

The Theory of Relativity of the Natural Rate of Unemployment in Indiana Locales

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This paper examines the variations in unemployment across the State of Indiana for 2014. There is a significant literature concerning regional differences in unemployment which shows that differences in regulatory regimes and labor laws together with the differences in the structure of the local economies explain a significant amount of the variation in unemployment. Few studies have been published concerning differences by county within a jurisdiction with a uniform regulatory environment. What studies have been published found that the structure of the local economies were significant in explaining the differences in unemployment within the jurisdiction. For Indiana in 2014 this study finds that the structure of the Indiana economy explains the variations in unemployment. Those counties which are rural or have industries which are not manufacturing have higher unemployment rates than those counties with automobile and aerospace core industries.

INTRODUCTION

Unemployment is often cited as one of the more important measures of aggregate economic activity. Participation in the labor force is how most household derive the income necessary to survive. State political leaders also have a proclivity to cite falling unemployment rates as support for the propriety of their policy agenda – albeit, policy is probably less important than the core economics of that state. At a minimum, the policy contentions makes for interesting political theatre and, at worse, is a distraction from the real intent of the politics. More seriously, economists have been more focused on the underlying determinants of unemployment and the cause of variations in unemployment across local markets. Robert Topel (1986) noted that few studies have been published concerning local labor markets (Hall, 1972 and Rosen, 1974). Specifically, Topel states (p. S112):

Economists and other observers of labor market activity have long been aware of persistent differences among geographic areas in such aggregate variables as unemployment, wages and income, net migration flows, and growth. For example, journalistic accounts routinely note disparity between the levels and amplitudes of

measured unemployment rates in rapidly growing “sunbelt” localities, on the one hand, and the typically higher ones that occur in the industrial Northeast and upper Midwest regions. These disparities are often attributed to specific industry characteristics (area compositional effects), temporary or permanent changes in local market conditions affecting the demand for labor, or local policy variables (e.g., unemployment insurance). Somewhat surprisingly, detailed investigations of these regional difference in labor market activity have seldom been attempted.

This paper focuses on the State of Indiana for the year 2014. Unemployment insurance, workers compensation, income taxation and other labor market policies are basically constant across the counties within the same State’s jurisdiction thereby eliminating public policy differences as a source of explanation for variations in local labor market unemployment rates (as Topel suggests these are potential explanations for variations in unemployment rates). This reduces the task in explaining the variations in unemployment rates to the standard variables used in such studies. Education levels (Bozick, 2009), size of market (Ellison, Keller, Roberts and Stevens, 2014), and structure of the local economy (Weiler, 2001) are used to explain the variations in the unemployment rate across the 92 counties in Indiana. Scholars have published studies suggesting that the cross-section selected and the time frame examined appear to have significant influence on the statistical results reported (Bean, 1994; Neuman and Topel, 1991 and Holzer, 1991).

THE INDIANA ECONOMY

Among all of the states in the Union, Indiana is the where the largest proportion of its labor force is employed in manufacturing. It is also the state with the largest proportion of the State’s Gross Domestic Product arising from manufacturing. The largest manufacturing industries in Indiana are the steel, automobile and aerospace industry. Table 1 reports the top ten states in the proportion of their state

**TABLE 1
GROSS STATE PRODUCT AND EMPLOYMENT ATTRIBUTABLE TO
MANUFACTURING: 2014**

Rank	State	Manufacturing as Proportion of GSP	Rank	State	Employment In Manufacturing
1.	Indiana	30.06	1.	Indiana	16.77
2.	Oregon	29.77	2.	Wisconsin	16.25
3.	Louisiana	23.40	3.	Iowa	14.02
4.	North Carolina	20.85	4.	Michigan	13.52
5.	Michigan	19.02	5.	Alabama	13.09
6.	Wisconsin	18.90	6.	Arkansas	12.95
7.	Kentucky	18.30	7.	Ohio	12.60
8.	Alabama	17.77	8.	Kentucky	12.43
9.	Ohio	17.66	9.	Mississippi	12.30
10.	South Carolina	17.30	10.	Kansas	11.86
			10.	South Carolina	11.86

Source: National Association of Manufacturers’ Website, 2014

products which are accounted for by manufacturing. Indiana's Gross State Product is 30.06 percent from manufacturing, the majority of which is from the automobile industry, and of those 619 manufacturing firms, nearly half of which produce automobile, truck, and aircraft parts (Incontext, 2014).

Examination of Table 1 shows that Indiana ranks first in the United States in both the proportion of Gross State Product (GSP) and Employment accounted for by manufacturing. The majority of this manufacturing is accounted for by two industries, automobile and aerospace and the steel industry.

Table 2 presents data concerning how Indiana compares to the United States. Indiana's median household income is significantly below the national median. Both the unemployment rate and labor force participation rate is slightly above the national average. Indiana is recovering from the recent recession, but it is unclear that income in the State has made the same strides that employment has.

TABLE 2
INDIANA COMPARISONS WITH UNITED STATES

	Indiana	United States
Unemployment Rate	5.8	5.6
Percent Employment Manufacturing	16.8	10.5
Median Household Income	\$48,248	\$53,046
Labor Force Participation Rate	.774	.772

Source: InStat Website

Indiana also has a significant amount of coal mining in the State. For 2013, the State of Indiana's website reports that mining amounted to 1.3 percent of the Gross State Product. The majority of this mining is bituminous coal. While transportation and construction are larger, about 2 percent each, these industries' employment is correlated with the size of the local labor market and are not base industries within the State.

DATA AND EMPIRICAL MODEL

The data used to estimate the empirical model are from published sources. The State of Indiana has created a website which is a link to various U.S. Commerce data sources. From this link, the data for unemployment, county size, and educational attainment were available. This same website also provided links the data gathered by the National Association of Manufacturers for counties which have manufacturing establishments, including breakdowns for automobile, aerospace, and steel firms. The State of Indiana's website also identifies counties in which coal mining is conducted. To obtain data for plant and mine closing a media search was conducted using two sources, *Indianapolis Star* and *Indianapolis Business Journal* from 2007 through 2014. The unemployment rate and size variables were the only variable which were not dummy variables.

The empirical model used to explain variations in the unemployment rate in Indiana is shown as equation 1) below. The independent variable included in the model reflect the findings previous studies published in the literature concerning local labor markets, as well as the realities concerning the current state of the Indiana economy. The equation to be tested is:

$$UR = \beta_0 + \beta_1 SIZE + \beta_2 ED + \beta_3 STLLOSS + \beta_4 AUTO + \beta_5 ALOSS + \beta_6 COALLOSS \quad (1)$$

where SIZE is the population of the county in Indiana (92); ED is the percentage of the labor force with at least a 4 year college degree (Income and Education levels, are correlated in the county data at .5. Per capita Personal Income was used in early estimations of this model, but the correlation of the two variables made both insignificant. It was therefore decided to include education which is also picking up some of the variation that would normally be attributed to income); STLLOSS is a dummy variable which is one for a county is which there has been a net loss in employment in the Steel industry over the past decade and zero otherwise; AUTO is a dummy variable which is one for a county in which there is at least one establishment employing persons in SIC code 31-33 - automobiles and aerospace, zero otherwise; ALOSS is a dummy variable which is one for a county which has had a net loss in employment in these industries over the past decade, zero otherwise; and COALLOSS is a dummy variable which is one for a county which has had a net loss in coal mining jobs over the past decade, zero otherwise.

EMPIRICAL RESULTS

Ordinary least squares was applied to data obtained from Indiana Statistics for SIZE, AUTO, and ED. Table 3 presents the results for the estimated model.

Approximately 43 percent of the variation in unemployment rates among Indiana’s counties is explained by the model. Each of the estimated coefficients is significant and of the hypothesized sign. The intercept term is 6.659, suggesting that unemployment in Indiana taking into account the variations from the explanatory variables is roughly 6.7 percent – an argument could be made that this is the natural rate of unemployment for Indiana in the aggregate, albeit, each county would exhibit a different natural rate.

The SIZE variable is positive, as hypothesized and consistent with findings of other studies of local labor markets. Consistent with results reported by Roback (1987) and subsequent studies published. As the market size increases there are compensating components of the larger community which will offset the pain of potential unemployment. These compensating differentials include the existence social services, educational opportunities, and a higher likelihood that job search could be fruitful. This is a standard result in the literature (Roback, 1982; Ellison, Keller, Roberts and Stevens, 2014).

**TABLE 3
STATISTICAL RESULTS**

R Square	0.43			
Adjusted R Square	0.39			
Standard error	0.76			
F Statistic	10.75			
Observations	92			
	Coefficient	Standard Error	t-statistic	p-value
Intercept	6.659	0.277	29.36	0.000
SIZE	0.407	0.273	1.46	0.069
ED	-0.049	0.013	-3.71	0.000
STLLOSS	1.942	0.597	3.25	0.002
AUTO	-0.654	0.223	-2.94	0.004
ALOSS	1.313	0.356	3.69	0.000
COALLOSS	-0.668	0.288	-2.32	0.023

Education is posited to have a negative sign. As education increases the likelihood of becoming unemployed and persisting in unemployment declines (Sephton, 2009). Table 3 shows that ED has a negative sign and is statistically significant. Again, this is a result consistent with the results reported in the literature (Bozick, 2009 and Ellison, Keller, Roberts and Stevens, 2014).

The results support the contention that the variations in unemployment rate across Indiana counties during this particular year are a function of the structure of the Indiana economy. Those counties which have establishments which are in the automobile and aerospace industries, have a lower unemployment rate than those counties which do not participate in these industries. The higher incomes earned in these industries support significant secondary economic activities, but also there are many suppliers and other firms which often thrive as a result of having automobile or aerospace businesses in their communities. Therefore, the sign for AUTO was hypothesized to be positive, and that was what was obtained.

The remaining structural variables were included to capture the effects of loss of core businesses (automobile, aerospace, coal and steel) on the counties' respective economies. It was hypothesized that as automobile and aerospace plants, steel mills, or coal mines closed, there would be significant loss of employment which directly resulted from plant closings. In addition, it is likely that the loss of jobs in establishments in core industries would spill-over into secondary labor markets (i.e., retail etc.). Further, that since many of these were high paid jobs, and often skilled or semi-skilled jobs, the unemployment observed was likely to persist (Weiler, 2001). Those who had invested in such training would be unlikely to accept lower skilled, lower paid jobs.

Table 3 shows that STLOSS, and ALOSS were of the proper sign and significant. In the case of these two variables, the loss of these establishments were associated with higher unemployment rates in the affected counties – a result which is consistent with previously published studies (i.e., Roback, 1987; Holzer, 1991 and Weiler, 2001). However, the sign for COALLOSS was negative, which was unexpected because coal mining was hypothesized to be a base industry in Indiana. In fact, coal is over half of the total mining sector in Indiana, which is just over one percent of the State's gross domestic product. Moreover, coal mining occurs primarily in rural areas and is relatively capital intensive – particularly open pit mining like most of Indiana's mines. Further complicating matters is the fact that much of this coal is exported which does not generate employment in secondary labor markets. The exportation of coal and the lack of secondary labor markets fueled by this industry results in a negative sign for this variable which, upon reflection, is a reasonable result.

CONCLUSION

The size of the labor market and post-secondary education play their standard roles as determinants of variations in unemployment rates among Indiana's 92 counties. The evidence supports the idea that the variations, by county, are significantly associated with the structure of the local economy. Indiana's economy is heavily manufacturing (highest proportions in the U.S.) and it should come as no surprise that unemployment would be mitigated by the presence of manufacturing firms within the county. What is interesting that the loss steel mills and automobile factories have significant impacts on the unemployment rate within a county even when that loss occurred years (seven or eight) before 2014. This suggests that not only the economic structure is important, but there is significant persistence of high rates of unemployment when plant or mine closings occur. The closing of coal mines does not produce higher unemployment rates for 2014 in Indiana. This is because coal mining is an export industry and has little impact in secondary labor markets in the rural areas which lost those coal mines.

These results are consistent with the inherited literature, but seems at odds with much of the rhetoric observed from the State's political leaders. To maintain high rates of employment, attraction of firms outside of manufacturing does not seem fruitful. Attraction of establishments to areas outside of the areas where there is a history of plant closures also seems worthy of re-examination.

REFERENCES

- Bean, Charles. (1994). "European Unemployment: A Survey," *Journal of Economic Literature*. Vol. 32: 573-619.
- Bozick, Robert. (2009). "Job Opportunities, Economic Resources, and the Postsecondary Destinations of American Youth," *Demography* Vol. 46 (August): 493-512.
- Ellison, Martin, Godfrey Keller, Kevin Roberts and Margaret Stevens. (2014). "Unemployment and Markets Size," *The Economic Journal*. Vol. 124 (March): 119-48.
- Hall, Robert E. (1972). "Turnover in the Labor Force," *Brookings Papers on Economic Activity*, No. 3: 709-56.
- Holzer, Harry J. (1991). "Employment, Unemployment and Demand Shifts in Local Labor Markets," *Review of Economics and Statistics*. Vol. 73 (February): 25-32.
- Indiana University Business Research Center,(2014). "*Incontext*."
- Neuman, George, and Robert H. Topel. (1991) "Employment Risk, Diversification and Unemployment" "*Quarterly Journal of Economics*. Vol. 106 (November): 1341-65.
- Roback Jennifer. (1987). "Determinants of the Local Unemployment Rate," *Southern Economic Journal*. Vol. 53 (January): 735-50.
- Rosen, Sherwin. (1974). "Hedonic Prices and Implicit Markets: Product Differentiation in Price Competition," *Journal of Political Economy*, No. 82 (January/February): 34-55.
- Sephton, Peter S. (2009). "Persistence in U.S. State Unemployment Rates," *Southern Economic Journal*. Vol. 76 (October): 458-66.
- Topel, Robert H. (1986). "Local Labor Markets," *Journal of Political Economy*, No. 94 Hoover Institution Labor Conference (June): S111-43.
- Weiler, Stephan. (2001). "Unemployment in Regional Labor Markets: Using Structural Theories to Understanding Jobless Rates in West Virginia," *Industrial and Labor Relations Review*. Vol. 54 (April): 573-92.