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ABSTRACT

The severity of the Great Depression in the United States varied by region. Most notably, compared with the rest of the country, the South Atlantic states experienced a milder contraction, while the Mountain states suffered more severely. The impact of the contraction was more uniform across other regions of the country--surprisingly so, considering the large regional differences in industrial structure. We employ data from the biennial Census of Manufactures on 20 individual manufacturing industries disaggregated by state to analyze the relative contributions of industry mix and location to regional variations in economic performance during the period 1919-1937. Industrial composition had a significant impact on regional employment growth, with regions that concentrated on the production of durable goods or inputs to the construction sector tending to fare worse than others. Long-run regional trends also played an important role in regional variation, and explain much of the South Atlantic region's more favorable performance over the cycle.

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The Great Depression was a global crisis, but its severity varied both spatially and sectorally. Within the United States, the severity of the 1929-1933 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 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 paper 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 disaggregated 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 1929-33 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 paper over previous disaggregated analyses of the Depression, which have tended to examine either regional variation (e.g., Wallis 1989; Borts 1960) or industry variation (Bernstein

1987; Szostak 1995), 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 downturn. 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.

Our results have implications for some theories of the causes of the Depression, even though we do not directly test these theories. To the extent that region-specific shocks played a limited role in creating regional differences, the results cast some doubt on theories that would imply strong idiosyncratic region 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.

I. 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 rates varied considerably across cities and states,

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[1]The importance of disaggregation in recent work on the Great Depression is stressed by Margo (1993) and Calomiris (1993).

[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 1988). Blanchard and Katz (1992) 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 (1992) 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

for example, and bank failures were more prevalent in farm states.[3] In an important article, Wallis (1989) 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 (see also Borts 1960). While other regional differences are also revealed by the data, the North-South contrast is the most dramatic.

Regional variation in the 1929-33 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 1919-1939, normalized to 100 in 1929.[4] 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.[5] The most notable exception is the South Atlantic division, where employment declined less than 20 percent below its 1929 level. 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.[6]

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in regional employment growth are region-specific (not attributable to national or industry-specific innovations).

[3]On unemployment see U.S. Dept. of Commerce 1931, 1943a; Simon and Nardinelli 1992. On bank failures see Chandler 1970; Friedman and Schwartz 1963; Temin 1976.

[4]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.

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

[6] 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.

Evidence on non-manufacturing 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 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 (Schmitz and Fishback 1983).

The aggregate census employment and production data in Figures 1 and 2 suggest three stylized facts: (1) the magnitude of the contraction and recovery was quite similar across much of the country, despite considerable differences in industrial structure across regions; (2) the South Atlantic division experienced a milder downturn and recovered more rapidly than the rest of the country; and (3) 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 (Friedman and Schwartz 1963; Hamilton 1987; Temin 1989); monetary disturbances caused by the 1929 stock market crash and the bank failures of the early thirties (Friedman and Schwartz 1963; Field 1984); increased uncertainty in the wake of the stock market crash (Romer 1990); and unexplained shocks to consumption and/or investment (Temin 1976). In addition, supply effects operating through changing market structure or the pace of technological change may have contributed to the severity of the Depression (Bernstein 1987; Szostak 1995).

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 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 and/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. Technology shocks are also likely to vary across industries. Borts (1960) and Wallis (1989) find that industry composition contributed significantly to locational variation during the Great Depression, although location-specific effects remain even after controlling for industry composition.[7]

The effects of demand shocks on highly cyclical industries could be transmitted 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 essentially local and regional affairs and were concentrated in farming areas, especially in the East and West North Central and southern divisions of the country (Chandler 1970, pp. 83-84; Wicker 1996). Thus shocks to the money supply could have varied regionally. Furthermore, as Bernanke (1983) has argued, banking crises not only reduced money supply but also disrupted the operation of local capital markets. Thus access to capital

[7] Both Borts (1960) and Wallis (1989) measure the effect of industry structure 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 composition. 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.

was disrupted for an entire local economy during a banking crisis.

Geographical differences in the impact of government are a further potential source of regional variation. Government expenditures varied across states, partly for political reasons (Wright 1974), and the impact of New Deal regulations may also have differed regionally. Wright (1986) 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.

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 paper. For now, we focus on quantifying the relative importance of industry structure and region-specific effects. If industry mix accounts for much of the observed regional variation, we may conclude that the Depression was essentially a national phenomenon that affected the regions in a uniform fashion.

II. THE DATA

Our panel data set is based on the published reports of the biennial Census of Manufactures for the years 1919-1937.[8] 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 identifies which of them are in our sample.

For each state-industry observation in each year, we recorded the number of establishments, the

[8]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.

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" (U.S. Dept. of Commerce 1933, p. 5). 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: (1) part-time employees may have been counted the same as full-time employees; (2) establishments that were shut down on the 15th of the month might have selected a different week as more "representative"; (3) 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. 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 large number of 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 non-durables. The 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, end, and middle (1929) of our panel. For the United States as a whole, our sample covers a little over 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.[9] In spite of these variations in coverage, however, as we note below, our sample tracks employment changes over the course of the Great Depression reasonably well in most regions, with the exception of the East South Central.

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 4 reports the percentage 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

[9]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.

all but one of them.

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 the manufacturing series [correspond] to the Census of Manufactures between all odd-numbered years" (Wallis 1989, p. 50).

For our purposes, the validity of the data depends primarily on whether they reasonably capture 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.[10] 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 and 1931 than was true for manufacturing as a whole. In the Mountain and West North Central divisions, the timing of the 1929-33 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

[10]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.

the East South Central division.

III. 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 1929-1933 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 paper. 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,..., I), state s (s = 1,..., S), and time period t (t = 1,..., 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

(1) $$e_{int} = c + h_i + z_n + b_t + f_{it} + g_{nt} + u_{int}$$

where n = 1, ..., N indexes the region, and u_{int} is an error term.

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 (see Marimon and Zilibotti 1996, p. 5). 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.

The following restrictions imply that the mean coefficient effects are zero:

$$\sum_i h_i = 0$$

$$\sum_n z_n = 0$$

$$\sum_t b_t = 0$$

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

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

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

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

Because the dependent variable is the percentage change in employment, the constant term under our specification (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 deviations of cyclical variations around trend that are specific to individual industries and regions respectively.

IV. RESULTS: EMPLOYMENT

Results for employment growth rates are summarized in Tables 5 and 6. Table 5 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 and year-by-industry interactions account for the lion's share of the explained variation. In other words, year-to-year variations around trend in employment for the economy as a whole and the industry-specific deviations from those fluctuations are the major source of explained variation in our sample. Region effects, both trend and cycle, are statistically significant, but account for less of the variation in employment growth.[11]

Table 6 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}).[12]

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[11]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.

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

The estimated baseline trend indicates that average employment growth was negligible over the period of our sample. 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 6, the severe contraction of 1919-1921 is evident, as is the recovery that followed. The dramatic employment reductions of the "great contraction" between 1929 and 1933 also show up clearly. We discuss the region-specific trends below.

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 7 presents regional trend coefficients estimated using a couple of alternative sample periods. The first alternative drops the 1919-1921 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 1921-1929 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. 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 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 8 we summarize the percentage changes in employment for the 1929-33 contraction, the 1933-37 recovery, and the full 1929-37 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 US average during 1929-33. By contrast, the East South Central and Mountain divisions show the most substantial negative deviations during the downturn. During the recovery period (1933-37), 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 Section II above). 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 and East

North Central. The Mountain and New England divisions lagged in employment growth over the 8-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 8. 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.[13] 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 $ln(E^*_{trend}) - ln(E_{n,t-1})$.[14]

The final column of the table adds up the regional 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, since 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

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[13]These industry effects resemble Marimon and Zilibotti's (1995) "virtual region," but here we present separate estimates of the trend and cycle effects of industry composition.

[14]It should be noted that the estimated industry trend effects for each region change somewhat between the 1929-33 and 1933-37 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.

second and final column of the table are presumably due to the effects of interactions between industry and region that we have not captured in the model.

Turning to the estimates for the 1929-33 contraction, it is clear that 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 9 percentage points of the employment reduction in the Mountain states.

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 industries that were relatively less volatile. 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 above 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 9 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 1929-31 downturn (see the coefficients in Table 6). 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 demand shock between 1929 and 1933.

Regions that did relatively poorly during the contraction tended to bounce back during the 1933-37 recovery period. Examining the middle panel of Table 8, New England stands out as the weakest performer during the recovery. That region's less volatile industry structure--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 1929-1937 period in the bottom panel of Table 8, 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 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.

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 (see Chandler 1970, pp. 83-84). 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.

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.[15]

Third, variation across industries in the severity of the cyclical contraction played a large role in the 1929-33 downturn, but over the course of the decade it was broader industry growth trends that 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.

V. 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 5 and 6 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 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 6 and 11 reveals similarities as well as differences between the behavior of employment and product value. The patterns of regional and industry time

[15]The causes and consequences of the collapse of the construction sector during the Depression are discussed in Field (1992). 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.

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.

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 1929-1933, 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 1931-33. 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.

VI. 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.[16] Wright (1986, pp. 216-25) 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. Movements in labor costs may also have affected trend employment growth across regions. In our analysis of employment growth (see Table 6), 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?

To investigate regional and industrial movements in labor costs, we derive two measures from

[16]On this issue see Margo (1993), Dighe (1997), and sources cited therein.

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 to value added (product value minus materials costs), or the wage share of value added. This measure corresponds to the so-called adjusted real wage used by Vedder and Gallaway (1993), and is also equivalent to the ratio of the real (annual) product wage to average labor productivity. This ratio is not sensitive to movements in the product price, but will change with changes in labor productivity as well as the real wage.

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. For neither measure are the regional dummy variables significant. In other words, there is no evidence of regional differences in trend growth of labor costs during this period. Regional variation in the trend growth of employment was apparently not caused by observable regional differences in the trend of wages.

Nominal annual earnings did exhibit statistically significant regional differences in the cyclical component, and there is some evidence of faster wage growth in much of the South during the NRA period, 1933-1935. The coefficients are presented in Table 13. During the NRA years, the national average of nominal earnings in our sample rose 16.1 percentage points faster than trend; earnings growth was about 2.4 percentage points greater than that in the South Atlantic, 1.3 percentage points greater in the East South Central. On the other hand, the industry effects for the same period show falling wages in some of the dominant low-wage southern industries, including cigars and cigarettes and cotton goods.

For the wage share variable, only the year effects and year-by-industry interactions are significant (see lower panel of Table 12). By this measure of labor costs, which is not sensitive to

changes in product price, there are no significant region effects in either the trend or cyclical components. These results thus appear to be at odds with Wright's argument about the effect of New Deal wage policies in the South.

VII. CONCLUSIONS

We have shown that regional variation in the severity of the Great Depression in manufacturing can be attributed largely to two factors: regional differences in trend employment growth, and regional differences in industrial composition. Put somewhat differently, the severity of 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, operating fairly uniformly through national product markets. 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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Table 1
Index of retail employment by region (1929 = 100)

	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 (1935), p. 4; U.S. Department of Commerce, Bureau of the Census (1943b), pp. 60-62.

Table 2
Top 31 manufacturing industries in 1929, ranked by employment

Rank	Industry	In sample?	Number of wage earners
1	Foundry and machine-shop products		454,441
2	Cotton goods	Y	424,916
3	Lumber and timber products	Y	419,084
4	Iron and steel: steel works and rolling mills	Y	394,574
5	Car and general construction and repairs, steam RR		368,681
6	Electrical machinery		328,722
7	Motor vehicles	Y	226,116
8	Motor vehicles, bodies and parts	Y	221,332
9	Knit goods		208,488
10	Boots and shoes other than rubber	Y	205,640
11	Bread and other bakery products	Y	200,841
12	Furniture	Y	193,399
13	Clothing, womens'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	Y	129,660
18	Meatpacking, wholesale	Y	122,505
19	Cigars and cigarettes	Y	105,308
20	Paper	Y	103,320
21	Canning and preserving	Y	98,866
22	Clay products		93,336
23	Planing-mill products	Y	90,134
24	Worsted goods		88,485
25	Rubber tires and inner tubes	Y	83,263
26	Petroleum refining	Y	80,596
27	Dyeing and finishing textiles		79,327
28	Nonferrous metals	Y	79,183
29	Glass	Y	67,527
30	Confectionery	Y	63,501
31	Chemicals	Y	62,199

Source: U.S. Dept. of Commerce, Bureau of the Census, Fifteenth Census of the United States, Manufactures: 1929, Vol. II (Washington, GPO: 1933), Table 6.

Table 3
Employment in 20-industry sample as percentage of total manufacturing employment

	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
USA	33.8	36.5	36.8

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

Table 4
Sample coverage of employment by industry, 1929

	Sample employment	USA employment	Proportion covered
Boots	202,608	205,640	0.985
Bread	199,495	200,841	0.993
Canning	98,693	98,866	0.998
Chemicals	58,739	62,199	0.944
Cigars, cigarettes	98,715	105,308	0.937
Confectionery	63,176	63,501	0.995
Cotton Goods	411,977	424,916	0.970
Furniture	193,256	193,399	0.999
Glass	62,548	67,527	0.926
Iron	369,197	394,574	0.936
Lumber	418,539	419,084	0.999
Meat packing	119,032	122,505	0.972
Motor vehicle parts	218,275	221,332	0.986
Motor vehicles	207,079	226,116	0.916
Nonferrous metal	73,558	79,183	0.929
Paper	101,343	103,320	0.981
Petroleum refining	73,487	80,596	0.912
Planing-mill products	89,770	90,134	0.996
Printing, newspaper	128,315	129,660	0.990
Rubber tires, tubes	68,398	83,263	0.821

Source: See Table 2.

Table 5
ANOVA for panel model of employment growth rate

Number of obs	= 4717	R-squared	= 0.3916
Root MSE	= .32264	Adj R-squared	= 0.3576

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	4466	0.104		
Total	764.18	4716	0.162		

Table 6
Panel regression results
(Dependent variable: Employment growth rate)

		Business Cycle Deviations								
	Trend	1919-21	1921-23	1923-25	1925-27	1927-29	1929-31	1931-33	1933-35	1935-37
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

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

Table 7
Estimated regional trend coefficients under alternative sample periods

	Full sample	Alternative sample periods	
	1919-37	1921-37	1921-29
South Atlantic	0.0355	0.0381	0.0361
East South Central	0.0301	0.0249	0.0452
West South Central	0.0228	0.0128	0.0086
Pacific	0.0363	0.0403	0.0478
Mountain	-0.0207	-0.0161	-0.0377
West North Central	-0.0368	-0.0371	-0.0362
East North Central	0.0003	0.0046	0.0082
New England	-0.0468	-0.0441	-0.0423
Middle Atlantic	-0.0205	-0.0234	-0.0296

Table 8
Accounting for regional differences in employment growth, 1929-1937 (percent)

	Actual Change	Region -USA	Region Effects			Industry Effects			Region+ Industry
			Trend	Cycle	Total	Trend	Cycle	Total	
1929-33									
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								
1933-37									
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								
1929-37									
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								

Table 9
Industrial composition of sample employment by region, 1929 (percent)

	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.

Table 10
ANOVA for panel model of product value growth rate

Number of obs	= 4714	R-squared	= 0.4001
Root MSE	= .45566	Adj R-squared	= 0.3665

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	4463	0.208		
Total	1544.54	4713	0.328		

Table 11
Product value regression
(Dependent variable: Growth rate of product value)

		Business Cycle Deviations								
	Trend	1919-21	1921-23	1923-25	1925-27	1927-29	1929-31	1931-33	1933-35	1935-37
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

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

Table 12
ANOVA for panel models of growth rate in labor costs

Panel A
Dependent variable: Growth rate of nominal average annual earnings

Number of obs	= 4715	R-squared	= 0.3606
Root MSE	= .19767	Adj R-squared	= 0.3248

Source	Partial SS	df	MS	F	Prob>F
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	4464	0.039		
Total	272.79	4714	0.058		

Panel B
Dependent variable: Growth rate of wage share of value added

Number of obs	= 4544	R-squared	= 0.1685
Root MSE	= .45039	Adj R-squared	= 0.1203

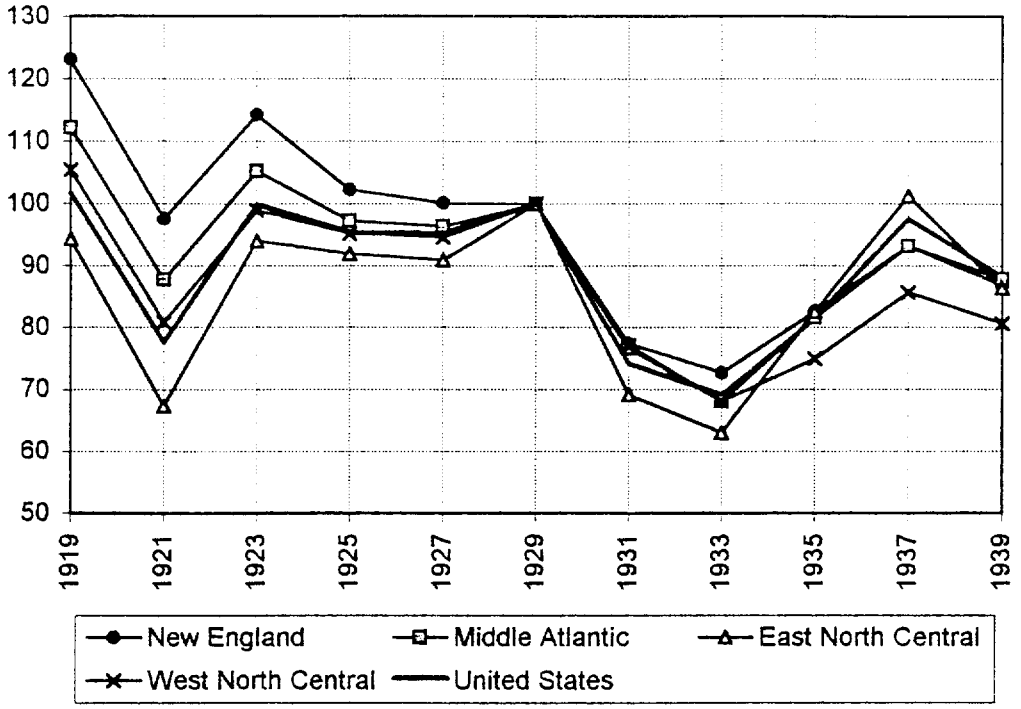
Source	Partial SS	df	MS	F	Prob>F
Model	176.49	249	0.709	3.49	0.000
year	27.69	8	3.462	17.07	0.000
region	0.35	8	0.044	0.22	0.988
ind	0.91	19	0.048	0.24	1.000
year*region	12.04	64	0.188	0.93	0.641
year*ind	125.96	150	0.840	4.14	0.000
Residual	871.05	4294	0.203		
Total	1047.54	4543	0.231		

Table 13
Average annual earnings regression
(Dependent variable: Growth rate of nominal average annual earnings)

		Business Cycle Deviations								
	Trend	1919-21	1921-23	1923-25	1925-27	1927-29	1929-31	1931-33	1933-35	1935-37
Baseline effects	0.002	0.071	0.010	0.041	0.014	-0.012	-0.156	-0.229	0.161	0.101
Region effects										
South Atlantic	-0.029	-0.248	0.045	0.076	0.000	0.030	-0.002	0.058	0.024	0.018
East South Central	0.007	0.053	-0.011	-0.029	0.027	-0.001	-0.038	0.021	0.013	-0.035
West South Central	0.001	0.017	0.069	-0.027	0.002	-0.011	-0.020	0.000	-0.009	-0.022
Pacific	0.002	-0.004	-0.025	-0.006	0.002	-0.008	0.006	0.009	-0.011	0.037
Mountain	-0.008	0.000	0.009	-0.034	0.007	-0.012	0.065	-0.041	0.024	-0.018
West North Central	0.008	0.087	-0.046	-0.030	-0.007	0.002	0.021	-0.013	-0.020	0.006
East North Central	0.009	0.040	0.016	-0.024	-0.027	0.010	-0.058	-0.032	0.038	0.037
New England	0.005	0.044	-0.003	0.000	-0.018	-0.005	0.051	0.006	-0.039	-0.036
Middle Atlantic	0.004	0.012	-0.053	0.073	0.015	-0.006	-0.025	-0.009	-0.019	0.013
Industry effects										
Boots	0.031	0.288	-0.048	-0.080	-0.012	0.003	-0.070	0.042	-0.033	-0.091
Bread	0.003	0.061	-0.065	0.041	-0.004	-0.019	0.098	0.015	-0.088	-0.040
Canning	-0.013	-0.082	0.137	-0.016	-0.042	0.030	0.002	0.024	0.008	-0.061
Chemicals	0.009	-0.127	-0.012	0.044	-0.018	0.041	0.032	0.041	-0.070	0.071
Cigars, Cigarettes	-0.039	0.083	-0.111	-0.046	-0.004	0.021	0.073	0.003	-0.039	0.021
Confectionery	-0.002	0.241	-0.181	-0.052	0.025	-0.010	0.086	0.001	-0.030	-0.080
Cotton Goods	-0.010	-0.121	0.052	-0.064	0.048	-0.028	0.056	0.055	-0.044	0.045
Furniture	-0.008	0.027	0.007	-0.007	0.017	-0.024	-0.040	-0.034	0.024	0.030
Glass	0.011	0.069	-0.090	-0.049	-0.005	0.020	0.093	-0.034	-0.057	0.054
Iron	-0.006	-0.204	0.146	-0.050	-0.057	0.124	-0.124	-0.009	0.043	0.130
Lumber	-0.038	-0.163	-0.190	0.259	0.051	0.043	-0.019	-0.067	0.054	0.030
Meat Packing	0.002	-0.008	-0.075	0.036	0.001	0.001	0.079	-0.012	-0.037	0.014
MV parts	-0.009	0.025	-0.024	0.012	-0.007	0.019	0.004	-0.034	0.048	-0.043
Motor Vehicles	0.003	-0.040	0.058	-0.022	-0.030	-0.047	-0.087	-0.135	0.312	-0.009
Nonferrous Metals	-0.010	-0.078	0.050	-0.002	-0.001	0.006	-0.029	-0.039	0.058	0.035
Paper	0.014	-0.094	0.003	0.073	0.078	-0.054	0.030	-0.030	-0.056	0.051
Petroleum Refining	0.049	-0.083	0.312	-0.068	-0.083	0.004	0.078	-0.018	-0.132	-0.010
Planing-Mill Prods	-0.014	0.014	0.061	-0.059	0.019	0.007	-0.002	-0.112	0.028	0.044
Printing, Newspaper	0.022	0.190	-0.027	0.023	-0.003	-0.032	-0.253	0.357	-0.124	-0.131
Rubber tires, tubes	0.004		-0.004	0.028	0.028	-0.106	-0.008	-0.014	0.135	-0.059

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

Figure 1:
Index of manufacturing employment (1929=100)



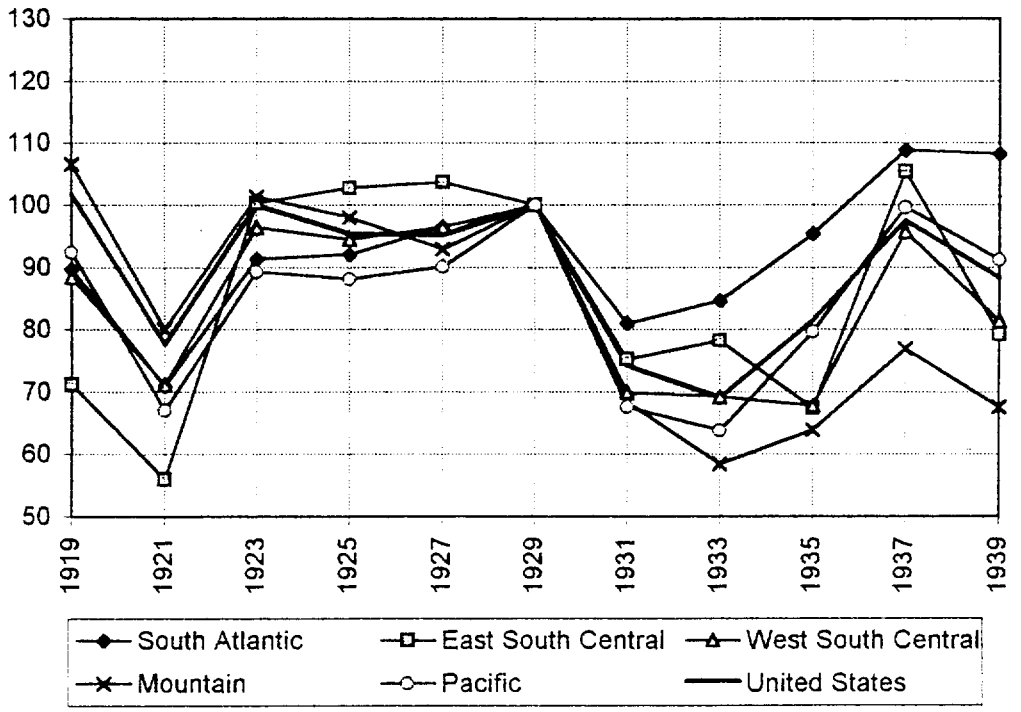
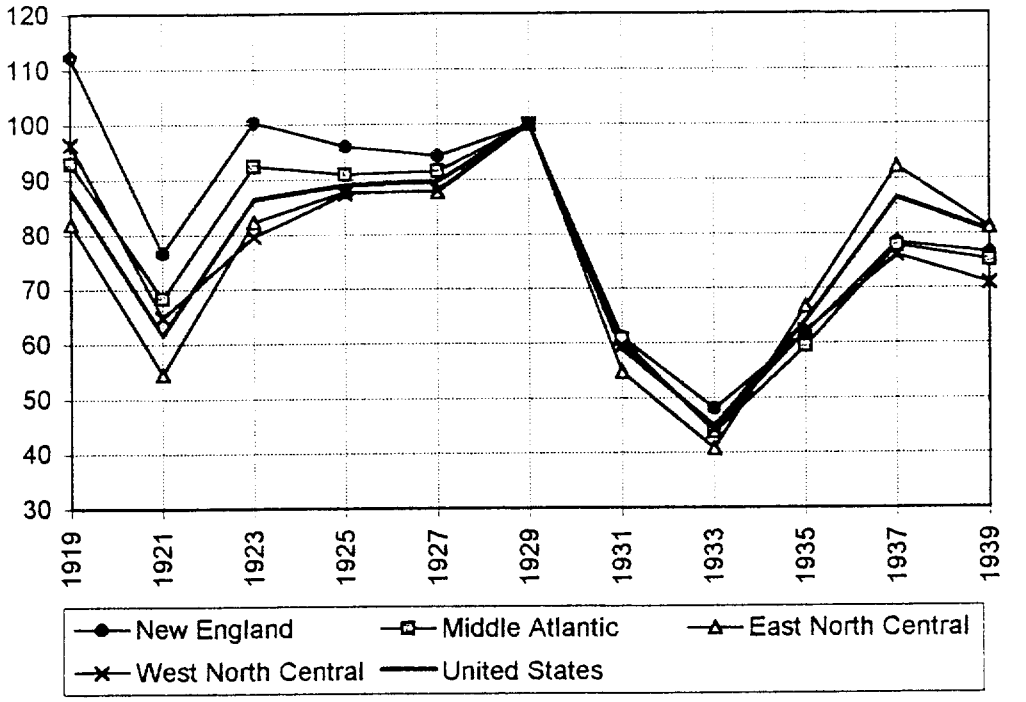


Figure 2:
Index of product value (1929=100)



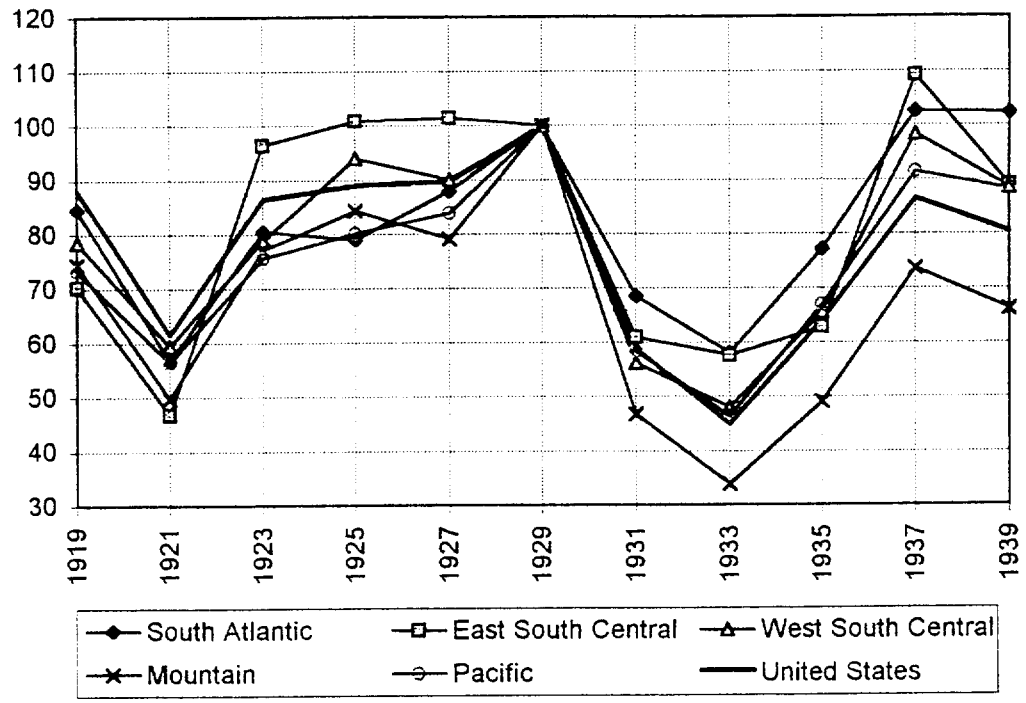


Figure 3: Employment changes for all manufacturing and 20-industry sample