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Explaining Differences in State Unemployment Rates During the Great Recession

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Abstract. The deterioration of the labor market during the Great Recession has varied considerably among states. This study investigates determinants of several measures of the change in state unemployment rates from pre-recessionary lows to recessionary peaks. As in previous studies for earlier recessions, industrial composition – specifically the share of state GDP (gross domestic product) in manufacturing – was strongly associated with greater labor market deterioration. However, new to this study were the findings that larger declines in housing prices and bigger household in-migration rates were also associated with more state labor market decline during the Great Recession. Three geographic groups of states – in the Far West, the Southeast, and the Midwest – had economic characteristics resulting in greater increases in unemployment rates during the Great Recession.

1. Introduction

The "Great Recession", the term denoting the economic downturn spanning late 2007 to mid-2009, was by most measures the steepest recession since the 1930s. The decline was especially severe in the labor market, where non-farm jobs dropped 6.4% from peak to trough (January 2008 to February 2010), and the household unemployment rate rose from 4.4% to 10% (U.S. Bureau of Labor Statistics, 2012). The initial job recovery in the three years from June 2009 to June 2012 was also especially modest.

Also noteworthy was the variation in labor market experience among the states. In 2007, the spread between the lowest and highest unemployment rate among the states was 4.6 percentage points (annual average). At the trough of the national labor market, February 2010, the spread had risen to 8.3 percentage points. At that point, nineteen states had unemployment rates over 10% (U.S. Bureau of Labor Statistics, 2012).

The rise in unemployment rates during recessions and the varying severity of joblessness among states is, of course, not new. And, as will be discussed in the next section, considerable analysis has been applied to the study of these topics. However, many claim the Great Recession was fundamentally different and unique among post-war downturns. The unprecedented decline in the residential housing market and the near implosion of the financial services industry were elements that had not occurred since the 1930s. Researchers have argued that recessions originating from stress in the financial system are more severe and damaging than recessions with other origins (Reinhart and Rogoff, 2009).

Therefore it is useful to revisit the changes in state unemployment rates resulting from the Great Recession, and this is the goal of the paper. Following this introduction, the analysis is organized in four sections. Next is a review of the considerable literature studying differences in state and regional unemployment rates within the U.S. This review is the basis for the empirical analysis in the third section of state unemployment rate changes during the Great Recession. The findings are contrasted with those of previous work to suggest similarities and

differences in state labor market changes during the Great Recession. Conclusions and implications are offered in the final section.

2. Previous work

Economists have long noted persistent differences in unemployment rates among U.S. states, and these differences have been the subject of numerous studies. The analyses can be grouped into three broad categories: explaining differences in the *levels* of state unemployment rates; identifying convergence or divergence of state unemployment rates; and explaining *changes* in unemployment rates among states, particularly during recessions.

The most attention has been given to studying differences in the levels of state unemployment rates. Here, several human capital characteristics have been found to be important to a state's unemployment rate. Greater educational attainment (Partridge and Rickman, 1995), fewer single-parent households (Blackley, 1989), and both fewer younger persons as well as fewer older persons (Partridge and Rickman, 1995) are related to lower unemployment rates. The linkage is likely through labor productivity, with the stated characteristics associated with greater labor productivity and hence an enhanced attractiveness for firms and employment positions. The age of the physical capital stock has also been found to be an important determinant of state unemployment rates, with greater age – and therefore, presumably, less productivity – associated with higher jobless rates (McHugh and Widdows, 1984).

Institutional arrangements, specifically in the form of unions, have been examined in studies of state unemployment rates, with the finding that greater unionization is associated with higher jobless rates (McKee, 1985; Blackley, 1989). By limiting labor supply and increasing labor costs, unions could be expected to reduce labor productivity and thereby lead to a higher unemployment rate. Mixed results have been found for the relative coverage of a state's unemployment compensation system (Partridge and Rickman, 1995; Partridge and Rickman, 1997), and the size of state taxes appears to have no independent impact on the level of a state's unemployment rate (McKee, 1985). Hyclak and Lynch (1980) also found the industrial composition of the state's economy to not be related to the level of unemployment.

Some researchers have been interested in whether state unemployment rates have been converging or diverging over time (Nissan and Carter, 2001; Murphy and Payne, 2003). The general conclusion is that, while state unemployment rates are still varied, they did converge over the last quarter of the 20th century. However, there is no evidence on how relative jobless rates between states changed in the first decade of the 21st century.

Lastly, investigations of determinants of *changes* in unemployment rates among states during a business cycle constitute the most relevant literature for the current analysis. The most relevant related work for this topic is by Connaughton and Madsen (1980; 2010). In Connaughton and Madsen's 1980 work, determinants of relative changes in state unemployment rates were individually examined for three recessions, 1970-71, 1974-75, and 1979-80. Two significant conclusions emerged. First, industrial composition – specifically the relative importance of manufacturing to the state economy – was a significant determinant of state unemployment rate changes in two of the three recessions (the exception being 1970-71). Second, the findings revealed that the impact of industrial composition varied by recession – from no effect in 1970-71, to an effect three times as great for the recession of 1979-80 as for the recession of 1974-75. The implication is that each recession is unique, and therefore findings may not necessarily be transferred from one recession to another.

In Connaughton and Madsen (2010) the authors continued their work examining the differential performance of states during the business cycle by analyzing state recoveries from the 1990-91 and 2001 recessions. Although their dependent variable was Gross State Product (GSP) growth rather than changes in the state unemployment rate, the main finding was consistent with their earlier work. Industrial composition was strongly related to the speed of economic recovery in the state. States with a higher relative importance of manufacturing recovered faster from recessions Also, states with a higher percentage of adults without a high school degree recovered at a slower rate.

3. Data and methods

This section discusses the model, introduces the data, and provides the analysis of changes in unemployment rates among states during the Great Recession. The form of the model is:

$$UNEMPCHG = f(INDUSTCOMP, HUMANCAP, UNIONS, TAXES, HSEPRCHG, INMIGR),$$

where:

UNEMPCHG = measure of change in the unemployment rate in the state,

INDUSTCOMP = measure of the state's industrial composition,

HUMANCAP = measure of the state's human capital,

UNIONS = measure of workplace unionization in the state,

TAXES = measure of the relative size of state and local taxes in the state,

HSEPRCHG = measure of the change in residential housing prices in the state, and

INMIGR = net in-migration rate to the state during the Great Recession.

Due to differing business cycles in states, employment markets begin and end their deterioration at different dates in individual states. To accommodate this reality, seasonally-adjusted unemployment rate data for each state were searched for the pre-recessionary low unemployment rate (LOWRATE) and the recessionary high unemployment rate (HIGHRATE).[1] LOWRATE and HIGHRATE were then used to construct five alternative models of the deterioration in the labor market in each state during the Great Recession. The first used as the UNEMPCHG dependent variable HIGHRATE, and the second also put HIGHRATE as the dependent variable but then also used LOWRATE as one of the right-hand-side variables. The third model used the difference HIGHRATE - LOWRATE, denoted RATECHG, as the dependent variable. The dependent variable in the fourth model (PCRTCHG) expressed RATECHG as a percentage of LOWRATE (i.e., PCRTCHG = [RATECHG/LOWRATE]*100). The dependent variable in the fifth model was taken from Connaughton and Madsen (1980), using RATECHG for the state relative to RATECHG for the nation, that is, $RATECHG_{state}/RATECHG_{us}$, designated as STATEUS in the analysis.

[1] The national seasonally-adjusted unemployment rate was at a pre-recessionary low of 4.4% in both March and May of 2007, and the rate reached a peak of 10% in October 2009. The range of the dates of the pre-recessionary low seasonally-adjusted unemployment rate among the states was January through March 2004 in Mississippi to April 2008 for each of Oklahoma, West Virginia, and Wisconsin. The range of the dates of the recessionary high seasonally-adjusted unemployment rate among the states was March 2009 (North Dakota) and July 2011 (Idaho).

INDUSTCOMP is measured by two variables. The first is the share of the state's GDP in manufacturing (MANUFPC). Since the purchase of manufactured products can often be postponed, it is expected that states with a greater concentration of manufacturing will have a larger drop in aggregate output during recessions and a complementary bigger jump in unemployment. The manufacturing share is from the U.S. Bureau of Economic Analysis and is for 2007, at the start of the Great Recession. Due to the importance of real estate during the downturn, the state's GDP share in construction (CONSTPC) was also included for 2007.

HUMANCAP is important for determining how states with different levels of labor productivity fared during the Great Recession. It is measured by the percentage of adults in the state with a college degree (EDUCPC) in 2007 (U.S. Census, 2011). The role of UNIONS in affecting changes in state unemployment rates is captured by the percentage of the workforce who are union members in 2007 (U.S. Bureau of Labor Statistics, 2012). The impact of TAXES is derived from the percentage of the state's total personal income paid in state and local taxes in 2007 (Tax Foundation, 2009).

Two right-hand side variables have not appeared in previous work but deserve special attention for the labor market changes in the Great Recession. HSEPRCHG is the percentage change in the state's average single-family house price from first quarter 2008 to fourth quarter 2011, taken from the Federal Housing Finance Agency (2012). States with larger home price declines would have more economic disruption and larger relative increases in unemployment. Conversely, states with bigger jumps in unemployment might be expected to have weaker housing markets and sharper declines in housing prices. So, although the direction of causality between unemployment and house prices might be uncertain, an association between the two likely exists.

The second new right-hand-side variable addresses a potential link between in-migration and a state's unemployment rate. INMIGR is the cumulative net in-migration rate to the state for 2008 to 2010 and is from Internal Revenue Service data (2012). States with more in-moving households – many of whom may be seeking work during the economic downturn – would experience a larger expansion in their labor force and potentially bigger increases in unemployment. INMIGR tests the proposition that states can "import" unemployment.

Table 1 summarizes the variables, sources, and descriptive statistics for the data used in the analysis. There is considerable variation in both the alternative dependent variables (HIGHUNRT, RATECHG, PCRTCHG, and STATEUS) and the right-hand-side variables.

Table 1. Descriptive statistics

Variable	Meaning	Source	Mean	Std. Dev.	Min	Max
HIGHUNRT	Highest unemployment rate	BLS	9.17	2.13	4.20	14.20
LOWUNRT	Lowest unemployment rate	BLS	4.05	0.97	2.30	6.70
RATECHG	High rate – low rate	BLS	5.13	1.66	1.30	9.80
PCRTCHG	High rate – low rate as a percentage of low rate	BLS	131.55	48.82	38.98	245.83
STATEUS	RATECHG for state relative to RATECHG for nation	BLS	0.92	0.30	0.23	1.75
MANUFPC	Manufacturing real GDP as a % of total GDP, 2007	BEA	12.72	5.84	0.27	29.22
CONSTPC	Construction real GDP as a % of total GDP, 2007	BEA	4.39	1.21	0.97	8.37
EDUCPC	% of adults with a bachelor's degree or above, 2007	Census	27.36	5.57	17.10	48.20
UNIONS	% of workforce as members of unions	BLS	12.53	5.44	3.90	26.30
TAXES	State and local taxes as a percent of state personal income	Tax Foundation	9.36	1.14	6.40	11.80
HSEPRCHG	% change in house price, 2008 I – 2011 IV	FHA	-3.90	3.80	-17.44	2.95
INMIGR	Net in-migration of households 2008-2010 as percent of 2008 households	IRS	0.09	0.35	-0.60	1.61

BLS= U.S. Bureau of Labor Statistics; BEA=U.S. Bureau of Economic Analysis; Census=U.S. Census; FHA=Federal Housing Finance Authority; IRS=Internal Revenue Service

Regression results (OLS) are in Table 2. The adjusted R^2 results show between half and approximately three-fourths of the variation in the dependent variables is associated with changes in the right-hand side variables, and the insignificance of the White tests indicates that homoscedasticity cannot be rejected.

The results show that the strongest relationship is between the change in house prices and the various measures of labor market deterioration among the states during the Great Recession. In every equation the percentage change in house prices has a negative and very statistically significant effect. The negative coefficient indicates that states with positive price changes or smaller declines (smaller negatives) were associated with less labor market deterioration than states with larger price declines. While causality is undetermined, the relationship is strong.

The second most consistent performer is industrial composition, measured either by the state's share of GDP in manufacturing (MANUFPC) or in construction (CONSTPC). Together, the industrial composition variables are positive and statistically significant in four of the five regressions, with MANUFPC significant in three and CONSTPC significant in one. Thus, states with more concentration in manufacturing or in construction had greater labor market deterioration during the Great Recession.

Lastly, the in-migration measure (INMIGR) is positive and statistically significant in three of the five regressions, suggesting that states attracting moving households may have, in fact, imported some unemployment during the Great Recession.

There are only two other statistically significant findings. In the first regression on HIGHUNRT, UNIONS has a positive coefficient, suggesting a higher peak unemployment rate in states with more union membership. However, in the second regression on HIGHUNRT, the statistical significance of UNIONS disappears and is replaced by a statistically significant positive coefficient on the pre-

recessionary low unemployment rate, LOWUNRT. The results suggest any impact of UNIONS on a state's unemployment rate is reflected in both the state's low and high jobless rates.

Table 2. Regression results (statistically significant coefficients in **bold**).

	Dependent Variable:				
	HIGHUNRT	HIGHUNRT	RATECHG	PCRTCHG	STATEUS
Intercept	7.89	-0.19	2.29	-9.90	0.41
LOWUNRT	-	**1.44*** **	-	-	-
MANUFPC	**0.16*** **	0.05	**0.08** **	-0.44	**0.01** **
CONSTPC	-0.50	0.14	-0.05	**16.94*** **	-0.01
EDUCPC	-0.04	-0.01	-0.01	0.33	-0.01
UNIONS	**0.12***	-0.01	0.03	-1.37	0.01
TAXES	-0.10	0.11	0.04	6.01	0.01
HSEPRCHG	**-0.48*** **	**-0.34*** **	**-0.38*** **	**-6.22*** **	**-0.07*** **
INMIGR	**1.64** **	0.66	**0.96***	9.34	**0.17***
Adjusted R^2	**0.52*** **	**0.79*** **	**0.62*** **	**0.57*** **	**0.62*** **
F-value	**8.69*** **	**23.18*** **	**12.44*** **	**10.52*** **	**12.44*** **
White test	35.40	42.44	32.31	35.17	32.31

*** statistically significant at the 0.01 level, one-tail test; ** statistically significant at the 0.05 level, one-tail test;
* statistically significant at the 0.10 level, one-tail test.

To ascertain how much impact these factors have on changes in state unemployment rates during the Great Recession, Table 3 compares the actual unemployment rate change (RATECHG) of states to the unemployment rate change *if each state had the average values for MANUFPC, HSEPRCHG, and INMIGR*.[2] The first column of Table 3 is the actual RATECHG. The second column is the predicted RATECHG using the coefficients from Table 2 but substituting the average state values for MANUFPC, HSEPRCHG, and INMIGR. The third column of Table 3 is the difference (DIFF) between the actual and predicted RATECHG, with the states ranked by the size of the difference.

There appears to be a geographic pattern to DIFF. Among the sixteen states with DIFF greater than 1.0, fifteen are in the Far West, the Midwest, or the Southeast (the exception is Rhode Island). Table 4 shows the characteristics of these three geographic groupings in terms of MANUFPC, HSEPRCHG, and INMIGR compared to the averages for these factors for all states. Interestingly, each of the three state categories has a different factor (highlighted in bold) generating their high value for DIFF (and therefore their high value for RATECHG). For the Far West, it was their much higher-than-average decline in housing prices, with an average HSEPRCHG almost three times the average for all states. In the Southeast a very high in-migration rate was the major contributor to the high DIFF. For the three states in the Midwest, clearly the very high dependence on manufacturing drove the large rise in unemployment rates.

4. Conclusions and implications

Although unemployment rates rose in all states during the Great Recession, just as in previous downturns, the degree of increase varied by state. This study found three factors that were significantly related to explaining differences in state unemployment rate changes. First, confirming previous findings, states with a greater concentration of manufacturing activity in their economy suffered larger increases in unemployment rates. But, new to this analysis and potentially specific to the Great Recession, states with bigger decreases in housing prices and with larger household in-migration rates were also associated with greater increases in unemployment rates. States with the largest increase in unemployment rates as a result of the three factors are geographically clustered in the Far West, the Southeast, and the Midwest.

The findings have implications for state economic policies as applied to the business cycle. While a heavier industrial concentration in manufacturing can be a positive characteristic for states during expansions (Connaughton and Madsen, 2010), the reverse is true for recessions. Hence, if a smoother business cycle is the goal for a state, diversification

[2] Values for the other right-hand-side variables are each state's actual values. Note that DIFF is *not* a standard residuals calculation.

Table 3. Actual RATECHG compared to RATECHG if state had average values for MANUFPC, HSEPRCHG, and INMIGR.

State	RATECHG	Predicted RATECHG	DIFF		State	RATECHG	Predicted RATECHG	DIFF
1 Nevada	9.8	5.0	4.8		27 Connecticut	5.1	5.3	-0.2
2 Florida	8.1	4.8	3.3		28 Maryland	4.7	5.1	-0.4
3 Arizona	7.3	4.9	2.4		29 Virginia	4.4	4.8	-0.4
4 Alabama	7.4	51.	2.3		30 Wisconsin	4.9	5.3	-0.4
5 California	7.6	5.3	2.3		31 New Mexico	4.6	5.1	-0.5
6 Michigan	7.5	5.5	2.0		32 Hawaii	4.8	5.4	-0.6
7 North Carolina	6.8	4.9	1.9		33 West Virginia	4.6	5.3	-0.7
8 Rhode Island	71.	5.2	1.9		34 Louisiana	4.2	5.0	-0.8
9 Illinois	7.0	5.2	1.8		35 Pennsylvania	4.5	5.3	-0.8
10 Tennessee	6.6	5.0	1.6		36 Massachusetts	4.2	5.1	-0.9
11 South Carolina	6.5	4.9	1.6		37 Minnesota	4.4	5.3	-0.9
12 Oregon	6.6	5.2	1.4		38 Texas	3.9	4.9	-1.0
13 Idaho	6.2	4.9	1.3		39 New York	4.6	5.7	-1.1
14 Georgia	6.1	4.9	1.2		40 Vermont	3.9	5.1	-1.2
15 Utah	5.9	4.8	1.1		41 Maine	4.0	5.2	-1.2
16 Indiana	6.3	5.2	1.1		42 Oklahoma	3.9	5.1	-1.2
17 Colorado	5.5	4.9	0.6		43 Montana	3.9	5.1	-1.2
18 Washington	5.8	5.3	0.5		44 Kansas	3.6	5.0	-1.4
19 Mississippi	5.3	5.1	0.2		45 New Hampshire	3.3	5.0	-1.7
20 New Jersey	5.5	5.4	0.1		46 Arkansas	3.3	5.1	-1.8
21 DC	5.1	5.1	0.0		47 South Dakota	2.7	5.0	-2.3
22 Kentucky	5.2	5.2	0.0		48 Iowa	2.7	5.2	-2.5
23 Wyoming	4.9	4.9	0.0		49 Nebraska	2.1	5.1	-3.0
24 Missouri	5.1	5.1	0.0		50 Alaska	2.3	5.4	-3.1
25 Ohio	5.3	5.4	-0.1		51 North Dakota	1.3	5.0	-3.7
26 Delaware	5.1	5.2	-0.1					

Table 4. Geographic categories of states with DIFF greater than 1.0.

	Far West	Southeast	Midwest	State Average
MANUFPC	12.73	15.15	**20.58**	12.72
HSEPRCHG	**-10.95**	-5.35	-4.32	-3.90
INMIGR	0.07	**0.30**	-0.32	0.09

away from manufacturing would be recommended. This advice follows previous work and is reinforced in the present study.

But based on the results of the study, a similar implication can be made for household in-migration. During periods of economic expansion and optimism, in-migrating households can fuel growth and sustain the expansion. Economic growth in the Southeastern states since the mid-1970s has benefited from high household in-migration. However, as the findings indicate, in-migration continuing during recessions can lead to higher unemployment rates. While policy-makers may not be able to control in-migration, an awareness of its adverse impact during economic downturns can avoid surprises over the consequent labor market impacts.

The "signature" feature of the Great Recession has been the collapse of the residential housing market and the associated decline in housing prices, and the latter was the factor most consistently related to differences in unemployment rate changes among states during the Great Recession. While the housing market bust certainly had roots in national conditions (Taylor, 2009), the rate of deterioration did vary between states. Therefore, policies that state officials could implement to moderate the boom-bust nature of the housing or other investment markets – such as policies to encourage supply during expansionary times and hence moderate price boosts and speculative buying – would work toward easing the labor market decline during economic downturns.

Future recessions will occur, and when they do states will fare differently. To lessen the inevitable loss of jobs, states should look within, at their economic characteristics, to ascertain if policy initiatives made now could put themselves in a better position to handle economic trauma later. The findings presented in this paper can be helpful in formulating such plans.

References

Blackley, P.R. 1989. The measurement and determination of state equilibrium unemployment Rates. *Southern Economic Journal* 56 (2): 440-456.

Connaughton, J.E., and R.A. Madsen. 2010. Understanding differential state expansions following the 1990-1991 and 2001 recessions. *The Journal of Regional Analysis and Policy* 40 (2): 116-124.

Connaughton, J.E., and R.A. Madsen. 1980. Explaining differences in state unemployment rates during recessions. *The Journal of Regional Analysis and Policy* 35 (1): 18-24.

Federal Housing Finance Agency. 2012. House price index. Washington, DC. http://fhfa.gov/Default.aspx?Page=14.

Hyclak, T., and G. Lynch. 1980. An empirical analysis of state unemployment rates in the 1970's. *Journal of Regional Science* 20 (3): 377-386.

Internal Revenue Service. 2012. SOI Tax Stats – Migration Data. Washington, DC. www.irs.gov/taxstats/article/0,,id=212683,00.html.

McGee, R.T. 1985. State unemployment rates: what explains the differences? *Federal Reserve Bank of New York Quarterly Review* 10 (1): 28-35.

McHugh, R., and R. Widdows. 1984. The age of capital and state unemployment rates. *Journal of Regional Science* 24 (1): 85-92.

Murphy, K.J., and J.E. Payne. 2003. Explaining change in the natural rate of unemployment: a regional approach. *The Quarterly Review of Economics and Finance* 43 (5): 345-368.

Nissan, E., and G.H. Carter. 2001. Convergence-divergence of U.S. state unemployment rates. *Journal of Economics and Finance* 25 (2): 172-180.

Partridge, M.D., and D.S. Rickman. 1997. State unemployment differentials: equilibrium factors vs. differential employment growth. *Growth and Change* 28 (3): 360-379.

Partridge, M.D., and D.S. Rickman. 1995. Differences in state unemployment rates: the role of labor and product market structural shifts. *Southern Economic Journal* 62 (1): 89-106.

Reinhart, C., and K. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press.

Tax Foundation. 2009. *Facts and Figures: How Does Your State Compare?* Washington, DC.

Taylor, J. 2009. *Getting Off Track*. Stanford, CA: Hoover Institution Press.

U.S. Bureau of Economic Analysis. 2012. GDP by State and Metropolitan Area. Washington, DC: U.S. Department of Commerce. www.bea.gov/iTable/iTable.cfm?ReqID=70&step=1&isuri=1&acrdn=1.

U.S. Bureau of Labor Statistics. 2012. State and Local Unemployment Rates. Washington, DC www.bls.gov/lau/#data.

U.S. Census, 2011. *Statistical Abstract of the United States*. Washington, DC. www.census.gov/compendia/statab/past_years.html.