The Sources of Regional Variation in the Severity of the Great Depression: Evidence from U.S. Manufacturing, 1919–1937

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The impact of the Great Depression was milder in the South Atlantic states, more severe in the Mountain states, and surprisingly uniform across other regions of the country —despite large differences in industrial structure. Employing data on 20 manufacturing industries disaggregated by state, we analyze the relative contributions of industry mix and location to regional variations in economic performance. Industrial composition had a significant impact on employment growth, with regions that concentrated on durable goods or inputs to construction faring worse than others. Long-run trends also mattered, and explain much of the South Atlantic's more favorable performance.

The Great Depression was a global crisis, but its severity varied both spatially and sectorally. Within the United States, the severity of the 1929 to 1933 contraction differed substantially across regions and cities. Although all regions suffered considerable employment losses, the contraction was relatively milder and shorter in the South Atlantic states and more severe and prolonged in the Rocky Mountain states. The severity of the contraction also varied dramatically across sectors of the economy, with employment falling most in such industries as construction and durables manufacturing, more modestly in the service sector and nondurables manufacturing.

The economic fates of regions and industries were clearly linked. Regional economies that were more dependent on cyclically volatile industries were bound to suffer a relatively more severe contraction of economic activity during the Depression. But there may also have been a local component to economic shocks or their propagation that affected all or most industries within a region. A wave of bank failures in a specific region, for example, was a disruption to the region's capital markets that could affect any industry that depended on local sources of capital.

In this article we explore the sources of regional variation in the severity and duration of the Depression in the U.S. manufacturing sector, using a panel data set of employment in 20 manufacturing industries drawn from the biennial Censuses of Manufactures, 1919 to 1937. Because the data are dis-aggregated by industry and state, we are able to distinguish the effects of industry composition and region-specific effects. Furthermore, by using data that span nearly two decades, we are able to distinguish the short-run impact of the 1929 to 1933 contraction from longer trends in the growth of regional economies and industrial sectors. Controlling for the effects of both region and industry represents the major advance of our article over previous dis-aggregated analyses of the Depression, which have tended to examine either regional variation (for example, studies by John Wallis and George Borts) or industry variation (studies by Michael Bernstein and Rick Szostak), but not both simultaneously.[1]

Our analysis confirms the importance of industry mix in the impact of the downturn on regional economies. Regional manufacturing sectors that were particularly dependent on demand for inputs by the construction industry were especially adversely affected by the contraction. The importance of lumber production in the Mountain and East South Central regions, for example, accounts for their relatively worse performance during the down-turn. In the South Atlantic region, where the contraction was relatively less severe, industry composition played a less important role. Instead, the South Atlantic benefitted from greater regional *trend* growth in its manufacturing sector. Our results suggest generally that region-specific effects of the *cycle* were rather small.

The results have implications for some theories of the causes of the De-pression, even though we do not directly test these theories. To the extent that region-specific shocks played a limited role in creating regional differ-ences, the results cast some doubt on theories that would imply strong idio-syncratic regional effects. For example, disruptions to local capital markets caused by regionally concentrated waves of bank failures do not appear to have had large effects on regional manufacturing sectors; nor do New Deal wage restrictions that may have been more binding in low-wage regions.

REGIONAL VARIATION IN THE SEVERITY OF THE DEPRESSION

Regional differences in the depth and duration of the Great Depression have been documented for a variety of economic indicators.[2] Unemployment

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[1] Wallis, "Employment"; Borts, "Regional Cycles"; Bernstein, *Great Depression*; and Szostak, *Technological Innovation.* The importance of disaggregation in recent work on the Great Depression is stressed by Margo, "Employment"; and Calomiris, "Financial Factors."

[2] Research using modern data has also found that states vary considerably in the degree to which their economic fluctuations are linked to national cycles (Sherwood-Call, "Exploring the Relation-

rates varied considerably across cities and states, for example, and bank failures were more prevalent in farm states.[3] In an important article, Wallis has shown that employment in both manufacturing and nonmanufacturing declined less (in percentage terms) and recovered more rapidly in the South—particularly the South Atlantic—than elsewhere.[4] While other regional differences are also revealed by the data, the North-South contrast is the most dramatic.

Regional variation in the 1929 to 1933 decline and subsequent recovery are illustrated in Figures 1 and 2, which show, respectively, employment and the total value of output in manufacturing by census division for the period from 1919 through 1939, normalized to 100 in 1929.[5] In most regions the trough in employment was reached in 1933, with 1933 employment typically 30 to 40 percent below its 1929 level, and recovery remained incomplete as late as 1939. The most notable exception is the South Atlantic division, where employment declined less than 20 percent below its 1929 level.[6] The South Atlantic was the only division in which 1939 employment had recovered to a level above where it stood in 1929. The only other region showing significantly anomalous behavior is the Mountain region, where as late as 1939 manufacturing employment remained at less than 80 percent of its 1929 level. The regional movements of total product value (Figure 2) are largely consistent with those for employment.[7]

Evidence on nonmanufacturing industries is less extensive, but the basic regional patterns seem to hold outside manufacturing as well. Table 1, for example, presents an index of employment in retail trade, again relative to the 1929 value, based on published figures from the *Census of Business* (available for 1929, 1933, 1935, and 1939). Retail employment was less volatile than manufacturing employment, but the superior performance of

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ships"). Blanchard and Katz ("Regional Evolutions") show that there are persistent differences in rates of employment growth across states, with shocks tending to have a permanent effect on the level of employment. Clark ("Business Cycle Fluctuations") decomposes innovations in employment growth into national, region-specific, and industry-specific shocks. Controlling for broadly defined industry groups, he finds that on average about 40 percent of the variance of cyclical innovations in regional employment growth are region-specific (not attributable to national or industry-specific innovations).

[3] On unemployment see U.S. Dept. of Commerce, *Fifteenth Census* and *Sixteenth Census*; and Simon and Nardinelli, "Does Industry Diversity." On bank failures see Chandler, *America's Greatest Depression*; Friedman and Schwartz, *Monetary History*; Temin, *Did Monetary Forces*; and Wicker, *Banking Panics*.

[4] Wallis, "Employment." See also, Borts, "Regional Cycles."

[5] The data in Figures 1 and 2 are derived from the Biennial Census of Manufactures (U.S. Department of Commerce (various years)). Because of a shift in industrial coverage in 1935, the 1935 figures are the mean of two values; one consistent with the earlier years and one consistent with the later years. The difference between these levels was not large.

[6] In this article we use the terms "region" and "division" interchangeably, always referring to the U.S. Census's definitions of divisions.

[7] Unemployment rates cannot be directly estimated at the state or regional level except in the decennial census years, 1930 and 1940. For these years unemployment rates by geographical division parallel the differences in manufacturing employment.

FIGURE 1
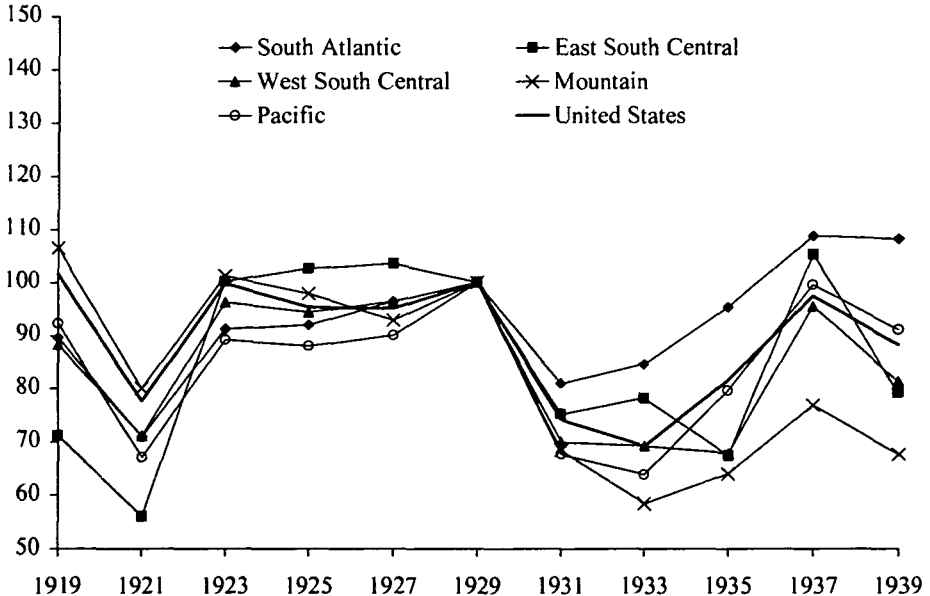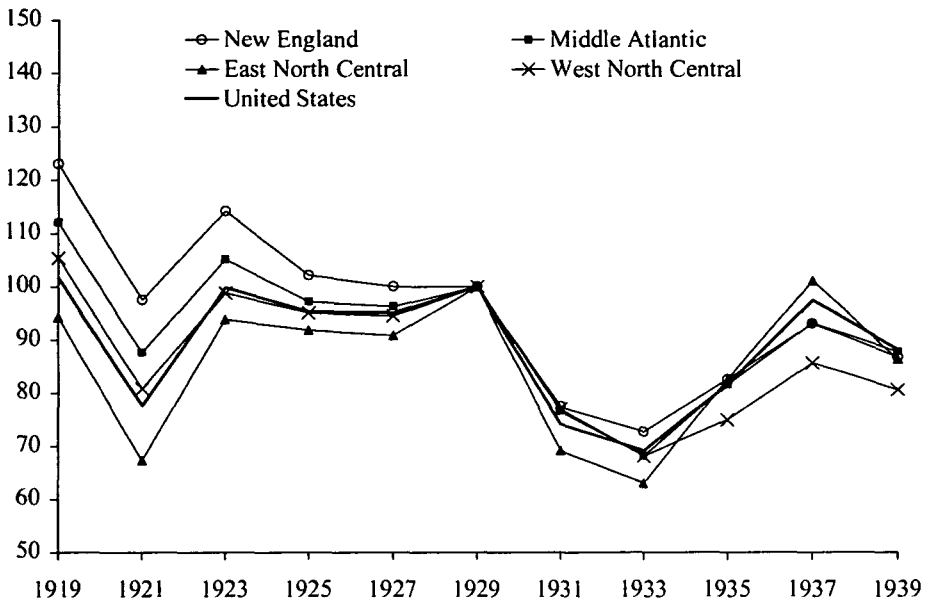INDEX OF MANUFACTURING EMPLOYMENT (1929 = 100)

Note: Industrial coverage changed in 1935. Figures for 1935 are the average of two values: one consistent with the industries covered in earlier years, the other consistent with later years.
Source: U.S. Department of Commerce, *Census of Manufactures* (various years).
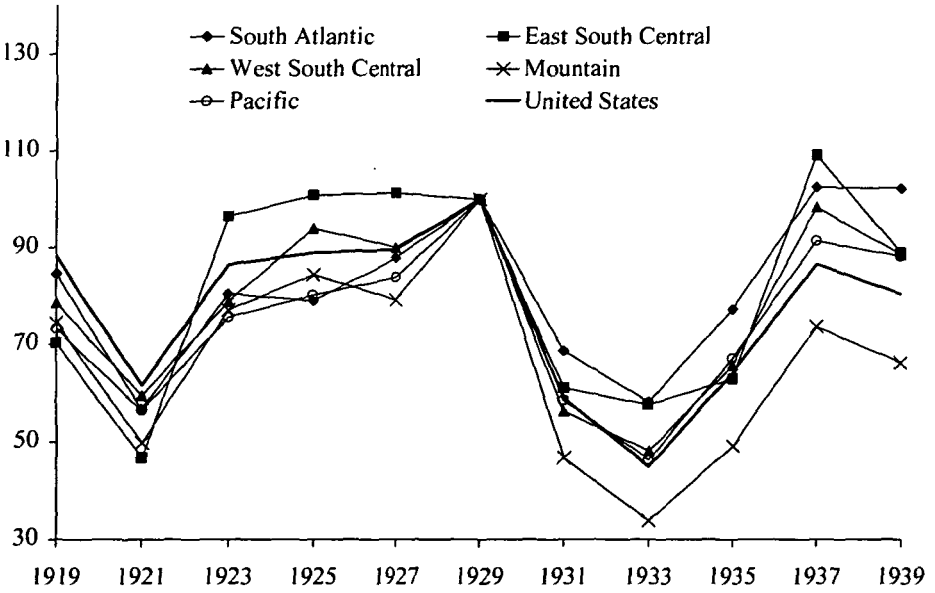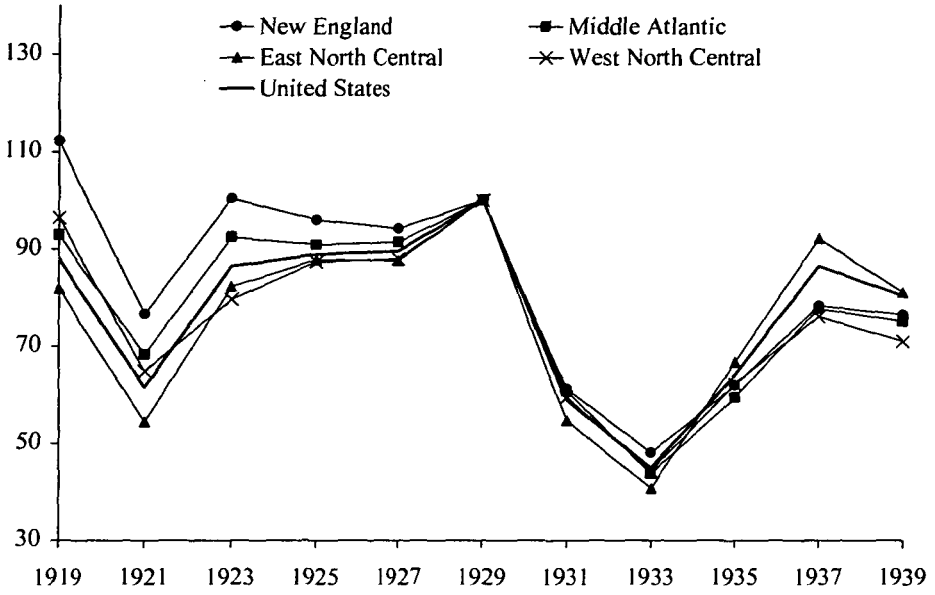
FIGURE 2
INDEX OF PRODUCT VALUES (1929 = 100)

Note: See Figure 1.
Source: See Figure 1.

TABLE 1
INDEX OF RETAIL EMPLOYMENT BY REGION
(1929 = 100)

Region	1933	1935	1939
New England	82.3	92.0	102.5
Middle Atlantic	79.5	91.2	100.5
East North Central	77.7	87.0	104.1
West North Central	80.9	88.9	100.8
South Atlantic	89.5	104.4	130.0
East South Central	77.3	88.6	108.5
West South Central	78.5	88.1	112.8
Mountain	73.8	88.0	113.8
Pacific	80.8	92.3	115.7

Sources: U.S. Department of Commerce, Bureau of the Census, *Census of American Business*, p. 4, and *Census of Business*, pp. 60–62.

the South Atlantic division after 1929 is evident. Regional differences in manufacturing employment were also mirrored in the behavior of total output and per-capita income.[8]

The aggregate census employment and production data summarized in Figures 1 and 2 suggest three stylized facts: the magnitude of the contraction and recovery was quite similar across much of the country, despite considerable differences in industrial structure across regions; the South Atlantic division experienced a milder downturn and recovered more rapidly than the rest of the country; and employment losses were severe and relatively persistent in the Mountain states.

What might explain the observed geographical variations in the severity of the Depression? Most accounts of the causes of the Depression focus on the role of large national shocks to aggregate demand. Among the potential sources of such shocks are tight monetary policy; monetary disturbances caused by the 1929 stock market crash and the bank failures of the early thirties; increased uncertainty in the wake of the stock market crash; and unexplained shocks to consumption or investment.[9] In addition, supply effects operating through changing market structure or the pace of technological change may have contributed to the severity of the Depression.[10]

Although these shocks would have been national in scope, their propagation into aggregate disturbances in prices and quantities is likely to have varied by location because of locational differences in industrial structure, economic institutions, or other economic conditions. One of the most likely

[8] See Schmitz and Fishback, "Distribution."

[9] On tight monetary policy, see Friedman and Schwartz, *Monetary History*; Hamilton, "Monetary Factors"; and Temin, *Lessons*. On monetary disturbances, see Friedman and Schwartz, ibid.; and Field, "Asset Exchanges." On increased uncertainty, see Romer, "Great Crash." On unexplained shocks, see Temin, *Did Monetary Forces*.

[10] Bernstein, *Great Depression*; and Szostak, *Technological Innovation*.

sources of regional differences is variation in industry composition. Shocks
to aggregate demand have differential effects by industry. As consumer
incomes fall, the demand for relatively more income-elastic goods should
fall relatively further; as real interest rates rise or future incomes become
more uncertain, the demand for durables should decline relatively more than
the demand for nondurables. Industries that produce inputs for industries
with more volatile demand are themselves more likely to experience severe
demand shocks. National economic policies also may affect industries differ-
ently. Barbara Alexander and Matthew Krepps, for example, report that the
effectiveness of industry codes adopted following passage of the National
Industrial Recovery Act (NIRA) in 1933 varied across industries depending
on market structure and product characteristics.[11] Finally, technology shocks
are also likely to vary across industries. Borts and Wallis find that industry
composition contributed significantly to locational variation during the Great
Depression, although location-specific effects remain even after controlling
for industry composition.[12]

The effects of demand shocks on highly cyclical industries could be trans-
mitted to other local industries in a variety of ways. Employment reductions
would reduce worker incomes for purchases of consumer goods produced
locally. Stress on local financial markets may also have spread shocks across
industries. Banking panics, for example, at least before 1933, were essen-
tially local and regional affairs and were concentrated in farming areas,
especially in the East and West North Central and southern divisions of the
country.[13] Thus shocks to the money supply could have varied regionally.
Furthermore, as Bernanke has argued, banking crises not only reduced the
money supply but also disrupted the operation of local capital markets.[14]
Thus access to capital was disrupted for an entire local economy during a
banking crisis.[15]

Additional potential sources of regional variation include geographical
differences in wealth or wealth distribution and in the impact of government
expenditures or market interventions. To the extent that consumption expen-

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[11] Alexander, "Failed Cooperation"; and Krepps, "Another Look."

[12] Both Borts ("Regional Cycles") and Wallis ("Employment") measure the effect of industry struc-
ture by comparing actual employment behavior across states to a counterfactual in which each industry
is assigned its national rate of employment reduction and then weighted by the state's industry composi-
tion. Unfortunately, this method is biased toward finding a strong industry composition effect. Suppose,
for example that within a region all industries have the same rate of employment loss, but some regions
experience a larger employment decline than others. Industries concentrated in the more volatile region
will appear more volatile, with the result that some of the decline in employment will be mistakenly
assigned to industry mix, when in fact all industries within a region experienced the same reduction in
employment. Only by controlling simultaneously for location and industry can the contribution of
industrial composition be estimated accurately.

[13] Chandler, *America's Greatest Depression*, pp. 83, 84; and Wicker, *Banking Panics.*

[14] Bernanke, "Nonmonetary Effects."

[15] For modern evidence of such a regional credit channel, see Samolyk, "Banking Conditions."

ditures fell due to the wealth effect of declining asset values, the shock to consumption could have varied with regional variations in wealth or its distribution. Government expenditures varied across states, partly for political reasons.[16] The impact of New Deal regulations differed not only by industry, as noted above, but also by region. Gavin Wright, for example, notes that the minimum wages established under the NRA and later the Fair Labor Standards Act were binding for a larger percentage of workers in the low-wage South.[17]

A full assessment of all the major potential causes of regional variation in the impact of the Depression is beyond the scope of the present article. Instead, we focus on quantifying the relative importance of industry structure and region-specific effects. If industry mix accounts for most of the observed regional variation, we may conclude that the Depression was essentially a national phenomenon that was transmitted to the regions via industry-specific shocks.

THE DATA

Our panel data set is based on the published reports of the biennial Census of Manufactures for the years 1919 through 1937.[18] We collected data for all 48 states (District of Columbia excluded) and for 20 industries. The industries chosen were the 20 largest (ranked by number of wage earners employed in 1929) for which we could construct a reasonably consistent series for the entire period, using the census classification scheme of the period. Shifts in the definition and constituent industries for certain industry groups precluded using them in the sample. The 20 industries selected for our sample were, however, all within the top 31 manufacturing industries nationally in 1929. Table 2 lists the 31 largest industries according to employment and gives sample employment and coverage for those included in the study.

For each state-industry observation in each year, we recorded the number of establishments, the average number of wage earners (employment), and the total dollar value for the census year of compensation of wage earners, cost of materials, and value of production. The Census calculated average annual employment in an establishment as the average of 12 monthly figures, where each month's employment was the number of wage earners on the payroll "for the week which included the 15th day of each month, or for some other representative week."[19]

[16] Wright, "Political Economy."
[17] Wright, *Old South.*
[18] Although we also collected observations for 1939, extensive changes in the industry definitions between the 1937 and 1939 censuses raised serious questions about the comparability of the data between those years. We have excluded 1939 from the present analysis.
[19] U.S. Department of Commerce, *Fifteen Census,* p. 5.

TABLE 2
TOP 31 MANUFACTURING INDUSTRIES IN 1929, RANKED BY EMPLOYMENT

Rank	Industry	Number of Wage Earners	Sample Employment	Proportion Covered
1	Foundry and machine-shop products	454,441		
2	Cotton goods	424,916	411,977	0.970
3	Lumber and timber products	419,084	418,539	0.999
4	Iron and steel: steel works and rolling mills	394,574	369,197	0.936
5	Car and general construction and repairs, steam RR	368,681		
6	Electrical machinery	328,722		
7	Motor vehicles	226,116	207,079	0.916
8	Motor vehicles, bodies and parts	221,332	218,275	0.986
9	Knit goods	208,488		
10	Boots and shoes other than rubber	205,640	202,608	0.985
11	Bread and other bakery products	200,841	199,495	0.993
12	Furniture	193,399	193,256	0.999
13	Clothing, women's	187,500		
14	Printing and publishing, book and job	150,649		
15	Clothing, men's	149,868		
16	Silk and rayon	130,467		
17	Printing and publishing, newspapers and periodicals	129,660	128,315	0.990
18	Meatpacking, wholesale	122,505	119,032	0.972
19	Cigars and cigarettes	105,308	98,715	0.937
20	Paper	103,320	101,343	0.981
21	Canning and preserving	98,866	98,693	0.998
22	Clay products	93,336		
23	Planing-mill products	90,134	89,770	0.996
24	Worsted goods	88,485		
25	Rubber tires and inner tubes	83,263	68,398	0.821
26	Petroleum refining	80,596	73,487	0.912
27	Dyeing and finishing textiles	79,327		
28	Nonferrous metals	79,183	73,558	0.929
29	Glass	67,527	62,548	0.926
30	Confectionery	63,501	63,176	0.995
31	Chemicals	62,199	58,739	0.944

Source: U.S. Department of Commerce, Bureau of the Census, *Fifteenth Census of the United States, Manufactures: 1929*, table 6.

The employment numbers suffer from various potential biases. The Census warned that several of these biases would likely inflate the employment numbers beyond full-time equivalent employment: part-time employees may have been counted the same as full-time employees; establishments that were shut down on the fifteenth of the month might have selected a different week as more "representative"; and some employees who had been laid off or terminated might have remained on the payroll for a period, even if they were not actually at work.

It seems likely that all of these biases dampen the employment fluctuations reported in the Census relative to the actual fluctuations, and thus the

employment data are likely to understate the size of employment losses during the contraction of the early 1930s. Furthermore, the Census did not systematically report weekly working hours, so the employment numbers do not completely reflect movements in total labor hours. Cyclical adjustments in weekly hours were relatively larger during the interwar period than they have been in postwar cycles.[20] Unless there were good reason to believe that these biases operated differentially by region, however, the data should still be useful in examining the sources of regional variations in employment fluctuations. Furthermore, we can compare the results using employment as the dependent variable with those using total product value, which should not be subject to the same biases. From Figure 2 it is clear that the overall regional patterns for product value closely resemble those for employment.

Clearly, our sample is not a random sample of manufacturing industries or establishments. Some of the most important U.S. industries—such as the single largest employer, foundries and machine shops, and the clothing industries—are not represented in our sample; nor are the numerous smaller, more specialized industries. Still, the sample represents a large percentage of U.S. manufacturing workers in a wide range of industries, including both consumer and producer goods and durables and nondurables.

Another shortcoming of the data is its low frequency (biennial). We cannot capture details of the timing of the Depression that are available to researchers who use monthly series. Still, the biennial observations coincide roughly with well-known cyclical turning points, such as the trough of the 1920/21 depression, the pre-Depression peak in 1929, and the trough of the Great Contraction in 1933. It should also be noted that the other major Depression-decade manufacturing data set that is disaggregated to the state level—John Wallis's—is benchmarked to the biennial Census of Manufactures, and thus "movements in [his] manufacturing series [correspond] to the Census of Manufactures between all odd-numbered years."[21]

To maintain the confidentiality of business establishments, the census did not report details for establishments in states with very few firms in a given industry. As a result, our data set has missing values for certain industry-state cells. Nevertheless, the coverage of our sample is quite good for each of the 20 industries. Table 2 also reports the proportion of total U.S. industry employment covered by non-missing observations in our sample. Coverage exceeds 80 percent in all 20 industries and 90 percent in all but one of them.

The regional coverage of the data is presented in Table 3, which shows the number of wage earners in our sample as a percentage of all manufacturing wage earners, by census division, for the beginning, middle (1929), and end of our panel. For the United States as a whole, our sample covers a little over

[20] Bernanke and Powell, "Cyclical Behavior."
[21] Wallis, "Employment," p. 50.

TABLE 3
EMPLOYMENT IN A 20-INDUSTRY SAMPLE AS A PERCENTAGE OF TOTAL
MANUFACTURING EMPLOYMENT

Region	1919	1929	1937
South Atlantic	48.6	51.9	49.6
East South Central	44.1	38.4	29.9
West South Central	50.2	46.2	46.2
Pacific	40.6	53.4	55.1
Mountain	28.6	36.9	43.1
West North Central	32.8	33.4	38.6
East North Central	35.2	40.0	42.7
New England	33.0	29.6	24.5
Middle Atlantic	25.3	26.5	26.4
United States	33.8	36.5	36.8

Source: U.S. Dept. of Commerce, *Census of Manufactures*, 1919, 1929, and 1937.

one-third of manufacturing wage earners. Coverage varies but is at least 24 percent in every region. Table 3 indicates that between 1919 and 1937 there were significant changes in our sample's coverage in four of the nine divisions. Coverage fell substantially in the East South Central and New England divisions and rose substantially in the Pacific and Mountain divisions. The declining coverage of our sample in the East South Central is accounted for almost entirely by the dramatic collapse of employment in the lumber industry there. As we note below, this imparts a bias toward excessive volatility in our sample for that division. In New England, the drop in coverage is again attributable largely to one industry—in this case, cotton textiles. In the Pacific and Mountain regions, the rising coverage of our sample seems to be due to a relative decline in employment in industries outside our sample.[22]

For our purposes, the validity of the data depends primarily on whether they reasonably track the cyclical movement of employment and other variables, as well as the regional variation in those movements. Figure 3 plots percentage changes in employment for each census year in our sample, comparing total U.S. manufacturing with the employment recorded in our sample.[23] The sample tracks changes in total manufacturing employment quite well. Similar figures for regional subsamples are presented in an appendix available from the authors. Although there are somewhat larger deviations between the regional subsamples and the manufacturing totals, the sample again does a reasonable job tracking the aggregate movements in most regions. The most important exception is the East South Central, in which our sample shows a much larger employment reduction between 1929

[22] This can be inferred from the fact that employment in most of the individual sample industries is an increasing percentage of total manufacturing employment in these two divisions.

[23] The percentage change for year *t* is the natural log of employment in year *t* minus the natural log of employment in year *t* − 1.
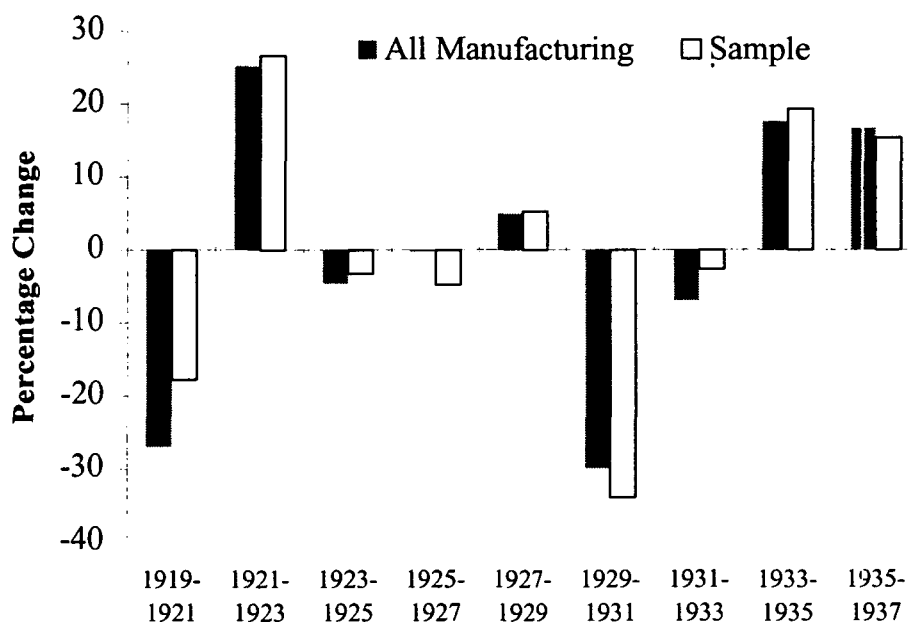
FIGURE 3
EMPLOYMENT CHANGES FOR ALL MANUFACTURING AND 20-INDUSTRY SAMPLE

Notes: The All Manufacturing series uses 1935 employment that is consistent with earlier years in industrial coverage. Proportional changes are calculated as the change in natural log of employment.
Sources: U.S. Department of Commerce, *Census of Manufactures* (various years); see the text for details on the 20-industry sample.

and 1931 than was true for manufacturing as a whole. In the Mountain and West North Central divisions, the timing of the 1929 to 1933 contraction differs between the sample and all manufacturing, although the total reductions over the four-year period are of similar magnitude. To summarize, our sample seems to provide a reasonable representation of employment movements in the manufacturing sector, with the exception of the East South Central division.

A PANEL ANALYSIS OF THE INDUSTRY-STATE DATA

Changes in economic activity during the Depression varied by location, industry, and time period. Furthermore, these variations may have included both trend changes and cyclical variations around trend. For example, a relatively large decrease in employment in a particular region during the 1929 to 1933 contraction could have been due to a strong region-specific cyclical shock, slower trend growth in regional employment, or both. In this section we present an empirical regression model for our panel data that

allows us to estimate the separate effects of both trend and cyclical changes associated with industries and regions. By doing so, we can determine the extent to which regional variation in the severity of the Depression was the consequence of variation in region-specific cyclical effects, time trends, or variation due to differences in the industrial composition of regional economies.

The dependent variable in our analysis is the percentage change (change in the natural log) in employment between two biennial manufacturing censuses. The analysis can also be performed for other variables of interest, such as annual production value or annual wage payments per worker, which we summarize later in the article. For employment, we define the dependent variable as

$$e_{ist} \equiv \ln(E_{ist}) - \ln(E_{is,t-1})$$

where E_{ist} is employment in industry i ($i = 1, \ldots, I$), state s ($s = 1, \ldots, S$), and time period t ($t = 1, \ldots, T$), with the unit of time being two years.

The regression model uses dummy variables to capture the effects of industry (h_i), region (z_n), and time (b_t), as well as the interactions between industry and time (f_{it}) and region and time (g_{nt}). The model, then, is

$$e_{ist} = c + h_i + z_n + b_t + f_{it} + g_{nt} + u_{ist} \tag{1}$$

where $n = 1, \ldots, N$ indexes the region, and u_{ist} is an error term. We omit interactions between industry and region, which would provide estimates of separate time trends for specific industry-region combinations. As we later note (see note 26), these interaction terms are not significantly different from zero in our analysis of variance.

Identification of the model requires imposing identifying restrictions on the dummy variables. Usually this is accomplished by dropping one category for each set of dummies, in which case the intercept becomes the value of the excluded category. Instead, we restrict the mean effect of each set of dummy variables to be zero. In other words, the model makes the sample average the reference point for the dummy variables, rather than an arbitrarily excluded region, industry, and time period.[24] This specification eases interpretation of the results, but it has no effect on the estimated relative effects; indeed, the coefficients we estimate can readily be transformed into those obtained from the conventional restrictions.

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[24] Marimon and Zilibotti, "'Actual' Versus 'Virtual' Employment," p. 5.

The following restrictions imply that the mean coefficient effects are zero

$$\sum_i h_i = 0$$

$$\sum_n z_n = 0$$

$$\sum_t b_t = 0$$

$$\sum_i f_{it} = 0 \qquad \forall_{t=1,...,T}$$

$$\sum_t f_{it} = 0 \qquad \forall_{i=1,...,I}$$

$$\sum_n g_{nt} = 0 \qquad \forall_{t=1,...,T}$$

$$\sum_t g_{nt} = 0 \qquad \forall_{n=1,...,N}$$

Because the dependent variable is the percentage change in employment, the constant term under our specification (equation 1) represents the (unweighted) average time trend in employment growth over the whole sample period, while the effects h_i and z_n capture the deviations of industry-specific and region-specific trends from the average or baseline trend. The time-period dummy variables (b_t) represent average year-specific effects and thus can be thought to capture cyclical movements around the trend that are common to all industries and regions. Finally, the interaction effects f_{it} and g_{nt} capture cyclical variations around trend that are specific to individual industries and regions respectively. If, for example, the coefficient g were more negative for region A than for region B, it would imply that the cyclical downturn was more severe in region A, even after controlling for regional differences in industry composition.

RESULTS: EMPLOYMENT

Results for employment growth rates are summarized in Tables 4 and 5. Table 4 is a partial ANOVA table for the model. Approximately 40 percent of the variation in employment growth rates is explained by the model. The *F* statistics indicate that all the sets of variables, including the interactions, are statistically significant in explaining employment growth. Examining the column for sum of squares, it is evident that the year effects (b_t) and year-by-industry interactions (f_{it}) account for the lion's share of the explained variation. In other words, year-to-year variations around trend in employ-

TABLE 4
ANOVA FOR PANEL MODEL OF EMPLOYMENT GROWTH RATE

Source	Partial SS	df	MS	F	Prob > F	
Model	299.28	250	1.197	11.50	0.000	
Year	81.49	8	10.187	97.86	0.000	
Region	4.09	8	0.512	4.92	0.000	
Ind	14.95	19	0.787	7.56	0.000	
Year*region	16.66	64	0.260	2.50	0.000	
Year*ind	119.01	151	0.788	7.57	0.000	
Residual	464.90	4,466	0.104			
Total	764.18	4,716	0.162			
N						4,717
R-squared						0.3916
Root MSE						0.32264
Adjusted R-squared						0.3576

Note: ANOVA estimate using 20-industry sample (see the text).

ment for the economy as a whole and the industry-specific deviations from those fluctuations are the major source of explained variation in our sample.[25] Region effects, both trend and cycle, are statistically significant, but account for less of the variation in employment growth.[26]

Table 5 summarizes the results of estimating equation 1 using unweighted ordinary least squares. The first column gives the estimated trend coefficients for average or baseline employment growth (the constant term), region-specific trends (z_n), and industry-specific trends (h_i). The remaining columns give the estimates of the year-specific effects for the baseline (b), region-time interactions (g_{nt}), and industry-time interactions (f_{it}).[27]

The estimated baseline trend (0.004) implies an average biennial growth rate of just 0.4 percent, a negligible rate of employment growth. Continuing down the first column, the regional trends show considerable variation. All three southern regions were regions of above-average growth, controlling for industry composition, as was the west coast (Pacific). Manufacturing employment grew more slowly than average in the industrial northeast (New England and Middle Atlantic), and in the West North Central and Mountain regions.

The year-to-year deviations from trend show the expected patterns. Reading across the first row of Table 5, the severe contraction of the 1919 to 1921 period is evident, as is the recovery that followed. The dramatic employment reductions of the "great contraction" between 1929 and 1933 also show up clearly. Looking at the region cycle effects there is some evidence of regional differences in the magnitude of cyclical movements, with the 1929 to

[25] This result is consistent with the findings of Ghosh and Wolf, "Geographical and Sectoral Shocks," using data from 1963 through 1991.

[26] Interaction terms between industry and region are not significantly different from zero when added to the ANOVA, suggesting that industry trends did not vary systematically across regions.

[27] Standard errors and estimated *t*-statistics are reported in an appendix available from the authors.

TABLE 5

PANEL REGRESSION RESULTS (dependent variable: employment growth rate)

	Trend	Business Cycle Deviations								
		1919–1921	1921–1923	1923–1925	1925–1927	1927–1929	1929–1931	1931–1933	1933–1935	1935–1937
Baseline effects	0.004	-0.194	0.177	-0.006	-0.044	0.089	-0.350	-0.076	0.238	0.165
Region effects										
South Atlantic	0.036	0.041	0.048	-0.069	0.025	-0.038	0.015	0.016	0.004	-0.041
East South Central	0.030	-0.048	0.091	0.004	-0.040	0.054	-0.140	0.002	0.040	0.039
West South Central	0.023	-0.080	-0.182	0.088	0.100	0.003	-0.056	0.102	-0.057	0.082
Pacific	0.036	0.142	0.063	-0.071	-0.062	0.000	-0.013	-0.017	-0.018	-0.025
Mountain	-0.021	-0.016	-0.151	0.046	-0.021	0.058	-0.028	-0.019	0.166	-0.034
West North Central	-0.037	-0.079	0.075	0.022	-0.006	-0.009	0.188	-0.196	0.001	0.005
East North Central	0.000	-0.059	0.095	0.011	0.027	-0.035	0.026	0.010	-0.043	-0.032
New England	-0.047	0.082	-0.064	-0.006	0.002	0.008	0.009	0.029	-0.041	-0.019
Middle Atlantic	-0.020	0.019	0.026	-0.026	-0.025	-0.041	-0.001	0.072	-0.051	0.026
Industry effects										
Boots	0.047	0.173	0.125	-0.153	0.024	-0.115	0.077	0.125	-0.107	-0.149
Bread	0.070	0.140	-0.136	-0.039	0.058	0.044	0.146	-0.015	-0.078	-0.119
Canning	0.075	-0.445	0.071	0.113	0.008	0.148	0.065	0.019	0.023	-0.001
Chemicals	0.057	-0.015	0.017	-0.109	-0.106	0.051	0.093	0.101	0.055	-0.087
Cigars, Cigarettes	-0.173	0.158	-0.007	-0.019	0.101	-0.138	0.211	-0.141	-0.086	-0.079
Confectionery	-0.057	0.534	-0.624	0.155	-0.015	-0.022	0.079	0.124	-0.185	-0.046
Cotton Goods	-0.030	0.169	-0.060	-0.037	0.079	-0.121	0.086	0.119	-0.156	-0.078
Furniture	0.042	0.048	0.039	0.116	-0.020	0.044	-0.047	-0.309	0.027	0.102
Glass	-0.010	-0.180	0.094	-0.004	-0.002	-0.071	0.113	0.048	0.085	-0.084
Iron	0.059	-0.366	0.312	-0.066	0.140	-0.053	-0.110	0.000	0.085	0.058
Lumber	-0.077	-0.062	0.120	0.021	-0.009	0.004	-0.405	0.045	0.235	0.051
Meat Packing	0.008	-0.084	-0.014	-0.063	0.081	-0.091	0.186	0.159	-0.137	-0.038
MV parts	0.016	-0.166	0.378	-0.328	0.001	0.014	-0.154	-0.117	0.235	0.138
Motor Vehicles	0.007	-0.092	0.228	-0.015	-0.250	0.351	-0.168	-0.361	0.137	0.170
Nonferrous Metals	0.031	-0.264	0.200	-0.129	0.170	-0.054	-0.167	-0.013	0.093	0.164
Paper	0.007	0.094	-0.066	0.101	-0.305	0.070	0.158	0.048	-0.016	-0.086
Petroleum Refining	0.017	0.225	-0.511	0.124	0.100	0.053	0.206	0.056	-0.144	-0.109
Planing-Mill Prods	-0.031	0.098	0.028	0.197	-0.075	-0.076	-0.117	-0.344	0.127	0.162
Printing, Newspaper	0.007	0.036	-0.119	-0.003	0.074	0.012	-0.191	0.372	-0.139	-0.042
Rubber tires, tubes	-0.065	(a)	-0.076	0.139	-0.053	-0.051	-0.061	0.083	-0.053	0.072

1931 downturn being much stronger in the East South Central, and much milder in the West North Central divisions. The industry cycle effects reveal quite pronounced and relatively systematic differences in the movements of employment in individual industries. For the most part, the industry effects in both the 1919 to 1921 and 1929 to 1933 downturns are consistent with the view that employment fluctuations in durable goods industries were more volatile than overall manufacturing employment over the cycle, whereas nondurable goods industries were less volatile.

Our interpretation of the coefficients in the first column of the table as estimates of trend employment growth is open to the criticism that our sample period of two decades is simply too short to identify a genuine trend, particularly considering the fact that the second half of the period is dominated by the Great Depression. Regions exhibiting slow "trend" growth in employment in our sample may actually be regions that were especially hard hit by the Depression, with the consequence that the estimated trend over two decades is negative. If this were true, it would make little sense to claim a sharp distinction between trend and cycle in our results.

In fact, our estimates of the regional trends are largely robust to changing the sample period, including estimating the trend on the pre-Depression data alone. Table 6 presents regional trend coefficients estimated using alternative sample periods. The first alternative drops the 1919 to 1921 observations, thus beginning the sample in the 1921 trough. This has virtually no effect on the variation in regional trends. The second alternative estimates the trend using only the 1921 to 1929 observations, thus dropping the Depression years altogether. Although the East South Central does a little better and the West South Central a little worse in this sample, the basic regional pattern of trends remains remarkably similar to that based on the full-sample estimates. The last column of Table 6 offers another indicator of regional trends in employment: the percentage change in total manufacturing employment between 1919 and 1947. The basic regional pattern is overall quite similar to that indicated in our trend estimates. We thus are confident that what we have termed regional trend growth rates are capturing more than regional differences in the severity of the Depression itself.

Accounting for Regional Differences in Employment Growth During the Depression

The most substantial regional differences revealed in Figure 1 are the milder contraction of employment in the South Atlantic region and the more

TABLE 6
ESTIMATED REGIONAL TREND COEFFICIENTS UNDER ALTERNATIVE SAMPLE
PERIODS AND GROWTH OF TOTAL MANUFACTURING EMPLOYMENT, 1919–1947

Region	Full Sample 1919–1937	Alternative Sample Periods		Employment Growth (percentage) 1919–1947
		1921–1937	1921–1929	
South Atlantic	0.0355	0.0381	0.0361	49.8
East South Central	0.0301	0.0249	0.0452	52.8
West South Central	0.0228	0.0128	0.0086	46.9
Pacific	0.0363	0.0403	0.0478	53.9
Mountain	-0.0207	-0.0161	-0.0377	6.2
West North Central	-0.0368	-0.0371	-0.0362	24.1
East North Central	0.0003	0.0046	0.0082	39.7
New England	-0.0468	-0.0441	-0.0423	-7.9
Middle Atlantic	-0.0205	-0.0234	-0.0296	12.9
United States				27.0

Notes: Trend coefficients from OLS regressions using 20-industry sample. Employment growth measured as the change in the natural log of total manufacturing employment. Employment is number of wage earners in all years except 1947, when it is number of production workers.
Sources for employment growth: U.S. Dept. of Commerce, Bureau of the Census, *Abstract of the Census of Manufactures, 1919*, p. 280. U.S. Dept. of Commerce, Bureau of the Census, *Census of Manufactures: 1947, Volume I, General Summary*, p. 32.

severe and prolonged contraction in the Mountain region. Our panel analysis allows us to examine the role of regional trends and cyclical shocks as well as industry composition in generating these regional differences.

In Table 7 we summarize the percentage changes in employment for the 1929 to 1933 contraction, the 1933 to 1937 recovery, and the full 1929 to 1937 swing, and decompose these changes into region and industry effects. The first column shows the actual changes in employment in our sample, by region and for the United States as a whole. The second column gives the deviation of the regional change from the U.S. total. The South Atlantic's milder contraction is indicated by the 14-percentage-point differential between its employment change and the U.S. average during the period from 1929 to 1933. By contrast, the East South Central and Mountain divisions show the most substantial negative deviations during the downturn. During the recovery period (1933 to 1937), the Mountain region bounced back substantially, whereas the East South Central remained severely depressed. The results for the East South Central division must be treated with caution, however, to the extent that our sample overstates the size of the employment contraction there (see the earlier section on data). New England, which had a relatively mild contraction, had essentially no employment recovery in our sample.

Taking a longer view, the bottom third of the table shows that between 1929 and 1937 there was considerable regional variation in employment growth. With the exception of the anomalous East South Central division, the South fared somewhat better than the national average, as did the Pacific

TABLE 7
ACCOUNTING FOR REGIONAL DIFFERENCES IN EMPLOYMENT GROWTH, 1929–1937
(percentages)

	Actual Change	Region – USA	Region Effects			Industry Effects			Region + Industry
			Trend	Cycle	Total	Trend	Cycle	Total	
			1929–1933						
South Atlantic	-22.7	14.2	7.1	3.0	10.1	-6.0	5.6	-0.4	9.7
East South Central	-68.8	-31.9	6.0	-13.8	-7.8	-6.5	-14.2	-20.7	-28.5
West South Central	-38.7	-1.8	4.6	4.6	9.2	-3.8	-2.0	-5.7	3.5
Pacific	-43.0	-6.0	7.3	-2.9	4.3	-2.8	-13.2	-16.0	-11.7
Mountain	-65.9	-29.0	-4.1	-4.7	-8.8	-4.9	-8.4	-13.3	-22.1
West North Central	-32.0	4.9	-7.4	-0.8	-8.2	3.9	10.9	14.8	6.6
East North Central	-39.5	-2.6	0.0	3.6	3.6	3.4	-11.0	-7.6	-4.0
New England	-25.1	11.9	-9.4	3.8	-5.5	1.4	13.2	14.6	9.0
Middle Atlantic	-40.9	-3.9	-4.1	7.1	3.1	3.7	0.9	4.6	7.7
United States total	-36.9								
			1933–1937						
South Atlantic	24.5	-10.2	7.1	-3.7	3.4	-3.8	-9.9	-13.7	-10.3
East South Central	39.8	5.2	6.0	7.8	13.9	-4.4	7.6	3.2	17.1
West South Central	41.9	7.2	4.6	2.5	7.1	-1.6	-0.8	-2.4	4.6
Pacific	45.7	11.0	7.3	-4.3	2.9	-0.2	10.2	10.0	13.0
Mountain	54.9	20.3	-4.1	13.2	9.0	-0.4	3.1	2.7	11.8
West North Central	31.1	-3.6	-7.4	0.5	-6.8	5.0	-12.8	-7.9	-14.7
East North Central	47.1	12.4	0.0	-7.5	-7.5	4.1	10.9	15.0	7.6
New England	-0.8	-35.5	-9.4	-6.0	-15.4	2.1	-14.9	-12.8	-28.2
Middle Atlantic	33.3	-1.4	-4.1	-2.5	-6.6	6.1	-1.7	4.4	-2.2
United States total	34.7								
			1929–1937						
South Atlantic	1.8	4.0	14.2	-0.7	13.5	-10.8	-3.9	-14.8	-1.3
East South Central	-29.0	-26.7	12.0	-6.0	6.0	-11.5	-5.5	-17.0	-10.9
West South Central	3.1	5.4	9.1	7.1	16.3	-6.4	-3.3	-9.7	6.5
Pacific	2.7	4.9	14.5	-7.2	7.3	-4.1	-3.0	-7.1	0.2
Mountain	-11.0	-8.7	-8.3	8.5	0.2	-8.2	-2.8	-10.9	-10.7
West North Central	-1.0	1.3	-14.7	-0.2	-15.0	8.4	0.7	9.1	-5.9
East North Central	7.6	9.8	0.1	-3.9	-3.8	7.4	-1.5	5.9	2.1
New England	-25.9	-23.6	-18.7	-2.2	-20.9	3.4	-2.0	1.4	-19.5
Middle Atlantic	-7.6	-5.3	-8.2	4.6	-3.5	8.6	-0.2	8.4	4.9
United States total	-2.3								

Notes: Decomposition of effects based on regression estimates from Table 5.

and East North Central. The Mountain and New England divisions lagged in employment growth over the eight-year period.

To account for the regional deviations, we use the regression coefficients from the panel model to predict the impact of pure regional effects as well as industry composition on regional employment, net of the national average trend and cycle. These effects are summarized in the third through ninth columns of Table 7. Under the heading "Region Effects," the trend effect is the regional trend coefficient z_n, compounded over the relevant number of

periods, while the cycle effect is the sum of the region-specific year effects g_{nt} for the relevant periods.

The effects of industry composition are calculated from counterfactual regional employment, using the trend or cycle industry coefficients weighted by the regional employment in each industry in the initial year.[28] Because the estimated industry trend and cycle effects are (by construction) common to all regions, the industry effects will differ across regions only because of differences in the relative employment shares of each industry in the different regions. The counterfactual employment levels due to industry trends (E^*_{trend}) and industry cycles (E^*_{cycle}) are given by

$$E^*_{trend} = \sum_i e^{h_i} E_{in,t-1} \qquad E^*_{cycle} = \sum_i e^{f_{it}} E_{in,t-1}$$

The industry effects presented in the table are the percentage change in employment between the actual value at time $t - 1$ and the counterfactual value at time t; for example, the trend effect for region n is $ln(E^*_{trend}) - ln(E_{n,t-1})$.[29]

The final column of the table adds up the region and industry effects. The sum of the effects can be viewed as a rough indication of how well these effects explain the region's deviation from the national average employment growth, because they are calculated leaving out the common trend and cycle effects. Thus the final column should be compared with the second column. Differences between the second and final columns of the table are presumably due to the effects of interactions between industry and region that we have not captured in the model.

As the estimates for the 1929 to 1933 contraction show, the region effects are particularly important in explaining the relative mildness of the contraction in the South Atlantic, and it is the upward *trend* of employment in the region that does most of the work. By our accounting, about half of the South Atlantic's 14-percentage-point advantage in employment loss can be attributed to its higher trend employment growth. Industry composition had a negligible impact in the South Atlantic during this period. By contrast, industry composition played a significant role in the severity of the contraction in the Mountain division, adding about 13 percentage points to the region's employment loss relative to the national average. Adverse regional trend and cycle terms together account for another nine percentage points of the employment reduction in the Mountain states.

[28] These industry effects resemble Marimon and Zilibotti's ("'Actual' Versus 'Virtual' Employment") "virtual region," but here we present separate estimates of the trend and cycle effects of industry composition.

[29] It should be noted that the estimated industry trend effects for each region change somewhat between the 1929 to 1933 and 1933 to 1937 periods, even though the same trend coefficients are being used. The reason is the shift in industry employment shares between 1929 and 1933, which alters the weights used in the calculations.

Industry composition contributed substantially to the better-than-average employment changes during the contraction in the West North Central and New England divisions. In both cases, the industry cycle effect predominates—that is, employment in both regions tended to be concentrated in nondurable goods producing industries in which employment movements were relatively less volatile.[30] In these regions the industry effect offsets substantial negative contributions from the regional trends.

Employment losses in the East South Central region were quite severe between 1929 and 1933, although, as noted previously, our sample considerably overstates the employment change relative to the figures for manufacturing as a whole. In our sample, at least, the weak performance of the East South Central was a function of a strong negative cyclical shock to the region as a whole and an especially negative industry composition effect.

The adverse cyclical impact of industry composition in the East South Central, Pacific, and Mountain divisions can be traced to the heavy concentration of industrial employment in the lumber products industry in these regions. Table 8 shows the composition of industry employment in our sample in 1929. Lumber employed over 40 percent of the workers in our sample in each of these three divisions. Lumber, furthermore, suffered the largest cyclical shock of any industry in our sample during the 1929 to 1931 downturn (see the coefficients in Table 5). In other words, the dependence of these regional economies on demand from the construction industry left them vulnerable to the collapse of construction during the Depression. The importance of the automobile industry in the East North Central region had a similar impact on that division, as employment in motor vehicles and parts production suffered a large negative shock between 1929 and 1933.

Regions that did relatively poorly during the contraction tended to bounce back during the 1933 to 1937 recovery period. Examining the middle panel of Table 7, New England stands out as the weakest performer during the recovery. That region's dependence on cotton goods and boots and shoes, which dampened employment losses during the contraction, resulted in a large negative contribution of industry structure during the recovery (less volatile industries had less recovering to do). Adverse region-specific trend and cycle terms added to New England's weaker recovery in our sample.

Examining the entire 1929 to 1937 period in the bottom panel of Table 7, we find that both region-specific and industry composition effects help explain the regional variation in employment growth over the course of the Depression. In each of the southern divisions, for example, the effects of industry composition were quite negative. The two most important southern

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[30] Among our sample industries cotton goods and boots and shoes accounted for close to 60 percent of employment in New England, and boots and shoes, bread, and meat packing accounted for close to 55 percent of employment in the West North Central (see Table 8).

TABLE 8
INDUSTRIAL COMPOSITION OF SAMPLE EMPLOYMENT BY REGION, 1929
(percentages)

	SA	ESC	WSC	Pac	Mt	WNC	ENC	NE	MA
Boots	0.48	3.07	0.14	0.30	0.00	16.68	3.94	24.51	6.54
Bread	2.69	4.56	7.64	6.21	10.02	12.76	4.88	5.13	8.90
Canning	2.54	1.72	2.02	14.30	8.80	3.27	1.94	0.55	2.19
Chemicals	1.21	0.92	0.45	0.90	0.15	0.61	1.43	1.12	3.99
Cigars, Cigarettes	7.07	2.41	0.00	0.01	0.39	0.81	1.46	0.61	5.86
Confectionery	0.97	1.10	1.29	1.58	3.32	3.31	1.82	2.55	2.48
Cotton Goods	48.89	7.48	4.99	0.46	0.00	0.00	0.22	36.08	6.17
Furniture	5.90	5.13	3.01	4.63	0.56	4.83	8.14	3.77	5.39
Glass	2.72	0.00	0.89	0.61	0.00	0.00	2.11	0.00	3.47
Iron	2.76	3.80	0.00	3.01	0.00	2.15	15.59	0.00	24.25
Lumber	17.84	51.04	40.64	45.75	52.81	5.58	3.21	2.81	4.30
Meat Packing	0.64	1.26	3.77	2.30	6.27	24.06	4.48	0.88	2.09
MV parts	0.12	2.35	1.00	0.99	0.20	3.24	16.38	1.34	4.61
Motor Vehicles	0.00	0.00	0.00	2.16	0.00	3.86	16.86	0.00	3.21
Nonferrous Metals	0.42	0.17	0.14	0.50	0.32	0.75	2.11	7.49	3.06
Paper	1.05	1.09	0.00	2.24	0.00	1.20	3.57	8.06	3.31
Petroleum Refining	0.34	5.09	23.95	3.23	5.47	1.97	0.65	0.33	2.45
Planing-Mill Prods	2.57	5.52	3.78	4.85	2.41	5.40	2.20	1.54	2.22
Printing, Newspaper	1.80	3.31	6.29	3.86	9.27	9.40	3.22	3.22	4.99
Rubber tires, tubes	0.00	0.00	0.00	2.12	0.00	0.12	5.82	0.00	0.49

Note: Each column adds to 100 percent.

industries, lumber and cotton goods, both exhibit lower than average trend growth over our sample period. Only because of strong regional trends in employment growth were the South Atlantic and West South Central divisions able to experience above-average employment growth during this period.

By contrast, the regional trend in New England employment accounts for most of that division's very weak employment growth over the period. In the Mountain division, both regional and industry trends contributed to slow employment growth.

In the economy's industrial core (Middle Atlantic and East North Central divisions), industry trends made a strong positive contribution to employment growth rates. In the Middle Atlantic, this positive effect was offset almost completely by a relatively slow regional trend in employment growth. Comparing the second and final columns of the table, however, it is clear that our model does not, on balance, account for the difference in growth rates between the Middle Atlantic and East North Central over this period.

Implications for Understanding the Depression

Our analysis of regional variation in employment growth sheds light on several issues. First, regional variations in the *trend* of employment growth

were at least as important as regional variations in the cyclical severity of the Depression downturn, once we control for industry composition. In particular, the milder contraction in the South Atlantic was largely a function of the greater trend growth rate of manufacturing employment there. These regional trends may be seen as part of the process of convergence in the sectoral structure of employment across U.S. regions during the twentieth century.[31] Overall employment growth in manufacturing was most rapid in the South and the Pacific, slowest in the Northeast (see Table 6).

Second, the pattern of region-specific cyclical effects defies any simple generalizations about the sources of regional vulnerability to the contraction, and may call into question some widely cited hypotheses about the Depression. As we have noted, for example, the major waves of bank failures were often rural in origin and, at least until the 1933 panic, tended to occur at a much higher rate in the nation's more rural areas: the East and West North Central, South Atlantic, and East South Central divisions in particular.[32] If disruption of local financial markets played an important role in propagating the Depression, this disruption might be expected to have spilled over to the manufacturing sector in these divisions. Yet by our estimates, these divisions show no consistent tendency toward a larger negative cyclical shock, controlling for industry composition. Of course, the fact that bank failures in agricultural areas—which tend to drive regional variations in bank failure rates before 1933—did not have a significant spillover effect on manufacturing does not preclude an important role for bank failures and financial market disruptions within industrial areas.

A better place to look for an explanation of the collapse of manufacturing employment in certain regions would be the dependence of some regional economies on demand from the building industries. Those areas of the country may have suffered not only directly from employment losses in the lumber and wood processing industries, but from spillover effects on demand for locally produced goods, such as bread or newspapers.[33]

Third, variation across industries in the severity of the cyclical contraction played a large role in the 1929 to 1933 downturn, but over the course of the

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[31] See Barro and Sala-i-Martin ("Convergence," pp. 382–92) for evidence on long-run trends in state per capita income. This convergence is presumably the result of adjustment from an initial disequilibrium position. Wright (*Old South*) attributes low wages in the South to the combination of weak international demand for cotton in the post–Civil War era and the lack of significant outmigration to the North until after World War I. More generally, patterns of regional comparative advantage are subject to recurrent shocks arising from the evolution of technology and market structures. On the reasons for New England's declining employment in this period, see Rosenbloom, "Challenges."

[32] Chandler, *America's Greatest Depression*, pp. 83–84.

[33] The causes and consequences of the collapse of the construction sector during the Depression are discussed in Field, "Uncontrolled Land Development." Here we emphasize not the direct effects of declining construction activity on local economies but the impact on manufacturing through the derived demand for inputs.

decade broader industry growth trends made the largest contribution to regional variation in employment growth. Not surprisingly, the cyclical shock to employment was greater for industries dependent on the construction sector, and for producers of durable goods such as automobiles, iron, and furniture. Our analysis cannot distinguish between different sources of the volatility of these industries, such as differences in the income elasticity of demand, the impact of uncertainty, or the effects of market saturation.

The Role of Hours of Work

Although the movement of employment is of intrinsic interest, variations in employment may not accurately characterize variations in total labor input during the Depression, because average weekly working hours fell dramatically in many industries.[34] When workers care about both wages and hours of work, hours reductions can have interesting, if ambiguous, implications for equilibrium real wages during a contraction.[35] In some industries or regions, relatively small employment adjustments may have been accompanied by relatively large hours reductions. In such cases work sharing would have mitigated the employment effects of the demand shock. Changes in the incidence of shift work might also have influenced the number of hours per worker. For these reasons it would be desirable to estimate our model for total working hours, or separately for employment and average hours per worker.

Unfortunately, the Census of Manufactures did not collect data on working hours until 1933. The hours data used by Bernanke, which were collected by the National Industrial Conference Board (NICB), are aggregated to the national level.[36] For the 11 industries in our sample that overlap with the NICB industries, we can compare the percentage reduction in hours with the percentage reduction in employment using a scatter diagram (Figure 4).

Although employment and hours reductions tended to be correlated across industries (the correlation is about 0.4), there was considerable variation in the relative importance of hours reductions. Hours reductions were particularly important in the iron and steel industry. Conversely, employment cuts account for the lion's share of total work-hour reductions in automobiles and lumber. Whereas the percentage employment loss in the lumber industry was about twice that in the iron and steel industry, the magnitudes of the reductions in total worker-hours were actually much more similar.[37]

[34] Bernanke and Powell, "Cyclical Behavior."
[35] Bernanke, "Employment."
[36] Ibid.
[37] The small number of industries represented in Figure 4 makes the correlation very sensitive to outliers. For example, if we exclude the two industries with unusually large employment reductions (automobiles and lumber), the correlation between hours and employment adjustments rises to about 0.6.
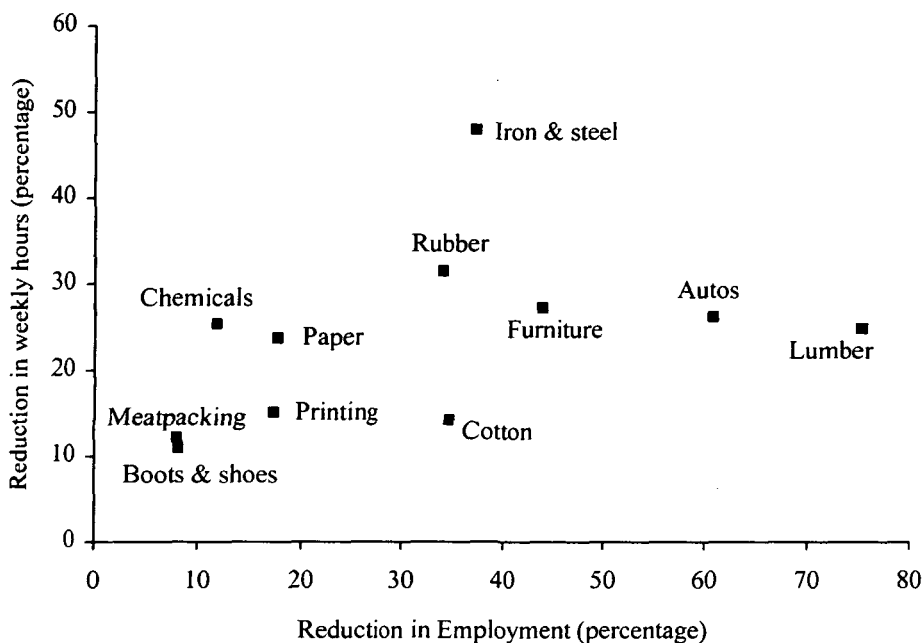
FIGURE 4
SCATTER OF HOURS VERSUS EMPLOYMENT REDUCTIONS, NICB INDUSTRIES,
1929–1933

Note: Proportional changes calculated as the change in natural log of employment.
Source: Beney, *Wages*, various tables.

Some fragmentary evidence on hours of work disaggregated by industry and region is available in various Bureau of Labor Statistics reports on wages and hours, as well as the Census reports on "Man-Hour Statistics," which begin in 1933. These sources can provide some insights into movements in weekly hours in two industries that were especially significant in parts of the South: the cotton goods and lumber industries. Data for the period from 1928 to 1933 are summarized in Table 9.

A deficiency of the hours statistics for cotton is that the 1928 and 1930 numbers (from BLS reports) refer to scheduled full-time hours, whereas the 1933 figures (from the Census) are for actual hours. By 1930 the contraction had almost certainly resulted in shortened actual hours; furthermore, the depressed condition of the New England textile industry in the late 1920s may imply that actual hours there were already considerably below the reported "full-time" hours by 1928. These caveats in mind, the table does suggest that the percentage reduction in working hours between 1930 and early 1933 was greater in the South Atlantic branch of the industry. Within the South Atlantic, a dramatic additional reduction in average actual hours

TABLE 9
AVERAGE WEEKLY HOURS OF WORK IN THE COTTON AND LUMBER
MANUFACTURING INDUSTRIES, 1928–1933

Cotton	New England[1]	South Atlantic[2]
Weekly hours		
Full-time, 1928	47.8	55.6
Full-time, 1930	47.5	55.3
Actual, January 1933	39.7	43.3
Actual, November 1933	36.2	34.5
Actual, Average 1933	39.4	40.0
Changes (percentages)		
1928–1930	-0.7	-0.6
1930–January 1933	-17.8	-24.5
January 1933–November 1933	-9.4	-22.8
1930–Average. 1933	-18.6	-32.5

Lumber	East South Central	Mountain[3]	Pacific	South Atlantic[4]	West South Central[5]
Weekly hours (actual)					
1928	52.4	44.8	48.5	54.4	51.3
1930	46.6	46.3	46.3	50.5	49.5
1932	45.7	35.6	37.4	43.2	36.9
Changes (percentages)					
1928–1930	-11.7	3.5	-4.6	-7.4	-3.6
1930–1932	-1.8	-26.3	-21.4	-15.6	-29.5
1928–1932	-13.5	-22.9	-26.0	-23.0	-33.1

Notes: Regions correspond to census divisions except as noted.
1. Excludes Vermont in 1928 and 1930, includes it in 1933.
2. Georgia, North Carolina, South Carolina, and Virginia in 1928 and 1930; Maryland added in 1933.
3. Idaho, Montana.
4. Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia.
5. Arkansas, Louisiana, Texas.
Sources: U.S. Dept. of Labor, Bureau of Labor Statistics, *Wages and Hours in Cotton-Goods Manufacturing, 1910–1930*, BLS Bulletin No. 539, p. 9. U.S. Dept. of Commerce, Bureau of the Census, *Census of Manufactures: 1933, Man-Hour Statistics for 32 Selected Industries*, tables 2, 3. U.S. Dept. of Labor, Bureau of Labor Statistics, *Wages and Hours in the Lumber Industry in the United States: 1928*, BLS Bulletin No. 497, p. 36. U.S. Dept. of Labor, Bureau of Labor Statistics, *Wages and Hours in the Lumber Industry in the United States: 1932*, BLS Bulletin No. 586, p. 6.

occurred during 1933, coinciding with the implementation of the NRA code of 40 hours in textiles. In fact, by November of 1933, average hours in both regions had fallen to well below 40 hours, raising the question of whether the NRA hours code was actually binding.

Our decompositions suggest that employment reductions in the lumber industry were probably a significant factor in the relatively poor performance of the East South Central and Mountain divisions during the early 1930s. Table 9 shows that as of 1932, hours reductions were smaller in the East South Central branch of the lumber industry than elsewhere, although the region may have experienced more substantial reductions during 1933

TABLE 10
ANOVA FOR PANEL MODEL OF PRODUCT VALUE GROWTH RATE

Source	Partial SS	df	MS	F	Prob > F	
Model	617.92	250	2.472	11.90	0.000	
Year	231.16	8	28.895	139.17	0.000	
Region	4.56	8	0.570	2.75	0.005	
Ind	19.13	19	1.007	4.85	0.000	
Year*region	21.53	64	0.336	1.62	0.001	
Year*ind	161.39	151	1.069	5.15	0.000	
Residual	926.62	4,463	0.208			
Total	1,544.54	4,713	0.328			
N						4,714
R-squared						0.4001
Root MSE						0.45566
Adjusted R-squared						0.3665

Notes: ANOVA estimate using 20-industry sample (see the text).

when the NRA code set weekly hours in lumber at 40. On balance, the evidence on hours in the lumber industry suggests that if we could examine the reduction in total *worker-hours*, the contraction in the lumbering regions (especially the East South Central) would not look quite as severe as it does in terms of employment alone, as compared with other parts of the country.

The fragmentary evidence on hours summarized here indicates that there may have been significant regional differences in hours adjustments, both because of differences in industry composition and because of regional differences within industries. Consequently, our results for employment variation must be interpreted with care: they are not necessarily indicative of variations in total labor input, as measured by total worker hours. To the extent that regional differences in employment variations were offset by shifts in weekly hours, the question becomes why the margins of adjustment differed from one part of the country to another.

RESULTS: PRODUCT VALUE

The Census of Manufactures collected data not only on employment but also on the annual value of production and materials costs. Panel regression results for growth rates of nominal product value are presented in Tables 10 and 11, which are analogous to Tables 4 and 5 for employment growth. The analysis of variance, presented in Table 10, indicates that all the groups of dummy variables as well as their interactions are significant, with the year and year-by-industry effects again accounting for the bulk of the explained variation.

Interpretation of the results for nominal product value is hampered by the fact that movements in product value reflect the joint influence of price and

TABLE 11
PRODUCT VALUE REGRESSION (dependent variable: growth rate of product value)

	Trend	Business Cycle Deviations								
		1919–1921	1921–1923	1923–1925	1925–1927	1927–1929	1929–1931	1931–1933	1933–1935	1935–1937
Baseline effects	-0.002	-0.316	0.324	0.082	-0.074	0.130	-0.539	-0.321	0.425	0.291
Region effects										
South Atlantic	0.003	-0.232	0.081	-0.015	0.077	-0.012	0.015	0.093	-0.006	0.000
East South Central	0.041	-0.025	0.063	-0.028	0.012	0.031	-0.150	0.016	0.052	0.029
West South Central	0.031	-0.124	-0.082	0.076	0.082	0.008	-0.099	0.079	-0.023	0.084
Pacific	0.041	0.192	-0.012	-0.118	0.022	-0.016	0.017	-0.007	-0.038	-0.041
Mountain	-0.024	0.055	-0.101	-0.056	-0.009	0.045	0.001	-0.049	0.171	-0.057
West North Central	-0.036	-0.013	0.023	-0.012	0.023	-0.008	0.222	-0.175	-0.049	-0.010
East North Central	0.007	0.009	0.053	-0.012	0.036	-0.011	-0.022	-0.013	-0.032	-0.010
New England	-0.045	0.060	-0.035	-0.021	0.010	0.007	0.037	-0.022	-0.006	-0.029
Middle Atlantic	-0.019	0.077	0.011	0.187	-0.253	-0.044	-0.021	0.078	-0.069	0.034
Industry effects										
Boots	-0.047	-0.466	0.173	-0.159	0.216	-0.014	0.095	0.273	-0.064	-0.054
Bread	0.039	0.173	-0.332	0.056	0.131	-0.036	0.198	0.045	-0.081	-0.153
Canning	0.071	-0.379	-0.010	0.153	0.019	0.199	0.032	0.166	-0.068	-0.111
Chemicals	0.072	0.111	0.018	0.414	-0.840	0.074	0.194	0.108	-0.028	-0.052
Cigars, Cigarettes	-0.182	0.381	-0.238	-0.081	0.111	-0.088	0.271	-0.186	-0.107	-0.062
Confectionery	-0.073	0.073	-0.172	0.015	0.095	-0.051	0.146	0.096	-0.136	-0.066
Cotton Goods	-0.073	-0.140	0.182	-0.146	0.054	-0.015	-0.027	0.382	-0.164	-0.127
Furniture	0.034	0.176	-0.060	0.088	0.040	0.005	-0.080	-0.272	-0.002	0.106
Glass	0.041	0.084	-0.092	-0.141	0.076	-0.091	0.215	0.181	-0.132	-0.100
Iron	0.063	-0.457	0.406	-0.160	0.107	0.099	-0.344	0.067	0.126	0.156
Lumber	-0.096	-0.071	0.100	0.001	0.016	-0.015	-0.428	0.070	0.241	0.087
Meat Packing	-0.010	-0.285	-0.068	0.112	0.122	0.008	0.093	-0.009	0.077	-0.051
MV parts	0.034	0.005	0.237	-0.365	0.015	-0.034	-0.080	-0.115	0.270	0.066
Motor Vehicles	0.039	-0.014	0.192	-0.159	-0.182	0.307	-0.269	-0.309	0.318	0.118
Nonferrous Metals	0.019	-0.277	0.371	-0.177	0.001	0.127	-0.406	-0.033	0.168	0.227
Paper	0.056	0.180	-0.033	0.012	-0.031	-0.082	0.106	0.134	-0.261	-0.025
Petroleum Refining	0.063	0.237	-0.249	0.202	-0.051	0.003	-0.055	0.141	-0.168	-0.061
Planing-Mill Prods	-0.047	0.242	0.034	0.075	-0.077	-0.063	-0.255	-0.297	0.146	0.195
Printing, Newspaper	0.044	0.427	-0.281	0.017	0.115	-0.057	0.584	-0.368	-0.248	-0.188
Rubber tires, tubes	-0.048	(a)	-0.178	0.242	0.064	-0.274	0.012	-0.072	0.113	0.093

TABLE 11—continued
(a) Coefficient could not be estimated because of missing data.
Notes: Estimated OLS coefficients from panel regression model (see the text).

quantity changes. Sorting these effects out would require price indices disaggregated to the region and industry level, which to our knowledge are not available. A comparison of the coefficients in Tables 5 and 11 reveals similarities as well as differences between the behaviors of employment and product value. The patterns of region and industry time trends are generally similar, with the notable exception that the time trend in the South Atlantic is considerably weaker for product value than it is for employment.[38]

The business cycle deviations for product value during the Depression years are also qualitatively similar to those for employment. Among the industries, lumber and planing-mill products experienced substantial negative deviations during the 1929 to 1933 period, as did such durables industries as furniture, iron, and motor vehicles. The regional patterns of cyclical deviations are also similar to those for employment, with the South Atlantic again the exception: there, the region-specific cyclical component is much larger for product value than for employment during the 1931 to 1933 period. In sum, the results for product value appear to be largely consistent with those for employment, with the exception of somewhat anomalous results for the South Atlantic division.

RESULTS: TWO MEASURES OF LABOR COST

The seemingly perverse upward movement of real wages during the first half of the Depression has been noted by a number of authors, and wage stickiness is often named as a likely suspect in creating the high unemployment rates of the 1930s.[39] Wright argues that New Deal wage policies had a particularly strong effect in the South, where minimum wages were binding for a large percentage of workers and had adverse employment effects.[40] Movements in labor costs may also have affected trend employment growth across regions. In our analysis of employment growth (see Table 5), we find significantly positive trend employment growth in all three southern divisions, which helped moderate the adverse effects of the Depression in the South. Was employment growth in the South associated with regional differences in wage trends that were making the South relatively attractive to employers?

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[38] The weaker trend of product value in the South Atlantic would be consistent with greater reductions in working hours there, which would lead to lower output levels, given employment.

[39] On this issue see Margo, "Employment"; Dighe, "Wage Rigidity"; and sources cited therein.

[40] Wright, *Old South*, pp. 216–25.

To investigate regional and industrial movements in labor costs, we derive two measures from our Census data. The first is simply the nominal average annual earnings of wage earners, which we calculate by dividing the annual wages by average annual employment. Because we do not have disaggregated measures of product prices, we cannot deflate the average annual earnings to a real product wage. Furthermore, the annual earnings figures do not reflect changes in annual hours worked.

The second measure of labor costs is the ratio of total wage payments (wage bill) to value added (product value minus materials costs), or the wage share of value added. This measure corresponds to the "adjusted real wage" used by Richard Vedder and Lowell Gallaway, and is also equivalent to the ratio of the real hourly product wage to average labor productivity per worker hour.[41] As a measure of real labor costs, the wage share has two advantages: first, it is proportional to the hourly product wage and is not directly sensitive to hours per worker; and second, it is deflated by the product price. It will, however, vary inversely with changes in labor productivity.

The panel results for the growth rate of each measure of labor costs are summarized in the ANOVA tables presented in Table 12: the upper panel uses the growth rate of average annual earnings as the dependent variable, the lower panel uses the growth rate of the wage share.[42] For neither measure are the regional dummy variables significant. In other words, these results provide no evidence of regional differences in trend growth of labor costs during this period.

Nominal annual earnings did exhibit statistically significant regional differences in the cyclical component, and the regression coefficients (not reported here) do provide some evidence of faster earnings growth in much of the South during the NRA period, 1933 through 1935. During the NRA years, the national average of nominal earnings in our sample rose 16.1 percentage points faster than trend; in the South Atlantic, earnings growth was about 2.4 percentage points greater than that; and in the East South Central, it was 1.3 percentage points greater. On the other hand, the industry effects for the same period show falling earnings in some of the dominant low-wage southern industries, including cigars and cigarettes and cotton goods.[43]

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[41] Vedder and Gallaway, *Out of Work*. To see this, note that value added is $Pq - R\alpha q$, where P is the output price, q is the quantity produced, R is an index of materials prices, and α is the amount of materials per unit of output. The wage bill is WEH, where W is the hourly wage, E is employment, and H is average annual hours per worker. Then the wage share of value added is $WEH / (Pq - R\alpha q) = W / (P - R\alpha) * 1 / (q / EH) = w / \lambda$, where w is the real hourly product wage (deflated by value added per unit) and λ is the average productivity of labor.

[42] Full tables of the estimated regression coefficients are available in an appendix from the authors.

[43] This latter effect may reflect the southern differentials written into some NRA codes, which allowed southern manufacturers to play lower wages in some circumstances.

TABLE 12
ANOVA FOR PANEL MODELS OF GROWTH RATE IN LABOR COSTS

Source	Partial SS	df	MS	F	Prob > F	
Panel A: Dependent Variable: Growth Rate of Nominal Average Annual Earnings						
Model	98.37	250	0.393	10.07	0.000	
Year	30.33	8	3.791	97.02	0.000	
Region	0.10	8	0.013	0.33	0.954	
Ind	1.53	19	0.080	2.06	0.005	
Year*region	3.78	64	0.059	1.51	0.006	
Year*ind	32.53	151	0.215	5.51	0.000	
Residual	174.43	4,464	0.039			
Total	272.79	4,714	0.058			
N						4,715
R-squared						0.361
Root MSE						0.19767
Adjusted *R*-squared						0.325
Panel B: Dependent Variable: Growth Rate of Wage Share of Value Added						
Model	176.49	249	0.709	3.49	0.000	
year	27.69	8	3.462	17.07	0.000	
region	0.35	8	0.044	0.22	0.988	
ind	0.91	19	0.048	0.24	1.000	
year*region	12.04	64	0.188	0.93	0.641	
year*ind	125.96	150	0.840	4.14	0.000	
Residual	871.05	4,294	0.203			
Total	1047.54	4,543	0.231			
N						4,544
R-squared						0.1685
Root MSE						0.45039
Adjusted *R*-squared						0.120

Notes: ANOVA estimates using 20-industry sample. See the text for definitions of the dependent variables.

For the wage share variable, only the year effects and year-by-industry interactions are significant (see the lower panel of Table 12). By this measure of labor costs, there are *no significant region effects* in either the trend or cyclical components. These results appear to be at odds with Wright's argument that New Deal policies raised real wages relatively more in the South than elsewhere. Only if regional differences in the movement of real product wages were masked by offsetting regional differences in the path of average labor productivity would our results be consistent with this hypothesis.

CONCLUSIONS

We have shown that regional variation in the severity of the Great Depression in manufacturing can be attributed largely to two factors: regional dif-

ferences in trend employment growth, and regional differences in industrial composition. Put somewhat differently, the severity of the Depression downturn did not actually differ dramatically across regions, once we account for trends and industry structure. Regional manufacturing sectors that were more concentrated in the production of goods with highly volatile demand, such as durables and inputs to construction, were relatively hard hit. Regions that were experiencing higher trend growth rates of employment experienced a somewhat milder contraction.

Overall, then, the Depression's impact was truly national in scope, perhaps because the principal demand shocks were common to all regions (for example, due to Federal Reserve policy), or because the impact of the shocks spread through national product markets to affect all regions. We find little evidence that regional variation in the severity of bank failure waves had region-specific effects on local economies; nor do we find systematic evidence that New Deal policies raised wage costs or reduced employment more in the low-wage South than elsewhere. Future attempts to explain the depth and duration of the Great Depression using disaggregated data would do well to focus on causes that varied across industries, where we have found the most substantial differences in the impact of the contraction.

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