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STRUCTURAL/FRICTIONAL AND DEMAND-DEFICIENT UNEMPLOYMENT IN LOCAL LABOR MARKETS

Harry J. Holzer

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ABSTRACT

This paper uses data on unemployment rates and job vacancy rates to measure structural/frictional and demand-deficient components of unemployment rate differences across local labor markets. Data on occupational and industrial distributions of unemployed workers and vacant jobs, as well as on local wages, recent sales growth, Unemployment Insurance, and demographics are then used to help account for these components of unemployment across local areas.

Harry J. Holzer
Department of Economics
Michigan State University
East Lansing, MI 48824

I. Introduction

Economists frequently categorize unemployment into frictional, structural and demand-deficient components. Frictional unemployment generally refers to the normal movement of individuals into and out of jobs while structural unemployment refers to particular difficulties in this process, caused by "mismatches" of skill, locations, etc. Demand-deficient unemployment, on the other hand, refers to a shortage of jobs relative to workers - i.e., an excess of labor supply over labor demand at given wages. Such an excess can result from cyclical factors and possibly from secular ones as well, such as persistent non-market-clearing wages.[1]

While these categories are fairly distinct conceptually, our ability to distinguish them empirically has been less successful. At least part of this difficulty lies in our uncertainty over how these components should be measured. Analyses of aggregate movements over time have centered on calculations of the "non-accelerating inflation rate of unemployment" (NAIRU), though our ability to measure this rate from time-series data when the rate itself has been changing over time has been limited.[2] More recently, Lilien (1982) has focused on the variance in employment growth across industries as a measure of structural unemployment induced by sectoral shifts. This interpretation has been challenged by Abraham and Katz (1986), among others.

A more direct measure of job availability and therefore of demand-deficiencies is the job vacancy rate, which has been widely analyzed in Great Britain and other OECD countries. But since these data are not regularly collected by the federal government in the U.S., they have not been used very extensively here in sorting out types of unemployment. Analyses of aggregate movements over time have sometimes used the Conference Board's Help-Wanted Index as a proxy for the trend in the aggregate-vacancy rate (e.g., Abraham and Katz (1986), Abraham (1987)). Aside from these studies, only Abraham

(1983) has used actual survey data on job vacancies to decompose unemployment in the U.S. into its structural/frictional and demand-deficient components.

In this study I use data on unemployment rates and vacancy rates to sort out structural/frictional and demand-deficient components of unemployment differences across local labor markets. A fairly large literature already exists on local and regional unemployment rates which stresses "equilibrium" differences between markets (e.g., Hall (1970), Reza (1978), Murphy and Hofler (1985)). These studies stress local differences in wages, amenities, transfer payments/Unemployment Insurance, and population demographics. Alternatively, studies focusing on "disequilibrium" differences (e.g., Marston (1985), Topel (1986), stress local demand shocks which may require migration across areas in order to re-establish equilibrium. Others have focused on different regional sensitivities to aggregate cyclical fluctuations (e.g., Brown (1978), Rones (1986)) in analyzing disequilibrium differences. While the "disequilibrium" components of unemployment clearly center on relative demand differences across areas, the "equilibrium" components generally contain both demand-based (due to wages) and frictional/structural elements (due to wages and other factors mentioned above).[3]

In this study I will use a cross-sectional analogue of the aggregate "Beveridge Curve" (i.e., the unemployment rate-vacancy rate relationship) to estimate the structural/frictional and demand-deficient components of local unemployment rate differentials. I will then use data on the occupations and industries of unemployed workers and job vacancies, local wages, UI payments, industries, sales growth, and demographics in trying to explain these components. This latter part of the analysis should help link this study to the "equilibrium - disequilibrium" literatures on this topic. Comparisons of results for different years will also shed light on how these relationships change over the aggregate business cycle.

The vacancy data used for this analysis are computed from the Employment Opportunity Pilot Project (EOPP) Survey of Firms in 1980 and a followup survey (by Gallup, Inc.) in 1982. These firms (about 5200 in 1980 and 3400 in 1982) are located in 28 local areas which were sites for the EOPP labor market experiments of 1979 and 1980. Of these areas, thirteen are SMSA's and the rest are groups of counties. The sites are heavily concentrated in the South and Midwest, though they cover a broad range of industrial and demographic characteristics. The list of sites appears in the tables of the Appendix at the end of the paper. Within sites, large and/or low-wage firms were over-sampled. However, sampling weights appear in the data to correct for this.

Vacancy rates at the level of the firm have been used to calculate site-level rates. These have been merged with published census data on unemployment rates for the same local labor markets. The EOPP data are also used for the calculation of area wage premia, while the census data are used for occupational, industrial and demographic data here. Finally, state-wide data on UI benefits from Department of Labor publications are merged with the various site-level data as well.

II. The Model and the Data

The relationship between unemployment rates and vacancy rates has been studied extensively in the "Beveridge Curve" framework, which relates the two aggregate rates as they move over the business cycle. This relationship was first examined empirically by Dow and Dicks-Mireaux (1958) for Britain, and theoretical formulations were developed by Holt and David (1966), Holt (1970) and Hansen (1970). More recent contributions within the search framework include those of Jackman et. al. (1984) and Pissarides (1985).

The standard theoretical treatment of this relationship specifies a steady-state movement of individuals into and out of unemployment that leaves total unemployment unchanged - i.e., inflows equal outflows. Inflows into unemployment represent exogenously determined separation (or turnover) probabilities per period while outflows represent job accession probabilities. The latter will, in turn, reflect the stocks of unemployed individuals and vacant jobs, their chances of contacting each other, and the chances that offers will be made and accepted. More formally this can be written as:

1) $$tE = b(s_L U)^x (s_F V)^y$$

where E, U, and V are stocks of employed workers, unemployed workers, and vacant jobs respectively; s_L and s_F are worker and firm search intensities; t is the turnover rate out of employment; and b, x, and y are parameters of a Cobb-Douglas production function of job matches (i.e., offers and acceptances) for a set of workers and vacant jobs. Returns to scale in matching thus reflect the sum of x and y.[4]

Solving for the unemployment rate u we obtain

2) $$u = \left(\frac{t}{b s_L^x s_F^y v^y}\right)^{1/x}$$

where v is the vacancy rate.[5] It is clear that a tradeoff exists between unemployment and vacancy rates since:

3) $$\frac{du}{dv} = -\frac{yu}{xv} < 0 \quad \text{or} \quad \frac{d \ln u}{d \ln v} = -\frac{y}{x} < 0$$

Changes in the level of labor demand relative to labor supply are captured by this tradeoff since

4) $$U \equiv L^s - E, \; V \equiv L^D - E$$

where L^D and L^s represent the stocks of labor demand and supply respectively. Changes in search intensity, the matching technology or turnover, on the other hand, will shift the unemployment-vacancy locus inward or outward. Shifts in the locus thus represent changes in frictional and/or structural unemployment while movements along the locus capture demand-induced unemployment changes (of a cyclical or more general nature).

While this framework is generally used to analyze aggregate movements over time, it can also be used to consider a cross-section of local labor markets. If we hypothesize that a common matching function (characterized by the parameters x and y) exists across local markets, then we can analyze unemployment and vacancy rate differences across these markets. As Roper and Jackman (1987) have shown, the distribution of rates across these markets will help to determine the position of the aggregate Beveridge Curve. Thus, greater dispersion across sites (or greater convexity in the function) will lead to outward shifts in the aggregate curve, as shown in Figure 1. Greater dispersion reflects a greater geographic imbalance in unemployment and vacancies across sites, which would imply greater "structural" unemployment in the aggregate. Similarly, the changes in unemployment and vacancies of these local markets over the business cycle will determine the movement of the two rates along the aggregate curve as well, as shown in Figure 2.

An empirical representation of such an unemployment vacancy-relationship in a cross-section of local labor markets is:

5) $$u_{kt} = \alpha + \beta v_{kt} + \alpha Z_{kt} + \varepsilon_{kt}$$

where u_{kt} and v_{kt} are unemployment and vacancy rates in local market k at time t; and the Z_{kt} are variables which shift the unemployment/vacancy locus. The latter might include the determinants of search intensity and the turnover rate as well as the match technology in that market; i.e., anything which helps determine frictional and/or structural unemployment in that market.[6] Such variables should include measures of skills in the population, which might determine the productivity of the matching technology; demographic characteristics (e.g., age and sex), which might determine turnover; and transfer payments or Unemployment Insurance that might affect search intensity.[7]

Figure 1

Local Unemployment-Vacancy Relationships:
The Effects of Rising Dispersion
on Aggregate Unemployment

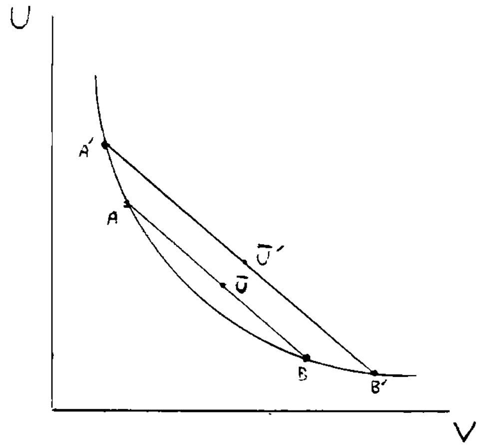
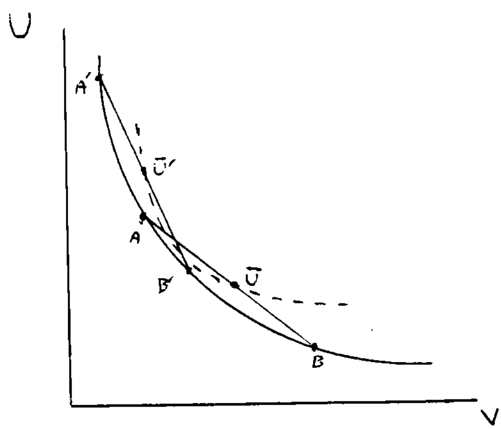


Figure 2

Local Unemployment-Vacancy Relationships:
The Effects of the Business Cycle



Another determinant of the match technology for each local market is the degree of balance between the occupational and industrial distributions of enemployed workers and vacant jobs. Higher imbalances suggest "mismatches" between the skills in which workers have invested and those needed for available jobs. Following Roper and Jackman, we estimate the degree of mismatch as:

6) $$I_k = .5\sum_i |U_{ik}/U_k - V_{ik}/V_k|$$

where U_{ik}/U_k and V_{ik}/V_k are the fractions of total unemployment and vacancies respectively in markets that are accounted for by occupation or industry i. These indices will therefore be included among the Z_{kt} in some variations of Equation 5).

In this context, $b^*\sum_k(V_{kt}-\bar{V}_t)$ would measure the variation in unemployment attributable to demand-shifts (or movements along the unemployment-vacancy locus) while $c^*\sum_k(Z_{kt}-\bar{Z}_t)$ would reflect that part due to structural/frictional factors. Simple and partial R^2's should thus enable us to measure these components.

We can also add variables to Equation (5) which might help to explain differences across local markets in relative labor demand - e.g., area wages, industries, and/or sales growth. These variables will hopefully shed some light on the sources of these demand differences and perhaps on their equilibrium/disequilibrium nature. Wages and industries might also contribute to the frictional and structural components of unemployment, since high average wages might themselves induce larger periods of job search while industries might proxy for skill requirements on the demand side of the labor market. Finally, we can estimate these relationships for different years to see how the components of unemployment differences change with the aggregate cyclical environment.

A few additional comments are in order concerning the estimation of this cross-sectional relationship. For one thing, the empirical functional form suggested by the Cobb-Douglas function is the double log (see Equation 3), of which the rectangular hyperbola is a special case. In our estimation below, we will consider several functional forms and check them for goodness of fit.

Furthermore, the model presented above assumes that all markets are in a steady-state with constant unemployment and vacancy rates. While the non-steady-state dynamics of aggregate markets have been studied and even estimated on occasion, there is little which can be done to estimate such dynamics in a cross-section.[8] Consequently we will maintain the assumption that all markets are in their steady state, though the empirical implications of this being untrue will be considered.[9]

Finally, we note that the vacancy rate and perhaps even some of the shift variables (e.g., local wages and the age and education of labor force) in Equation (5) are endogenous. This equation does not have a particular casual interpretation; rather, it represents a locus of steady-state points determined by a combination of demand and structural factors whose effects we are trying to measure. Given this non-causal interpretation, the endogeneity of some independent variables does not pose a severe problem.

We now move on to consider in greater detail the data with which Equation (5) above will be estimated. As mentioned before, we aggregate vacancy rates at the firm level in the EOPP data to obtain market-level rates. Vacancies are defined as all jobs which are available for immediate occupancy. Vacancy rates are defined as fractions of all jobs in these firms, whether filled or vacant. However, vacancies in 1980 were gauged by the survey for non-managerial and non-professional employees only. These employees are therefore omitted from the base group for that year as well.

The unemployment rates as well as demographic and industrial data for each site were obtained from the City and County Data Book (1983), based on data from the 1980 Census. County-level data were weighted by population size in each case to obtain the appropriate variables for each site. The demographic variables which were used are the median age of the population, the fractions of the population aged 25 or more with high school and college degrees, and the fraction of the labor force that is female. The fractions of total employment found in manufacturing and in services for each market are also obtained from this source, whereas the fractions of unemployed workers in each occupation and industry (used for construction of the I_k) were found in the 1980 Census of Population for each state.[10]

The Unemployment Insurance measure used is the ratio of average weekly benefits to weekly wages, published state-wide by the Department of Labor.[11] Unemployment rates for 1982 are published annual rates, using statewide averages for non-SMSA's.[12]

Finally, certain variables for each site are calculated from the EOPP survey. The wage premia are the sample- and firm-size-weighted means of residuals from a log wage equation using the EOPP data. The wages used are starting wages for the last worker hired at each firm before the 1980 survey, while the controls are the age, education, prior experience and occupation of the worker hired. The sales growth measures are weighted means of the log of (1 + percentage sales growth) for the firms at each site between 1979 and 1981.[13]

III. Estimated Results

In Table 1 we find a listing of all of the sites, along with their unemployment and vacancy rates in 1980. The results show that unemployment rates exceed vacancy rates in every local labor market in 1980. On the other hand, substantial variation exists across sites in the ratio of vacancy rates

TABLE 1

Unemployment and Vacancy Rates By Site, 1980

		u	v
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	.061	.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

to unemployment rates. If we interpret this ratio as the fraction of unemployment within each site that we can attribute to structural and frictional factors (while the remainder is attributable to deficient demand), we see that this fraction ranges from as much as .583 (in Cincinnati) to as little as .046 (in Toledo). We must, however, note that an excess of unemployed workers over vacant jobs does not by itself signify a suboptimal market, since the cost of unemployment to individuals may be less than the costs of vacancies to firms.[14]

In Table 2, Part A we present summary statistics on unemployment rates and vacancy rates for 1980 and 1982. Two different unemployment rates are presented. The first is based on the published rate for each relevent county from the 1980 census, while the second represents the annual averages for SMSA's and states (in place of non-SMSA's) for 1980 and 1982. The former will be used below for most of the estimation in 1980, while the latter will be used only for comparisons of unemployment-vacancy relationships over different points in the business cycle.

These results show mean unemployment rates of about 7% in 1980 and 10% in 1982, which are approximately the annual averages for each of those years. 1980 thus represents a moderately healthy aggregate economy, while 1982 represents the trough of a major recession. Mean vacancy rates range from about 1.5% in 1980 to about 1.2% in 1982. Unemployment rates therefore exceed vacancy rates by a substantial amount regardless of the economy's position in the business cycle.

However, we do observe the inverse movements of the two rates as the aggregate demand for labor changes over the cycle. This is especially clear when we consider the rates within the subsample of SMSA's, which are based on large samples and are presumably measured with less error than those of the total sample. The aggregate economy, and individual local markets, thus

Table 2

Unemployment and Vacancy Rates
in 1980 and 1982:

A. Means and Standard Deviations

	TOTAL		SMSA's	
	1980	1982	1980	1982
Unemployment Rate[1]	.068 (.018)	-	.066 (.018)	-
Unemployment Rate[2]	.070 (.012)	.101 (.022)	.070 (.013)	.101 (.023)
Vacancy Rate	.015 (.008)	.012 (.008)	.016 (.008)	.011 (.005)

NOTE: Unemployment Rate[1] is the published rate for each site based on the 1980 Census, while Unemployment Rate[2] is the annual average for SMSA's and for states instead of non-SMSA's. Vacancy rates for each market are calculated from the 1980 and 1982 EOPP Surveys. Means are weighted by labor force size of each market.

B. Unemployment - Vacancy Equations, 1980 and 1982

1. Using Site-Specific Unemployment

	1980	
	TOTAL	SMSA
Ln (Vacancy Rate)	-.234 (.070)	-.345 (.090)
R^2	.299	.571

2. Using SMSA and State-wide Annual Averages

	1980		1982	
	TOTAL	SMSA	TOTAL	SMSA
Ln (Vacancy Rate)	-.132 (.049)	-.173 (.081)	-.241 (.050)	-.418 (.088)
R^2	.216	.295	.472	.674

NOTE: Standard errors appear in parentheses. Equations (here and in all tables) are estimated using Weighted Least Squares, using (labor force size)$^{1/2}$ as weights. The dependent variable is Ln (Unemployment Rate).

appear to be moving along their respective "Beveridge Curves" as aggregate demand declines.

In Table 2, Part B we consider estimates of simple unemployment rate-vacancy rate equations across sites. The first set of equations presents results using the Census-based unemployment rates for each site in 1980, while the second set presents results using the published SMSA and statewide data for 1980 and 1982. The equations are estimated using Weighted least Squares to correct for potential heteroscedasticity, where the weights are the square root of labor force size for each site. Both unemployment rates and vacancy rates appear in log form, which generally provided the best fits (though quadratic outperformed linear in all cases).[15]

The results of Table 2 show that differences in vacancy rates account for substantial fractions of the total variation in unemployment rates across local markets (as measured by R^2). In Panel A, we see that the vacancy rate accounts for about 30% of the total variation in unemployment. Within the sample of SMSA's this fraction rises to about 57%. Estimated elasticities of unemployment with respect to vacancies also rise from about -.23 to -.34. If vacancy rates are measured with less error among the SMSA's,[16] these results imply that labor demand differences (relative to labor supply) might account for as much as half or more of the unemployment rate differences across local labor markets.

The evidence of measurement error in vacancy rates among smaller sites led us to also consider the possible use of instruments for that variable. Two-stage least-square estimation of this equation was therefore attempted here. Using all of the X_{kt} variables as well as wage premia and industrial employment as instruments, the two-stage estimates were comparable in magnitude to the OLS estimates for the SMSA sample, though their precision and explanatory power were lower (coefficient = -.301, standard error = .102,

R^2 = .249). A simple Hausman test on the significance of the instrumented vacancy rate led us to drop it from the subsequent analysis.[17]

The better fit achieved from nonlinear functional forms relative to linear ones also suggests that major shifts in labor demand across markets could have implications for aggregate unemployment rates, since these rates may rise more when demand declines than they fall when demand rises. Since demand shifts across areas may have risen in frequency during the 1970's, the convexity of the estimated unemployment-vacancy relationships might have contributed to the observed shifting out of the aggregate "Beveridge Curve" during that decade. (See Abraham (1987), Holzer (1988).)

The comparison of unemployment-vacancy equations between 1980 and 1982 in the second set of equations shows a weaker effect for 1980 than appeared in the first set, when only site-specific unemployment rates were used. Nonetheless, we find a substantial rise in the magnitude of the demand effect between 1980 and 1982. About 47% of the unemployment variation is accounted for by vacancies in the total sample, and over 67% is accounted for within the SMSA sample. These fractions are more than twice the magnitudes observed for 1980. The coefficients on the vacancy variables rise by comparable magnitudes.

These results indicate that relative labor demand becomes a more crucial determinant of unemployment rate differences across local markets when the aggregate economy enters a cyclical downturn. The larger estimated effects are also consistent with a movement of the aggregate economy to a new position along a convex Beveridge Curve, as predicted by the model above and as indicated in Figure 2. Of course, the rise in the estimated coefficient on vacancies indicates that the logarithic form may not be the correct one here, though it provides the best available approximation.[18]

While the estimates of Table 2 provide a glimpse at the importance of demand differences in explaining unemployment, we need to control for factors that determine structural and frictional unemployment as well.[19] Several estimates are presented in Table 3. Among the control variables we include our indices of occupational and industrial imbalance between unemployed workers and vacant jobs. Other control variables are chosen to reflect the demographic factors and transfer programs which should be the most important determinants of job turnover and search durations. They are also most frequently mentioned as potential causes of the outward shifts in Beveridge and Phillips Curves in the 1970's.[20] The demographic variables include the median age of the labor force and fraction which is female; while the program variables is the Unemployment Insurance benefit to wage ratio. We also include the fractions of the labor force with high school and college degrees, since education may be a proxy for skills and "matching" success in a local labor market. Finally, we include geographic dummy variables (for South and SMSA) in some equations to capture unmeasured effects of location and region of residence as frictional and structural characteristics.

Several specifications are presented in Table 3, since the sample size is relatively small and independent variation across the list of regressors is not particularly high. Thus we generally include the geographic variables separately, since they are highly correlated with college education and UI ratios.[21] Some specifications exclude median age, since younger people are most likely to migrate in response to demand factors captured by the unemployment-vacancy coefficient. The frictional and structural variables appear both with and without the vacancy rate, so that their effects on unemployment when controlling for labor demand can be gauged. But the final specification (column 7) does include all of these regressors.

Table 3

Unemployment - Vacancy Equations, 1980 -
Including Demographics, Unemployment Insurnce and Location

	Mean (S.D.)	1	2	3	4	5	6	7
South	.510	-.191	-	-	-.071	-	-	.067
	(.520)	(.106)			(.107)			(.220)
SMSA	.806	-.053	-	-	-.069	-	-	-.001
	(.396)	(.106)			(.099)			(.150)
Ln (Median Age)	3.362	-	-	1.384	-	-	1.019	1.228
	(.210)			(.767)			(.848)	(1.067)
% Females	.421	-	1.667	.118	-	.967	.018	.126
	(.024)		(1.975)	(2.075)		(1.921)	(2.058)	(2.241)
UI/Wages	.377	-	2.200	2.005	-	1.281	1.389	1.820
	(.054)		(.876)	(.844)		(.995)	(.988)	(1.532)
% of Pop. with:								
High School	.650	-	1.321	1.002	-	1.185	.987	1.126
	(.063)		(.759)	(.748)		(.731)	(.741)	(.873)
College	.158	-	-5.216	-3.215		-4.307	-3.082	-3.283
	(.038)		(1.571)	(1.892)		(1.544)	(1.878)	(2.046)
Occupational Imbalance		-	-.188	-.122	-	-.232	-.172	-.153
			(.291)	(.280)		(.279)	(.281)	(.314)
Industry Imbalance		-	.244	.233	-	.138	.159	.152
			(.319)	(.304)		(.311)	(.308)	(.369)
Ln (Vacancy Rate)	.150	-	-		-.190	-.144	-.105	-.102
	(.008)				(.083)	(.084)	(.089)	(.095)
R^2	-	.204	.440	.513	.347	.512	.546	.550

NOTE: Dependent variable and weights as in Table 2B. All independent variables are defined in text.

Several findings emerge from Table 3. The significantly lower unemployment rate of the South which we observe in column 1 is largely accounted for by their higher vacancy rate (column 4) and also by certain other factors, such as lower UI benefit ratios. This latter variable has a significant positive effect on unemployment before controlling for vacancies and a marginally significant effect after controlling for them. The benefits of a college-educated labor force in lowering unemployment also appear substantial, even after controlling for vacancies. Both variables thus appear to be capturing frictional and/or structural effects on unemployment, and are consistent with findings in the literature (see Footnote 7).

On the other hand, neither of our indices of imbalance between unemployed workers and vacant jobs contributes significantly to unemployment. Of the two measures, only the index for industrial imbalance has the correct sign. These results are consistent with evidence from other countries (e.g., Britain in Roper and Jackman, Germany in Franz).

As for the effects of labor force age and gender on unemployment, we find that the fraction of females in the labor force has a positive but generally not significant effect. Age, on the other hand, has a significant positive effect without the vacancy control and a marginal positive effect even with the control. Since younger workers (especially teens) are well known to have higher rates of frictional unemployment, this is perhaps surprising. The age effect might therefore reflect the greater mobility and training of young workers in response to shifting labor market opportunities, thereby lowering frictional/structural unemployment within a market. However, the age effect may also at least partly reflect endogenous migration responses across markets in response to demand-based unemployment differences. This last interpretation is supported by the relatively sharp decline in the magnitude of the vacancy coefficient when age is included. But even without controlling for age, the inclusion of demographics and UI variables reduces the magnitude of the vacancy effect by over a third.

Finally, we note the ability of these equations to explain over half of the total variation in unemployment across all sites. Calculations of partial R^2's suggest that more than half of the explained variation is accounted for by the frictional/structural variables of Table 3.[22]

While these estimates give us some insight into the determinants of frictional and structural unemployment differentials, they give us little understanding of the forces driving the relative demand differences across local markets. In Table 4 we consider the effects of three potential determinants of relative demand differences: 1) Wage levels; 2) Industries; and 3) Recent shifts in product demand.

As noted above, wage level differentials can create "equilbrium" differences in unemployment across local areas, though wages may themselves respond to high levels of unemployment caused by demand shifts.[23] Industrial differences can proxy for different cyclical sensitivities, wages, shocks to product demand or technology (both of which effect labor demand), as well as differences in skill requirements or other frictional and structural factors.[24] Demand shifts, measured by differences across markets in average sales growth, are most likely to reflect short-run "disequilibrium" causes of demand-based unemployment.[25]

Once again, high correlations among regressors and small sample sizes cause us to estimate several different specifications of equations containing these variables. We therefore enter them separately in equations with and without the vacancy rate.[26]

Columns 1-3 of Table 4 show fairly significant, positive effects of wages (as in Hall (1970, 1972)) and manufacturing employment and negative effects of average sales growth on unemployment rates. Controlling for

Table 4

Unemployment - Vacancy Equations, 1980 -
Including Wage, Industry, and Sales Growth

	Mean (S.D.)	1	2	3	4	5	6
Wage Premium	.035 (.025)	.918 (.559)	-	-	.590 (.501)	-	-
% Employed in:							
Manufacturing	.188 (.066)	-	1.175 (.633)	-	-	.091 (.719)	-
Services	.211 (.021)	-	.119 (1.846)	-	-	-.881 (1.812)	-
Ln (1 + Sales Growth)	.025 (.505)	-	-	-3.175 (.638)	-	-	-2.702 (-577)
Ln (Vacancy Rate)	.015 (.008)	-	-	-	-.216 (.072)	-.229 (.091)	-.165 (.054)
R^2	-	.094	.126	.488	.336	.308	.626

NOTE: Variables are defined in the text.

vacancies in column 4-6 reduces the magnitude of the wage coefficient by over a third and the manufacturing coefficient almost entirely, though the sales growth effect is reduced by less. These findings suggest that lower relative demand accounts for part of the wage effect and almost all of the manufacturing effect on unemployment.

A comparison of the vacancy coefficients of this table with those of Table 2, Panel A also shows that including wages or industry has little effect on the vacancy coefficient while including sales growth reduces that coefficient by about a third. It therefore appears as though recent demand shifts play a much greater role in explaining relative demand effects on unemployment than do wage differences or industrial compositions across local labor markets. These shifts presumably lead to wage and price adjustments within markets as well as migration between markets that should help to equalibrate those markets in the longer run.[27]

IV. CONCLUSION

In this study I use data on unemployment rates and vacancy rates to estimate the structural/frictional and demand-deficient components of local unemployment rate differentials. I then use data on demographics, UI benefit ratios, wages, industries and sales growth across these local markets in trying to account for these components.

The results of the paper show that demand deficiencies account for a substantial fraction of unemployment rate differentials. In 1980 this fraction might be as high as half or more for SMSA's, though the exact magnitude is unclear. The fraction also appeared to rise substantially during the major cyclical downturn of 1982. Within local markets, unemployment rates exceed vacancy rates by substantial amounts, though the ratios of the latter to the former vary widely across markets.

The demand component of unemployment partially accounts for the higher unemployment of high wage areas and almost totally accounts for that of manufacturing areas. But wages and manufacturing account for very little of the total demand component of unemployment. Recent shifts in product demand, measured by differences across areas in sales growth, appear to play a greater role in explaining the demand component of unemployment in the short-run.

As for the frictional/structural component, we find that UI benefit-to-wage ratios and fractions of the labor force with college degrees are major positive and negative determinants of this component respectively. While the fraction of females in the labor force had virtually no effect, the median age of the labor force contributed positively to unemployment. Some part of the age effect, though not all, appeared to reflect a migration of young workers in response to differential. Finally, indices of occupational and industrial imbalance between unemployed workers and vacant jobs had no significant effects on measured unemployment rates.

We must keep in mind some caveats of this study when reviewing the results. Measurement error seems to plague the vacancy rate, especially in the non-SMSA markets. Small sample sizes and high correlations among regressors limited our ability to disentangle some of these effects. The exogeneity of certain regressors is also questionable.

Still, the results suggest that many factors contribute to unemployment rate differences across areas. Policy attempts to reduce these differences must consider a broad range of these factors if they are to be successful.

FOOTNOTES

[1]This characterization of business cycles as demand-side phenomena abstracts from other recent explanations of fluctuations, such as the literature on real business cycles (e.g., Long and Plosser (1983)) Evidence of the persistence of non-market-clearing wage differences across industries appears in Krueger and Summers (1986) but is disputed in Murphy and Topel (1987).

[2]For a recent analysis which questions the existence of a unique NAIRU see Blanchard and Summers (1986).

[3]Wages differences can create changes in labor demand by movements along local demand curves, assuming uncovered sectors cannot absorb the labor displaced in the covered section (Mincer, 1976). High wages can also lead to queues for jobs or longer durations of search unemployment, thereby raising frictional/structural unemployment. Early evidence on the persistenceof high wages and unemployment for certain SMSA's is found in the papers noted above by Hall.

[4]This model essentially follows that of Holt and Jackman et. al. Their models are generalizations of earlier ones (e.g., Lipsey (1960)) in which $s_L = s_F = x = y = 1$. Thus increasing returns are suggested in these earlier models while the later ones consider the possibility of constant (or decreasing) returns. More general functions are also considered in Jackman et. al. and Franz (1986).

[5]Unemployment and vacancy rates are defined as $u = {}^{U}/_{E}$ and $v = {}^{V}/_{E}$ respectively.

[6]Equation 2) implies that the structural parameters x and y (and therefore returns to school) of the matching function could be estimated if turnover rates and search intensities could be measured. Using firmwide

measured of these variables that are available in the EOPP data, I attempted to estimate these parameters. Unfortunately, the estimates were extremely unstable and were therefore abandoned.

[7]Evidence that Unemployment Insurance affects search intensity directly can be found in Barron and Mellow (1979). Effects of Unemployment Insurance on reservation wages and unemployment duration are observed in Moffitt and Nicholson (1982) and Ehrenberg and Oaxaca (1976), among others. Demographic effects on turnover rates are found in Marston (1976). Age, sex, and education effects on unemployment are also recently discussed in Summers (1987).

[8]Dynamics can be considered if Equation (1) is modified to be $\frac{dU}{dt} = tE - b(s_L U)^x (s_F V)^y$. Many theoretical models (e.g., Jackman et. al, Pissarides) suggest that these dynamics involve a counter-clockwise movement between steady-state points on the Beveridge Curve. Empirical estimates of model parameters in a dynamic context can be found for Britain in recent papers by Duffy (1983) or Hannah (1984).

[9]The possibility that observed unemployment and vacancy rates are non-steady-state is enhanced in local labor markets by the prospects of migration across areas in response to demand and supply shocks. Given the high rank correlations in unemployment rates over time for local areas (Hall, 1970), the ability of migration to rapidly eliminate unemployment differentials seems fairly low.

[10]Occupational and industrial distributions of unemployment are calculated as the differences in distributions for the experienced labor force and the employed. The former are available only for the categories of rural and non-rural within each state. Consequently each index is calculated twice per site: once using statewide unemployment data, and once using rural data for non-SMSA's and non-rural data for SMSA's within each

state. Results for each are reported below for the second version, though they were extremely comparable.

[11]See Unemployment Insurance Financial Data, United States Department of Labor, Employment and Training Report No. 394 (1983).

[12]Annual rates for both states and SMSA'a are published in the appropriate issues of Employment and Earnings. Comparisons between 1980 and 1982 rates are only made using rates that are similarly constructed for the two years.

[13]The 1982 survey asked, "Adjusting for price increases, approximately what was the percentage change in your unit sales [between 1979 and 1981]?"

[14]See the discussion by Mincer in the NBER volume on vacancies (1966).

[15]Adjusted R^2 was highest for the logarithic form in all cases except when using the mix of SMSA and statewide rates for 1980, where the quadratic form gave the best fit. In all cases the quadratic term was positive and at least marginally significant, thus providing a better fit than did the linear form.

[16]The magnitude of measurement error can be gauged by using the reciprocal of the coefficient from a reverse regression to estimate the upper bound to the true coefficient estimate. Doing so gives upper bounds of -.785 for the total sample and -.605 for the SMSA sample. Given that the directly estimated coefficients are lower bounds which are -.234 and -.345 respectively, we see a wider range and thus potentially more error within the total sample.

[17]An unemployment equation containing both the original and instrumented versions of the vacancy rate produced coefficients and standard errors of -.166 and .101 on the original as well as -.135 and .141 on the instrumented rate.

[18]The significantly higher slope (though the intercepts are almost identical)

for 1982 is unlikely to represent a shift in the curve, since only two years separate the cross-sections. The likelihood that a single nonlinear functional form exists for these two estimates which is not well-measured here therefore is high. Alternatively, certain markets in one or both of these years might reflect non-steady-state movements between points on stable Beveridge Curves for those particular markets.

[19]The significantly different estimated coefficients across the two years, as well as the evidence of measurement error in the vacancy rate cited above, also precluded the use of first difference estimators here and below in dealing with problems of omitted variables. The exacerbation of measurement error problems in first-difference or fixed-effect models is discussed in Freeman (1984). First-difference estimates were substantially lower in magnitude and explanatory power than were the OLS estimates of either year.

[20]See Abraham (1987) for a recent discussion of these shifts in the U.S. and Jackman et. al. (1984) for one in Britain.

[21]The labor force-weighted correlation between South and the Unemployment Insurance ratio is -.76, while that between UI ratio and college education is .52.

[22]When the vacancy rate is considered the first variable entered, the partial R^2 (based on column 5 of Table 3) for the frictional/structural variables is approximately .30, which is comparable to the simple R^2 for vacancies in Table 2B. When the frictional/structural variables are entered first (using column 2 of Table 3), the partial R^2 for vacancies is reduced to .13.

[23]Medoff (1983) and Holzer (1987) for more general evidence of unemployment effects on wage increases across areas.

[24] See Krueger and Summers (1986) for evidence on industry wage differentials and Pencavel (1970) for quit differentials across industries.

[25] The interpretation of average sales growth differences as demand shifts across markets, as well as their effects on unemployment, are discussed at great length in Holzer (1988).

[26] These equations were also estimated with and without the inclusion of demographic and Unemployment Insurance variables. Most results were fairly similar, although employment in the service industry showed a significant positive effect on unemployment when the extra controls were included. Once again, high correlations between Unemployment Insurance, college education and industry made precise estimates of effects quite difficult to achieve.

[27] See Greenwood (1975), Medoff (1983), Topel (1986), and Marston (1985), for discussions and evidence on these various adjustments to labor demand shifts across areas.

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