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U.S. State and Regional Economic Impact of the 2008/2009 Recession

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Abstract. This paper identifies the states that suffered the largest job losses and the states whose employment levels suffered the least during the 2008/2009 recession. State-by-state performance varied widely during this downturn, with Nevada having the largest percentage job loss, a drop in employment of 13.11 percent of its December 2007 employment level. At the other extreme North Dakota had an employment gain of 1.24 percent of its December 2007 employment level. In addition, this paper also provides insight into why some states fared so poorly and other states suffered so little during this downturn. The results suggest strong regional differences between the states, with the states in the New England Census Region showing weaker relative job performance and states in the Southwest, Rocky Mountain, and Far West Census Regions showing stronger job growth.

1. Introduction

The 2008/2009 recession has been the worst recession since World War Two. The national unemployment rate went from five percent to over ten percent in less than two years. Real GDP growth was negative during five of the six quarters of 2008 and the first half of 2009. Over eight million establishment jobs were lost during the recession. While the national numbers are staggering, the state and local impacts are quite varied. This paper identifies the states that suffered the largest job losses and the states whose employment levels suffered the least during this severe recession. In addition, this paper provides insight into why some states fared so poorly and other states suffered so little during this downturn.

2. Literature Review

Connaughton and Madsen (1985) examined the impact of the 1981-82 recession on state and regional economies. The paper used state specific estimates of real GSP that had recently been made available to assess the regional impacts of the 1981-82 recession. The results showed wide variation in the performances of state economies as measured by annualized rates of change in real GSP. Percent changes in real GSP ranged from a decline of 10.8 percent for Iowa to an increase of 4.6 percent in Alaska. Additionally, northern states generally showed larger declines in real GSP than southern states and there were substantial differences in industry specific impacts by state. In a subsequent paper Connaughton and Madsen (2009) investigated the impact of the 2001 recession on a state by state basis. The approach used for this investigation measured the state by state severity of the 2001 recession and identified factors that tend to increase state and regional cyclical volatility as well as factors that tend to smooth volatility.

There are several types of explanatory variables that are consistently identified as having an influence on state economic performance. The selection of explanatory variables for this study is based on earlier studies which focused on changes in state performance measured by per capita personal income over time. Berry and Kaserman (1993) includ-

ed the percentage of employment in manufacturing as an explanatory variable in explaining state economic growth over the extended time period of 1929-1987. Levernier, Partridge, and Rickman (1996) utilized economic, demographic, human capital, and labor market variables along with regional dummies to capture unmeasured regional fixed effects. Vohra (1997) specifies differences in demographics, industrial mix, human capital, and technology or physical capital to explain forces influencing productivity and the rate of convergence among states. Connaughton and Madsen (2005) also showed the importance of controlling for fixed effects of the eight census regions of the United States when explaining differences in state performance measured by real per capita income. In this study it is assumed that differences in state employment levels can be explained by a similar set of explanatory and regional variables.

3. Employment changes by state

The loss of jobs for the 50 states totaled 8,744,900 between December of 2007 and the end of 2009. These job losses are measured using the establishment seasonally-adjusted data reported by the BLS for the 50 states. This represents an employment decrease of 6.38 percent versus the December 2007 employment level. Table 1 presents the state by state job changes over this period arranged in descending order of percentage job losses by state.

Nevada had the largest percentage job losses with a drop in employment of 13.11 percent of its December 2007 employment level. Arizona, Florida, Michigan, and California follow with job losses that exceeded 9 percent of their December 2007 employment levels. Oregon, Idaho, and Georgia follow with job losses that exceeded eight percent of their December 2007 employment levels. In absolute numbers of jobs lost California had the largest job losses, with 1,371,200 fewer jobs than their December 2007 employment level representing a 9.03 percentage job loss. In numbers of jobs lost during the recession California was followed by Florida (802,900 jobs lost), Illinois (426,000 jobs lost), Ohio (423,300 jobs lost), and Michigan (401,800 jobs lost). In percentage terms twenty states lost more jobs than the overall U.S. job loss of 6.38 percent of the December 2007 employment level.

Table 1. Job losses/gains by state 2007-2009 in thousands of jobs and in percentage of December 2007 jobs.

State	2007-2009 Job Losses/ Gain	2007-2009 Percent Change
United States	-8,744.9	-6.38%
Nevada	-169.5	-13.11%
Arizona	-287.8	-10.76%
Florida	-802.9	-10.10%
Michigan	-401.8	-9.46%
California	-1,371.2	-9.03%
Oregon	-147.6	-8.49%
Idaho	-53.6	-8.16%
Georgia	-337.5	-8.13%
Ohio	-423.3	-7.81%
Alabama	-156.1	-7.76%
Tennessee	-217.5	-7.76%
Indiana	-227.9	-7.63%
Rhode Island	-36.6	-7.49%
Illinois	-426.0	-7.12%
South Carolina	-134.5	-6.91%
North Carolina	-283.2	-6.79%
Utah	-85.5	-6.77%
Hawaii	-41.6	-6.62%
Delaware	-28.7	-6.54%
Wisconsin	-187.1	-6.48%
Washington	-185.9	-6.28%
Colorado	-144.9	-6.17%
Mississippi	-70.8	-6.11%
Connecticut	-96.2	-5.64%
New Jersey	-228.3	-5.59%
Kentucky	-103.9	-5.56%
Montana	-24.8	-5.55%
Minnesota	-150.0	-5.41%
Maine	-32.9	-5.30%
New Mexico	-43.7	-5.15%
Missouri	-136.6	-4.88%
Massachusetts	-151.3	-4.60%
Maryland	-117.5	-4.50%
Wyoming	-13.0	-4.43%
Arkansas	-53.4	-4.42%
Pennsylvania	-255.7	-4.40%
Virginia	-164.0	-4.35%
Iowa	-65.0	-4.27%
Kansas	-59.0	-4.26%
Vermont	-13.0	-4.21%
West Virginia	-28.0	-3.68%
New York	-318.9	-3.63%
Oklahoma	-56.0	-3.56%
New Hampshire	-22.5	-3.47%
Texas	-306.6	-2.91%
Nebraska	-27.5	-2.86%
Louisiana	-54.2	-2.80%
South Dakota	-8.1	-1.98%
Alaska	2.2	0.69%
North Dakota	4.5	1.24%

Two states, North Dakota and Alaska, had small job gains over the course of the recession. North Dakota had an employment gain of 1.24 percent of its December 2007 employment level and Alaska had a 0.69 percent employment gain. South Dakota, Louisiana, Nebraska, and Texas had employment losses of less than 3 percent, and four states (New Hampshire, Oklahoma, New York, and West Virginia) had job losses between 3 and 4 percent. The relatively small job losses in the large state economies of Texas and New York stand out amongst those states with the smallest relative job losses during this recession. These states fared considerably better in relative terms to the much larger percentage jobs losses noted earlier in the twenty states with percentage job losses that exceeded the overall U.S. job loss of 6.83 percent.

The relative and absolute job losses shown in Table 1 indicate great variation in the impact of the 2008/2009 recession on the separate state economies, and it was of interest to look at the job changes by state that occurred during the first seven years of the decade leading up to this recession. Did the job losses occur in the states that had been growing rapidly or in states that had slow growing or stagnant economies prior to this severe recession? Table 2 presents the absolute and relative job changes for the U.S. and the 50 states for the first seven years of the decade measured against the December 2000 employment levels, based on the BLS Establishment data for each of the fifty states. The table is arranged in the ascending order of the number of jobs gained between December 2000 and 2007 by state. The basis for this arrangement was to see where the heaviest job growth occurred in absolute numbers. The percentage job change is also reported for comparisons in relative terms.

The gain of jobs for the fifty states totaled 5,108,500 between December 2000 and the end of 2007. This represents an employment increase of 3.87 percent versus the 2000 employment level. There is great variation shown in this table in both absolute and relative job changes for the fifty states.

There are four states with job losses between December 2000 and December 2007. Michigan lost 417,300 jobs during this period. This represents a loss of 8.95 percent of the jobs in the state since December 2000, remarkably low in contrast to the U.S. job total increase of 3.87 percent. Ohio lost 191,300 jobs, Massachusetts lost 81,600 jobs, and Illinois lost 63,100 jobs between December 2000 and December 2007. As shown in Table 1 Michigan, Ohio, and Illinois continued to lose jobs at an above overall U.S. rate during the recession. Table 2 shows there were thirty-four additional states that saw their job totals increase less than 100,000 jobs between December 2000 and December 2007. While some of these thirty-four states showed a large percentage increase in jobs versus December 2000, the really significant growth in U.S. employment was concentrated in the twelve states with the largest absolute growth in job numbers. These twelve high employment growth states were led by Texas' growth of 989,100 jobs between December 2000 and December 2007. This was a 10.37 percent increase in employment over the December 2000 job level. During the same time job totals increased by 792,100 in Florida, 480,500 in California, 400,200 in Arizona, and 249,800 in North Carolina. Thus these five states accounted for just over 57 percent of the total job growth in the U.S. economy between December 2000 and December 2007. Adding in the employment gains of the next five largest state employment gains (in Nevada, Washington, Virginia, Georgia, and Utah) the 10 states with the largest employment growth accounted for 77.3 percent of the total U.S. job growth between December 2000 and December 2007.

Table 3 presents the net changes in job levels over the full decade 2000-2009 organized in the ascending order of job gains for each state over the December 2000 to December 2009 time period. The table also contains the job losses (gains) for each state experienced during the 2008-2009 recession, information reported in Table 1 but with a different ordering. The overall results for the fifty states combined showed a net job loss over the decade of 3,636,400 jobs. The 2008-2009 recession was so severe that the overall gain in jobs for the 50 states, which totaled 5,108,500 between December 2000 and the end of 2007, was more than completely offset by the job losses occurring in 2008 and 2009. Overall this employment loss for the U.S. over the decade represents a 2.76 percent decrease in the number of jobs based on the BLS establishment data.

Over the full decade California lost 890,700 jobs representing 6.06 percent of its 2000 employment level. The state of California also lost the most jobs during the 2008-2009 recession (1,371,200 jobs). The state of Michigan lost the second most jobs during the 2000-2009 decade (819,100 jobs) representing 17.56 percent of its 2000 employment level. In numbers of jobs lost during the decade Michigan was followed by Ohio (614,600 jobs lost), Illinois (489,100 jobs lost), New York (238,000 jobs lost), Massachusetts (232,900 jobs lost), and Indiana (213,200 jobs lost). Overall 33 of the 50 states had fewer jobs at

the end of 2009 than they had in December 2000. The 2008-2009 recession wiped out the job growth of an entire decade for 29 of these 33 states and the other four states (Michigan, Ohio, Massachusetts, and Illinois) had already experienced job losses during the 2000-2007 time period.

Table 2. Job losses/gains by state 2000-2007 in thousands of jobs and in percentage of 2000 jobs.

State	2000 Total Non-Farm Employment	2000-2007 Job Gains	2000-2007 Percent Change
United States	131,899.0	5,108.5	3.87%
Michigan	4,663.5	-417.3	-8.95%
Ohio	5,613.0	-191.3	-3.41%
Massachusetts	3,370.5	-81.6	-2.42%
Illinois	6,047.3	-63.1	-1.04%
Connecticut	1,696.6	7.7	0.45%
Indiana	2,972.0	14.7	0.49%
Louisiana	1,921.8	12.2	0.63%
New York	8,698.9	80.9	0.93%
Mississippi	1,146.0	12.2	1.06%
Rhode Island	481.0	7.5	1.56%
New Jersey	4,024.2	62.8	1.56%
Pennsylvania	5,710.6	99.3	1.74%
Wisconsin	2,833.6	51.9	1.83%
Vermont	302.7	5.8	1.92%
Maine	608.3	11.9	1.96%
Missouri	2,742.0	57.8	2.11%
Kentucky	1,828.3	41.6	2.28%
Minnesota	2,702.1	68.1	2.52%
Kansas	1,349.6	35.3	2.62%
Tennessee	2,724.9	79.5	2.92%
New Hampshire	629.2	18.4	2.92%
West Virginia	737.1	23.6	3.20%
Iowa	1,475.8	48.0	3.25%
California	14,700.3	480.5	3.27%
Delaware	421.6	17.3	4.10%
Alabama	1,928.5	82.8	4.29%
Arkansas	1,156.2	51.1	4.42%
Colorado	2,249.7	99.5	4.42%
Georgia	3,971.9	178.9	4.50%
South Carolina	1,855.0	91.4	4.93%
Maryland	2,482.9	129.2	5.20%
Oklahoma	1,493.4	81.7	5.47%
Nebraska	912.2	50.6	5.55%
Virginia	3,559.4	207.2	5.82%
North Carolina	3,919.7	249.8	6.37%
Oregon	1,630.4	107.7	6.61%
South Dakota	377.3	31.0	8.22%
Washington	2,733.0	228.0	8.34%
Texas	9,536.4	989.1	10.37%
North Dakota	327.6	34.5	10.53%
Florida	7,161.2	792.1	11.06%
Alaska	286.8	32.5	11.33%
Hawaii	557.9	70.2	12.58%
New Mexico	754.0	95.0	12.60%
Montana	390.9	56.2	14.38%
Idaho	566.0	90.7	16.02%
Utah	1,087.0	176.5	16.24%
Arizona	2,273.5	400.2	17.60%
Wyoming	241.6	51.6	21.36%
Nevada	1,045.6	247.3	23.65%

Table 3. Job losses/gains by state 2000-2009 in thousands of jobs and in percentage of 2000 jobs.

State	2000-2009 Job Losses	2000-2009 Percent Change	2008-2009 Job Losses	2008-2009 Percent Change
United States	-3,636.4	-2.76%	-8,744.9	-6.38%
California	-890.7	-6.06%	-1,371.2	-9.03%
Michigan	-819.1	-17.56%	-401.8	-9.46%
Ohio	-614.6	-10.95%	-423.3	-7.81%
Illinois	-489.1	-8.09%	-426.0	-7.12%
New York	-238.0	-2.74%	-318.9	-3.63%
Massachusetts	-232.9	-6.91%	-151.3	-4.60%
Indiana	-213.2	-7.17%	-227.9	-7.63%
New Jersey	-165.5	-4.11%	-228.3	-5.59%
Georgia	-158.6	-3.99%	-337.5	-8.13%
Pennsylvania	-156.4	-2.74%	-255.7	-4.40%
Tennessee	-138.0	-5.06%	-217.5	-7.76%
Wisconsin	-135.2	-4.77%	-187.1	-6.48%
Connecticut	-88.5	-5.22%	-96.2	-5.64%
Minnesota	-81.9	-3.03%	-150.0	-5.41%
Missouri	-78.8	-2.87%	-136.6	-4.88%
Alabama	-73.3	-3.80%	-156.1	-7.76%
Kentucky	-62.3	-3.41%	-103.9	-5.56%
Mississippi	-58.6	-5.11%	-70.8	-6.11%
Colorado	-45.4	-2.02%	-144.9	-6.17%
South Carolina	-43.1	-2.32%	-134.5	-6.91%
Louisiana	-42.0	-2.19%	-54.2	-2.80%
Oregon	-39.9	-2.45%	-147.6	-8.49%
North Carolina	-33.4	-0.85%	-283.2	-6.79%
Rhode Island	-29.1	-6.05%	-36.6	-7.49%
Kansas	-23.7	-1.76%	-59.0	-4.26%
Maine	-21.0	-3.45%	-32.9	-5.30%
Iowa	-17.0	-1.15%	-65.0	-4.27%
Delaware	-11.4	-2.70%	-28.7	-6.54%
Florida	-10.8	-0.15%	-802.9	-10.10%
Vermont	-7.2	-2.38%	-13.0	-4.21%
West Virginia	-4.4	-0.60%	-28.0	-3.68%
New Hampshire	-4.1	-0.65%	-22.5	-3.47%
Arkansas	-2.3	-0.20%	-53.4	-4.42%
Maryland	11.7	0.47%	-117.5	-4.50%
South Dakota	22.9	6.07%	-8.1	-1.98%
Nebraska	23.1	2.53%	-27.5	-2.86%
Oklahoma	25.7	1.72%	-56.0	-3.56%
Hawaii	28.6	5.13%	-41.6	-6.62%
Montana	31.4	8.03%	-24.8	-5.55%
Alaska	34.7	12.10%	2.2	0.69%
Idaho	37.1	6.55%	-53.6	-8.16%
Wyoming	38.6	15.98%	-13.0	-4.43%
North Dakota	39.0	11.90%	4.5	1.24%
Washington	42.1	1.54%	-185.9	-6.28%
Virginia	43.2	1.21%	-164.0	-4.35%
New Mexico	51.3	6.80%	-43.7	-5.15%
Nevada	77.8	7.44%	-169.5	-13.11%
Utah	91.0	8.37%	-85.5	-6.77%
Arizona	112.4	4.94%	-287.8	-10.76%
Texas	682.5	7.16%	-306.6	-2.91%

Texas had by far the largest net job growth during the 2000-2009 decade. The job growth in Texas over the decade totaled 682,500 jobs, a 7.16 percent increase over its December 2000 employment level. In a distant second in net employment growth over the full decade was Arizona (112,400 jobs gained), followed by Utah (91,000 jobs gained), Nevada (77,800 jobs gained), and New Mexico (51,300 jobs gained).

4. Data Analysis

The disparity in state job changes is extremely large, as already noted, with California losing 890,700 jobs representing a loss of 6.06 percent of its 2000 employment level over the full decade, and Texas gaining 682,500 jobs representing a gain of 7.16 percent over the same period. To try to explain the basis for such large differences among the states over the full decade a model was developed that includes both quantitative variables related to the structure and demographic variability between the states and consistent with earlier studies and qualitative variables to control for regional differences. The following model was specified to explain the differences in the percentage change in state employment levels over three periods: the 2000-2007 expansion, the 2007-2009 recession, and the 2000-2009 decade:

$$JOBPCHG_i = B_0 + B_1PROD2000_i + B_2POV_i + B_3PCOL_i + B_4NEWIND + B_5PMANF_i + B_6NE_i + B_7SE_i + B_8GL_i + B_9PL_i + B_{10}SW_i + B_{11}RM_i + B_{12}FW_i + e_i$$

where:

$JOBPCHG_i$ = Percentage change in jobs in state i between time periods (2000-07, 2007-09, or 2000-09),

$PROD2000_i$ = The relative productivity of workers in state i versus the average productivity of workers in the U.S. in the year 2000 measured as $(GSP_i/employment_i)/(GDP_{u.s.}/employment_{u.s.})$,

$PPOV_i$ = The percent of the population of state i below the poverty level in 2000,

$PCOL_i$ = The percent of the population of state i that had 4 years of college in 2000,

$NEWIND_i$ = State rank in the Kauffman Foundation New Economy Index 2008. This variable measures the economic structure of each state economy compared to an ideal structure. There are five measures associated with this index: knowledge jobs, globalization, economic dynamism, transformation to a digital economy, and technological innovation capacity. In essence this variable attempts to rank state's economic structure based on old versus new and address its future economic growth potential,

$PMANF_i$ = The percent of the population of state i employed in the manufacturing sector in 2000,

NE_i = A regional dummy with a value of 1 if the state is in the New England Census Region and 0 otherwise (see Appendix for the location of states by census region),

SE_i = A regional dummy with a value of 1 if the state is in the South-East Census Region and 0 otherwise,

GL_i = A regional dummy with a value of 1 if the state is in the Great Lakes Census Region and 0 otherwise,

PL_i = A regional dummy with a value of 1 if the state is in the Plains Census Region and 0 otherwise,

SW_i = A regional dummy with a value of 1 if the state is in the South-West Census Region and 0 otherwise,

RM_i = A regional dummy with a value of 1 if the state is in the Rocky Mountain Census Region and 0 otherwise, and

FW_i = A regional dummy with a value of 1 if the state is in the Far-West Census Region and 0 otherwise.

The data for all the quantitative variables was from the 2000 census. The omitted Census Region for the qualitative variables was for the Mideast Region. Thus the coefficients on the other regional variables are to be interpreted as the predicted difference in the percentage job change over the decade for a given state in a given region versus a state located in the Mideast Region. The model was estimated for the fifty states using an OLS regression model with White heteroskedasticity-consistent standard errors and covariance. The regression results are reported in Tables 4 through Table 6.

Table 4 presents the overall results for the 2000-2007 time period. This model has an R-squared value of 0.805 and an F-statistic that tests significant at the 0.01 level. Further, the coefficient on the relative productivity measure (*PROD2000*) tests significant at the 0.05 level. The coefficients on the percent poverty (*PPOV*), and percent manufacturing (*PMANF*) are negative and test significant at the 0.05 level or above. It is a notable result that for a one percent increase in the percentage of a state's population below the poverty level there was a 1.75 percent decrease in the state's predicted job growth between 2000 and 2007. The results also indicate that for a one percent increase in the state's percentage of jobs in manufacturing in 2000 the state's predicted job growth between 2000 and 2007 decreased by 0.45 percent.

Table 4. Regression results for percentage job change from 2000-2007.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	131.472900	10.566450	12.442480	0.0000
PROD2000	-9.775195	4.430732	-2.206226	0.0337
PPOV	-1.748475	0.478658	-3.652867	0.0008
PCOL	-0.442250	0.412533	-1.072037	0.2906
NEWIND	0.020942	0.066510	0.314870	0.7546
PMANF	-0.451496	0.112884	-3.999656	0.0003
NE	-0.951047	1.379948	-0.689190	0.4950
SE	3.619186	1.577991	2.293541	0.0276
GL	-3.786102	2.358119	-1.605560	0.1169
PL	1.227835	2.010039	0.610852	0.5450
SW	10.209970	2.978124	3.428322	0.0015
RM	11.559210	2.543485	4.544633	0.0001
FW	5.277657	1.292286	4.083970	0.0002
R-squared	0.804596	Mean dependent var.		105.5877
Adjusted R-squared	0.741221	S.D. dependent var.		6.27812
S.E. of regression	3.193698	F-statistic		12.695920
Sum squared resid	377.3891	Prob(F-statistic)		0.000000

*Based on 50 observations using White heteroskedasticity-consistent standard errors and covariance.

The coefficient on the dummy variable for the Southeastern states (*SE*) is positive and significant at the 0.05 level. This coefficient says that the states in the Southeastern Census Region had an average percentage change in the number of jobs over the decade that was 3.62 percentage points greater than states in the Mideast Census Region. The coefficient on the dummies for the Great Lakes Census Region and the Northeast Census Region were negative but not significant at even the 0.10 level after controlling for the quantitative variables in the model. The coefficients on the dummies for the Southwest Census Region (*SW*), the Rocky Mountain Census Region (*RM*), and the Far-West Census Region (*FW*) were large, positive, and significant at the 0.01 level.

Table 5 presents the overall results for the 2007-2009 time period. This model has an R-squared value of 0.592 and an F-statistic that tests significant at the 0.01 level. Further, the coefficients on the relative productivity measure (*PROD2000*) and percent poverty (*PPOV*) are positive but not significant at the 0.05 level. The coefficients on the percent college (*PCOL*) and new industry rank (*NEWIND*) are positive and test significant at the 0.01 level. Percent manufacturing (*PMANF*) is negative, but tests insignificant at the 0.10 level.

The coefficient on the dummy variables for the New England Census Region (*NE*) and the Southeastern Census Region (*SE*), the Plains Census Region (*PL*), the Southwestern Census Region (*SW*), and the Far-West Census Region (*FW*) are all negative but not significant at the 0.05 level. The coefficients on the dummies for the Great Lakes Census region (*GL*) and the Rocky Mountain Census Region (*RM*) were negative and significant at the 0.05 level.

Table 6 presents the overall results for the 2000-2009 time period. This model has an R-squared value of 0.788 and an F-statistic that tests significant at the 0.01 level. Further, the coefficient on the relative productivity measure (*PROD2000*) is negative but does not test significant at the 0.10 level. The coefficient on the percent poverty measure (*POV*) is negative and tests significant at the 0.01 level. The coefficients on the percent college (*PCOL*) and new industry rank (*NEWIND*) are positive and test significant at the 0.01 level. The coefficient for percent manufacturing (*PMANF*) is negative but not significant at the 0.10 level.

The coefficient on the dummy variable for the New England Census Region (*NE*) is negative and significant at the 0.10 level. This coefficient says that the states in the New England Census Region had an average percentage change in the number of jobs over the decade that was 2.36 percentage points lower than states in the Mideast Census Region. The coefficient on the dummy for the Great Lakes Census Region was negative and significant at the 0.01 level after controlling for the quantitative variables in the model. This coefficient says that the states in the Great lakes Census Region had an average per-

centage change in the number of jobs over the decade that was 6.41 percentage points lower than states in the Mideast Census Region. The coefficients on the dummies for the Southwest Census Region (*SE*) and the Far-West Census Region (*FW*) were large, positive, and significant at the 0.05 level. The estimated coefficients for the Rocky Mountain Census Region (*SE*) and Plains Census Region (*PL*) were not significantly different from the Mideast Census Region states.

Table 5. Regression results for percentage job change from 2007-2009.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	78.888810	5.634049	14.002150	0.0000
PROD2000	3.865876	3.578832	1.080206	0.2870
PPOV	0.173962	0.303058	0.574020	0.5694
PCOL	0.779423	0.178593	4.364231	0.0001
NEWIND	0.182899	0.042581	4.295283	0.0001
PMANF	-0.157879	0.103855	-1.520198	0.1370
NE	-1.258457	0.781732	-1.609831	0.1159
SE	-3.010963	1.566816	-1.921709	0.0624
GL	-2.860634	1.073535	-2.664686	0.0114
PL	-1.936804	1.096855	-1.765778	0.0857
SW	-2.751308	2.138971	-1.286276	0.2063
RM	-5.898140	1.344207	-4.387822	0.0001
FW	-1.505296	1.049734	-1.433978	0.1600
R-squared	0.592392	Mean dependent var.		94.26026
Adjusted R-squared	0.460195	S.D. dependent var.		2.616157
S.E. of regression	1.922127	F-statistic		4.481131
Sum squared resid	136.6992	Prob(F-statistic)		0.000205

*Based on 50 observations using White heteroskedasticity-consistent standard errors and covariance.

Table 6. Regression results for percentage job change from 2000-2009.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	105.726400	8.688679	12.168290	0.0000
PROD2000	-4.658314	5.275716	-0.882973	0.3830
PPOV	-1.422318	0.438498	-3.243616	0.0025
PCOL	0.483849	0.341332	1.417531	0.1647
NEWIND	0.225762	0.067701	3.334690	0.0020
PMANF	-0.591283	0.139069	-4.251707	0.0001
NE	-2.355026	1.248050	-1.886965	0.0670
SE	0.092798	1.668909	0.055604	0.9560
GL	-6.414799	2.205580	-2.908441	0.0061
PL	-1.076672	2.040703	-0.527599	0.6009
SW	6.494807	2.662594	2.439278	0.0196
RM	4.239118	2.580237	1.642918	0.1089
FW	3.485624	1.528002	2.281165	0.0284
R-squared	0.787682	Mean dependent var.		99.50877
Adjusted R-squared	0.718821	S.D. dependent var.		6.183095
S.E. of regression	3.278665	F-statistic		11.438880
Sum squared resid	397.7368	Prob(F-statistic)		0.000000

*Based on 50 observations using White heteroskedasticity-consistent standard errors and covariance.

Comparing the three regressions periods produces some interesting results. Productivity (*PROD2000*) and percent poverty (*PPOV*) are significant during the 2000-2007 period and become insignificant during the 2007-2009 period. So it appears that productivity and poverty have an impact on job growth but a less significant impact job contraction. Two other variables, percent college (*PCOL*) and the New Economy Index (*NEWIND*), were insignificant in the 2000-2007 period and become significant in the 2007-2009 period, suggesting that during an expansion period a state with a higher percentage of college graduates and a more modern economy did not fare better in job growth than states with average or low percentages of college graduates or more traditional economic structures.

For both periods a higher percentage of a state's workforce in manufacturing leads to weaker job growth, although during the 2007-2009 time period the percent manufacturing variable is not significant. The regional dummies also provide an interesting result over the two time periods. During the 2007-2009 period all of the control variables are either positive and significant or not significant. During the 2007-2009 period all of the regional control variables have negative signs and the Great Lakes (*GL*) and the Rocky Mountain (*RM*) regions coefficients are significant.

Looking at the combined period (2000-2009) regression the coefficients for both percent poverty (*PPOV*) and percent manufacturing (*PMANF*) are negative and significant, suggesting that their correlation with job losses are strong enough to influence their impact on job growth over the entire period. In addition, a similar result occurs with the New Economy Index (*NEWIND*), as the correlation with job losses also influences its impact on job growth during the entire period. It appears that the combined period results and the 2007-2009 results are similar to each other but different from the 2000-2007 results. This doesn't necessarily suggest that different factors affect expansion periods than affect contraction periods. It is more likely that the large job losses associated with the 2007-2009 period influenced the combined period results.

5. Summary and conclusions

The purpose of this paper was to identify the states that suffered the largest job losses during the 2008-2009 recession and the states whose employment levels suffered the least during this severe recession. The study also provides the job gains or losses of the 50 states between December 2000 and December 2007 and the overall job gains or losses over the decade from December 2000-2009. In addition, this paper provides insight into why some states fared so poorly and other states suffered so little during the 2000-2009 decade.

The loss of jobs for the 50 states totaled 8,744,900 between December 2007 and the end of 2009. These job losses are measured using the establishment data reported by the BLS for the 50 states. This represents an employment decrease for the U.S. as a whole of 6.83 percent versus the December 2007 employment level. Among the states, Nevada had the largest percentage job losses during the 2008-2009 recession with a drop in employment of 13.11 percent versus its 2007 employment level. Arizona, Florida, Michigan, and California followed with job losses that exceeded 9 percent of their December 2007 employment levels. Oregon, Idaho, and Georgia followed with job losses that exceed 8 percent of their December 2007 employment levels. In absolute numbers of jobs lost, California had the largest job losses with 1,371,200 fewer jobs than their December 2007 employment level, representing a 9.03 percentage job loss.

Two states, North Dakota and Alaska, had small job gains over the course of the 2008-2009 recession. North Dakota had an employment gain of 1.24 percent versus its December 2007 employment level and Alaska had a 0.69 percent employment gain. South Dakota, Louisiana, Nebraska, and Texas had employment losses of less than 3 percent, and four more states (New Hampshire, Oklahoma, New York, and West Virginia) had job losses less than 4 percent.

The gain of jobs for the 50 states totaled 5,108,500 between December 2000 and the end of 2007. This represents an employment increase of 3.87 percent versus the 2000 employment level. There were only four states that lost jobs over the 2000-2007 period, Michigan, Ohio, Massachusetts, and Illinois. Texas led the nation over this period with a gain of 989,100 jobs.

Over the decade of 2000-2009 the overall results for the 50 states combined showed a net job loss over the decade of 3,636,400 jobs. The 2008-2009 recession has been so severe that the overall gain in jobs for the 50 states which totaled 5,108,500 between 2000 and the end of 2007 has been more than completely offset by the job losses occurring in 2008 and 2009. Overall this employment loss for the U.S. over the decade represents a 2.76 percent decrease in the number of jobs versus the December 2000

employment level. The variation among the states in performance over this period is quite large.

Over the full decade California lost 890,700 jobs, representing a 6.06 percent decline, and Michigan lost 831,400 jobs, representing a 17.83 percent decline in employment. At the other extreme the job growth in Texas over the decade totaled a gain of 682,500 jobs, a 7.16 percent increase over its 2000 employment level. Overall 33 states finished the decade with fewer jobs than they had in 2000. This is largely attributed to the severity of the 2008-2009 recession, but four of these 33 states had already experienced job losses between December 2000 and December 2007.

In explaining the percentage of job changes by state over the 2000-2009 decade a regression model showed significant negative impacts of the percent of the population of a state that was below the poverty level and the percent of the population of a state employed in the manufacturing sector. The model also indicated strong regional differences between the states, with the states in the New England Census Region showing lower job growth and states in the Southwest Census Region, Rocky Mountain Census Region, and Far West Census Region showing stronger job growth versus the reference Mideast Census Region.

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Appendix. U.S. Regions.

State or Region name	Abbreviation
New England	NE
Connecticut	CT
Maine	ME
Massachusetts	MA
New Hampshire	NH
Rhode Island	RI
Vermont	VT
Mideast	ME
Delaware	DE
District of Columbia	DC
Maryland	MD
New Jersey	NJ
New York	NY
Pennsylvania	PA
Great Lakes	GL
Illinois	IL
Indiana	IN
Michigan	MI
Ohio	OH
Wisconsin	WI
Plains	PL
Iowa	IA
Kansas	KS
Minnesota	MN
Missouri	MO
Nebraska	NE
North Dakota	ND
South Dakota	SD

State or Region name	Abbreviation
Southeast	SE
Alabama	AL
Arkansas	AR
Florida	FL
Georgia	GA
Kentucky	KY
Louisiana	LA
Mississippi	MS
North Carolina	NC
South Carolina	SC
Tennessee	TN
Virginia	VA
West Virginia	WV
Southwest	SW
Arizona	AZ
New Mexico	NM
Oklahoma	OK
Texas	TX
Rocky Mountain	RK
Colorado	CO
Idaho	ID
Montana	MT
Utah	UT
Wyoming	WY
Far West	FW
Alaska	AK
California	CA
Hawaii	HI
Nevada	NV
Oregon	OR
Washington	WA