Dependent variable: Log (vacancy rate) Independent variables:	1	2
Turnover rate	.0024 (.0012)	.0025 (.0012)
Log (1+sales growth)	.0014 (.0008)	—
Log (1+employment growth)	—	.0022 (.0021)
R^2	.005	.004
N	1415	1415

NOTE: The turnover rate at each firm is defined as the fraction of employees who quit or were discharged in 1981 Sales growth is defined as the percentage increase in sales (adjusted for price increases) between 1979 and 1981. employment growth is defined for December 1979 through December 1981. These equations are weighted by (firm size)$^{1/2}$.

In table 2.4 we consider the effects of the two factors we presumed to underlie the frequency of vacancies: job turnover and employment growth. A potential major determinant of the latter is considered as well: the recent growth rate of the firm's sales, which should capture shifts in product demand that the firm faces.

Since all of these determinants are best measured as continuous rather than categorical variables, we turn to multiple regression techniques in order to estimate their effects. The dependent variable in these equations is the log of the firm's vacancy rate, while the independent variables include turnover and employment/sales growth.

Turnover rate is defined here as the fraction of the firm's employees who either quit or were discharged during the year 1981. Layoffs are specifically omitted, as these should be captured in employment growth. Employment growth is measured as the log of one plus the employment growth rate between December 1979 and December 1981. This is calculated for retrospective employment level figures at six-month intervals contained in the 1982 follow-up survey. The sales growth variable is based on a question in the 1982 survey which gauged increases in the firm's sales (controlling for prices) between 1979 and 1981. This variable also appears as the log of one plus the growth rate.[9] The employment growth period was thus chosen for consistency with the sales growth period. To deal with the presumably larger errors associated with small firms, these (and all other) firm-level equations are weighted by the square root of the firm size.[10]

The results of these regressions confirm that both higher turnover and growth lead to higher vacancy rates within the firm. However, these variables explain less than 1 percent of the observed variation across firms in vacancy rates. Furthermore, the estimated effects are quite small. For instance, a rise of 10 percentage points in turnover would lead to only a 2.5 percent increase in vacancies, while a rise in employment growth of the same magnitude would increase vacancies by about 2.2 percent. The sales growth effect is smaller, though it is measured with greater precision due to its smaller standard error.

The positive but weak results suggest that a large part of the variation across firms in vacancy rates is "noise"—i.e., random variation that is unrelated to any observable effects in these data. Given the infrequent nature of vacancies, we would expect this to be the case. Potential measurement error in the dependent variable would also lower the precision and explanatory power of estimated effects, while such errors in the independent variables would bias these effects downward as well. Still, the estimated effects confirm the notion that turnover and growth should raise vacancy rates through their effects on vacancy frequencies.

In table 2.5, we turn to the effects of the firm's personnel policies, which it can choose in order to affect its vacancy rates. We consider two aspects of policy: wages and hours spent recruiting and screening. Theoretically, the firm could put its resources into either or both, in order to lower the costs (in terms of foregone production and profits) of vacancies. We thus expect that both types of policy should have negative effects in observed vacancy rates. Since both variables are defined only for a specific job, we include control variables for the age, sex, education, prior experience, and occupation of the last individual hired. The wage is in log form.

Table 2.5
Effects of Firm's Wages and Recruiting Efforts on Vacancy Rates

Dependent variable: log (vacancy rate) Independent variables:	1	2
Log (wage)	-.0013 (.0035)	—
Recruitment effort	—	-.0013 (.0025)
R^2	.0152	.0153
N	1455	1455

NOTE: Wage is defined as the starting wage for the most recently hired employee, while recruitment effort measures hours spent recruiting for this position. Control variables include age, sex, education, experience, and occupation of the individual hired. Equations are weighted by (firm size)$^{1/2}$.

The results show the expected negative effects of both wages and recruitment effort on vacancy rates. But, as before, the estimated effects are small (insignificant in both cases) and the explanatory power of the equation is very limited. In fact, a 10 percent rise in the firm's wages would only lower vacancies by 1.3 percent.

There is once again some reason to believe that these estimates are biased towards zero, however. For instance, inability to control for all differences across individuals and jobs would cause biases in this direction, since high wages may reflect higher skilled jobs and therefore higher vacancy rates. Noise in both dependent and independent variables would also lower the precision and explanatory power of estimated effects.

Taken together, the evidence indicates that turnover, employment/sales growth, and wages do have the expected effects on vacancy rates, even if we cannot estimate the magnitudes of these effects with confidence. The differences we observe in vacancies across occupations, industries, firm sizes and union status are at least partly explained in this context.

Evidence on Vacancy Durations

Here we consider evidence on vacancy durations, as proxied by the number of days that elapse from the start of recruitment until the last employee hired begins work.

Table 2.6 represents means and standard deviations on durations for the entire sample and by education level and occupation of the last hired employee. These calculations are sample-weighted, and can thus be interpreted as representing the experience of a random sample of firms within each site.[12]

The results show an average duration of about 13 days.[13] This result is fairly consistent with those reported by Abraham (1983), among others. By education group, vacancy duration for jobs for which high school and college graduates were hired was longer than those for which grade school graduates were hired. This presumably reflects either the more limited supply of workers or the greater amount of skill required and closer screening which goes into jobs requiring some education. In this light, the lack of a difference in duration between the jobs of high school and college graduates is somewhat puzzling. It is possible that the market for college graduates is better organized and thus generates applicants more regularly than does the high school market, thereby counteracting the higher skill requirements of the latter. It is also possible that the supplies of high school and college graduates relative to the demands are in balance, thereby negating the greater skill requirements. These hypotheses are, of course, strictly speculative.

Table 2.6
Vacancy Durations by Education and Occupation: Means and Standard Deviations

Total Sample	13.01
	(24.60)
By education level of employee:	
Grade School	10.25
	(21.45)
High School	13.35
	(23.39)
College	13.13
	(15.07)
By occupation:	
Professional	14.09
	(25.91)
Management	21.99
	(21.99)
Clerical	18.58
	(27.40)
Sales	10.67
	(20.31)
Crafts	13.14
	(32.30)
Operatives	10.98
	(27.70)
Laborer	8.61
	(15.20)
Service	9.29
	(20.36)

NOTES: Vacancy duration is defined as number of days that elapsed from the start of recruitment to the time the last employee began work. The means are sample-weighted.

By occupation, we find the longest durations in the managerial category and the shortest in the laborer and service fields. These differentials certainly conform to our expectations regarding skill. On the other hand, the relatively lengthy durations observed for clericals are a bit surprising. Apparently, the low vacancy rates observed earlier reflect lower frequencies (due to lower turnover rates) rather than durations. But aside from this group, the relative durations of vacancies across occupations seem to be correlated with relative skills and wages fairly well.

Table 2.7 presents vacancy durations by one-digit industry. These results show that the lengthiest durations are in the financial and service sectors while the shortest are in construction and manufacturing. The lengthy durations in services and the short ones in manufacturing are consistent with evidence seen earlier in vacancy rates, and once again suggest a nonmonotonic (i.e., negative for some values and positive for others) relationship between skill levels (or wages) and vacancies. On the other hand, the lengthy durations in the financial sector and shorter durations in construction run counter to the earlier evidence. The high concentration of white-collar positions (particularly clericals) for which durations appear to be lengthy may explain the former, and particularly low rates of turnover might account for the low vacancy rates which appear in table 2.2. Explanations for the high rates and short durations in construction are less clear, however.

In table 2.8, we consider evidence on vacancy durations by firm size and union status. We see a strong trend here of lower duration with increasing firm size. This is fully consistent with hypotheses presented earlier about size affecting applicant flows through wages and applicant awareness of firm. The shorter durations we observe here for unionized positions is also consistent with earlier evidence and earlier hypotheses. Both findings in this table might help to explain the short durations which we observe for manufacturing and the relatively lengthy ones which we observe in the financial and service sectors.

Finally, table 2.9 contains evidence on the effects of turnover and growth on the log of vacancy durations. Since these independent variables have their direct effects on frequencies rather than durations, there is no *a priori* reason to expect coefficients of a particular sign. The correlation between frequencies and durations of vacancies should provide us with the greater insights into the pattern of vacancy rates observed across occupations and industries, however.

Table 2.7
Vacancy Durations by Industry:
Means and Standard Deviations

Mining	13.71
	(13.22)
Construction	8.12
	(16.94)
Durable manufacturing	8.38
	(14.44)
Nondurable manufacturing	10.14
	(10.99)
Transportation, communication, utilities	9.72
	(15.08)
Wholesale trade	15.50
	(18.61)
Retail trade	12.37
	(28.91)
Finance, insurance, real estate	16.92
	(19.71)
Services	15.94
	(29.57)

The results of table 2.9 show a negative (and marginally significant) relationship between turnover rates and vacancy duration. This may reflect the fact that firms are unwilling to invest a lot of resources in screening individuals for positions that generate high turnover due to their low wages and/or lack of specific skill requirements. Alternatively, the low resources invested may generate low-quality workers or poorly matched workers and jobs. Either way, the shorter vacancy durations at least partly counteract the effects of high turnover and frequency on vacancy rates.

Table 2.8
Vacancy Durations by Firm Size and Union Status: Means and Standard Deviations

Firm size	
1 - 49	13.67
	(26.33)
50 - 99	13.90
	(22.55)
100 - 499	9.74
	(13.29)
500 - 1999	3.88
	(10.19)
2000+	7.27
	(8.71)
Union status	
None	13.26
	(25.04)
Some	10.99
	(20.46)

Table 2.9
Effects of Turnover and Firm Growth on Vacancy Durations

Dependent variable: Log (vacancy duration)

Independent variables:	1	2
Turnover rate	-.044	-.043
	(.034)	(.034)
Log (1+employment growth)	—	.040
		(.080)
Log (1+sales growth)	.025	—
	(.031)	
R^2	.0033	.0027
N	677	677

NOTE: Equations are weighted by $(\text{firm size})^{1/2}$

On the other hand, there seems to be a weak (and not significant) positive relationship between employment/sales growth and vacancy durations. If, in fact, such a relationship exists, it suggests that growing firms have some short-run difficulty in obtaining the employees they want. This may reflect the fact that rapidly growing firms are heavily concentrated in industries that require specific skills not widely held, especially within the particular local labor markets in which they reside. Such a "structural" problem should be resolved (through training, migration, etc.) over time; it raises at least the possibility, however, of policy remedies that subsidize these adjustments in the short-run.

Summary

This chapter has presented firm-level evidence on vacancy rates and durations. Vacancy rates are a function of both the frequency with which vacancies occur and their durations once they occur. The former should reflect turnover and desired employment growth within the firm, while the latter will reflect the quantity and quality of applicant flows and firm offers. Wages, skill requirements, product demand, firm size and unions are among the many economic variables that should influence one or both of these vacancy dimensions.

The evidence shows that vacancy rates and durations vary across occupations and industries in ways suggesting an important role for wages and skills. They seem lowest in occupations and industries (e.g., manufacturing) where semiskilled work at relatively high wages is obtained, and highest in white-collar occupations and/or service sector jobs. Larger firm size and higher unionism are also associated with lower vacancy durations and rates. While turnover seemed positively linked to vacancy rates but negatively related to durations, unemployment and sales growth were positively (though weakly) related to both measures. This suggests the possibility of short-run employment difficulties for growing firms. There also was some evidence that a firm's wages and recruitment efforts, controlling for occupation and worker characteristics, might affect vacancy rates. Here again, the statistical evidence was too weak to draw firm conclusions.

NOTES

1. This inverse relationship is well known in the literature on unemployment durations, e.g , Barron (1975). It assumes a constant probability of gaining new employment over time.

2. The possibility of multiple establishments occurs since all of a firm's establishments within any site are covered by all the questions in the survey.

3. We expect managerial and professional jobs to have *lower* vacancy frequencies but *higher* vacancy durations (the latter of which is confirmed by the data below), so that vacancy rates in these positions might be higher or lower than those in the included occupations.

4. Of course, nothing can be done about the nonrandom sample of the sites themselves.

5. The economy entered a brief and mild recession in the spring and summer of 1980 from which it promptly began to recover. Unemployment averaged 7 percent for the year and never exceeded 7.6 percent.

6. The high wages of manufacturing jobs, after controlling for personal characteristics, are discussed in Dickens and Katz (1986) or Krueger and Summers (1986), among other places. Low quit rates for manufacturing are found in Parsons (1977).

7. See Freeman and Medoff (1986).

8. See Leonard (1987) for a discussion of this issue.

9. Logs are used here to limit the effects of outliers on the estimated parameters, since coefficients on logged variables are interpreted as effects of *percentage* changes in the independent variables. The log of one plus a growth rate generally approximates the growth rate itself (for low rates) and also equals the log of the ratio of ending to beginning value.

10. This weighting is the standard econometric treatment of grouped data with varying group sizes and is based on the assumption of constant errors per individual within each group.

11. Measurement error in our vacancy measures could easily reflect ambiguity in the employer's or manager's mind over whether a vacancy actually exists. Such ambiguity is especially likely at smaller firms without formal job categories and classifications. Measurement error in employment and sales growth figures could reflect inaccurate guesses by survey respondents, etc.

12. These calculations are not size-weighted, since large firms do not hire individuals in direct proportion to their size.

13. If the zeroes for nonrecruited individuals are excluded from the samples, the average duration rises to approximately 17 days.

3
Unemployment-Vacancy Relationships Across Local Labor Markets

In this chapter, we will consider the relationship between unemployment rates and vacancy rates at the level of the local labor market. This relationship should enable us to decompose local unemployment rates into their frictional/structural and demand-deficient components, which we will then attempt to explain through other characteristics (e.g., wages, UI ratios, industries, etc.) of the local markets.

Before moving to the data, we consider the theoretical interpretations of unemployment-vacancy relationships.

Unemployment and Vacancies
The Theory

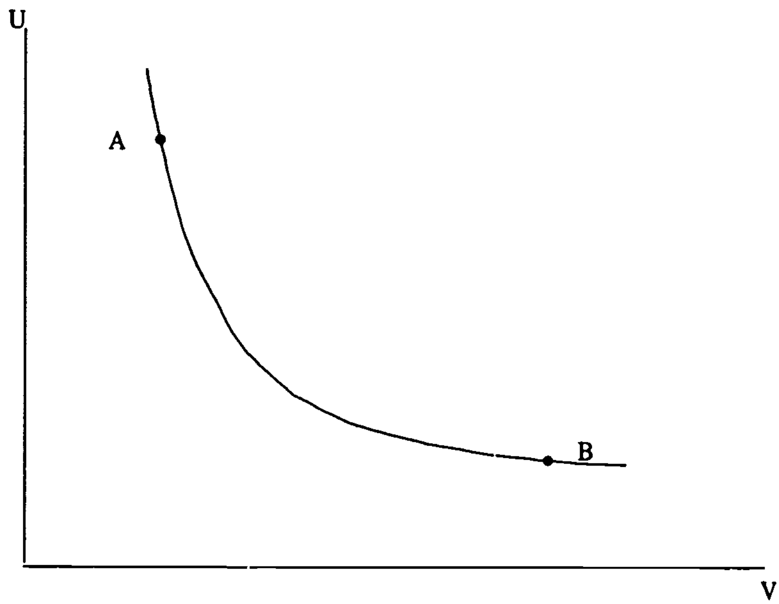
The literature on the relationship between unemplcyment rates and vacancy rates has centered on the Beveridge curve, which posits a tradeoff between the two. Such a tradeoff has been empirically observed in Britain (Dow and Dicks-Mireaux 1958) and other OECD countries over time. The theoretical formulations behind the curve were first developed by Holt and David (1966) and by Hansen (1970). More recent versions of this theory, embodied in the general equilibrium search framework, appear in Jackman *et al.* (1984) and Pissarides (1985).

The basic notion here is that frictions on both sides of the labor market generate unemployment and vacancies simultaneously. Separations initiated by both employers and employees create a constant flow of both, while job offers and acceptan~es help to eliminate both. The number of offers and acceptances will reflect search intensities and effectiveness on both sides of the market, as well as the quality of matches available between firms and individuals with particular characteristics.

A tradeoff between unemployment and vacancies is generated by changes in the demand for labor in a market. A rise in demand will result in rising vacancies and falling unemployment, while a fall in demand will result in the opposite. This is true for changes caused by shifts in labor demand (cyclical or otherwise) at constant wages or by wage changes along a stable demand curve.

A Beveridge curve graph appears in figure 3.1. Movement between points such as A and B reflect different levels of labor demand relative to labor supply, with B representing the higher demand position.

Figure 3.1
Unemployment-Vacancy Relationship



A stable tradeoff between vacancies and unemployment exists only for a given structure and a given set of frictions in the labor market. If these factors change, due to changing search intensities (from transfer payments, unemployment insurance, etc.) or changing match qualities (from skill requirements changing, etc.), the curve may shift inward or outward. More specifically, a worsening of frictions and structural unemployment (see chapter 1 for definition) will mean a higher rate of unemployment for a given rate of vacancies (or vice versa) and thus will shift the curve out. Improvements in these factors will have the opposite effect.

Application to Local Labor Markets

Though the Beveridge curve is often thought of as a representation of the aggregate economy as it moves over the business cycle, it can be used to analyze differences in unemployment across local markets as well. By estimating a relationship between unemployment and vacancies across these markets, we estimate the extent to which differences in unemployment are generated by movements along a Beveridge curve, which in turn reflect differences across markets in the level of relative labor demand. Factors which control for shifts in this relationship then measure the extent of observable differences in frictional and structural unemployment across markets, while the residual captures unobserved differences in frictional and structural unemployment.

More formally, we can analyze these relationships at a point in time as follows:

$$(3.1)\quad U_{kt}=a+bV_{kt}+\check{c}\check{X}_{kt}+e_{kt}$$

where U_{kt} and V_{kt} are the unemployment and vacancy rates of market k and time t respectively; while X_{kt} is a vector of shift variables (e.g., the ratio of average unemployment insurance benefits to area wages, measures of skills in the population, etc.). The addition of area wage and industry variables to the basic equation should enable us to see how much of the observed "demand effect" of coefficient b or the frictional/structural effects of coefficient c are accounted for by these variables.

Finally we will be able to estimate these cross-sectional relationships at two different points in time: 1980 and 1982. These two years represent quite different points in the aggregate business cycle. The year 1980 began at the peak of the cycle and, despite a mild recession, unemployment averaged only 7 percent. In 1982, on the other hand, the more severe recession of the early 1980s reached its trough and aggregate unemployment reached almost 11 percent. A comparison of the cross-sectional relationships between these two years should therefore reveal how the importance of different components in unemployment change over the cycle. The differences in cyclical sensitivities across markets will interact with the underlying components of unemployment to produce the changes over these years that we observe.

Unemployment and Vacancies, 1980

To analyze these relationships, we have calculated average job vacancy rates for each of the 28 sites of the EOPP Survey for 1980. This was done (as in chapter 2) by taking the ratios of (sample-weighted) mean vacancies to mean number of jobs in each site. The rates for each site are thus unbiased estimates of the true rates. These rates are then compared with unemployment rates for each site computed from the 1980 Census.[1]

Table 3.1 presents summary data on the unemployment and vacancy rates for all sites. These computations are weighted by the size of the labor force in each site in an attempt to infer something about aggregate rates.[2]

Table 3.1
Unemployment and Vacancy Rates, 1980:
Means and Standard Deviations

	Unemployment	Vacancy
All sites	.068	.015
	(.018)	(.008)
South	.060	.019
	(.012)	(.007)
Non-South	.076	.011
	(.019)	(.006)
SMSA	.066	.016
	(.018)	(.008)
Non-SMSA	.077	.012
	(.015)	(.007)

NOTE: Means and standard deviations are weighted by size of labor force at each site.

The results show a substantially higher unemployment rate than vacancy rate for 1980. This is true in spite of the fact that the aggregate economy was never far from its business cycle peak of 1979. This finding confirms that of Abraham (1983) for different sets of locations and data. Of course, the aggregate imbalance between the two rates does not necessarily imply a nonoptimal rate of unemployment, since the cost of unemployment to an individual worker may be quite different from the cost of job vacancies to an employer. But the low vacancy rate does suggest that the opportunities for lowering aggregate unemployment rates strictly through policies to address frictional and structural problems may be somewhat limited unless more jobs are created in the process. This last possibility might occur if the reducing of frictional/structural problems in markets makes labor more available and less costly to firms, thereby generating higher labor demand and more jobs.[3]

It is also worth noting here that this comparison of unemployment and vacancy rates reflects a particular set of economic and demographic characteristics of the U.S. labor market at the beginning of the decade. The changes in relative cohort sizes (due to the aging of the "Baby Boom" group and the entrance of the "Baby Bust" cohort into the market), unemployment insurance, transfer payments, industry growth rates, etc., that have occurred in the 1980s could dramatically alter the picture presented by these numbers. This must be kept in mind as we interpret these results and those which follow.

Table 3.1 also presents unemployment and vacancy rates broken down by region (South v. non-South) and by whether or not the sites are SMSAs. The results show lower unemployment rates and higher vacancy rates in the southern sites than in non-southern ones. This pattern suggests higher level of demand relative to the available supplies of the labor in the South. To what extent this is due to lower wages, employer relocations, product demand shifts, changes in prices of other factors (e.g., energy), etc. remains to be seen. The lower rate of unemployment and higher rate of vacancies for SMSAs than for non-SMSAs also implies higher relative demand in the former.

Table 3.2 then presents the unemployment rate and vacancy rate in 1980 for each of the 28 sites. The sites are listed by state groups with SMSAs presented in the upper half of the table.

Table 3.2
Unemployment and Vacancy Rates
by Site

	UR	VR
1. Cincinnati, OH	.048	.028
2. Columbus, OH	.056	.016
3. Dayton, OH	.091	.005
4. Toledo, OH	.115	.006
5. Baton Rouge, LA	.053	.019
6. Lake Charles/Lafayette, LA	.047	.020
7. New Orleans, LA	.070	.020
8. Birmingham, AL	.068	.008
9. Mobile, AL	.074	.026
10. Pensacola, FL	.078	.009
11. Beaumont/Port Arthur, TX	.061	.019
12. Corpus Christi, TX	.047	.020
13. San Antonio, TX	.061	.019
14. Harlan, KY	.094	.014
15. Pike, KY	.077	.010
16. Buchanan/Dickenson, VA	.072	.016
17. Alamosa, CO	.058	.031
18. Logan/El Paso, CO	.073	.018
19. Weld, CO	.066	.009
20. Marathon, WI	.075	.008
21. Outagamie, WI	.063	.008
22. Winnebago, WI	.059	.004
23. Skagit/Whatcom, WA	.103	.010
24. Skamania, WA	.095	.013
25. Balance of WA	.099	.011
26. Grundy, MO	.068	.032
27. St. Francoise, MO	.083	.005
28. Balance of MO	.060	.010

These results show a higher unemployment rate than vacancy rate *in every site*. The ratio of the unemployment rate-to-vacancy rate is lowest in Cincinnati (1.71) and highest in nearby Toledo (19.2), indicating substantial differences in the extent to which relative demand can explain unemployment rates across sites.

An even more direct comparison of numbers of unemployed workers and vacant jobs would avoid the problem of different bases for each rate. This is done by dividing each unemployment or vacancy rate by one minus that rate, thereby producing ratios of unemployed workers-to-employed workers and vacancies-to-filled jobs. Since these denominators are equivalent, dividing one ratio by the other produces the appropriate comparison of levels.[4]

When these transformations are done, the results are similar. The ratio of unemployed workers to vacant jobs using the aggregate rates from table 3.1 is .074/.015 or 4.93 unemployed workers per vacant job. For Cincinnati and Toledo these ratios are 1.72 and 21.7 respectively. By using the reciprocals of these ratios, we can infer that structural and frictional problems explain as much as 58.3 percent of unemployment within some sites or as little as 4.6 percent in others. It is important to note that these fractions are generally lowest for the areas with high unemployment rates.

In table 3.3 we present estimates of coefficients from simple regressions of unemployment rates on vacancy rates. Both rates appear in log form, and equations are weighted (in this and all other cases) by the square root of labor force size at the site.[5] Equations are presented for all sites and for SMSAs only.

Table 3.3
Unemployment-Vacancy Equations, 1980

Dependent variable: Log (unemployment rate)

	All sites	**SMSAs only**
Coefficient on log (vacancy rate)	-.234 (.070)	-.345 (.102)
R^2	.299	.571
N	28	13

NOTE: Equations are weighted by (labor force size)$^{1/2}$.

The results show significant negative effects of vacancy rates on unemployment rates. If one interprets the variation in vacancy rates as capturing the demand component of variation in unemployment rates, the R^2s imply that about 30 percent of the unemployment differences across all sites reflect demand. For SMSAs, this figure rises to well over one-half. Thus, in a year when unemployment was not far above the natural rate in the aggregate, demand differences across sites appear to explain major fractions of the differences across sites in unemployment rates. If vacancy rates are measured with error (most likely for the smaller, non-SMSA sites), the fractions of unemployment differences attributable to demand will be higher.

Unemployment-Vacancy Relationship Including Structural Characteristics

Having examined the relationship between unemployment and vacancy rates across local markets in a simple regression framework, we now seek to incorporate other determinants of this relationship into the analysis. This first involves specifying the X_{kt} variables of equation 3.1 above and including them as control variables when estimating the unemployment-vacancy equations. Afterwards, some potential determinants of relative labor demand within the labor market, such as average wage rates and industrial composition, will be included in the estimation as well.

The X_{kt} variables are chosen in order to capture various frictional and structural characteristics of local labor markets. In many recent discussions of why the Beveridge curve (or the short-run Phillips curve) has shifted out in the last few decades (e.g., Perry (1977), Medoff and Abraham (1982), Abraham (1987), etc.), the following are usually cited as major determinants of frictional and structural problems in labor markets: (1) demographics; (2) skills; and (3) unemployment insurance (or transfer payments more generally).

The primary demographic characteristics usually stressed in these discussions are the proportions of young workers and women in the labor force. Both groups are considered to have higher rates of frictional unemployment than do prime-age males (Feldstein 1973). This occurs because many young workers are new entrants to the full-time labor force, and they are seeking to find the correct match with a firm. Even after accepting employment, their turnover rates out of such jobs for the first few years will be high as they seek to improve on the quality of job market matches. Women, on the other hand, are more likely to be labor force reentrants after having taken leave for childbearing and childrearing responsibilities. Since the fractions of the labor force which these groups comprise have risen dramatically in the past two decades, they are often mentioned as having contributed to the rise of frictional unemployment during that time.

The skills of labor force participants are also often mentioned in any discussion of structural unemployment. As new industries develop, they may require a different set of skills from those that had been sufficient for older and now declining industries. Obviously, the issue of education and training figures prominently in most current discussions of the growing high-tech and service (or financial) sectors and the decline of traditional manufacturing industries. Little direct evidence has been provided, however, on how the skills of the labor force affect current unemployment rates and whether the shifting mix of industries has created a short-run mismatch between job requirements and worker endowments of education and training.[6,7]

Another frequently mentioned possible cause of rising frictional unemployment in the last two decades has been the growth of unemployment insurance (UI) payments. UI may lead to higher turnover because, given the imperfect experience-rating of employers' payroll taxes, UI payments may provide a subsidy to those participating in temporary layoffs (Feldstein 1978; Topel 1983). UI might also raise the unemployment durations of those on layoff by lowering the costs of remaining unemployed while awaiting recall or searching for new work (Ehrenberg and Oaxaca 1976; Moffitt and Nicholson 1982). It is at least theoretically possible, however, that UI might lower frictional unemployment rates by its effect of lowering the costs of job search, which might improve the quality of matches between employers and employees. Recently observed declines in the fraction of unemployed individuals who are insured (Burtless 1983) also raise some doubts about the long-term importance of this fact for explaining rising unemployment. Nonetheless, UI must be considered in any analysis of frictional unemployment, whether cross-section or time-series in its approach. Other transfer payments to low income groups (e.g., Aid to Families With Dependent Children, Food Stamps, etc.) that have grown in usage over time could have similar effects and might be considered as well.[8]

Since demographic characteristics, skills, and the generosity of UI payments and transfers vary across local areas, it is possible that these characteristics affect unemployment rates across these areas as well as aggregate rates over time. Accordingly, I have merged census data on these characteristics for each site into the unemployment and vacancy rate data.[9] The following sitewide characteristics have been chosen: the fractions of the population (ages 25 and over) with high school and college degrees; the fraction of the labor force that is female; and the median age of the labor force. In addition, I have added the statewide ratio of average UI payments to weekly wages as an additional variable for each site.

Table 3.4 presents weighted (by labor force size) means of these variables across all sites, as well as the value of each variable for each site. The results show a wide range of characteristics represented by the sites in the sample. We find, for instance, that fractions of the labor force with college degrees range from 24 percent for Baton Rouge to 6 percent in the coal-mining areas of Harlan and Pike Counties, Kentucky. Fractions with high school degrees also range from 76 percent in Skagit and Whatcom Counties, Washington to only 33 percent in Buchanan and Dickenson, Virginia. The data suggest fairly low correlations between SMSA status or region and educational attainment, though the three sites in rural areas of southern states are clearly the lowest. Also, the high school and college level variables themselves seen quite positively correlated.

The demographic characteristics show somewhat less variation across sites. Fractions of the labor force that are female range from about 38 percent to 45 percent in all sites except Harlan and Buchanan/Dickenson, where they are significantly lower. Median ages range from about 26 to 33, with no apparent correlation with region or SMSA status. Finally, the UI ratios range from almost 45 percent in Wisconsin to 31 percent in Texas. Here, a negative correlation between benefit ratios and southern location is more apparent.

Table 3.4
Structural Characteristics of Sites

	HS	C	F	AGE	UI
TOTAL	.650	.158	.421	28.8	.377
1. Cincinnati, OH	.65	.19	.433	30.0	.436
2. Columbus, OH	.73	.21	.445	28.2	.436
3. Dayton, OH	.69	.16	.435	30.3	.436
4. Toledo, OH	.67	.14	.422	29.5	.436
5. Baton Rouge, LA	.72	.24	.427	26.1	.396
6. Lake Charles/Lafayette, LA	.61	.17	.390	26.7	.396
7. New Orleans, LA	.59	.18	.430	28.7	.396
8. Birmingham, AL	.63	.15	.409	30.2	.319
9. Mobile, AL	.61	.09	.407	28.5	.319
10. Pensacola, FL	.70	.15	.441	28.1	.311
11. Beaumont/Port Arthur, TX	.63	.12	.381	29.3	.311
12. Corpus Christi, TX	.55	.13	.393	27.1	.311
13. San Antonio, TX	.61	.15	.427	27.7	.311
14. Harlan, KY	.38	.06	.318	27.9	.398
15. Pike, KY	.38	.06	.396	27.1	.398
16. Buchanan/Dickenson, VA	.33	.05	.295	26.7	.394
17. Alamosa, CO	.71	.21	.420	25.6	.403
18. Logan/El Paso, CO	.72	.20	.450	27.0	.403
19. Weld, CO	.69	.17	.411	26.7	.403
20. Marathon, WI	.65	.12	.413	28.6	.448
21. Outagamie, WI	.72	.13	.407	27.5	.448
22. Winnebago, WI	.72	.15	.429	29.1	.448
23. Skagit/Whatcom, WA	.76	.16	.408	29.9	.371
24. Skamania, WA	.70	.12	.377	32.0	.371
25. Balance of WA	.69	.10	.386	32.3	.371
26. Grundy, MO	.64	.10	.426	33.1	.339
27. St. Francoise, MO	.55	.11	.455	33.0	.339
28. Balance of MO	.59	.12	.423	31.5	.339

NOTE: Total means are weighted by labor force size HS and C are fractions of the population (over age 25) with high school or college degrees respectively, UI is the ratio of average unemployment insurance benefits to weekly wages in the state, and F and AGE are percent female and median age in the labor force.

In table 3.5 we present estimates of unemployment-vacancy equations, which include these structural characteristics. Because of the relatively small sample size and large correlations between at least some of the characteristics, adding all of these variables at once would presumably lead to multicollinearity and imprecise estimates. Instead, groups of variables are included sequentially across equations. Comparisons across these equations (as well as with those of table 3.3) will then give us some insights into the marginal importance of each set of variables that are newly included.

Column 1 presents estimates of a simple unemployment-vacancy equation with dummy variables for region (South v. non-South) and SMSA status included. Coefficients on both are negative but neither is significant, which suggests little difference by location in overall frictional and structural attributes. The small reduction in the vacancy rate coefficient (from −.234 in table 3.3 to −.190 in table 3.5) when these variables are included suggests, however, some small differences in relative labor demand across these areas.

Columns 2–4 present estimates of equations to which the educational attainment variables have been added. Since the high school and college variables are themselves quite highly correlated, it seemed sensible to add each of them separately (columns 2 and 3) and then together (column 4).

The results show insignificant effects of high school attainment but large and fairly significant negative effects of college attainment on unemployment. In fact, the results suggest that a 5 percentage point rise in college attainment levels leads to a 11–15 percent decline in unemployment rates. A further decline of about 17 percent in the magnitude of the coefficient on vacancies when education levels are included suggests at least somewhat higher relative labor demand in areas with highly-educated workforces, which could be a function of the firms and industries that locate in these areas. But the remaining negative effects of college attainment once vacancies are controlled for also suggests important structural differences across labor markets that vary by educational levels.

Table 3.5
Unemployment-Vacancy Equations, Structural Characteristics Included

Dependent variable: Log (unemployment rate)

	1	2	3	4	5	6
Independent variables:						
Log (vacancy rate)	-.190	-.187	-.157	-.158	-.142	-.104
	(.083)	(.085)	(.079)	(.079)	(.083)	(.087)
SMSA	-.069	-.058	.055	.046	.044	-.011
	(.099)	(.109)	(.109)	(.110)	(.111)	(.123)
South	-.071	-.092	-.178	-.124	-.064	.095
	(.107)	(.133)	(.112)	(.148)	(.148)	(.198)
High school	—	-.167	—	.735	.951	1.057
		(.643)		(.705)	(.769)	(.782)
College	—		-2.312	-3.067	-3.657	-2.984
			(1.102)	(1.316)	(1.548)	(1.892)
UI ratio	—	—	—		.885	1.874
					(1.189)	(1.469)
Female	—	—	—	—		-.133
						(2.120)
Log (median age)	—	—	—	—	—	1.371
						(1.006)
R^2	.347	.349	.452	.478	.491	.537
N	28	28	28	28	28	28

NOTE: Equations are weighted by (labor force size)$^{1/2}$.

Of course, several interpretations of these results are possible. If the differences in education levels are truly exogenous, it may imply lower levels of frictional and structural unemployment among the well-educated. This could reflect lower turnover rates as well as shorter unemployment duration for highly-educated workers. The lower turnover rates would be particularly plausible if firm-specific training, which generally reduces turnover, is positively correlated with education. It is possible that the highly-educated migrate to areas where industries that value their training are located, or that firms choose to locate in areas where the highly-educated already reside. Well-known examples of this phenomena would include Silicon Valley in California, Route 128 around Boston, and the Research Triangle in North Carolina. In all of these cases, the observed effects on unemployment rates would still reflect either higher demand or less severe turnover/matching problems for these firms and workers. The former could only be the predominant effect if vacancy rates are seriously mismeasured here, thereby not correctly controlling for demand effects which are then measured by education.

We must also remember that, as human capital theory suggests, college enrollments are themselves functions of the relative returns to such education. If, indeed, turnover and matching problems are less severe for well-educated workers, these facts should be reflected in higher rates of return for such workers, which should encourage greater attendance. However, the lags of several years which occur in the process of obtaining more education suggest that imbalances could persist for several years.[10] Alternatively, the high private costs of obtaining such education may lead to equilibria in which both relative wage and turnover/matching differences persist indefinitely. In such cases, greater government financial support for education may be appropriate. By lowering the costs of obtaining education, higher levels might be obtained; in turn, the private and social costs of high turnover and lengthy periods of job search might be reduced.

In columns 5 and 6 of table 3.5, we add the UI ratio and demographic characteristics to unemployment-vacancy equations with the previously discussed characteristics already included. When the UI ratio alone is added, we find positive but insignificant effects on unemployment rates. But when the UI variable is added along with demographic characteristics, the coefficient on the former approximately doubles in magnitude and now appears to be almost significant (by conventional standards). The estimated coefficient now suggests that a 10 percentage point rise in the UI ratio might have raised unemployment rates by as much as 19 percent. This suggests that UI might have fairly large effects in raising turnover and/or durations of joblessness, thus contributing to frictional and structural unemployment in some areas. This finding is also consistent with more recent evidence (e.g., Woodbury and Spiegelman (1987)) on UI effects on unemployment.

The coefficients on the demographic variables themselves are also noteworthy. The fraction of females in the labor force has an insignificant effect on unemployment rates, while the log of median age has a positive and fairly significant effect. These findings run counter to the expectation that females and young people in the labor force will raise the amounts of frictional unemployment. In fact, the coefficient on median age implies quite the opposite; controlling for vacancies, we find that a higher-aged labor force raises unemployment.

Once again, this result needs to be interpreted with some caution. It is possible that young workers, by virtue of their greater mobility (with lower relocation costs and fewer specific skills), actually have shorter durations of unemployment which outweigh the higher frequencies that they experience due to turnover. This, of course, runs counter to the well-known empirical fact of higher unemployment rates for young people. An alternative interpretation is that young people relocate towards areas containing high growth and/or firms and industries to which they are well matched. The substantial reduction in the magnitude of the vacancy coefficient when the median age is included suggests that there is an effect of labor demand on the age of the local labor force. On the other hand, the remaining coefficient on age after controlling for vacancies suggests demand may not be the entire story.

Finally, we note the various effects on the South coefficient from including these structural characteristics in the unemployment-vacancy equation. When we control for levels of college attainment, the coefficient on South briefly becomes negative and marginally significant, but when the UI ratio and demographic characteristics are added, this coefficient becomes fairly large (though not quite significant) and positive, implying an almost 10 percent higher unemployment rate in the South. These numbers suggest that the lower UI ratios and younger labor forces of the South contribute to lower rates of unemployment there, though the lower levels of college attainment counteract this somewhat.

To sum up, we find significant negative effects of college attainment and positive effects of UI ratios and median age on local unemployment rates. While the effects of college and age work at least partly through their correlations with relative labor demand (as measured by job vacancies), we continue to observe significant effects of these variables even after controlling for demand. Unless these controls are seriously weakened by measurement error, the results suggest some fairly important effects of these factors on the frictional and structural characteristics of labor markets.

The Role of Wages and Industries

The preceding sections of this chapter suggest important differences across local labor markets in both relative labor demand and structural characteristics. In order to understand these differences more clearly, we now move to consider two more important characteristics of local labor markets: average wages and industrial composition of employment.

The role of wages in generating unemployment differences across local labor markets has been noted by Hall (1970, 1972) and others since then, such as Behman (1978), Reza (1978). These differences are generally attributed to equilibrium differences in labor demand generated by higher wages. They might also reflect workers queuing for the higher wage job (or spending more time searching) rather than accepting potentially available lower-wage ones or migrating to lower-wage areas. Such wage differences across areas might result from differences in industries or unionization rate.

If, on the other hand, the higher wages of certain areas reflect compensating wage differences for local amenities (Roback 1982), we needn't necessarily find effects on local unemployment rates, since these factors might instead operate through population and labor force levels in each market.

Industrial compositions of local labor markets can also affect unemployment rates through a variety of channels. Persistent wage differentials across industries which are not explained by observable characteristics of workers (Dickens and Katz 1986; Krueger and Summers 1986) suggests that different industrial compositions could generate wage effects on unemployment of the types described above. Alternatively, industries can have more direct effects on labor demand due to differences in cyclical sensitivities (Browne 1978; Rones 1986) or to secular trends caused by changes in tastes, other factor costs, etc., which shift demand across industries. Different industrial growth rates would fit into the latter category. Finally, the different technologies across industries may mean differences in frictional and structural unemployment associated with them, since the skills required may vary and matching problems may result in some areas.

To gain some insights into the actual effects of wages and industries on local unemployment, we have merged data on these characteristics into our other site-level data. The fractions of employment found in manufacturing and services are obtained from the *City and County Data Book* (1983). We focus on only these two industry groups in order to preserve our limited number of degrees of freedom. The widely observed differences in cyclical sensitivities and growth rates across these two sectors also argue for such a focus.

The wage measures used here are sample and size-weighted means for each site of residuals from a log wage equation. As noted in chapter 2, this equation was estimated across firms using the EOPP data, and included the personal characteristics of workers as controls (e.g., age, sex, education, prior experience, and occupation). The resulting means for each site can therefore be interpreted as average wage premia in percentage terms.

Table 3.6 contains the weighted means (by labor force size) of wages and industrial composition of employment, as well as the actual figures for sites. These results shown several interesting features of wage and industry differences across local areas. Wage premia are somewhat more likely to be positive in SMSA than in non-SMSA areas. But some of the largest premia are found in the rural areas of Kentucky and Washington State. Within SMSAs, two southern ones (Beaumont/Port Arthur and Lake Charles/Lafayette) show the highest rates. On the other hand, the most negative premia are in other southern SMSAs (Mobile and Pensacola) as well as non-SMSAs in Colorado and Missouri.

Table 3.6
Wage Premia and Industries of Sites

	W	M	S
Total	.034	.186	.210
1. Cincinnati, OH	.098	.26	.22
2. Columbus, OH	.039	.17	.23
3. Dayton, OH	.043	.27	.21
4. Toledo, OH	.045	.25	.23
5. Baton Rouge, LA	.035	.15	.24
6. Lake Charles/Lafayette, LA	.123	.13	.19
7. New Orleans, LA	.025	.10	.25
8. Birmingham, AL	.055	.19	.21
9. Mobile, AL	-.029	.21	.19
10. Pensacola	-.058	.12	.21
11. Beaumont/Port Arthur, TX	.186	.26	.17
12. Corpus Christi, TX	.003	.11	.20
13. San Antonio, TX	-.007	.12	.21
14. Harlan, KY	.193	.04	.18
15. Pike, KY	.170	.02	.17
16. Buchanan/Dickenson, VA	.028	.05	.17
17. Alamosa, CO	-.035	.06	.31
18. Logan/El Paso, CO	-.044	.15	.21
19. Weld, CO	-.008	.03	.15
20. Marathon, WI	.144	.26	.16
21. Outagamie, WI	.001	.33	.17
22. Winnebago, WI	.017	.35	.21
23. Skagit/Whatcom, WA	.199	.17	.21
24. Skamania, WA	.082	.25	.17
25. Balance of WA	.248	.30	.18
26. Grundy, MO	.060	.20	.18
27. St. Francoise, MO	-.044	.24	.22
28. Balance of MO	.009	.20	.22

NOTE: M and S are fractions of total employment in manufacturing and services, and W is the sample and size-weighted mean of residuals from a wage equation across firms by site

As for industrial differences, we find manufacturing most heavily concentrated in the SMSAs of Ohio and in the non-SMSA areas of Wisconsin and Washington. In contrast, the lowest concentrations are found in the non-SMSA areas of Kentucky, Virginia and Colorado. Most southern SMSAs have less manufacturing than do those of Ohio. We also note that the range of differences across sites in service employment (.15 to .31) is much lower than that in manufacturing employment (.02 to .35).

In table 3.7, we present estimates of unemployment equations that include wages and industrial compositions of sites as explanatory variables. Columns 1 and 2 present equations containing the wage premia, with and without the vacancy rates included. The results show a positive and fairly significant effect of wages on local unemployment rates. The estimated elasticity is not significantly different from one. When vacancies are added to this equation, we find the wage effect reduced in magnitude by about 35 percent. In contrast, the coefficient on vacancies is reduced by less than 10 percent in comparison with that of table 3.3.

Table 3.7
Unemployment-Vacancy Equations, 1980:
Wage and Industry Included

Dependent variable: Log (unemployment rate)	1	2	3	4	5
Independent variables:					
Log (vacancy rate)	—	−.216	—	−.229	—
		(.072)		(.091)	
Wage	.918	.590	—	—	.762
	(.559)	(.501)			(.598)
Manufacturing	—	—	1.175	.091	1.014
			(.633)	(.719)	(.638)
Services	—	—	.119	−.881	.848
			(1.946)	(1.812)	(2.006)
R^2	.094	.336	.126	.308	.181
N	28	28	28	28	28

NOTE: Equations are weighted by (labor force size)$^{1/2}$.

These equations suggest that wages affect unemployment across local areas through both demand and nondemand channels. Controlling for vacancies substantially reduces but does not eliminate the wage effect, which suggests that other forces (e.g., queuing or long durations of search) are also at work. On the other hand, wages appear to explain only a very small part of the total demand effect as measured by job vacancies. Presumably, other sources of demand differences (i.e., shifts in tastes, technologies, other factor costs, etc.) are more important as explanations of demand-side differences than are wage differences across markets.

In columns 3–5 of table 3.7 we consider estimates of equations in which fractions employed in manufacturing and services are included as explanatory variables. Column 3 presents an equation in which only these variables appear. As expected, we find fairly significant, positive effects of manufacturing employment or unemployment. In contrast, services show very little effect. The particularly large standard error on the services coefficient appears to reflect the low variance in that variable observed in table 3.6 or its relatively high correlation with the other independent variables.

When vacancy rates are added to this equation in column 4, almost all of the effect on unemployment rates of manufacturing disappears. This suggests that manufacturing works almost exclusively through labor demand in its effects on unemployment rates. On the other hand, the vacancy effect is virtually unchanged from that observed in table 3.3. Differences in percent of manufacturing in [employment] thus explain very little of demand differences across local areas.

In column 5, we have added the manufacturing and service variables to the simple equation containing only wages from column 1. We find the wage effect from column 1 reduced by about 17 percent and the manufacturing effect from column 3 reduced by about 14 percent. Thus wages play some role in the demand effects observed for manufacturing, though not a primary one.

We must remember that these estimates reflect a set of local labor markets in 1980. Given that a minor recession occurred in part of that year, the effects we observe here may be partially cyclical. However, this issue is considered in greater detail in the next section. More important, differences in unemployment associated with wages and/or manufacturing may have been more pronounced after 1980, due to a variety of factors (e.g., exchange rates and imports, growth trends, etc.). Both the particular year and the particular set of sites must be kept in mind as we review these results.

The Role of the Business Cycle 1980 v. 1982

As we have noted above, the role of the business cycle in generating unemployment differences across sites needs to be addressed. An economic downturn will reduce labor demand relative to available labor supply (at given wages), which should move the aggregate economy along a Beveridge curve towards a higher-unemployment, lower-vacancy point (see figure 3.1). Until such a new equilibrium point is reached, counterclockwise movements around the curve may be generated as well.

For a cross-section of local labor markets, the mean rates of unemployment and vacancies will change over the business cycle. This implies a movement of most sites along and around some stable (though perhaps not perfectly observable) unemployment-vacancy curve. If this curve is nonlinear, we may observe a change in the slope of the relationship between unemployment and vacancies, as well as in the explanatory power of the latter with regards to the former. Since some sites will be more heavily affected by the business cycle than others, we may also observe changes in the effects of various characteristics that we have discussed in the previous sections.

To analyze these issues, we compare unemployment and vacancy rates for 1980 and 1982. While a very brief and minor downturn occurred during the spring and summer of 1980, a much more pronounced recession began in 1981 and reached its trough in 1982. A comparison of these two years (1980 and 1982) thus gives us a picture of two very different points in the aggregate business cycle.

The vacancy rates from 1982 are calculated from the same set of firms from which we calculated those rates for 1980. The survey questions used to gauge these results are somewhat different in the two years, however. Unlike 1980, the 1982 survey contains a question on the total number of job vacancies available for immediate employment. This number can then be divided by total employment at the firm to obtain job vacancy rates. Since the 1980 figures excluded professional and managerial jobs, the rates for the two years are not exactly comparable. As in 1980, the vacancy rates reflect the ratio of sample-weighted means for vacancies-to-employment with each site.

The unemployment rates used here also differ somewhat from those used earlier. The sitewide unemployment rates used above are derived from the 1980 Census. Consequently, the comparable numbers are not available for 1982. We therefore use a consistent set of rates between the two years in the analysis below. These rates are annual ones for SMSAs and statewide unemployment rates for non-SMSAs (available in various issues of *Employment and Earnings*).

The means of these unemployment and vacancy rates for 1980 and 1982 appear in table 3.8. The results show a rise in the mean unemployment rate from 7.0 percent to 10.1 percent, as well as a decline in the mean vacancy rate from 1.5 percent to 1.2 percent between 1980 and 1982. These results are consistent with our view of a cyclically-induced movement along the aggregate Beveridge curve.

Table 3.8
Mean Unemployment and Vacancy Rates, 1980 and 1982

	UR		VR	
	1980	1982	1980	1982
All sites	.070	.101	.015	.012
South	.069	.099	.019	.013
Non-South	.072	.102	.011	.011
SMSA	.070	.101	.016	.011
Non-SMSA	.070	.099	.012	.014

NOTE: Unemployment rates used here are annual rates for SMSAs and annual statewide rates for non SMSAs. Means are weighted by labor force size.

We also present means on these rates in each year by region and by SMSA status. With each subgroup we find fairly similar increases in unemployment rates. The vacancy rates, however, decline only in the southern sites and in the SMSA sites. The lack of observed declines outside of the South and in the non-SMSAs may reflect the comparability problems described above between 1980 and 1982. Measurement error, which is likely to be most serious for the smaller (i.e., non-SMSA) sites, may also play some role. Nonetheless, we generally find movements in both unemployment and vacancy rates that appear to reflect the movement of the economy into a serious recession between 1980 and 1982.

In table 3.9 we present unemployment vacancy equations for 1980 and 1982. These are presented for all sites as well as for SMSAs only. Equations in which wages and industrial compositions are included as explanatory variables are provided as well. Column 1 presents results for equations containing only the vacancy rate. The results show large increases in the coefficients on vacancy rates for 1982. The increase is especially pronounced with the subsample of sites that are SMSAs. We also see very large increases in the explanatory power of these equations in 1982 as measured by R^2. Within all sites, almost half of the variation in unemployment rates is explained by vacancies in 1982. Within SMSAs, the comparable figure is above two-thirds.

Clearly, then, demand differences play a much greater role across local labor markets during recessions than during healthier times. The increase in (the absolute value of) the measured slope is also consistent with a movement along the aggregate Beveridge curve between points such as A and B in figure 3.1. If the correct, nonlinear functional form were known here, no such increase would be observed (since a movement along the curve would not change the estimated parameters of the curve). However, the logarithmic form used here is merely an approximation to the correct form.

In columns 2 and 3, we present unemployment rate equations containing only wages and industrial compositions respectively. The results show dramatic increases in the wage elasticities of unemployment rates, specially for SMSAs. Increases in the effects of manufacturing are noted as well. It is clear, then, that high-wage and/or manufacturing firms were hit hardest by the recession of the early 1980s. More recent evidence suggests that employment in these firms has been slow to

Table 3.9
Unemployment and Vacancy Equations, 1980 and 1982

Dependent variable: Log (unemployment rate)

	All sites					
	1980			1982		
Independent variables:	1	2	3	1	2	3
Log (vacancy rate)	-.132 (.049)	—	—	-.241 (.050)	—	—
Wage	—	.486 (.377)	—	—	1.365 (.432)	—
Manufacturing	—	—	.994 (.395)	—	—	1.365 (.500)
Services	—	—	-.315 (1.216)	—	—	-.992 (1.538)
R^2	.216	.060	.220	.472	.278	.269
N	28	28	28	28	28	28

	SMSAs only					
	1980			1982		
Independent variables:	1	2	3	1	2	3
Log (vacancy rate)	-.173	—	—	-.418	—	—
	(.081)			(.088)		
Wage	—	.175	—	—	1.613	—
		(.789)			(.910)	
Manufacturing	—	—	1.696	—	—	2.206
			(.771)			(.986)
Services	—	—	.503	—	—	-.581
			(2.351)	—	—	(3.005)
R^2	.295	.005	.330	.674	.222	.356
N	13	13	13	13	13	13

NOTE Unemployment rates are annual rates for SMSAs and annual statewide rates for non-SMSAs. Equations are weighted by (labor force size)$^{1/2}$.

recover as the decade has proceeded. The role of wages and industry in explaining demand differences across local areas has therefore probably remained quite large throughout these years.

Summary

This chapter has presented evidence on the relationship between unemployment rates and vacancy rates across local labor markets. In the relatively healthy aggregate environment of 1980, unemployment rates exceeded vacancy rates within each site. This was especially true in sites with high unemployment rates. In simple equations, vacancies explained about 30 percent of the unemployment rate differences across all sites and over half across SMSAs. We interpret these effects as the demand component of unemployment differences.

The structural characteristics of local areas considered here are levels of educational attainment, demographic characteristics (such as percent of labor force that is female and median age), and ratio of average UI benefits to weekly wages at the state level. When these are included in the unemployment-vacancy equations, we find large negative effects of fractions with college degrees and positive effects of UI ratios and median age. Since we have already controlled for vacancy rates, these effects appear to reflect differences in frictional and structural unemployment across local markets. However, the college and median age effects seem to partly reflect demand or industry differences across sites, which may cause young and/or educated workers to relocate in low unemployment areas.

Average wages and industrial composition also influence unemployment rates in local areas. Higher wages and higher concentrations of employment in manufacturing are associated with higher unemployment rates. The wage effect seems to be only partly explained by demand differences, while virtually the entire manufacturing effect is so explained. On the other hand, neither of these two factors explains very much of the overall demand effect, as measured by job vacancies.

Finally, the comparison of unemployment and vacancy rates between 1980 and 1982 showed the former rising and the latter declining as the economy moved into a serious recession by 1980. The role of vacancies in explaining unemployment differences across markets rose substantially in 1982.

NOTES

1. These rates are published in the *City and County Data Book* of 1983. Where sites involve groups of counties, weighted averages of the county estimates (weighted by population) are used here.

2. As noted before, there is no way to account for the nonrandomness of site selection here.

3. Recently developed theoretical models of the "job matching" process suggest that an improvement in the frictional/structural characteristics of a market should raise the total number of jobs available in that market. This occurs because frictional/structural problems reduce the *effective* supply of labor to the firm, thereby raising wages and lowering labor demand.

4. This transformation appears in Abraham (1983).

5. Other functional forms, such as the linear and rectangular hyperbolic (where the inverses of each variable are used), produced similar results.

6. There is voluminous literature on "human capital" investments in education and training, with the classic volumes of Becker (1975) and Mincer (1974) among the best-known. Another strand of literature analyzes the changes in rate of return to education as college attendance rose in the 1950s and 1960s, thereby depressing the differential in earnings between high school and college graduates (e.g , Freeman (1975, 1976)). However, little evidence has been provided recently on whether the changing industrial structure has changed relative returns to education and enrollment decisions, or on the effects on unemployment in the short-run.

7. Various attempts have been made in Britain to analyze mismatches between unemployed individuals and vacant jobs in terms of occupation, industry or region of employment. Jackman *et al.* (1984) and Jackman and Roper (1987) are two such examples, but they generally find little explanatory power in such attempts to explain the outward shifts in the Beveridge curve for Britain.

8. Transfer payments are usually thought to affect labor supply or labor force participation rather than unemployment. Consequently, most of the empirical work has focused on hours or weeks worked by individuals as well as on labor force participation (Danziger, Haveman, Plotnick 1981) It is at least possible, however, that transfer payments subsidize an unemployed individual's job search in the same manner as UI payments

9 See footnote 1 for sources.

10 "Cobweb" models of the labor market. e g . Freeman (1971) suggest that this is the case for highly-educated workers

4
Demand Shifts, Adjustment and Persistence

The previous two chapters have focused on the determination of vacancy rates and on their effect on unemployment rates. It was argued that differences in vacancy rates reflect demand-based differences in unemployment rates. Our ability to explain vacancies and their effects on unemployment has been quite limited, however. The micro equations rarely showed an ability to explain more than a small percent of the variation in vacancies. In the site-level equations, important characteristics such as wages and industrial composition also accounted for very little of the vacancy effect. In sum, our ability to explain the demand component of unemployment differences across areas has been very limited thus far.

In this chapter, we will consider the effects of recent shifts in demand between and within local areas on unemployment rates in these areas. Demand will be measured primarily by sales growth, though some evidence on employment growth will be considered as well.

Three types of demand shift will be considered here: (1) shifts in demand *between* local markets; (2) shifts in demand *within* local markets but *between* industries; and (3) shifts *within* local markets and *within* industries (but still *between* firms). Shifts of the first type might affect local unemployment by changing the total level of labor demand (relative to supply) facing each local area in the short run. Such unemployment will be eliminated only by wage and price adjustments within areas or migration of labor between areas. Shifts of the second and third types might affect local unemployment by changing the composition of demand in each area. By moving demand towards firms and industries for which many workers are not currently trained, these changes in the composition of demand might result in short-run structural unemployment. The unemployment effects might be worse for shifts between industries than for those within industries, since the latter should require replacing only firm-specific skills, while the former should require replacing industry-specific ones as well.

It will be argued below that shifts between local areas can be measured by (differences in) the means of sales growth for firms in each area, while shifts within local areas can be measured by the variances of sales growth for each area. The variances will also be decomposed into between-industry and within-industry components to measure each type of within-area shift. After presenting these measures in summary form and for each area, we will consider the extent to which they can explain both unemployment and vacancy rates at the site level. Since shifts in demand often create a need to retrain and relocate workers across firms, industries, or areas, they are often associated with short-term structural unemployment. The unemployment and vacancy rate equations will enable us to test these claims.

Finally, we will consider the relationships between demand shifts, long-term unemployment, and population or labor force growth (as measures of migration) at the site level. These will provide insights into the issues of market adjustment and unemployment persistence after shifts have occurred.

Employment and Sales Growth as Demand-Shift Measures

The 1982 wave of the EOPP Survey of Firms asked the following question: "What is the percentage change in sales (after adjusting for prices) that occurred at your firm between 1979 and 1981?" This measure of sales growth will be interpreted as a direct measure of product demand change that firms face.

Both the 1980 and 1982 surveys also asked several questions about the number of employees at the firm. Not only were the current numbers in each year requested, firms were also asked about their employment sizes at various six-month intervals prior to the survey date. These included July and December of 1979 in the 1980 Survey, as well as the same months for 1980 and 1981 in the 1982 Survey. Using employment sizes for December of 1979 and 1981, we can calculate employment growth for firms over a period that parallels the one covered by the sales growth question. Both variables have been aggregated to the site level.

In table 4.1, we present means and standard deviations on the sales and employment growth variables across sites. We use the logs of the ratios of end-to-beginning period sales and employment, which equal the logs of the growth rates plus one. For low rates, these values closely approximate the growth rates themselves.

Table 4.1
Employment and Sales Growth, 1979–1981: Means and Standard Deviations

Log (1+sales growth)	.031 (.050)
Log (1+employment growth)	-.018 (.157)

NOTE: Means and standard deviations are weighted by labor force size.

The results show that sales grew by approximately 3 percent during this period, while overall employment at the sample firms fell by almost 2 percent. These numbers are not too surprising, given that 1979 was the peak year of the late 1970s expansion, while the economy had begun to enter a major recession by the end of 1981. The standard deviations suggest substantial variation across sites, especially in employment growth.

In tables 4.2 and 4.3, we present sales and employment growth measures respectively for each site. Each table includes sample-weighted (to correct for nonrandom sampling of firms) means and variances across the firms for each site. Furthermore, the variances are decomposed into between-industry and within-industry variances.

These three measures for each site capture the three types of demand shifts whose effects on local unemployment we want to estimate. The mean of sales growth across firms for each market reflects changes in the total level of demand facing firms and labor in that market. Thus, differences in the means of sales growth across these markets capture shifts in demand from one local market to another.

Table 4.2
Sales Growth: Means and Variances, by Site

	Mean	Between-industry variance	Within-industry variance
1. Cincinnati, OH	.0185	.0019	.0151
2. Columbus, OH	.0349	.0049	.0726
3. Dayton, OH	.0070	.0059	.0327
4. Toledo, OH	-.0138	.0048	.0188
5. Baton Rouge, LA	.0772	.0001	.0274
6. Lake Charles/Lafayette, LA	.1522	.0820	.0974
7. New Orleans, LA	.0646	.0142	.0173
8. Birmingham, AL	.0014	.0072	.0155
9. Mobile, AL	-.0332	.0030	.0228
10. Pensacola, FL	.0324	.0034	.0105
11. Beaumont/Port Arthur, TX	.0698	.0081	.0530
12. Corpus Christi, TX	.1280	.0057	.0298
13. San Antonio, TX	.0791	.0096	.0263
14. Harland, KY	.0544	.0250	.1105
15. Pike, KY	.0414	-.0019	.0478
16. Buchanan/Dickenson, VA	.0064	-.0033	.0196
17. Alamosa, CO	.0007	.0065	.0345
18. Logan/El Paso, CO	-.0306	.0143	.0253
19. Weld, CO	-.0163	.0013	.0736
20. Marathon, WI	.0244	.0129	.0246
21. Outagamie, WI	.0103	.0563	.0416
22. Winnebago, WI	.0413	.0065	.0589
23. Skagit/Whatcom, WA	-.0511	.0048	.0536
24. Skamania, WA	-.0590	-.0010	.0329
25. Balance of WA	-.0350	.0103	.0260
26. Grundy, MO	-.0963	.0045	.0666
27. St. Francoise, MO	.0154	.0013	.0382
28. Balance of MO	-.0037	.0004	.0198

NOTE: All variables are based on log (1 + sales growth). Between-industry variance equals $\overline{R}^2$ times the variance in log (1 + sales growth), where R^2 is from a regression of the firm-level sales growth measure on a series of 1-digit and 2-digit industry dummies (1-digit for nonmanufacturing, 2-digit for manufacturing) within each site. The within-industry variance is $(1-\overline{R}^2)$ times the variance.

Table 4.3
Employment Growth: Means and Variances by Site

	Mean	Between-industry variance	Within-industry variance
1. Cincinnati, OH	-.1345	.0378	.2643
2. Columbus, OH	-.0322	.0091	.1542
3. Dayton, OH	-.1210	-.0095	.2356
4. Toledo, OH	-.0678	.0393	.0376
5. Baton Rouge, LA	.0093	.0009	.2861
6. Lake Charles/Lafayette, LA	-.2398	-.0474	.6675
7. New Orleans, LA	.1824	-.0626	.4884
8. Birmingham, AL	.0946	-.0150	.3405
9. Mobile. AL	-.0055	.0113	.1468
10. Pensacola, FL	-.1005	-.0266	.3019
11. Beaumont/Port Arthur, TX	-.0175	.0328	.1649
12. Corpus Christi, TX	.1252	.0047	.3109
13. San Antonio, TX	.0967	.0321	.1018
14. Harlan, KY	.2009	-.0030	.1499
15. Pike, KY	.1179	.0021	.0894
16. Buchanan/Dickenson, VA	.0529	-.0129	.1090
17. Alamosa, CO	.0771	.0477	.1514
18. Logan/El Paso, CO	-.0894	-.0077	.2301
19. Weld, CO	-.0881	0348	.1700
20. Marathon, WI	-.0609	.0240	.1232
21. Outagamie, WI	.0658	.0178	.0311
22. Winnebago, WI	-.0541	.0028	.0448
23. Skagit/Whatcom, WA	-.1688	.1159	.1994
24. Skamania, WA	-.1290	-.0116	.1066
25. Balance of WA	-.0939	.1246	.1810
26. Grundy, MO	.0053	-.0154	.1327
27. St. Francoise, MO	.0259	.1137	.2142
28. Balance of MO	.2015	.0380	.4579

NOTE. Variables defined as in table 4 2, but using employment growth rather than sales growth.

Variances of sales growth across firms for each market measure the extent to which some firms face larger changes in demand than do others within that market. Thus, these variances capture shifts in demand between firms but within each local market. Since some of these firms are in the same industries and others are not, we wanted to decompose the total variance for each market into parts reflecting shifts between firms of different industries (i.e., between-industry shifts) and those between firms of the same industries (i.e., within-industry shifts). This decomposition was accomplished by a series of separate regressions for each site of the log growth measure on a set of industry dummies. Each regression was sample- and size-weighted. The industry dummies included one-digit measures for nonmanufacturing and two-digit measures for manufacturing industries.[1] The adjusted R^2 (or $\overline{R}^2$) for each of these regressions was then used as a measure of the fraction of total variance in a site accounted for by between-industry variance.[2] One minus the adjusted R^2 (i.e., $1-\overline{R}^2$) reflects the fraction accounted for by within-industry variance. Multiplying each of these fractions by the total variance across firms in each site produced the respective between-industry and within-industry variances that appear in tables 4.2 and 4.3.

The results presented in table 4.2 show that sales growth ranged from over 15 percent in Lake Charles/Lafayette to almost −10 percent in Grundy, Missouri. Sales growth was generally more positive within the SMSAs, especially those in the South. Among non-SMSAs, the coal-mining areas of Kentucky generally saw the largest sales increases. Since the sample period directly followed the second oil shock, these results seem sensible.

Between-industry variances in sales growth are generally only a small fraction of the within-industry variances. In a few cases, the former appear to be negative—i.e., the adjusted R^2 on the industry dummies in the firm-level sales growth regression was below zero.

Table 4.3 presents comparable numbers for employment growth in each site. Over half of the sites showed negative employment growth for the period in question, with some of the largest declines occurring in the industrial cities of Ohio. In general, the employment growth means of table 4.3 seem somewhat correlated with the sales growth means of table 4.2, though there are some striking divergencies as well (e.g., Lake Charles/Lafayette shows the most negative employment growth and the most positive sales growth!). As in the case of sales growth, most of the variance in employment growth in almost every site is within-industry. To some extent, divergences in results between sales and employment growth needn't be very surprising. It is certainly possible for changes in sales to be absorbed without employment changes at a firm, especially if these changes are temporary. There are also other determinants of employment change besides changes in sales, such as changes in technology or substitution with other factors. Other evidence (Leonard 1987) has shown firm-level employment growth to be highly variable over time.

There is reason to believe, however, that the employment growth figures are measured with considerably more error than are those for sales growth. Greater measurement error in employment growth should be expected, since that variable is calculated from responses in two surveys while sales growth is based on one. The much higher variances and presence of outliers in the employment growth figures certainly suggest that this is true, as does some econometric evidence.[3] The sales growth variables are also a more direct measure of product demand shifts and can be more reasonably considered exogenous in an unemployment rate equation. For all of these reasons, the results reported below focus on sales growth as measures of demand shifts for a local labor market.

Unemployment and Vacancy Effects of Sales Growth

In this section we will use the means and variances of sales growth to explain unemployment and vacancy rates across local labor markets.

Some very prominent papers in the literature have done somewhat similar analyses on aggregate, time-series data. In particular, Lilien (1982) estimated unemployment rate equations using time-series data in which the variance of employment growth across industries was used as an independent variable (among others).[4] According to Lilien, high variances in employment growth suggest shifts in labor demand across industries which could produce adjustment (or mismatch) problems. When he found significant, positive effects of the variance measure on unemployment for the 1970s, Lilien concluded that demand shifts across industries were responsible for growing structural unemployment during that decade.

Others, however, questioned this particular interpretation of the variance measure. In particular, Abraham and Katz (1986) argued that downturns in aggregate demand could just as easily cause high variance in employment growth as could "mean-preserving" shifts across industries. If, for instance, low-growth industries are more cyclically sensitive than high-growth industries, a cyclical downturn would raise both unemployment and the variance of growth across industries.

To test for this, Abraham and Katz ran aggregate vacancy rate equations, using the Conference Board's Help-Wanted Index, in addition to aggregate unemployment rate equations. If employment growth variance leads to mismatch problems and structural unemployment, we would expect to find positive effects of variance on both vacancies and unemployment. Instead, they found negative effects of employment growth variance on vacancies as well as positive effects on unemployment, which suggested that the variance measure was capturing demand problems rather than truly structural unemployment.[5]

In the following analysis, we study the effects of demand shifts on unemployment rates and vacancy rates across local labor markets in a particular year. That year is 1980; demand shifts are measured by sales growth between 1979 and 1981. As noted above, the latter are somewhat affected by the major recession of 1981–82, though the former are not. Consequently, we should primarily be observing the effects of noncyclical demand changes here.

These equations should enable us to test whether demand shifts in local areas cause higher unemployment levels. Since the means of sales growth reflect changes in total demand for any market while the two variance measures reflect changes in the composition of demand, unemployment rate equations having these measures as independent variables should enable us to sort out demand-based and structural unemployment at the local level. Comparisons with vacancy rate equations should then confirm or contradict these findings, since demand factors should have effects of opposite sign on unemployment and vacancies while structural factors should have effects of the same sign.

In tables 4.4 and 4.5, we present results of unemployment and vacancy rate equations that include the three sales growth measures as independent variables. Both dependent variables appear in log form.

Table 4.4
Unemployment Effects of Sales Growth

Dependent variable: log (unemployment rate)	
Independent variables:	
Mean, Log (1+sales growth)	-3.122
	(.700)
Between-industry variance	3.433
	(4.250)
Within-industry variance	-2.476
	(1.590)
R^2	.535
N	28

NOTE: Equations are weighted by (labor force size)$^{1/2}$.

Table 4.5
Vacancy Rate Effects of Sales Growth

Dependent variable: Log (vacancy rate)	
Independent Variables:	
Mean, Log (1+sales growth)	2.71
	(2.29)
Between-industry variance	-2.52
	(13.92)
Within-industry variance	2.57
	(5.21)
R^2	.083
N	28

NOTE. Equations are weighted by (labor force size)$^{1/2}$

Table 4.4 shows large and significantly negative effects of mean sales growth on unemployment rates. The magnitude of the elasticity (approximately 3) is quite striking, as is the explanatory power of this variable.[6] The between-industry variance measure has a positive (though not significant) effect, while within-industry variances appear to have negative effects. The R^2 for the equation shows about half of the variation in unemployment across sites being explained by these measures, especially the mean of sales growth.

The vacancy rate equation in table 4.5 shows positive and very marginally significant effects of mean sales growth on vacancy rates. Neither of the variance measures has a significant effect on vacancies.

The results shown in tables 4.4 and 4.5 suggest that demand shifts between local labor markets (as reflected in differences in the mean growth rate of sales) have very important effects on unemployment and vacancy rates in these markets. Their negative effects on unemployment and positive effects on vacancies show that labor markets are moved along their respective Beveridge curves by these demand shifts. From the point of view of any particular local market, these shifts constitute demand rather than structural effects on unemployment. But from the point of view of the U.S. labor market as a whole, these demand shifts might be creating unemployment that is structural in nature. In other words, shifts in demand from some markets to others may also raise the aggregate unemployment and vacancy rates, thereby signifying rising structural unemployment.

This would occur if demand shifts cause unemployment or vacancies to rise by more in some markets than they decline in others. A convex relationship between unemployment and mean sales growth might thus exist, reflecting diminishing marginal productivity of the matching process in the short run for any particular market. In fact, our data suggest that this is, in fact, the case.[7]

This interpretation is also consistent with recent work by Abraham (1987), who found that the shifting out over time of the aggregate Beveridge curve for the U.S. could not be explained by shifts in curves *within specific states*. The implication was that demand shifts *between* states had contributed to structural problems at the aggregate level. The rising variance in employment growth and unemployment across states reinforced this view.

While demand shifts between local labor markets appear to have important implications for local unemployment, those within markets appear much less important. Shifts between industries have some positive effects on unemployment, and this implies some structural problems created for the local labor market. But even these effects are measured with very little precision. Shifts between firms of the same industry appear to produce no structural problems.

The overall implications of these results for structural unemployment are quite plausible. Demand shifts which require individuals to bear the costs of relocation should have the most pronounced short-run effects on unemployment. Those which occur within an area but which may require some retraining in order for individuals to move to different industries (depending on the degree to which skills are industry-specific) may create smaller effects, while those across firms within the same areas and industries produce none of these adjustment costs and therefore create few problems. While most of the variation in employment growth across firms is of this last variety, the small fractions that are not can create some short-run employment problems.[8]

Adjustment and Persistence of Unemployment Differences

The findings of the previous section raise some important questions regarding market adjustments to demand shifts and the persistence of unemployment which may be generated by these shifts. Economic theory suggests that the unemployment generated by demand shifts across areas should eventually be diminished by wage and price adjustments within markets as well as migration between markets. A large body of empirical literature shows some responsiveness of migration rates to relative unemployment rates (Greenwood 1975). A recent paper by Marston (1985) found limited persistence of unemployment from demand shocks, while Topel (1986) also found migration responding to demand shifts. In the latter study, however, migration was not large enough to counteract unemployment changes apparently caused by demand shifts over the decade 1970–80.

Similar questions are raised by the results found here. For one thing, we do not really know to what extent the observed demand growth differences reflect longer-term, persistent changes or just temporary shocks. Beyond this issue, we also need to examine the longer-term relations of unemployment to demand shifts, as well as population and labor force changes induced by these factors. Unfortunately, we did not have the data available for each site to consider unemployment rates and migration rates subsequent to 1980. Data from the 1970 census on unemployment, population and labor force provide at least some evidence on unemployment persistence and migration responses that we can consider here.

Table 4.6 presents data on unemployment rates for the whole sample and by site for 1970 and 1980, as well as the ratios of labor force and population sizes for the two years. The results show that average unemployment increased significantly between 1970 and 1980, as is well-known. The standard deviation of unemployment in the sample also rose substantially, which is consistent with Abraham's results described above. In particular, we note that certain areas showing quite moderate unemployment in 1970, such as Toledo and Dayton, had some of the highest unemployment rates by 1980. Not surprisingly, these are the manufacturing centers of Ohio which showed this trend. On the other hand, the Texas SMSAs also had moderate unemployment rates in 1970, which by 1980 were significantly below average. All of these shifts would tend to raise the variance of unemployment rates across sites over the decade.

Labor force growth occurred in all sites over the decade and population grew in most (except for the Ohio SMSAs). Presumably, the former reflects the entrance of the Baby Boom cohort into the labor force. Labor force growth ranged from under 13 percent in Dayton to over 30 percent in Lake Charles/Lafayette and 37 percent in Logan/El Paso. Population growth rates ranged from about –6 percent for New Orleans and Dayton to about 38 percent for Weld. The (weighted) correlation between the two measures was quite high (approximately .6).

Table 4.6
Unemployment, Labor Force and Populations: 1970 and 1980

	U_{70}	U_{80}	LF_{80}/LF_{70}	Pop_{80}/Pop_{70}
Total	.045 (.010)	.069 (.018)	1.272 (.144)	1.092 (.109)
1. Cincinnati, OH	.038	.067	1.1700	.9450
2. Columbus, OH	.034	.056	1.1914	1.0431
3. Dayton, OH	.040	.091	1.1262	.9432
4. Toledo, OH	.041	.115	1.1521	.9739
5. Baton Rouge, LA	.045	.053	1.2387	1.2841
6. Lake Charles/Lafayette, LA	.050	.047	1.3040	1.2434
7. New Orleans, LA	.058	.070	1.1314	.9394
8. Birmingham, AL	.042	.068	1.1658	1.0906
9. Mobile, AL	.054	.074	1.1780	1.1710
10 Pensacola, FL	.054	.078	1.2581	1.2066
11. Beaumont/Port Arthur, TX	.045	.061	1.1915	1.0851
12. Corpus Christi.TX	.044	.047	1.2405	1.1391
13. San Antonio, TX	.041	.048	1.2365	1.2027
14. Harland, KY	.071	.094	1.2367	1.1209
15. Pike, KY	.066	.077	1.2151	1.3286
16. Buchanan/Dickenson, VA	.053	.072	1.2374	1.2004
17. Alamosa, CO	.044	.058	1.1487	1.0330
18. Logan/El Paso, CO	.052	.073	1.3710	1.2929
19. Weld, CO	.042	.066	1.1949	1.3823
20. Marathon, WI	.051	.075	1.2163	1.1417
21. Outagamie, WI	.029	.063	1.2633	1.0791
22. Winnebago, WI	038	.059	1.2222	1.0136
23. Skagit/Whatcom, WA	.078	.103	1.1995	1.2718
24. Skamania, WA	.073	.095	1.1404	1.3402
25. Balance of WA	.081	.099	1.1451	1.1313
26. Grundy, MO	.038	.068	1 1311	1.0400
27. St. Francoise, MO	.043	.083	1.1821	1.1764
28. Balance of MO	.038	.060	1.1372	1.0676

In table 4.7, we present estimates of labor force growth equations. Various simple equations have been estimated in which unemployment rates or sales growth are used as independent variables.[9] Somewhat surprisingly, column 1 shows labor force growth being positively related to unemployment rates at the beginning of the decade. Keeping in mind that labor force growth is not a perfect index of immigration makes this somewht less implausible. Columns 2 and 3 show strong *negative* effects of unemployment rates in 1980 and especially changes in unemployment over the decade on labor force growth. Apparently, populations and labor forces move toward areas of declining unemployment, paying less attention to unemployment levels of earlier years.

Table 4.7
Equations for Labor Force Growth: 1970–1980

Dependent variable: Log (LF_{80}/LF_{70})

Independent variables:	1	2	3	4
Log (unemployment 1970)	.215 (.117)	—	—	—
Log (unemployment 1980)	—	-.165 (.111)	—	—
Log (U_{80}/U_{70})	—	—	-.330 (.092)	—
Log (1+sales growth)	—	—	—	.369 (.503)
R^2	.115	.078	.333	.020
N	28	28	28	28

NOTE Equations are weighted by (labor force size)$^{1/2}$

Finally, column 4 shows labor force growth rising as a function of mean sales growth, thus suggesting some positive responsiveness of migration to total demand. The estimated effect, however, is not significant. Given the differences between time periods covered between the dependent and independent variables, this is not too surprising.

In table 4.8, we present estimates of equations for the 1980 unemployment rate as functions of sales growth measures, but to which the 1970 rate and the labor force growth rates are respectively added. The addition of the 1970 rate enables us to control for long-term trends in unemployment when we consider the effects of more recent shifts in demand. Though presumably endogenous, the labor force growth variable can act as a proxy for longer-term trends in demand growth or unemployment that enable us to focus more specifically on the effects of more recent changes.

Table 4.8
Unemployment Rate Effects of Sales Growth, Controlling for Long-Term Unemployment and Labor Force Growth

Dependent variable: Log (unemployment 1980)

Independent variables:	1	2
Mean. Log (1+sales growth)	-2.882	-2.634
	(.653)	(.603)
Between-industry variance	2.156	1.824
	(3.959)	(3.606)
Within-industry variance	-1.863	-1.060
	(1.491)	(1.397)
Log (unemployment 1970)	.324	.464
	(.142)	(.142)
Log (LF_{80}/LF_{70})	—	-.538
		(.224)
R^2	.621	.700
N	28	28

NOTE: Equations are weighted by (labor force size)$^{1/2}$

Column 1 shows significant effects of the 1970 unemployment rate on that for 1980, though with a coefficient well below one. The effects on other estimated coefficients of including this variable are fairly small. In particular, the coefficient on mean of sales growth is reduced by under 10 percent from that which appears in table 4.4. When labor force growth is included instead, the results show somewhat greater reduction in the estimated coefficients. But even here, about 85 percent of the original sales growth effect remains.

We thus can conclude that fairly recent demand shifts can have very large effects on unemployment rates, even after controlling for certain long-term trends. While migration does apparently respond to such unemployment changes, the short-run response is limited and does not eliminate the underlying effects very quickly.

Summary

Using firm-level survey data on employment and sales growth between 1979 and 1981, we have calculated means and variances in sales growth rates at the site level. These are interpreted as between- and within-site demand shifts. The latter are also decomposed into between-industry and within-industry shifts within sites.

We then use these measures for sales growth in order to explain unemployment and vacancy ra' by sites for 1980. The results show large and significant negative effects of mean sales growth on unemployment and positive effects on vacancies. The between-industry component of variance had some effect on unemployment as well. From this we conclude that demand shifts between local labor markets can have large effects on unemployment, which may lead to short-term structural problems when reviewed from the aggregate perspective. Shifts within local labor markets are a lesser concern, especially when confined to the same industry.

Our limited evidence on migration rates and persistence showed some responsiveness of migration rates to unemployment changes over the 1970–80 decade, though not enough to eliminate the effects of the more recent demand shifts.

NOTES

1 Another series of regressions was run using only one-digit dummies for all industries. The calculated between- and within-industry variances produced very similar results in unemployment rate and vacancy rate equations to those presented here.

2. Adjusted $\bar{R}^2$ is used here, since the number of observations in some sites is fairly small relative to the number of industry dummies used Adjusted $\bar{R}^2$ essentially corrects R^2 for this degree of freedom problem by reducing the R^2 where degrees of freedom are low. The formula is $(1-\bar{R}^2) = \frac{n-1}{n-k-1}(1-R^2)$ Note that it is possible for $\bar{R}^2$ to be negative, as we observe in tables 4.2 and 4.3.

3. Reverse regressions are often used to determine the degree of measurement error in a variable, since the reciprocal of the estimated coefficient sets an upper bound to the true coefficient estimate of the desired regression Reverse regressions were run for the unemployment and vacancy rate equations reported below, using sales growth and employment growth as alternative measures. The employment growth estimates produced ranges of estimates that were several orders of magnitude higher than those of sales growth. This indicates the presence of a substantially greater measurement error problem for the former.

4. Lilien used Barro's (1978) unanticipated money growth variable to control for aggregate demand.

5. This result suggests that the control variables used in both studies for aggregate demand (i.e., unanticipated money growth) did not sufficiently control for aggregate conditions.

6 An equation in which the mean of sales growth appeared as the only independent variable had an R^2 of almost .50.

7 Equations in which the unemployment rate (not in logs) was regressed on mean sales growth and growth squared produced a significant negative coefficient on the former and a significant positive one on the latter, thereby indicating a quadratic (which is convex) relationship between unemployment and total demand across areas.

8. Regressions of employment or sales growth for the entire sample of firms on a set of site and 2-digit industry dummies produced R^2 of 05- 15, thereby indicating that most of the variation is both within-site and within-industry

9. Equations in which population growth rates rather than labor force growth appeared as the dependent variable showed fairly similar results

5
Conclusions and Policy Implications

Unemployment rates in the United States vary considerably over time and across local areas. Economists have long been concerned with explaining these variations and have attempted to sort out various components of unemployment in order to explain variations in rates. Components identified are frictional and structural unemployment, which involve the turnover and matching process between workers and jobs, and demand-deficient unemployment, which is caused by cyclical or secular demand shifts and the failure of wages and/or prices to adjust in the short run. It is crucially important for policymakers to recognize this distinction, since the policy prescriptions differ greatly for the different types of unemployment: the frictional type requires reform of unemployment insurance and/or improvements in job placement services; the structural type requires policies to enhance job training and migration; and the demand-deficient type requires job creation. While these types of unemployment are conceptually clear and distinct, however, it has often been difficult to measure them empirically.

In this study, I have used firm-level data on job vacancies, sales growth and wages, within and across a group of 28 local labor markets, to try to examine these issues. Data have been merged with census data on unemployment rates and also on the educational, industrial and demographic characteristics of the areas. Statewide ratios of unemployment insurance benefits-to-average wages are used as well. While most of the analysis is done for the year 1980, some comparisons with the year 1982 are done as well in order to see how these results are affected by the aggregate business cycle.

The analysis is based primarily on the relationship between unemployment and vacancy rates. High vacancy rates relative to unemployment rates would indicate substantial job availability and would imply that such unemployment is frictional/structural in nature, while low vacancy rates imply limited job availability and greater demand-deficient unemployment. Estimates of cross-sectional Beveridge curves (i.e., unemployment-vacancy equations) also tell us how much of the variation in unemployment across areas is accounted for by variation in vacancies and therefore by differences in labor demand (relative to labor supply).

Finally, we use differences in the mean of sales growth to measure recent shifts in labor demand across areas, while the variance of sales growth for each area measures demand shifts within areas. The latter are also decomposed into between- and within-industry components. The means thus measure changes in total demand while the variances measure changes in its composition that may create frictional or structural problems for an area. The effects of all of these shifts on area unemployment rates are then analyzed.

Our results indicate that many different factors contribute to differences in unemployment rates within and across local labor markets. In general, we find that job vacancy rates are much lower than unemployment rates. The former averaged only about 1.5 percent and the latter almost 7 percent during 1980. and the gap between the two grew during the recession year of 1982. Unemployment rates exceeded vacancy rates for every local labor market, especially in markets with high unemployment rates.

Using unemployment-vacancy equations, we also find that 30 percent to about 57 percent (the latter for SMSAs) of the differences among areas in unemployment rates in 1980 could be attributed to relative demand differences. In the more recessionary environment of 1982, these figures rose to one-half to two-thirds. Furthermore, the figures may be understated because of measurement error in the observed vacancy rates.

In 1980, only small fractions of the demand effects could be explained by wage level differences or industrial composition (i.e., fractions of the labor force employed in manufacturing as opposed to services). In 1982, the greater cyclical sensitivity of high-wage industries and the manufacturing sector probably raised the fractions attributable to these factors.

On the other hand, recent demand shifts at the local level appeared to be of major importance in explaining differences in unemployment rates. Differences in sales growth across the sites between 1979 and 1981, as a measure of between-market demand shifts, alone explain almost half of the variation in unemployment across areas. But demand shifts within local areas, as measured by variances in sales growth rates across firms for each area, had much smaller and insignificant effects on unemployment rates across areas. Only the proportion of the within-area shifts that occurred *between* (rather than within) industries had a positive (though insignificant) effect on local unemployment rates.

The effects of demand shifts across areas can be mitigated either by wage and price adjustments within these areas or by migration of workers between areas. The evidence provided in the latter case suggests that some migration did occur in response to recent shocks, though it did not occur quickly enough to eliminate the unemployment consequences of demand shocks in the short run.

As for other factors that contribute to frictional or structural problems at the local level, we found that rates of college attainment had major negative effects on local unemployment rates, as did low average ages of labor forces. Of course, it was not clear to what extent these characteristics reflected the migration of the young and educated to growing areas, as opposed to existing characteristics of the areas that contributed to smoothly functioning labor markets. The ratio of UI benefits to average wages also had significant effects on unemployment rates. In contrast, the proportions of females in the respective labor forces did not contribute significantly to unemployment rate differences.

On a more micro level, differences in vacancy rates across occupations and industries seem to reflect differences in skill requirements, wage premia, and job turnover rates, as well as firm size and unionization. There was at least some evidence that rapidly growing firms had higher vacancy rates and longer vacancy durations than others, which suggests some difficulties for these firms in hiring employees with the correct qualifications. We therefore conclude that differences across local areas in both frictional/structural and demand-deficient unemployment help to explain the overall variation in unemployment rates across local markets.

The low overall rate of vacancies relative to unemployment suggests an important role for low levels of labor demand in generating unemployment. This is particularly true in those markets with higher than average unemployment and lower than average vacancy rates. The much larger effects on unemployment of demand shifts across areas than within areas confirm the view that the total level of demand facing an area is far more important than the composition of such demand between industries and firms in explaining local unemployment.

On the other hand, some frictional and structural components of unemployment are also apparent in the data. Unemployment differences caused by demand shifts across areas are at least partly structural when viewed from an aggregate perspective, since unemployment rates rise in declining areas by more than they fall in growing ones. Even within areas, shifts across industries appear to have some effects (though they are small) on observed unemployment. The observed effects on unemployment rates of UI ratios, education levels, and perhaps age as well point to differences in turnover rates, durations of search, and/or skills as determinants of frictional and/or structural unemployment in local markets. If the costs of labor can be reduced and more vacancies result from the lowering of frictional and structural problems, the potential for lowering local unemployment rates by addressing these problems rises.

It is therefore also clear that no single policy prescription can be formulated which will effectively eliminate high unemployment rates and large differentials in these rates across areas. Job creation policies are clearly important for areas facing low levels of demand relative to supply. But we know that these policies produce the risk of higher inflation when pursued at the aggregate level through fiscal and monetary policy. Public job creation can be more easily targeted on specific areas, but it entails other problems (e.g., high budgetary expense and generally low wages and quality of jobs produced). The most important single factor for explaining differences across markets—i.e., local demand shifts—are particularly unsuited for influence or control through government policy, since these presumably reflect changes in consumer tastes, technology, or other factor costs which are part of the private sector's natural workings.

On the other hand, government policies might play some role in facilitating the adjustment processes of the private economy in response to such shocks. For instance, individual migration in response to demand shifts is a costly process which may also be hampered by individual uncertainty over opportunities in new areas. Government relocation subsidies might help to make this process less costly. Government efforts to gather more data on the quantity and characteristics of job vacancies in different geographical areas and to disseminate this information nationally might also have some payoff here. While economists have long debated the usefulness and value added of regularly gathering job vacancy data,[1] their potential importance in aiding the migration process across areas has rarely been mentioned.

Of course, a different approach to the problem of local demand shifts involves government efforts to counteract (or even prevent) the shifts themselves, rather than just aid the adjustment process after shifts occur. This might involve regional growth policies, designed to help declining areas in attracting or retaining firms. While we know fairly little about the efficacy of these approaches, at least a few of them are being discussed with growing frequency by policymakers. Such approaches include area enterprise zones, which might receive tax breaks from state or federal governments, and government efforts to improve infrastructure and business services in these areas. The latter were widely used by the State of Massachusetts recently in trying to redirect firms from the Boston area to some of the older and declining industrial areas of the state (e.g., Lowell, New Bedford, etc.). Of course, the role of these efforts in the lowering of Massachusetts' unemployment rate has been hotly contested.[2]

Some of the other findings mentioned above also suggest some potential roles for government policy. Worker education affects local unemployment rates, and more specific worker skills can presumably affect job vacancy rates for certain occupations and industries. Greater government efforts in financing education and training might therefore play some role in resolving frictional and structural problems in local areas. Subsidized retraining for displaced workers might be particularly useful in dealing with the effects of demand shocks within or across labor markets. Requiring employers to provide advance notice for major plant closings might also be useful in this regard.[3]

Finally, we note the role of unemployment insurance in contributing to higher turnover and/or lengthier durations of unemployment. In this data for 1980 analyzed here, a 10 percentage point rise in the ratio of benefits-to-wages was associated with increases in local unemployment of up to 19 percent. Of course, the recent decline in fractions of the unemployed covered by UI makes this issue less pressing than it might previously have been, particularly among the long-term unemployed. But the evidence presented here and elsewhere (e.g., Woodbury and Spiegelman 1987) suggests that the parameters of state UI systems (i.e., benefit durations and levels as well as the possible use of bonuses for early reemployment) can still have important effects on unemployment duration. Possible reforms of the UI system deserve greater attention in policy discussions.

We close with a few major caveats that bear repeating as we consider these results, and a few suggestions for further research. As noted above, this study has been limited by the small and nonrandom nature of the sites involved. Given the small sample size, only a limited number of control variables could be used in any particular equation. Measurement error and random noise in our data were constant concerns.

Perhaps more important, these results were based almost exclusively on two cross-sections of local markets at particular points in time. Since these markets are continually buffeted by demand (and supply) shocks, the results found here for particular sites might already have changed. This is especially possible for the oil-producing sites of Texas and Louisiana, who were enjoying the benefits of the OPEC oil shocks in 1980 but who are now presumably suffering from the effects of the recent oil glut. The coal-producing areas of Kentucky might have been similarly affected, while the areas with heavy concentrations of manufacturing presumably saw their fortunes worsen and then improve over the course of the 1980s. The appearance of growing labor shortages, especially among young workers (due primarily to the decline in birth rates during the 1960s and 1970s) in the late 1980s and (projected for) the 1990s, may also raise the overall ratio of vacancies to unemployment and thus the potential role for policies aimed at reducing frictional and structural problems.

As for further research, we clearly need to have a better understanding of why and where local demand shocks occur in order to devise the most appropriate policy responses. More research on the relationship between unemployment changes and migration is crucial here as welll. Finally, more serious evaluations of attempts already made by various states or the federal government in aiding retraining or relocation are needed beforc we can recommend these approaches with any confidence.

NOTES

1 See, for instance, the National Bureau of Economic Research volume entitled *The Measurement and Interpretation of Job Vacancies*, 1966.

2 An unpublished report prepared by Ronald Ferguson and Helen Ladd of the John F. Kennedy School of Government, Harvard University, attributes most of the state's recent success to the growth of demand for the high technology products and defense contracts, though it credits the state's efforts with having some beneficial effects for declining areas. These findings are consistent with the notion of redirecting local demand shifts discussed here They remain controversial, however, and are not necessarily conclusive.

3 In a monograph published by the W E Upjohn Institute, Ehrenberg and Jakubson (1988) find that advance notice of plant closing lowers the frequency of unemployment for displaced workers, though not the duration. This suggests that some workers about to be displaced use the lead time to locate new employment before their current jobs end

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