What Past Recoveries Say about the Outlook for New England

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As the nation begins to recover from the recent recession, forecasts abound regarding the recovery's pace and composition. Most offer little guidance to consumers, employers, and investors making decisions at the subnational level, however. This article asks how New England will fare over the next several years. The region lagged the national recovery in the mid-1970s but did better than average coming out of the 1982 recession. Do those experiences indicate anything about the region's pace of recovery this time around?

The article proceeds as follows: The first section describes patterns of employment growth during the 1975–78 and 1982–85 recoveries, finding that states' experiences differed markedly from one period to the other. Sections II and III examine several explanations for this variation in state growth rates. Section IV concludes that the most important determinants of states' recovery experiences were how well key local industries performed nationally, changes in costs such as wages and energy, and, less consistently, the state-local government fiscal stance in the recession. Using these findings, Section V analyzes the improvement in New England's fortunes in the 1982–85 recovery. Section VI looks forward, inferring from current conditions and U.S. industry forecasts that New England is likely to underperform the nation, largely because of sluggish national growth forecasts for its industries and labor cost increases relative to the nation.

I. Patterns of State Employment Growth Following Recessions

State experiences differed considerably following the 1973–75 and 1981–82 recessions. In each recovery, some states boomed while others barely grew or actually lost jobs. Furthermore, some states performed much better or worse in one recovery than the other. Figure 1 groups

states into quintiles according to employment growth in the two recoveries.[1]

The two recoveries were quite different. The first was more vigorous than the second, and Sunbelt and western states did especially well. Indeed, in the 1975–78 period, the 10 fastest-growing states, except for New Hampshire, were in the western part of the country. All but two of the next fastest 10 were in the South and West. The second recovery, as the popular

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The two earlier recoveries were quite different: the Sunbelt and western states did especially well in the 1975–78 recovery, while the 1982–85 recovery was bicoastal.

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press has pointed out, was bicoastal. Eight of the 10 fastest-growing states from 1982 to 1985 were in the East. Each of the New England states improved its ranking. Most dramatically, Massachusetts went from forty-first place during the 1975–78 period to eighth place during the 1982–85 recovery. Declining oil prices in the 1982–85 recovery resulted in a number of states with heavy concentrations of "mining"[2] employment doing very poorly, in sharp contrast to their speedy recoveries during the 1975–78 period.

The next two sections lay out the basic approaches economists have taken to understanding why state growth rates differ. Section II focuses on industry mix. Section III then broadens the discussion to include other factors believed to influence the geographic location of jobs. The analysis uses data on states' employment changes during the two recovery periods, *net of their long-term growth trends*, in order to focus on the cyclical aspects of state employment growth.[3]

II. The Role of Industry Mix in States' Recoveries

Industries grow at different rates and have different patterns of contraction and expansion over the business cycle. For example, employment in durables manufacturing usually plummets during recessions

and surges in recoveries, while employment in services industries declines only slightly, if at all, during recessions and typically exhibits a correspondingly mild recovery. Thus, even if each firm performed exactly like all other firms in its industry, some states would recover faster than others because they specialize in faster-growing industries. For this reason, industry mix is commonly used to predict a state's economic performance.

Using the 76 industries listed in Appendix Table A-2, simple predictions of each state's growth during the two recoveries were constructed. These predictions assume that each state industry grew at the industry's national "recovery" rate, where the recovery rate is the industry's growth rate during the recovery minus the industry's long-term trend rate of growth.[4] Figure 2 plots actual employment growth rates (net of 1969–90 trends) and the simple industry-mix based predictions for the states in the two recovery periods.

If the predictions were exactly on target, the points in each panel would fall along a diagonal line from the lower left corner to the upper right; they clearly do not. Industry mix does not appear to be at all related to actual growth rates in the 1970s recovery (top panel). And even for the 1980s, industry mix predicts only a small fraction of the interstate variation actually observed. Rapid employment growth

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[1] Appendix Table A-1 reports growth rates for the 48 continental states for the two recoveries and for the entire 1969–90 period. Throughout this analysis, employment patterns are used to measure state economic growth and decline. The employment data are annual. The analysis defines the "recovery" period as the three years following the recession trough; patterns of employment change for one- and two-year periods are similar.

[2] The mining category includes coal mining, oil and gas extraction, metal mining, and nonmetallic minerals, except fuels.

[3] Each state's 1969–90 annual growth rate is used to represent its long-term growth trend. The 1969–90 period was chosen because it is the longest period for which consistent state employment data are available and because it represents a peak-to-peak period which should be reasonably invariant to individual states' cyclical swings. U.S. employment growth averaged 2.1 percent per year between 1969 and 1990. Thus, U.S. detrended employment growth was 1.5 percent per year in the 1975–78 recovery and 1.0 percent annually from 1982 to 1985.

[4] Economists typically examine the influence of industrial mix on state growth rates under the rubric of "shift-share" analysis. The "share" component is this "prediction" based on the assumption that the state maintained a constant share of national employment in each industry. The "shift" component is the residual; that is, the difference between the state's actual growth rate and the predicted rate. The shift term thus indicates how much employment has grown or declined as a result of *changes* in the state's share of national employment in each industry. Appendix A-3 explains how the predictions were calculated and Appendix Table A-4 reports predictions for all the states.

Figure 1

Employment Growth during Recoveries, by State

1975 to 1978
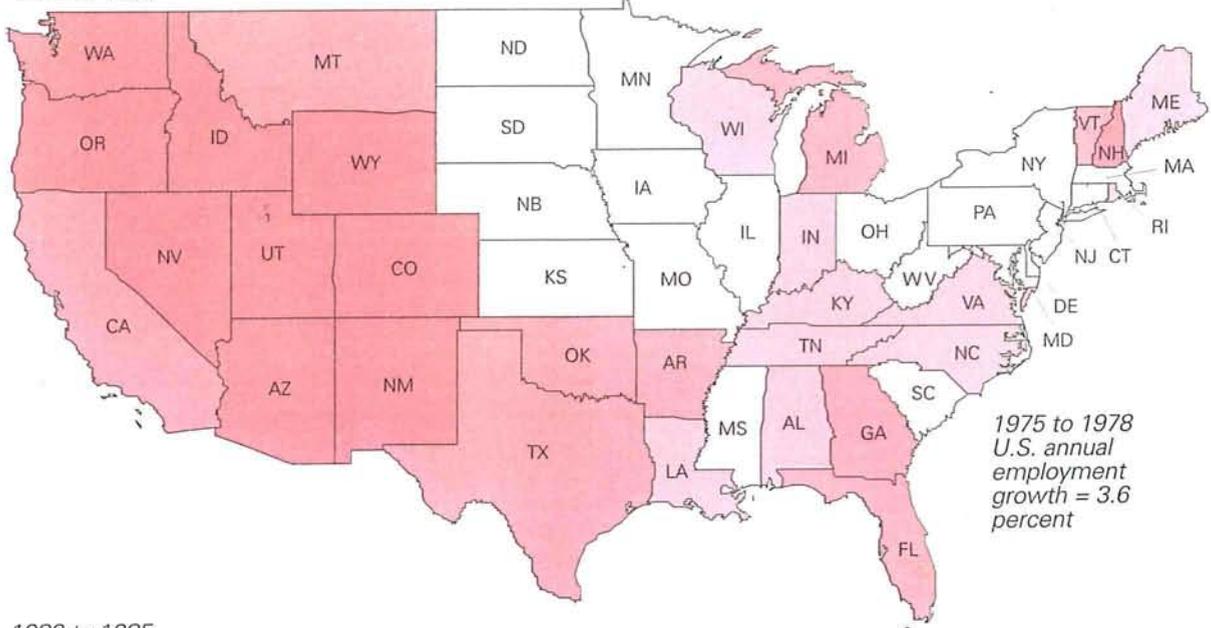
1975 to 1978
U.S. annual
employment
growth = 3.6
percent
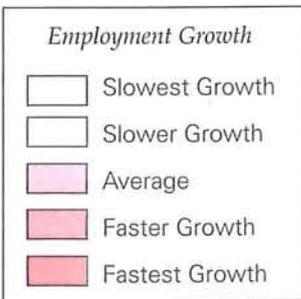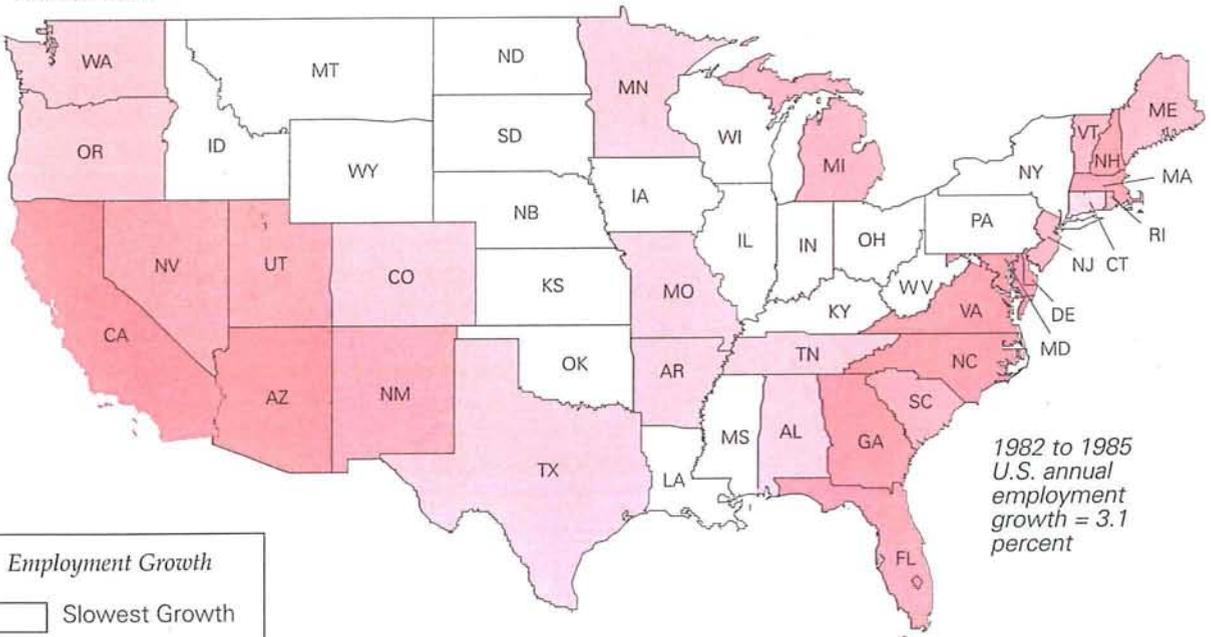
1982 to 1985

1982 to 1985
U.S. annual
employment
growth = 3.1
percent

Employment Growth

Slowest Growth
Slower Growth
Average
Faster Growth
Fastest Growth

Source: U.S. Bureau of Economic Analysis, "Total Full-Time and Part-Time Employment,"
machine-readable data. See appendix Table A-1.

was not just a matter of having the "right" industries; the fast-recovering states in both periods gained share in many industries. Clearly, additional explanations are needed for variations in state performance during recovery periods.

Actual Employment Growth vs. Industry-Mix Prediction
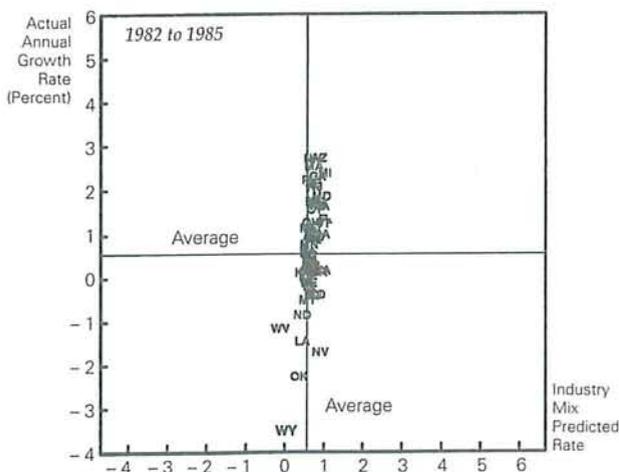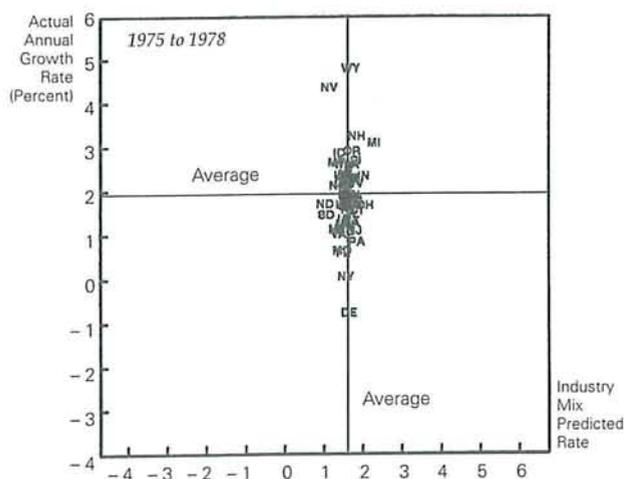
Note: Both actual growth and industry mix predictions are detrended.
Source: U.S. Bureau of Economic Analysis, machine-readable data and authors' calculations. See Appendix Table A-4.

III. Business Location Decisions

The second major approach to understanding state economic growth focuses on what attracts businesses to locate in a state. A state's share of national employment in a given industry will change as existing and new firms respond to changes in the state's attractiveness as a place to do business, or as the cost structure or input needs of individual industries change. A given industry's employment may grow in one state and shrink in another either through expansion and contraction of existing plants or through start-ups, closings, and relocations of facilities.

Firms prefer locations where their costs of doing business are low. For a given availability/quality/productivity of workers, any business would prefer lower wage costs. Low energy costs are also desirable. With respect to the public sector, a firm will come out ahead if it pays lower taxes for a given service bundle or receives more valued public services with a given tax burden. Past research has found labor cost and availability to affect business activity in a state, with tax costs playing no role or a small role in firms' location decisions. (See Bartik 1991 for a comprehensive survey of this literature.)

Adding a third element to understanding state economic growth, Gramlich (1987) has argued that state and local governments may be able to play an active countercyclical role in recessions, contrary to the conventional view that only the federal level of government can directly affect the pace of job loss or creation. He hypothesizes that increases in state expenditures or reductions in tax rates (to encourage private sector spending) could play a Keynesian pump-priming role during recessions, directly augmenting the level of economic activity in a state. The efficacy of such countercyclical fiscal policy by state governments has not yet been tested empirically. (See the Box.)

Some types of shocks to business firms will not be reflected in the broad measure of industry mix outlined earlier. For example, the defense sector cannot be identified directly in the employment data, but is subject to sizable swings not tied to the business cycle. Especially important in the New England states of Connecticut and Massachusetts, defense firms (in a variety of industries) produce goods on military-related contracts. Similarly, firms in many industries produce goods for export overseas. These export-oriented firms would be expected to suffer more than other firms in the same industry when the value of the dollar appreciates, as it did in the early 1980s, and perform better than others when the dollar declines.

State Governments' Countercyclical Fiscal Potential

Edward M. Gramlich argued in a controversial article (1987) that the "conventional wisdom" that only the national government can successfully fight recession should be reexamined. Under certain conditions, state governments also might successfully undertake countercyclical policy. Assuming reasonable values for key parameters, he hypothesized that increases in a state's spending or reductions in state taxes during recession might be expected to augment the state's job growth during recovery, notwithstanding the fact that some of the stimulus would "leak" outside the state's borders, as a sizable fraction of government or household purchases would be "imported" from other states. State governments generally face balanced budget requirements, but they would still be able to spend more than they raise during recessions through the unemployment insurance system, or by undertaking debt-financed infrastructure investments, employing rainy day funds, or spending federal aid funds, for example.

These hypotheses of Gramlich's have not previously been empirically tested, to the authors' knowledge, and unfortunately are not adequately tested in the current study either, although the evidence is interesting. This study finds a positive effect of recession spending increases in the first recovery but not the second and a very weak negative effect of recession tax increases in the second recovery but no effect in the first. The lack of a strong association between tax reductions and recovery in both 1975 and 1982 and between spending increases and recovery in 1982 has two possible interpretations: The first is that Gramlich's hypothesis is wrong, that states' countercyclical spending or tax changes during recession have no consistent effect on state job growth during recovery. It is also possible that states either did not act countercyclically in the reces-sions/recoveries centered around 1975 and 1982 or all acted in the same way. The regressions would not be able to detect any benefits from countercyclical policies if states did not undertake countercyclical policies. Also, if all states do the same thing, the regressions cannot detect any *variation*. Because of balanced budget requirements, recessions put procyclical pressures on state and local governments: Tax and nontax revenues collected locally are likely to decline along with economic activity in a recession, while demands on state services are likely to grow. Unless federal aid grows to fill the budget gap, states must raise tax rates and/or cut services to keep their budgets balanced during a recession.

On average, state budgets moved countercyclically in the 1970s recession but pro-cyclically in the 1980s. That is, the average state saw revenue burdens fall from fiscal years 1973 to 1975, while per capita expenditures (adjusted for inflation) rose. This was possible, at least in part, because federal aid rose. By contrast, between 1980 and 1982, revenue burdens rose while spending fell.

More important in explaining the regression results, however, is the fact that expenditure changes *varied more among the states* for 1973–75 than for 1982–85 and vice versa for tax burden changes, although not markedly so. If all the states look similar on a specific explanatory variable, the regression is less likely to be able to sort out its individual influence on the dependent variable. Thus, the coefficient estimates suggest that when variation across the states *was* greater, those states with larger expenditure increases in a recession (and, weakly, smaller tax increases) enjoyed more vigorous employment growth in the ensuing recoveries. These findings are generally consistent with Gramlich's hypothesis, but cannot definitively "prove" or reject it.

IV. Regression Results

The regressions in Table 1 relate the pace of a state's recovery to (1) short-term industry cycles and shocks, (2) changes in the competitive factors that affect a state's propensity to gain or lose employment share, and (3) changes in state and local government expenditures and revenues during the recession.[5] *Changes* in costs (labor, energy, taxes) or in other attributes in the years preceding the recovery are used rather than levels because the analysis seeks to explain states' cyclical deviations from their long-term trend rates of employment growth.[6]

Industry Mix

Once other state attributes are controlled for, industry mix is an important predictor of employment growth, even during the 1975–78 recovery. Indeed, the equations show coefficients on industry mix greater than one in both recovery periods, suggesting that national industry patterns have a bigger

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The national performance of a state's industries was an important factor influencing state economic growth in both recoveries.

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than one-for-one effect on states. This result probably derives from linkages among industries in a state: when a key industry booms it may have a positive effect on supporting industries, causing them to fare better than these industries nationwide. The point, though, is that the national performance of a state's industries was an important factor influencing state economic growth in both recoveries. In the same vein, the states with growing defense contracts recovered more speedily from the 1980–82 recessions than states facing cuts or non-defense states, but no relationship is apparent in the 1975–78 recovery when defense spending was not increasing as fast.

While the fraction of jobs that are export-oriented was unrelated to a state's employment growth in the 1970s recovery, export orientation was positively associated with a faster recovery in the early 1980s. This

Table 1
Regressions Explaining State Recoveries
Dependent variable is annual percent change in employment, detrended

Independent Variable:	1975–78 Eqn. (1)	1982–85 Eqn. (2)
Intercept	−2.35** (1.15)	−2.53** (1.09)
Industry mix and U.S. industry trends, time t to t+3[a]	1.52** (.46)	1.95** (.76)
Weighted change in defense contracts, time t−1 to t+2	−.0500 (.180)	.724** (.293)
Export-related manufacturing as % of all jobs, time t+1	.0422 (.0472)	.365** (.107)
Change in average hourly earnings, time t−x to t	−.262** (.090)	−.223 (.262)
Change in average commercial electric bill, time t−x to t	−.213** (.035)	.0394 (.0551)
Federal aid to state and local government per capita, time t	3.07** (.95)	.151 (1.38)
Change in state-local general spending per capita, time t−2 to t	4.35** (1.97)	.735 (3.06)
Change in state-local revenue burden[b], time t−2 to t	1.29 (2.21)	−3.47 (2.51)
R-squared	.60	.65
Adjusted R-squared	.52	.58

Standard errors in parentheses below estimated coefficients.
[a]Time designations are keyed to the trough years of 1975 and 1982; time t = trough year.
[b]Revenue burden is revenues per thousand dollars of personal income.
**Significantly different from zero with 95% confidence.
Note: See Appendix Table A-5 for variable definitions and sources.
Source: Authors' calculations; cross-section of 48 states.

was contrary to expectations, as the extremely large increase in the value of the dollar would tend to undermine the competitive position of U.S. products in the world marketplace. According to Little (1989), however, the exports of the more export-oriented regions (New England, the Pacific and Mountain states) were primarily high-tech products that were, at that time at least, relatively price insensitive. Thus, they withstood the effects of the higher dollar more than manufacturing generally.

Changes in Costs and Fiscal Stance

In both recoveries, increases in average hourly earnings of manufacturing production workers in a

state in the years preceding the trough were associated with slower employment growth in the recovery. The effect is not significantly different from zero in the 1980s recovery, however. Rising energy costs also had negative effects on recovery after 1975, probably because the first oil crisis in 1973 heightened awareness of inter-area energy price differentials.

Increases in per capita state-local government spending during the recession appear to have speeded the pace of employment gain in the 1975–78 recovery.[7] This finding is consistent with both cyclical and longer-term hypotheses: (1) state and local governments' countercyclical fiscal actions during recession have some efficacy; and (2) businesses are attracted to states that increase government services, controlling for tax burdens. Federal aid, which allows state and local governments to spend more than they raise locally, had positive effects on states' employment growth in the 1975–78 recovery, but not in 1982–85, perhaps because the budgetary importance of federal aid to state and local governments shrank between 1975 and 1982. (See the Box for additional discussion of the fiscal coefficient estimates.)

V. Why New England's Fortunes Shifted

The New England states pulled out of the 1975 trough relatively gradually but outperformed many other states during the 1982–85 recovery. The regression results suggest some reasons that the two recoveries were so different for New England. It should be recognized, however, that for the average state the 1975–78 recovery was considerably stronger than 1982–85. New England's improvement was a relative one—New England gained relative to the average state.

According to the equations, the New England states' improved performance in the 1980s reflects rising defense contracts, its export orientation, the waning of the 1970s energy price shock, and a better fiscal profile. Changes in the performance of individual New England states from one recovery to the next

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reflect changes in the relevant variable values between 1975 and 1982 as well as changes in the importance of variables in the two recoveries, as indicated by the estimated coefficients.

Table 2 uses the equations in Table 1 to assess the contributions of each variable to recovery in the New England states compared with the average state. The entries in each row represent, for a given variable, state values (relative to the average) multiplied by the estimated coefficient; they indicate how much the variable added to each state's relative employment growth during the two recoveries.

Industry trends and shocks, taken together, had more positive effects on the New England states in the 1980s than in the 1970s, relative to other states. The region's general industry mix was less of a plus in the 1982–85 recovery than in the 1975–78 recovery, largely because the national manufacturing rebound was more sluggish in the later recovery and New England was manufacturing-oriented. However, the region's specializations within manufacturing industries—defense and high-tech exports—worked to its advantage in the 1980s compared with other states, outweighing the broader industry mix effect. The defense buildup provided a boost to the recovery, especially in Massachusetts and New Hampshire. In addition, most of the New England states were highly export-oriented in the early 1980s, with high-tech industries that were skilled-labor-intensive accounting for a large share of the region's traded goods. As a result, they maintained export-related

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[5] See Appendix Table A-5 for definitions and sources of the included variables. See Appendix A-6 for a discussion of other independent and dependent variables examined in alternative versions of the equations.

[6] This implicitly suggests a stock adjustment process: as relative costs and benefits of different locations change, business location decisions will respond over time.

[7] Similarly, more restrained increases in own-source revenue burdens during the recessions of the early 1980s were associated with faster recovery during the 1982–85 period, but only weakly. These coefficient estimates could reflect an element of endogeneity: States less hard hit by the recession (and hence better poised for recovery) may have increased their spending more (or been forced to raise taxes less) during the recession. However, no significant relationship exists between a state's recession depth and recovery pace; hence, the fact that the measured fiscal changes refer to the recession should reduce the potential for reverse causation.

Table 2a
Factors Contributing to Economic Recovery in the New England States, 1975–78

	CT	ME	MA	NH	RI	VT
Detrended Percent Change in Employment, 1975–78	1.5	1.7	1.3	3.2	2.7	2.0
Predicted Employment Change, Equation (1)	1.3	2.1	1.4	1.6	2.2	1.6
Average Recovery[a]	1.9	1.9	1.9	1.9	1.9	1.9
Industry Mix and U.S Industry Trends, 1975–78	.3	.2	.1	.4	.3	−.1
Change in Defense Contracts, 1974–77	.1	−.1	0	0	0	0
Percent of Jobs Export-Related, 1976	.1	−.1	.1	.1	0	.1
Change in Average Hourly Earnings, 1969–75	.2	.1	.2	0	.3	.2
Change in Commercial Electricity Costs, 1969–75	−.6	−.1	−.6	−.6	−.7	−1.1
Federal Aid to State-Local Governments, 1975	−.3	.2	−.1	−.2	.2	.8
Change in State-Local Spending, 1973–75	−.3	−.1	−.2	.1	.2	−.2
Change in State-Local Revenue Burden, 1973–75	−.2	−.1	0	0	0	0
Residual (Unexplained)	.2	−.3	−.2	1.6	.5	.5

Table 2b
Factors Contributing to Economic Recovery in the New England States, 1982–85

	CT	ME	MA	NH	RI	VT
Detrended Percent Change in Employment, 1982–85	1.5	1.1	2.5	2.7	2.2	1.2
Predicted Employment Change, Equation (2)	2.1	.1	2.3	1.5	1.3	1.8
Average Recovery[a]	.6	.6	.6	.6	.6	.6
Industry Mix and U.S Industry Trends, 1982–85	.2	−.2	.1	0	−.2	.6
Change in Defense Contracts, 1981–84	.2	−.2	.5	.3	.1	−.3
Percent of Jobs Export-Related, 1983	1.0	−.1	.5	.5	.5	.7
Change in Average Hourly Earnings, 1975–82	.1	−.2	.2	.1	.1	0
Change in Commercial Electricity Costs, 1975–82	−.1	0	0	0	.1	.1
Federal Aid to State-Local Governments, 1982	0	0	0	0	0	0
Change in State-Local Spending, 1980–82	0	0	0	0	0	0
Change in State-Local Revenue Burden, 1980–82	.1	.1	.4	0	0	0
Residual (Unexplained)	−.6	1.0	.2	1.2	.9	−.6

Note: Table entries are estimated coefficients from equations (1) and (2) shown in Table 1 multiplied by New England states' variable values (deviations from average state). They indicate percentage points of employment change attributable to each state's deviation from average variable value. Elements may not sum to totals because of rounding.

[a]This row reflects the contributions of the constant term and the average values of all the variables.

Source: Authors' calculations. See Table 1 and Appendix Table A-5 for variable definitions and sources.

employment even as the high value of the dollar devastated jobs in states producing mostly commodities that substitute for imports, made by less-skilled labor.[8]

With respect to costs, New England's high energy costs became less of a brake on economic growth in the 1980s. Declining relative wage levels in the 1970s and early 1980s augmented New England's employment growth in both recoveries. However, the region's rise in relative energy costs in the wake of the first oil embargo more than offset these pluses in the 1975–78 recovery. The impact of energy price differentials on employment growth was much smaller in the 1980s than the 1970s, according to the estimated coefficients on the electricity variables in the two regressions.[9]

The fiscal variables (state-local government spending, tax burdens, and federal aid) had very little effect on the pace of states' recoveries from 1982 to 1985 (equation 2). For most of the New England states, this neutrality represented an improvement from 1975–78 when reductions in state spending and low federal aid were a drag on their recoveries compared with other states.

In sum, New England's higher standing in the 1982–85 recovery as compared with 1975–78 reflects the relative protection that the region's orientation toward defense and high-tech exports offered from a

weaker U.S. manufacturing recovery, along with a lessening of earlier negatives from energy costs and fiscal changes. However, New Hampshire's exceptionally strong growth in both recoveries is not explained by the factors included in the regression—its residual in both periods is relatively large and positive. A sizable part of the reason for Maine's and Rhode Island's improved performance in the 1982–85 recovery is similarly unexplained.

VI. What Will the Current Recovery Look Like?

Using the regressions reported in Table 1 to predict states' potential recoveries over the next few years, the key factors are industry trends and shocks, relative wage and energy cost changes, and the fiscal picture. Overall employment growth is expected to be quite sluggish in the 1991–94 recovery. Employment usually picks up smartly in the first few years after a recession trough, but U.S. employment growth in this recovery is forecast to be *below* the national economy's long-term employment growth trend.[10] Services, construction, and the trade sector are expected to recover the fastest over the 1991–94 period, but even their "recoveries" will be slower than their 1969–90 long-term growth trends. Many manufacturing industries, especially durables, are predicted to recover more slowly from 1991 to 1994 than they did during manufacturing's sluggish 1982–85 recovery.

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[8] The New England states were also relatively export-oriented in the 1970s, but the estimated coefficient on export-dependence in that recovery is not significantly different from zero, presumably reflecting the relative stability of the dollar in the 1970s.

[9] The 1970s coefficient presumably reflects the oil price shock of 1973, which exacerbated preexisting regional differences in energy prices and heightened decisionmakers' awareness of interregional energy price differentials. By 1982, the extreme attention to energy prices had abated; furthermore, the New England states' average electricity bills were falling faster than average in the years preceding 1982, in sharp contrast to their above-average rise during the first oil embargo of the early 1970s.

[10] Although the recent recession trough has not officially been dated, most analysts put it in 1991. Data Resources, Inc. forecasts only 1.5 percent annual growth in U.S. employment over the 1991–94 period, much slower than the 3.6 percent and 3.1 percent annual growth of the 1975–78 and 1982–85 recoveries, respectively (*DRI Review*, June 1992). On a detrended basis, the forecast is for U.S. employment to expand at a rate 0.6 percentage points *below* the 1969–90 long-term U.S. employment growth rate of 2.1 percent, as compared with the (positive) 1.5 percent and 1.0 percent detrended annual growth rates of the 1975–78 and 1982–85 recoveries, respectively. The forecast disaggregates nonmanufacturing employment only into its broadest categories.

Since U.S. employment growth is forecast to be below trend, no state has an industry mix that would cause it to grow at a faster pace from 1991 to 1994 than it did over the two decades from 1969 to 1990. All the New England states except Vermont would grow at a pace somewhat below the national average if their industries grew at the forecasted national rates (Table 3).

Scheduled cutbacks in defense spending will have a negative effect on New England in 1991–94, in contrast to the positive effect of rising expenditures in the early 1980s. According to the defense coefficient in equation (2), a cut of 5 percent per year from 1990 to 1993 (which is consistent with current U.S. defense

Table 3
Key Regression Variables for the New England States
Percent

	Average State[a]	CT	ME	MA	NH	RI	VT
Industry Mix and U.S. Industry Trends[b]							
1991–94	−1.0	−1.1	−1.0	−1.2	−1.1	−1.0	−1.0
1982–85	.7	.8	.6	.8	.7	.6	1.0
1975–78	1.6	1.8	1.7	1.7	1.8	1.8	1.5
Change in Real Wages[c]							
1982–91	−.8	.4	.9	1.1	1.1	.4	.7
1975–82	0	−.6	.8	−.8	−.4	−.6	.1
1969–75	.7	−.1	.3	.1	.6	−.4	.1

[a]Average of 48 states.
[b]Industry mix indicates annual rate (in percent) at which state would grow if each industry in state grew at the U.S. detrended rate for that industry. For 1991–94, predicted U.S. industry growth rates are from DRI (1992).
[c]Change in constant dollar average hourly earnings of manufacturing production workers at an annual rate (percent).
Source: Authors' calculations. See Appendix Table A-5 for variable definitions and sources.

budget projections), simply prorated among all the states, would reduce projected 1991–94 annual employment growth in Connecticut and Massachusetts by about one-half of a percentage point compared with the 1982 recovery, slightly more than in the average state. (Vermont, however, with very few defense contractors, will gain relative to the average state.)

Just as New England's high-tech exports were relatively insensitive to the dollar appreciation of the early 1980s, so too they did not benefit as much as more price-sensitive products from the dollar's subsequent decline. In addition, some important New England industries established production facilities abroad during the strong-dollar period. This adjustment also reduced their responsiveness to the dollar's eventual decline (Little 1989). But looking forward, the experience of the 1970s, when export orientation was neither a plus nor a minus, seems more relevant to the 1990s—the New England states can expect no automatic push from foreign markets in the 1991–94 recovery.[11]

Relative costs also tell a negative story for New England. Most notably, real wages rose faster in New England than in the nation in the years leading up to 1991 (Table 3). Indeed, the six New England states were among only 10 states nationwide in which average hourly earnings of manufacturing production workers rose faster than (national) inflation. This increase in New England's average hourly earnings could slow the region's employment growth during the recovery by about one-half of a percentage point annually compared with the average state—a sizable drag when U.S. employment is expected to grow only 1.5 percent per year. Furthermore, although real electricity costs have fallen, the rate of decline has been slower in New England than in other states.

Estimates of FY1989–91 changes in *state* government spending provide an early indication of state-local spending and revenue burdens during the recession. The New England states' economies turned down a year and a half before the nation entered recession in mid-1990, so their recession spending reductions are more pronounced than those of many other states.[12] If the responsiveness of the local economy in the upcoming recovery looks more like the 1970s than the 1980s, then these expenditure restraints may have been counterproductive—removing stimulus.[13]

Adding up the effects of current industry mix and cost factors and combining them with long-term state employment trends suggest that growth during the 1991–94 recovery will once again be focused in the western half of the nation.[14] The recovery will be slow everywhere because of slow U.S. employment growth. Given the region's adverse industry mix and cost factors and below-average trend, it seems likely that all the New England states except Vermont will grow more slowly than the average state.

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[11] Two key conditions have changed since the 1980s: (1) the steep dollar appreciation of the 1980s is not expected to recur in the 1990s and (2) some of New England's export-oriented industries may not have the same lack of sensitivity to exchange rate changes in the 1990s as they did in the 1980s. For example, computers have become more of a commodity in the last decade, making demand for them more responsive to change in prices (and hence exchange rates).

[12] Massachusetts, Maine, Rhode Island, and Vermont were four of the 10 states with the greatest real declines in state government spending from FY1989 to FY1991 (The National Governors' Association and National Association of State Budget

Officers (1990 and 1992) and Massachusetts budget documents). State *and local* government spending and revenue burdens were the fiscal variables used in the regressions, but they are not yet available for the FY1989–91 period.

[13] Of course, without increases in federal aid or help from rainy-day funds, the alternative would have been increasing taxes or fees.

[14] This statement reflects projections for 1991–94 based on current variable values and the 1975 coefficient estimates from equation (1) of Table 1, except for energy costs and defense (from equation 2), combined with DRI's U.S. employment growth forecast and each state's long-term trend rate of employment growth.

Employment Growth Rates of the States

	Annual Percent Change			State Rank (fastest = 1)			Detrended Annual Percent Change		Detrended State Rank (fastest = 1)	
	1975–78	1982–85	1969–90	1975–78	1982–85	1969–90	1975–78	1982–85	1975–78	1982–85
UNITED STATES	3.6	3.0	2.1				1.6	1.0		
New England										
Connecticut	3.2	3.2	1.7	36	20	32	1.5	1.5	34	14
Maine	4.0	3.4	2.3	22	16	19	1.7	1.1	28	18
Massachusetts	2.8	4.1	1.5	41	8	36	1.3	2.5	38	3
New Hampshire	6.5	6.0	3.3	4	2	6	3.2	2.7	3	2
Rhode Island	3.8	3.4	1.1	24	18	43	2.7	2.2	7	6
Vermont	4.7	3.9	2.6	14	12	15	2.0	1.2	21	17
Middle Atlantic										
New York	.8	2.5	.8	48	30	48	.1	1.7	47	11
New Jersey	2.8	3.8	1.7	40	14	31	1.1	2.1	41	8
Pennsylvania	1.7	1.4	.9	46	41	47	.8	.6	44	26
East North Central										
Illinois	2.5	1.5	1.0	45	39	45	1.5	.5	35	28
Indiana	3.7	2.4	1.4	26	31	39	2.3	1.0	13	19
Michigan	4.4	3.7	1.3	16	15	41	3.1	2.4	4	4
Ohio	2.8	2.3	1.1	42	32	44	1.7	1.2	31	16
Wisconsin	3.6	2.2	1.8	28	34	28	1.8	.4	25	30
West North Central										
Iowa	2.6	.8	1.2	44	43	42	1.4	−.4	37	41
Kansas	3.5	1.8	1.8	31	37	29	1.7	0	30	36
Minnesota	3.5	3.0	2.3	32	25	20	1.2	.8	39	25
Missouri	3.3	3.2	1.5	33	21	37	1.8	1.6	26	12
Nebraska	2.8	1.5	1.6	43	40	33	1.1	−.1	40	37
North Dakota	3.2	.7	1.6	35	44	35	1.7	−.9	29	43
South Dakota	2.9	2.0	1.5	39	35	38	1.4	.5	36	27
South Atlantic										
Delaware	1.4	4.3	2.1	47	6	23	−.8	2.1	48	7
Florida	5.0	5.7	4.4	12	3	3	.6	1.3	46	15
Georgia	4.4	5.1	2.8	17	4	12	1.6	2.3	32	5
Maryland	3.0	4.2	2.3	38	7	18	.6	1.8	45	9
North Carolina	3.8	4.0	2.2	25	10	21	1.6	1.7	33	10
South Carolina	3.5	3.4	2.4	30	17	17	1.1	.9	42	22
Virginia	3.7	4.3	2.7	27	5	13	1.0	1.6	43	13
West Virginia	3.0	−.3	.9	37	46	46	2.2	−1.2	19	44
East South Central										
Alabama	3.6	2.8	1.8	29	28	30	1.8	.9	27	21
Kentucky	4.0	1.9	1.8	21	36	27	2.2	.1	17	35
Mississippi	3.3	1.6	1.4	34	38	40	1.9	.3	23	31
Tennessee	4.0	3.0	2.2	23	24	22	1.9	.9	24	23
West South Central										
Arkansas	4.3	2.9	2.1	18	26	24	2.2	.9	16	24
Louisiana	4.2	.1	1.6	20	45	34	2.6	−1.5	9	45
Oklahoma	4.2	−.4	1.9	19	47	25	2.3	−2.3	14	47
Texas	5.1	2.7	2.9	11	29	10	2.3	−.2	15	38
Mountain										
Arizona	7.2	7.5	4.8	3	1	2	2.4	2.7	11	1
Colorado	5.7	3.1	3.5	7	22	4	2.2	−.4	18	39
Idaho	5.5	2.3	2.7	8	33	14	2.8	−.4	6	40
Montana	4.5	1.3	1.8	15	42	26	2.6	−.5	8	42
Nevada	9.9	3.8	5.5	1	13	1	4.4	−1.7	2	46
New Mexico	5.2	3.3	3.1	10	19	7	2.1	.1	20	33
Utah	5.8	3.9	3.5	5	11	5	2.3	.5	12	29
Wyoming	7.3	−1.0	2.5	2	48	16	4.8	−3.5	1	48
Pacific ex. AK & HI										
California	4.9	4.0	3.0	13	9	8	1.9	1.0	22	20
Oregon	5.7	2.9	2.8	6	27	11	2.9	.1	5	34
Washington	5.5	3.1	2.9	9	23	9	2.6	.2	10	32

Source: Authors' calculations based on U.S. Bureau of Economic Analysis, "Total Full-Time and Part-Time Employment," machine readable data.

U.S. Employment Growth Rates by Industry

| | Annual Percent Change | | | Industry Rank (fastest = 1) | | | Detrended Industry Growth | | | | | Percent of Total U.S. Employment, 1979 |
| | | | | | | | Annual % Change | | Rank (fastest = 1) | | | |
	1975–78	1982–85	1969–90[a]	1975–78	1982–85	1969–90	1975–78	1982–85	1975–78	1982–85	
All Industries	3.6	3.0	2.1				1.6	1.0			100.0
Farm	−1.6	−1.5	−1.1	73	62	69	−.6	−.5	70	45	3.4
Nonfarm											
Private											
Agric. Svcs, Forest., Fish., and Other											
Agricultural Services	7.3	7.0	4.7	13	10	9	2.6	2.3	30	16	.6
Forestry, Fisheries, and Other											
Forestry	.5	−.5	4.3	67	55	12	−3.8	−4.8	76	72	...
Fisheries	8.8	0	2.4	4	52	32	6.4	−2.4	3	64	.1
Other[b]	5.3	0	3.7	25	51	16	1.6	−3.7	45	70	...
Mining											
Coal Mining	3.4	−7.5	.3	43	74	57	3.1	−7.8	26	75	.2
Oil and Gas Extraction	10.0	−2.7	2.9	1	67	23	7.1	−5.5	2	74	.5
Metal Mining	.8	−11.9	−1.4	65	76	70	2.2	−10.5	37	76	.1
Nonmetallic Minerals, except Fuels	1.4	−.2	.1	63	53	61	1.3	−.3	50	44	.1
Construction											
General Building Contractors	7.4	8.0	2.4	12	7	30	5.0	5.6	8	3	1.4
Heavy Construction Contractors	4.2	−1.7	.9	33	63	49	3.3	−2.6	22	66	.9
Special Trade Contractors	6.5	7.6	3.3	14	9	19	3.2	4.2	25	6	2.9
Manufacturing											
Nondurable Goods											
Food and Kindred Products	1.3	−.9	−.2	64	59	63	1.4	−.7	47	46	1.6
Textile Mill Products	1.5	−2.3	−1.0	62	65	68	2.5	−1.3	32	54	.8
Apparel and Other Textile Products	2.6	−.8	−.8	53	57	66	3.4	0	21	40	1.2
Paper and Allied Products	2.9	.8	.4	49	49	55	2.5	.4	31	36	.6
Printing and Publishing	3.6	3.7	2.0	41	28	37	1.7	1.8	44	23	1.2
Chemicals and Allied Products	2.5	−1.1	.2	54	61	58	2.3	−1.3	36	55	1.0
Petroleum and Coal Products	2.7	−3.8	−.6	50	70	65	3.3	−3.3	23	67	.2
Tobacco Manufactures	−1.8	−3.5	−1.7	74	69	71	−.1	−1.8	67	60	.1
Rubber and Misc. Plastics Products	8.0	4.5	2.4	8	23	31	5.6	2.0	4	20	.7
Leather and Leather Products	1.7	−9.0	−3.5	61	75	75	5.2	−5.5	7	73	.2
Durable Goods											
Lumber and Wood Products	6.5	5.4	1.2	16	16	46	5.3	4.3	6	5	.8
Furniture and Fixtures	6.2	4.7	1.4	18	21	42	4.7	3.3	10	12	.5
Primary Metal Industries	2.2	−4.5	−2.0	56	71	72	4.2	−2.6	13	65	1.1
Fabricated Metal Products	4.5	1.1	.2	31	47	59	4.3	.9	12	31	1.5
Machinery and Computers	4.2	−.9	.5	32	58	53	3.7	−1.4	15	57	2.3
Electronic Equipment, except Computers	5.8	2.8	.9	21	34	48	4.9	1.9	9	21	1.9
Transp. Equip., excl. Motor Vehicles	3.1	2.1	.4	48	38	54	2.7	1.7	29	26	1.0
Motor Vehicles and Equipment	8.6	7.6	.6	5	8	52	8.0	7.0	1	2	.9
Stone, Clay, and Glass Products	3.8	1.3	.3	37	44	56	3.5	1.0	18	30	.7

	Annual Percent Change			Industry Rank (fastest = 1)			Detrended Industry Growth Annual % Change		Rank (fastest = 1)		Percent of Total U.S. Employment, 1979
	1975–78	1982–85	1969–90[a]	1975–78	1982–85	1969–90	1975–78	1982–85	1975–78	1982–85	
Durable Goods *continued*											
Instruments and Related Products	6.1	.1	1.5	19	50	41	4.7	−1.3	11	56	.6
Miscellaneous Manufacturing Industries	3.5	−.9	0	42	60	62	3.5	−.9	17	49	.5
Transportation and Public Utilities											
Railroad Transportation	−1.5	−5.7	−3.3	72	73	74	1.8	−2.3	40	63	.5
Trucking and Warehousing	5.2	4.7	2.4	26	22	29	2.8	2.2	28	18	1.5
Water Transportation	2.6	−2.4	−.4	51	66	64	3.0	−1.9	27	62	.2
Other Transportation											
Local and Interurban Passenger Transit	.1	2.7	1.0	71	35	47	−.9	1.7	73	24	.3
Transportation by Air	4.0	4.9	3.5	35	20	18	.5	1.5	58	28	.4
Pipelines, except Natural Gas	5.6	−3.3	.2	23	68	60	5.4	−3.4	5	69	···
Transportation Services	9.8	8.9	6.3	2	3	3	3.5	2.6	20	14	.2
Communication	1.8	−1.9	1.4	60	64	43	.4	−3.3	59	68	1.2
Electric, Gas, and Sanitary Services	2.0	1.9	1.9	58	41	39	.1	0	62	41	.7
Wholesale Trade	3.8	2.3	2.1	38	37	35	1.7	.2	43	38	5.1
Retail Trade											
Building Materials and Garden Equip.	5.6	4.2	1.9	22	25	40	3.7	2.3	14	17	.7
General Merchandise Stores	2.6	2.0	1.3	52	40	44	1.3	.7	49	35	2.1
Food Stores	3.2	3.2	2.5	46	31	28	.8	.7	55	33	2.3
Auto. Dealers and Service Stations	2.4	3.9	.6	55	27	50	1.8	3.3	41	11	1.9
Apparel and Accessory Stores	4.6	2.5	2.3	29	36	33	2.3	.2	35	39	1.0
Furniture and Home Furnishing Stores	4.9	6.5	2.6	28	11	26	2.4	3.9	34	8	.7
Eating and Drinking Places	7.5	5.9	4.0	10	14	14	3.5	1.9	19	22	4.4
Miscellaneous Retail Stores	3.9	1.1	3.0	36	46	22	.9	−1.9	53	61	2.8
Finance, Insurance and Real Estate											
Banking and Credit Agencies	4.0	3.2	3.2	34	32	20	.8	0	54	42	1.9
Other Finance, Insurance, and Real Estate											
Security and Commodity Brokers and Serv.	3.8	8.4	3.7	39	4	15	0	4.6	64	4	.2
Insurance Carriers	3.1	1.1	2.0	47	48	36	1.1	−.9	52	50	1.1
Insur. Agents, Brokers, and Services	3.7	3.5	3.6	40	29	17	0	−.1	63	43	.6
Real Estate	8.3	8.2	5.1	7	6	8	3.2	3.2	24	13	2.4
Combined Real Estate, Insur., Etc.	−4.7	−5.2	−4.2[c]	76	72	76[c]	−.5	−1.0	69	51	···
Holding and Other Investment Companies	6.5	2.0	6.4	15	39	2	0	−4.4	65	71	.3
Services											
Hotels and Other Lodging Places	3.3	5.3	3.2	45	17	21	.2	2.2	61	19	1.1
Personal Services	3.3	9.4	2.2	44	2	34	1.1	7.2	51	1	1.6
Private Household	.4	−.8	−2.1	69	56	73	2.5	1.3	33	29	1.6
Business Services	8.5	10.8	6.9	6	1	1	1.6	3.9	46	9	3.4

	Annual Percent Change			Industry Rank (fastest = 1)			Detrended Industry Growth				Percent of Total U.S. Employment, 1979
							Annual % Change		Rank (fastest = 1)		
	1975–78	1982–85	1969–90ᵃ	1975–78	1982–85	1969–90	1975–78	1982–85	1975–78	1982–85	
Services *continued*											
Auto Repair, Services, and Garages	6.3	8.3	4.3	17	5	13	2.0	4.0	38	7	.8
Miscellaneous Repair Services	4.6	4.4	2.7	30	24	25	1.9	1.7	39	25	.5
Amusement and Recreation Services	5.3	3.4	4.7	24	30	11	.7	−1.2	56	53	1.0
Motion Pictures	2.0	6.1	2.7	57	12	24	−.7	3.4	72	10	.2
Health Services	5.0	3.1	4.7	27	33	10	.2	−1.6	60	58	5.0
Legal Services	6.0	5.7	5.4	20	15	6	.6	0.3	57	37	.7
Educational Services	.6	4.2	2.5	66	26	27	−1.9	1.6	75	27	1.3
Social Services	8.9	6.1	5.4ᵈ	3	13	7ᵈ	3.6	.7	16	34	1.0
Museums, Botanical, Zoolog. Gardens	7.4	5.3	6.1	11	18	4	1.3	−.9	48	48	⋯
Member Organizations	.5	−.5	1.2	68	54	45	−.7	−1.7	71	59	1.4
Miscellaneous Services	7.8	5.0	6.0	9	19	5	1.7	−1.0	42	52	1.7
Government and Government Enterprises											
Federal, Civilian	.3	1.3	.6	70	43	51	−.2	.8	68	32	2.6
Military	−2.7	1.5	−.9	75	42	67	−1.8	2.4	74	15	2.2
State and Local	1.9	1.2	1.9	59	45	38	0	−.7	66	47	11.8

⋯ = less than 0.05 percent.
ᵃFor the 1969–90 period, annual growth rates are averages of annual growth excluding industry redefinition years 1975 and 1988.
ᵇInternational organizations and foreign embassies in the United States.
ᶜCombined real estate, insurance, etc. is averaged only from 1969 to 1987.
ᵈSocial services is averaged only from 1975 to 1990.
Source: Authors' calculations based on U.S. Bureau of Economic Analysis, "Total Full-Time and Part-Time Employment," machine-readable data.

Appendix A-3. Industry Mix and Predicted Growth: Shift-Share

If each industry in a state grew at that industry's national growth rate over a specified period, then total employment in the state would grow at a rate that was a weighted average of industry growth rates, where the weights reflect the state's industry mix. If EMP_{ij1} is employment in industry i and state j in year 1, then the state's annual employment growth rate from year 1 to year 2 would be

$$PEG_{j12} = \left(\sum_{i=1}^{n} \frac{EMP_{ij1}}{EMP_{Tj1}} \left(\frac{EMP_{iUS2}}{EMP_{iUS1}} \right)^{1/m} \right) - 1,$$

where the subscript T refers to total (all industries combined), the subscript US refers to the United States (all states combined), n is the number of industries, and m is the number of years between year 1 and year 2.

Economists and other analysts use shift-share analysis to examine the components of regional employment growth. PEG above represents employment growth if the state maintained a constant share of U.S. employment in each industry; the difference between this constant share prediction and actual employment growth represents the change, or shift, in the state's share of employment by industry. That is,

$$SHIFT_{j12} = EMPG_{j12} - PEG_{j12},$$

where $EMPG_{j12} = \left(\left(\frac{EMP_{Tj2}}{EMP_{Tj1}} \right)^{1/m} \right) - 1$, state j's actual rate of employment growth from year 1 to year 2.

The basic concepts are the same, but the calculations become a bit more complicated, when long-term employment trends are netted out in order to focus on cyclical changes. If a state's detrended employment growth rate is calculated as

$$DEMPG_{j12} = EMPG_{j12} - TREND_j,$$

where $TREND_j = EMPG_{j6990} = \left(\left(\frac{EMP_{Tj90}}{EMP_{Tj69}} \right)^{1/21} \right) - 1,$

then $DPEG_{j12} = PEG_{j12} - PEG_{j6990}$.
(The detrended predicted growth measure removes growth attributable to each industry's long-term U.S. growth rate. The long-term industry growth rates used in calculating PEG_{j6990} substitute total employment growth rates for industry rates in the two years in which the BEA data incorporate SIC code industry redefinitions, 1975 and 1988.)

And $DSHIFT_{j12} = SHIFT_{j12} - SHIFT_{j6990}$.

Thus, just as in the simpler version, the "shift" term (detrended) is equal to the difference between actual employment growth (detrended) and predicted employment growth (detrended).

The actual calculations differed slightly from those outlined above in order to calculate the long-term predicted growth measure using the state's beginning-of-period (1975 or 1982) industry mix with 1969–90 growth rates, not the industry mix as of 1969. But the long-term shift variable was similarly adjusted to retain the adding-up relationship among the three detrended variables (DEMPG = DPEG + DSHIFT) for each state.

Appendix Table A-4
Employment Growth Rates of the States in Recoveries, Net of 1969–90 Trends

	Actual Percent Change		Industry Mix Prediction[a]	
	1975–78	1982–85	1975–78	1982–85
New England				
Connecticut	1.5	1.5	1.8	.8
Maine	1.7	1.1	1.7	.6
Massachusetts	1.3	2.5	1.7	.8
New Hampshire	3.2	2.7	1.8	.7
Rhode Island	2.7	2.2	1.8	.6
Vermont	2.0	1.2	1.5	1.0
Middle Atlantic				
New York	.1	1.7	1.5	.8
New Jersey	1.1	2.1	1.8	.8
Pennsylvania	.8	.6	1.8	.6
East North Central				
Illinois	1.5	.5	1.8	.7
Indiana	2.3	1.0	2.0	.8
Michigan	3.1	2.4	2.3	1.0
Ohio	1.7	1.2	2.0	.7
Wisconsin	1.8	.4	1.8	.7
West North Central				
Iowa	1.4	−.4	1.5	.7
Kansas	1.7	0	1.5	.6
Minnesota	1.2	.8	1.5	.6
Missouri	1.8	1.6	1.6	.8
Nebraska	1.1	−.1	1.3	.6
North Dakota	1.7	−.9	1.0	.5
South Dakota	1.4	.5	1.0	.6
South Atlantic				
Delaware	−.8	2.1	1.6	.7
Florida	.6	1.3	1.5	1.1
Georgia	1.6	2.3	1.6	.8
Maryland	.6	1.8	1.5	.9
North Carolina	1.6	1.7	1.6	.8
South Carolina	1.1	.9	1.5	.8
Virginia	1.0	1.6	1.3	.9
West Virginia	2.2	−1.2	1.8	−.1
East South Central				
Alabama	1.8	.9	1.6	.7
Kentucky	2.2	.1	1.6	.5
Mississippi	1.9	.3	1.6	.7
Tennessee	1.9	.9	1.7	.7
West South Central				
Arkansas	2.2	.9	1.7	.7
Louisiana	2.6	−1.5	1.7	.5
Oklahoma	2.3	−2.3	1.6	.4
Texas	2.3	−.2	1.7	.6
Mountain				
Arizona	2.4	2.7	1.5	.9
Colorado	2.2	−.4	1.5	.8
Idaho	2.8	−.4	1.4	.8
Montana	2.6	−.5	1.3	.6
Nevada	4.4	−1.7	1.1	.9
New Mexico	2.1	.1	1.4	.7
Utah	2.3	.5	1.4	.6
Wyoming	4.8	−3.5	1.7	0
Pacific ex. AK & HI				
California	1.9	1.0	1.5	.9
Oregon	2.9	.1	1.7	.9
Washington	2.6	.2	1.5	.9

[a]Predicted change assumes each state's industries grow at U.S. detrended rates for that industry; see Appendix A-3 for methodology.
Source: U.S. Bureau of Economic Analysis, "Total Full-Time and Part-Time Employment," machine-readable data, and authors' calculations.

Appendix Table A-5
Variable Definitions, Sources, and Means

Variable	Definition	Source	Average (N = 48) 1975	1982	1991
Detrended employment growth (dependent variable), time t to t+3[a]	Percentage change in total employment in state, over three-year recovery period, at annual rate, minus 1969–90 rate of employment growth in state, at annual rate (percent).	U.S. Department of Commerce, Bureau of Economic Analysis (BEA)	1.9	.64	n.a.
Industry mix and U.S. industry trends, time t to t+3	Annual percent change in total employment over three-year recovery period, if each local industry grew at detrended national rate for that industry, using full BEA 76 industries. (Industry trends corrected for changes in SIC definitions.) See Appendix A-3.	Authors' calculations, based on BEA industry data for U.S. and states. 1991–94 predictions based on national industry forecasts of DRI (1992) and state mix 1990	1.6	.70	−.99
Weighted change in defense contracts, time t−1 to t+2	Change in defense prime contracts per capita, weighted by state share of contracts relative to state share of total U.S. employment (percent/100). Variable is lagged on the grounds that it takes time for contracts to turn into jobs. Projections for 1990–93 assume 15 percent decline in each state and use 1990 weights.	U.S. Department of Defense, *Prime Contract Awards by Region and State*	.332	.342	−.129
Export-related manufacturing as percent of all jobs	Manufacturing employment related to exports as percent of total private-sector employment, 1976, 1983, and 1987.	U.S. Bureau of the Census, *Annual Survey of Manufactures*	5.7	4.5	5.9
Change in average hourly earnings, time t−x to t	Annual percent change in real average hourly earnings of manufacturing production workers, 1969–75, 1975–82, or 1982–91.	U.S Bureau of Labor Statistics, *Handbook of Labor Statistics*	.72	−.01	−.77
Change in average commercial electric bill, time t−x to t	Annual percent change in average monthly commercial electric bill for 300 kw-60,000 kwh, 1969–75, 1975–82, or 1982–90, in constant dollars.	U.S. Energy Information Administration, *Typical Electric Bills* and *Electric Sales and Revenue*	.42	.06	−3.65
Federal aid to state and local governments per capita, time t	Intergovernmental general revenue of state and local governments from federal government per capita (thousands of 1990 dollars).	U.S. Bureau of the Census, *Governmental Finances*	.578	.526	.583
Change in state-local spending, time t−2 to t	Annual change in constant dollar state and local government direct general expenditures per capita (percent/100).	U.S. Bureau of the Census, *Governmental Finances*	.0397	−.0538	n.a.
Change in state spending, time t−2 to t	Same as above, but state government alone, not local.	NGA and NASBO, *Fiscal Survey of the States*	n.a.	n.a.	.0358
Change in state-local own-source revenue burden, time t−2 to t	Annual change in state-local own source revenues per dollar of personal income (percent/100).	U.S. Bureau of the Census, *Governmental Finances*	−.0516	.0389	n.a.

[a]Time t is trough year (1975 or 1982); t+1 is one year later (1976 or 1983), and so on.
n.a. = not available.
Note: U.S. CPI was used to convert current dollar data to constant (calendar year) 1990 dollars.

Appendix A-6. Other Equations/Variables

Various other measures were included in versions of equations (1) and (2) not shown, but were eliminated in the interests of parsimony when they consistently failed to show any relationship with states' recovery rates. Three labor-market variables attempted to control for the quality, availability, and malleability of the work force pool: the percentage of the population with at least a high school (or college) education, the state's unemployment rate in the trough year, and the percentage of employed workers who are members of unions. None of these variables entered the equations with coefficients significantly different from zero, whether of the expected sign or the opposite.

On the fiscal side, several alternative measures were dropped after finding they had no effect on detrended recovery rates; they were variables that might be expected to have a stronger influence on long-term growth than on recovery. (1) Measures of state/local expenditure mix (education, highways) and state revenue mix (specific tax sources, charges and fees) were not associated with states' recoveries. This analysis thus fails to support, at least in the cyclical context, others' findings that education spending, for example, attracts employers to a state, or that businesses prefer revenue-raising through state sales taxes to corporate income taxes. (2) Earlier versions of the equations included levels as well as changes in per capita expenditures and revenue burdens; the levels never obtained coefficients significantly different from zero when recession changes were included.

The equations were also estimated using levels of defense contracts (relative to the size of the state's economy) rather than changes. Defense dependence was not associated with recovery rates, probably because growth rates for defense contracts varied considerably across defense-dependent states.

Also included in earlier versions were measures of the severity of each state's job losses during the recession. No support was found for the hypothesis that states losing more jobs during the recession would gain more jobs back as the economy recovered, once interstate differences in long-term rates of employment growth were netted out. Indeed, McNees (1992) warns against using the shape of a recession to predict the course of the recovery at the national level.

Similar equations were estimated using actual (not detrended) employment growth during the recovery as the dependent variable and including each state's 1969–90 trend rate of employment growth along with the other explanatory variables. The trend variable obtained an estimated coefficient of approximately 1.3 in the 1975–78 recovery and 0.7 in the 1982–85 recovery, but neither was statistically significantly different from one. The estimated coefficients on the other explanatory variables looked fairly similar to those shown in Table 1.

Equations (1) and (2) were combined into a pooled regression including both recoveries. Only the coefficients on defense, exports, electricity costs, and (to a lesser degree) federal aid differed significantly between the two recoveries.

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